

“Vanishing Boundaries”
State of the Institute Address
Georgia Tech President G. Wayne Clough
October 2007

TITLE SLIDE

One way to define the present is that it is the point where the past meets the future. Applied to the State of the Institute Address at Georgia Tech, that means looking back on a year of accomplishment and looking forward to a year of possibility and promise.

The highlights of the many achievements of the past year are contained a little brochure at your seats. Taken together, this list of accomplishments portrays a university that is entrepreneurial and propelled forward by the excellence of its people. It demonstrates our willingness to differentiate ourselves from others and some of the ways in which we do just that.

SLIDE: VANISHING BOUNDARIES

Boundaries are defined in Webster’s dictionary as “something that fixes a limit or extent.” There are many kinds of boundaries; examples include those set by federal and state governments as well as natural barriers like rivers and mountain chains. Others are more ephemeral like those that proscribe professional disciplines, or that are set by societal norms. The latter could be said to include boundaries set by perceptions associated with words like “technology.” Webster defines technology as “a scientific method of achieving a practical purpose,” and as “the totality of the means employed to provide objects necessary for human sustenance and comfort.” According to these definitions, technology has to do with “a practical purpose” and “providing objects.” These definitions are in accord with what Webster means by a boundary since they fix a limit for technology in a confined context of “objects” and a “practical purpose.”

Living within boundaries such as these has value and helps order society. However, it also limits what is possible or even imaginable. Those who choose to question the reason for boundaries or explore beyond them, can cause them to cease to exist and open the doors of opportunity. What would the United States have been if Thomas Jefferson had not had the vision to send Lewis and Clark on the Voyage of Discovery? While others were deterred from this bold step because of boundaries set by nations, nature, and fear of the unknown, Jefferson was not. History was changed as a result.

For many years, universities have been constrained by the boundaries set by professional disciplines, concepts of the traditional classroom, and even by campus

locations. Those who crossed beyond these boundaries often had their sanity questioned. In the past Georgia Tech was no different from other universities in this regard, and in addition we found ourselves constrained within the boundaries established by the definitions set by others around words like engineering and technology.

As we have matured as an institution, we have become more emboldened to question the status quo, and this is a good thing. With technology permeating all aspects of life, we have a stake in a broader societal role. In the past engineers and scientists were limited to the task of developing new technology, and when the task was finished, others determined how it was to be used and set policy around it. Today we should ask: Why should those who may not understand technology be the arbiters in deciding how it will be used, or whether it will be used to a good or evil purpose? Are we only about the objects and practical ends cited in Webster's definition of technology, or should we extend our abilities to broader ends? I would argue the boundaries set by the perceptions of others are limits that we should not accept.

SLIDE: GT VISION AND MISSION

Universities play an important role in our society, one that has grown and expanded over the past fifty years. Among these, universities like Georgia Tech have a special opportunity as technology moves to a more central role in our lives. We have stated it is our vision to define the technological university of the 21st century. In this journey, we will need to seize the opportunities created as boundaries disappear due to the choices and needs of society. We will also have to be willing to provoke change and assume leadership to erase boundaries that would otherwise stand in our way.

As the 21st century unfolds around us, the future shape of that new technological research university is becoming clear. It is collaborative in its nature. It is innovative, continually reshaping its educational experience and refocusing its research thrusts to produce the talent and the discoveries the future demands. It embraces the challenge of creating solutions to the world's seemingly intractable problems and shaping the way in which technology is used.

SLIDE: VANISHING EDUCATIONAL BOUNDARIES

A university that is collaborative, interdisciplinary, and global has a unique educational experience to offer. It gives students an opportunity to become both broader and deeper – an opportunity to gain deeper knowledge and expertise in a chosen field, but at the same time to see that chosen field in a global context. It is an opportunity to become a citizen of the world as well as an architect, scientist, engineer, historian, or business leader.

SLIDE: LEARNING ENVIRONMENT

So Georgia Tech should be willing to reinvent the learning environment we offer our students. Our faculty seek new ways to make the boundaries of the traditional classroom vanish by providing real-time realistic ways for them to interact. The Horizon Wimba Live Classroom grew out of the work of Georgia Tech's Center for the Enhancement of Teaching and Learning, better known as CETL. It is a live, real-time, interactive approach to teaching modern languages online.

The limitations of physical distance between learning communities is on the way to being erased by the break-through high-definition video technology, which our researchers in the Arbutus Learning Center have developed with HP engineers. This technology allows classes in two locations to be seen by each other through its ability to project high definition, life-sized images from one site to another onto the walls of the classrooms. Supplemented with high quality sound systems, it allows the respective classes to interact with each other by giving the appearance they are in the same room. Originally developed for high-end corporate video-conferencing between a handful of people, the Arbutus systems will cost much less and work for large sized classrooms. We are hoping to begin using it soon for classes that have students in Atlanta and Savannah, and we will demonstrate it for the Board of Regents in a few weeks.

In the library, the boundary that vanished was between the traditional reference desk and the IT help desk. The East and West Commons took our library into the future and won the Excellence in Academic Libraries Award.

Of course, a lot of learning takes place outside the classroom, lab, and library. And we are excited about the opportunity to expand across the boundary of North Avenue by acquiring the North Avenue Apartments. Now we can house 70 percent of our undergraduates on campus – a remarkable achievement for a public university – and by gathering our sophomores in this apartment complex we will be able to create a learning community that reinforces their college experience.

SLIDE: DIVERSE COMMUNITY

Diversity is a word often used with a specific end in mind. Here at Georgia Tech we see this concept more broadly – as a means to break down boundaries between cultures, races, and economic classes. First there is economic diversity, something we have been at risk of losing on our campus as costs of education have risen. This fall we inaugurated the Georgia Tech Promise program with the commitment to help students from Georgia whose family income is less than \$30,000 to cover the costs of their education. This is not just a handout, since we ask these students to do their part –

apply for Pell Grants and other grants they may qualify for, and participate in work/study to help earn their way. But Georgia Tech Promise gives students the opportunity to realize their dream of a Tech degree without the burden of excessive debt or fear of losing their status because of a temporary setback. We are working as we speak to raise a \$50 million endowment to provide long-term support, and as we are able, we will expand Georgia Tech Promise to other worthy students.

Beyond economic diversity there is ethnic and cultural diversity. We seek to achieve both and use them to create a vibrant community of learners. This does not come without focus and intent. For example, the number of African Americans who graduate with Ph.D.'s in engineering nationally has remained well below what this country should achieve. Georgia Tech has made it part of our mission to change this, and even though there are 320 accredited engineering programs in the U.S., for the last three years we graduated 10 percent of the African American Ph.D.s in engineering. Many deserve credit for this remarkable accomplishment, but we should acknowledge Dr. Gary May, Chair of the School of Electrical and Computer Engineering, who was recognized this year for his efforts with the nation's top mentoring award.

SLIDE: NEW BREED

We seek to bring together a richly diverse student body and provide them with an educational experience where boundaries cease to limit what is possible. Where technology and the liberal arts are intertwined. Where technology is suffused with appreciation of sustainability. Where students learn to not only work in groups, but to lead. Where students learn by listening and by doing through internships and co-op jobs, study abroad and research. Not long ago we chose to increase the opportunities on our campus for undergraduates to participate in the research programs of our great faculty, and the percentage doing research has tripled in the past decade.

SLIDE: TOM FRIEDMAN

In short, we hope our graduates are educated for life, not just a job – life in a world where it is said that many will change jobs up to ten times before they are forty. Our graduates will need to live well in a world that my generation did not face. How are we doing? Based on his campus visit, the Pulitzer winning author Tom Friedman expressed his endorsement in the expanded edition of *The World is Flat*, which features Georgia Tech in a chapter entitled “The Right Stuff.”

SLIDE: CAREER FAIR

We can also see the evidence in the companies seeking to hire our graduates. At the Career Fair organized by students last month, more than 400 companies came to campus to recruit – a new record. The list included the usual companies that you expect

to recruit at a technological university. But it also included some that might surprise you. For example, Medtronic, which reflects our growing prominence in healthcare. Or Goldman Sachs and Bloomberg. Our alumni are now beginning to appear more frequently on Wall Street where they excel as “quants”– graduates who can operate in a complex environment of many variables driven by a world of numbers. And here’s a unique pair of large retailers seeking our graduates for their skills as systems and logistics engineers. They need Tech grads to drive their ability to keep the shelves filled with products customized for each store location. And finally, C&S Wholesale Grocers and Chick-fil-A. They are joining the list of those seeking graduates from some of our new interdisciplinary majors to help them market their products and relate more readily to a new and more demanding customer.

SLIDE: VANISHING DISCIPLINARY BOUNDARIES

There are many universities that claim to be interdisciplinary, but very few that have successfully lowered the disciplinary boundaries far enough to really make a difference. In contrast, Georgia Tech has 125 interdisciplinary centers that address subjects ranging from nanomedicine to digital media. Of the dozens of new majors we have added in the past decade, the vast majority have been created by a melding of disciplines.

SLIDE: FACULTY

Each year my wife Anne and I host the new faculty at the President’s House, and I take that opportunity to ask many of them what attracted them to Georgia Tech. The most common response to that question is the opportunity to work in a genuinely interdisciplinary environment. That is true for assistant professors who are just beginning their careers as well as for the faculty leaders you see pictured on this slide. We cannot assume we have completed the task of the lowering of our disciplinary boundaries, but I believe our culture is no longer tolerant of them.

SLIDE: ENERGY

Most of the important problems facing the world today are broad and call for the participation of interdisciplinary teams to solve. Energy, for example. Political volatility in the Middle East, growing energy demands from large, emerging nations such as China and India, and deepening concern about global warming have made energy a priority issue for the nation and the world. Our response has been to create the Strategic Energy Institute to bring together researchers from areas of policy, engineering, science, and earth and atmospheric sciences to craft a comprehensive, sustainable approach to the problems.

For example, the combination of global warming and rising fuel prices has focused national attention on biofuels. Georgia Tech is a partner in a new \$125 million biofuels

research center led by Oak Ridge National Lab, and has a \$12 million partnership with Chevron to develop biofuels and hydrogen as alternatives for transportation.

We are also creating new green energy sources, from more powerful solar cells to a tiny nano-scale generator that harvests energy that is available in the environment around it, so it does not need a designated power source. And we have not neglected new approaches to nuclear energy, for which demand is growing.

SLIDE: CLIMATE CHANGE

But energy issues do not exist in a vacuum. They are intertwined with climate change and environmental sustainability. Studies on how the earth's climate is changing by Civil Engineer Peter Webster and Judy Curry in Earth and Atmospheric Sciences have provided new insights into how this occurs, and propelled Georgia Tech into the national spotlight. SEI researchers like Bill Koros and Ron Chance are among the national leaders in developing solutions to address the seminal carbon issue with capture and sequestration. Given the growth in world energy demands, there is no question that carbon-based fuels will continue to be used, and Georgia Tech will be among the leaders in developing technologies for carbon capture and sequestration.

The SEI approach also recognizes the importance of public policy. New faculty member Marilyn Brown is nationally recognized for her work on the policy underlying big-picture energy, climate, and sustainability issues.

Our students are not hesitant about getting into this picture. An interdisciplinary team of students and faculty from architecture, engineering, the sciences, and management competed for and won the opportunity to participate in a national Solar Decathlon. Their full-sized, solar-powered house, which is remarkable in its design, is now in Washington, D.C., competing against houses from 19 other universities.

SLIDE: HEALTH CARE

A decade or two ago, no one would have put the name of Georgia Tech in the same sentence with the words medicine or health care. But a transformation is taking place in this arena, and those who can blur the boundaries between biology, chemistry, engineering, computing, and medicine will be the leaders in the future. Through a unique and potent partnership with Emory University, the formation of collaborations with others like the Medical College of Georgia, and the willingness of our faculty to step across disciplines, Georgia Tech is now positioned to compete in this new world.

Research is ongoing on our campus that will allow DNA to be repaired, that will allow nanoparticles to detect and destroy cancer cells before they spread, and that will create

diagnostic techniques for ovarian cancer. These options and many more open new, exciting opportunities of study for our students which did not exist even a few years ago.

SLIDE: ARTS

The notion that technology and the liberal arts are two completely separate things is deeply rooted, dating back to ancient Greece. The call for dissolving this boundary was issued in 1959 by C.P. Snow, who was both a scientist and a novelist. He provoked heated debate by arguing that the lack of communication between the sciences and the humanities was a major hindrance to solving the world's most significant problems.

Tackling this problem of separation has proven difficult, but the interdisciplinary environment on our campus gives rise to the conditions for the sought-after reconciliation. After all, we understand that the fundamental creativity that drives engineers and scientists is closely related to that of the artist. Our poet in residence Tom Lux is fond of saying writing a great poem is not just an act of pure impulse, but is founded on structure as much as is the design of a bridge. The by-product of our interests in blending the arts and technology is enormous, as it helps humanize and inform the end result.

We are deliberately encouraging our campus to be a place where the arts and technology interact. When our inquiring minds produce new forms of electronic games, they serve to ask bigger questions about humanity and society. Campus video-gamers are leading the way in using games as a communication tool to model, simulate, and explore the complexities of large social issues and problems facing the nation and the world.

Technology also offers a way to make the arts more broadly participatory. Traditionally, the arts were the exclusive purview of those with special talents, and the rest of us were spectators. But the Music Department here at Tech is pushing the envelope using technology to open the door for audience participation. The graph theory program pictured on the screen allows listeners to put together their own version of a musical composition, composed of interlocking pieces.

SLIDE: VANISHING NATIONAL BOUNDARIES

One of the most obvious of the boundaries that vanish for a global university is national borders. Global universities have the advantage of a unique perspective. Things that are distant – in places like Europe and Asia – are much closer to us, because we have a presence there and are directly involved with universities and governments in those places. In turn, we have a unique opportunity to see ourselves from the perspective of

Europeans and Asians. Both of these views provide valuable perceptions than help the national boundaries that separate us to vanish.

SLIDE: GLOBAL UNIVERSITY

What does it mean to be a truly global university? What sets Georgia Tech apart from the typical university that has some international activities and programs? Yes, we have the same international activities as most colleges, but we take our programs to a higher level, embracing virtually all disciplines, not just the humanities, and integrating them into the curriculum. We have strategic international education and research platforms in France, Ireland, and Singapore, with a few more under consideration. We have collaborative research partnerships with other universities in all three of these locations whose research thrusts align with ours. And we have joint degree programs that allow our students and those of partner institutions in places like France, Singapore, and Shanghai to earn dual degrees.

We are engaged in economic development activities in all of these places, which enable us in turn to facilitate international relationships with businesses from Georgia. We bring a genuinely international perspective based on experience to the policy table on issues that cross national boundaries – from the environment to electronic communications. And finally, we are engaged with the highest levels of government at home and abroad in helping to shape the emerging global economy.

Georgia Tech is working hard to become a genuinely global university, and as I talk about the opportunities that are presented to us by vanishing boundaries, you are hearing these characteristics of a global university interwoven in all aspects of our efforts.

SLIDE: GLOBAL LEADERS

One of the characteristics of a global university is that it links to the highest levels of government in multiple international locations. Here you see some of the global leaders who came to our campus in the course of the past year. The President of Ireland and high-level officials from France reflect the partnerships we have with these nations to conduct research and do technology transfer and economic development to our mutual benefit. And I should note that in addition to the visit of President McAleese to Georgia and Georgia Tech, Georgia Governor Perdue led a trade mission to Ireland, facilitated by Georgia Tech.

The newly elected President of Liberia came to Georgia Tech last September to make her first address on the role of information and communication technologies in the development of this war-torn nation. And the reason was because faculty and graduate

students in international affairs and computing were advising Liberia on developing its first ever information and communication technology policy, which was unveiled last spring.

And it is a rare thing for anyone to host a high-level official from North Korea, which is one of the world's most closed and isolated nations. But Georgia Tech has been the site of several informal discussion sessions with high-level North Korean officials over the past decade.

SLIDE: ENVIRONMENTAL ISSUES

The combination of Georgia Tech's global presence with its interdisciplinary culture provides unique opportunities to work on challenging issues like the environment, which span the normal boundaries that constrain others. Here is just a small sampling of those efforts: Preserving coral reefs in Fiji without destroying the local economy. Researching the damage from a tsunami earthquake that brought 65-foot waves to Java, to discover why there was no warning. Providing advance warning of catastrophic floods in Bangladesh, so people can prepare. Analyzing an old and inadequate water system in Los Lima, Honduras and proposing a better replacement.

The Los Lima project is being done largely by students through Georgia Tech's chapter of Engineering Students Without Borders. And it is just one example of the many international experiences available to Tech students.

SLIDE: STUDENTS ABROAD

The concept of a global Georgia Tech has been welcomed by our students with gusto. From Italy to Australia, from China to Chile, Georgia Tech students have shown an enthusiasm for experiencing other cultures, learning foreign languages, stretching their own boundaries, and becoming citizens of the world. Every year, Georgia Tech's Office of International Education sponsors a photo contest to capture the special flavor of the study abroad experience, and the photos on the top of this slide are some of the winners from last year.

Of course, the largest study abroad program run by Georgia Tech is on our campus in Metz, France. Last summer 125 students took more than 2 dozen courses taught by 14 professors. It is an incredible opportunity for our engineering students to study abroad without missing a beat in their curriculum, but the course offerings also include a broad range of other subjects.

SLIDE: AT HOME

Even here on the Atlanta campus, the global experience has arrived. Forty-eight students live in International House on East Campus, in a unique residential community designed to be a mix of students from many nations. Special programming helps them share their cultures with each other and with the rest of the campus.

When you gather outstanding students and provide them with leadership experiences, you get surprising and remarkable results. The address of Liberia President Ellen Johnson-Sirleaf inspired Karan Chopra to create GT IDEA, a student organization aimed at helping to provide technological skill and business acumen in sub-Saharan Africa through collaboration with African universities. The pilot project was an eight-week teaching trip to Addis Ababa University this summer, funded by World Bank. Six Tech students joined six Ethiopian instructors to offer courses in digital media, engineering economics, and information technology.

SLIDE: ROBO-CUP

The world also came to Georgia Tech this year through our hosting of RoboCup 2007. If you were around this summer and wandered into the Campus Rec Center between July 1st and July 7th, you would have found yourself transported to geek heaven, surrounded by hundreds of young people hovering over a creative stable of robots. Over 400 media reports around the world covered the event.

SLIDE: VANISHING CAMPUS BOUNDARIES

As boundaries at a distance are vanishing between Georgia Tech and its global partners, so too are those between our campus and the neighborhoods that surround us here in Atlanta. We used to be bounded by the gulf created by the interstate on the east. And to the south, a public housing project and abandoned buildings and crack houses cut us off from downtown. We became an island-state, remote from our neighbors and unable to work with others to defeat the blight that came with isolation.

SLIDE: TECH SQUARE

Technology Square, linked to campus by the new Fifth Street Bridge, has served as a key element in revitalizing a once deteriorated part of Midtown. Where once there were vacant lots and crack houses, there are now shops, restaurants, and high-tech businesses. The North Avenue Research Area and Technology Enterprise Park have extended campus to the southwest, breaking down once daunting boundaries and helping to close the gap between our campus and downtown.

SLIDE: STUDENTS

Our students have also played an important part in crossing the traditional boundary that in many places has pitted “town” against “gown.” Their community volunteer efforts are truly extraordinary, and make all of us proud. They have been especially responsive to the disaster caused by Hurricane Katrina. Our fraternities and sororities are also active, and last year Georgia Tech’s Interfraternity Council won eight awards – including 3 for community service.

SLIDE: 5 CAMPUSES

The new Georgia Tech where boundaries are disappearing can be a bit confusing to those who only knew the old Georgia Tech. The new Georgia Tech is at once local and also global, with 1,000 students on other campuses around the world or online. The multiplicity of programs and activities at the places on this slide are intertwined, collaborating in unique ways that are mutually beneficial. Taken together they are building blocks in the process of defining technological research university of the 21st century, also known as Georgia Tech.

SLIDE: BUSH QUOTE

Our ultimate goal is not to be recognized as the best in the nation or the world, although if we succeed, that may be the result. Our goal is to understand... to use our knowledge and expertise to transform the quality of life for the better for this planet and all of its inhabitants.

Our friend and former provost, now president of Cal Tech, Jean-Lou Chameau, once was asked about Georgia Tech’s expanding international programs, and he said, “Georgia Tech has no boundaries.” Jean-Lou was, and is, a forward thinker. He could have said Georgia Tech “should” have no boundaries, but he was more emphatic. He left us with work to do, but he foresaw our voyage towards a future where boundaries vanish and we achieve our mission of defining the technological university of the 21st century.