

# A Technological University for the 21st Century

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On the Occasion of his Inauguration as the Ninth President of  
Georgia Institute of Technology

Governor Harris, Senator Nunn, Mayor Young, Chancellor Propst, Mrs. Ward, my wife Barbara, my son, Robert, and my daughter, Kate, Georgia Tech students, alumni, faculty, and friends; distinguished guests. I am particularly pleased that my mother and father are in attendance today. Like many of you in the audience, it was my parents' sacrifices that provided me with an opportunity to obtain a university education. Before beginning, I also want to thank the Inauguration Committee, especially its Chairman, Miriam Drake, for helping make this event so special for me and my family, and I hope for all of you.

This morning I would like to focus on one thought. How do we prepare for the 21st Century? My distinguished predecessor, the late Joseph Pettit, referred to us as Georgia Tech's "new founders." Georgia Tech enrolls its 100th freshman class this fall. Just as members of Georgia Tech's last 99 freshman classes have provided leadership for the 20th Century, this class will be part of the nation's leadership cohort for the 21st Century. Our challenge, and my challenge, is inextricably tied, then, to the 12 years remaining as we together prepare for the next century. *What vision do we have for Georgia Tech as a 21st Century technological university? What will constitute an educated person in the 21st Century? How do we translate this vision into a new reality?*

I freely admit to great ambition for Georgia Tech. Some may say it will prove to be too costly. Others may say that Georgia Tech is doing so well now, why change things? However, if you know the rate of change of technology and its expanding role in society, then Georgia Tech and other technological institutions must adapt to change to merely survive. I want Georgia Tech to do more than merely survive. I want Georgia Tech to thrive, and continue to contribute to broader goals. In particular, I believe that:

- if Georgia Tech is to continue its leadership role in shaping the destiny of Atlanta, the State of Georgia, and the United States, particularly the Southeastern United States.
- if Georgia Tech, together with the University of Georgia, is to raise the Georgia State University System to new heights of excellence and service, and with it Georgia and the Southeast,
- if Georgia Tech is to continue to create new technology and new leaders for a technological society,

then Georgia Tech must become a technological university designed for the 21st Century.

Georgia Tech's original founders had a vision. Their vision was that a technological school was integral to the New South of their day. I want Georgia Tech to be an integral part of the New South of the 21st Century, and an integral part of the intellectual engine that regains world leadership in technology for the United States. I believe we can do it. I believe that we must do it.

*My ambition for Georgia Tech is no less than to be the model of a modern, technological university. In so doing, we will help define what is meant by any great university in the 21st Century.*

*Why should Georgia Tech have such ambitions? Why should any State aspire to have a great university, and why a great technological university? The answer for the State of Georgia is straightforward. Increasingly, technology is becoming a driving force for our society. Focusing only on economic impacts, it is clear that no significant technology-based regional or national economic center exists without the presence, participation, and preeminence of great universities. Stanford and Berkeley in the Bay area, or MIT and Harvard in Boston are examples. Great cities, great universities, and great regions fuel and sustain each other. Great research universities attract human capital, produce knowledge and new technology through research, and create new human capital through education. Georgia Tech, the*

University of Georgia, and Emory, *acting together*, can propel this region to new and even greater heights. Our current, joint activities with Georgia State, members of the Atlanta University Consortium, and the Carter Center already contribute.

And there are no great universities -- technologically-based or otherwise -- that are not national and international in scope. Georgia Tech has to compete and earn national and international preeminence in order to best serve the interests and hopes of this region. We must follow the path of excellence if Georgia Tech is to serve Georgia effectively.

*Let me tell you why we can redefine what is meant by a modern, technological university during the next 12 years by describing the foundation we have to build on.*

#### The Foundation: Georgia Tech Today

Georgia Tech is the symbol and voice in Georgia and, indeed, in the entire Southeast for technology and the value of a technology-based education. There are at least four reasons why Georgia Tech is well-positioned for the future:

First, for almost the entire 100 years of our existence, Georgia Tech has had unique access to a large pool of the most talented students in the entire southeastern United States, including those with limited means, who desired a technically-based education. The result is a fantastic legacy of alumni who have made great contributions to the society and economy of the southeast and the nation. By educating engineers, scientists, managers, and architects, Georgia Tech has produced a human resource network that can rival the networks of any institution of higher education in the United States. My own assessment in my brief time here is that the Georgia Tech alumni and network of friends may be, person-for-person, the strongest and most loyal such network in the United States. It is a network based on work, solid accomplishments, and friendships, not on pretense and prestige.

Second, Georgia Tech has been particularly lucky to have been located in the midst of a great and vital city. Georgia Tech graduates like Mayor Ivan Allen and many others, past and present, have been joined by other enlightened leaders such as Dr. Martin Luther King, Jr., Ralph McGill, the Woodruffs, and Mayor Andrew Young in creating a great community, of which we are proud to be a part.

Third, the State and its university system has been well served by current and former governors, and by dedicated legislative leaders, who in the great populist tradition in the South have led by keeping a watchful eye on both the people and their immediate needs and on the future.

Fourth, Georgia Tech and the Georgia Tech Research Institute as centers of excellence in engineering and science have benefited from the boom in federally-sponsored R&D. My predecessors wisely took advantage of this climate and began the transformation of Georgia Tech from an excellent, undergraduate engineering school to the nationally-recognized technological research institution we have become. As a scientific research and engineering institution it was possible for Georgia Tech to again play a critical leadership role in the New South during the past decade. Our more recent leadership has been consistent with that of those five men whose vision at the founding saw Georgia Tech as critical to the New South of the 1880's.

Georgia Tech can aspire to greatness by continuing to build on the foundation we have today.

*Georgia Tech's destiny and my role in helping shape that destiny is to transform this first-rate technical institute and research enterprise into a new, stronger, and more broadly-based technological university for the 21st Century. We have 12 years to prepare for the next century.*

What kind of university ought we to become? It goes without saying that a modern, technological university cannot exist unless it embraces the twin missions of any true university: the *creation* of new knowledge, of new technology, and the *dissemination* of knowledge.

### The Challenge for Georgia Tech Today: Research Directions

Research and Scholarship, the creation of new knowledge and technology, is a central mission for any, true university. Research is important in its own right. For a technologically-based university, like Georgia Tech, research and scholarship serve as a foundation for other, essential missions such as education, and economic development.

A university's national reputation is the basis for its ability to attract outstanding students and faculty, for its ability to attract economic activity to a region, and for its contributions to the overall social and cultural attractiveness of a region. A university's national reputation is determined primarily by its relative strength in research and scholarship. One need only compare the more restricted contributions to a region of the many excellent liberal arts institutions in the northeast and Midwest, with the broader contributions of the Georgia Tech of 1988 to realize the importance of research to a university and those around it. This is particularly important for a public university. *Research and scholarship is and will remain a central objective for Georgia Tech.*

In a modern university, research and scholarship cannot and should not be tightly managed and administered. The overall direction and pace of research can be led and directed, but not dictated. Institution-wide concerns are more appropriately focused on broad issues, the identification of opportunities, the filling of gaps in an otherwise-coherent research agenda, and the creation of an environment that supports and fosters inquiry.

For a technological university, it is important to maintain a healthy tension between basic and applied research. Basic inquiry should be informed by real problems and applications. Appropriate and difficult applications often identify gaps in theory and can serve as the driving force for basic research. Applied research not undertaken in the context of and informed by theory, seldom takes on a significance beyond a narrow application and is often done better in non-academic institutions. An appropriate mix of faculty and research interests is required to maintain a healthy tension, as is a willingness to ignore the traditional boundaries of academic disciplines when those boundaries channel inquiry in unproductive ways.

Often, what is being attended to in research is as significant as how well it is being done. Georgia Tech is now a strong, national research university, with a healthy, viable foundation of basic and applied research. Continuing our current program of research is clearly a viable and attractive option. I propose a modest addition to Georgia Tech's research and scholarly agenda. It is an enhancement of perspective that would be appropriate for every technological institution in this country as we prepare for the 21st Century.

The modest addition I propose involves strengthening the faculty, and through it, the Institute's intellectual base in those academic disciplines that are primarily concerned with human systems -- psychology and the social sciences primarily concerned with individuals, human organizations, government, and social institutions.

The modest addition I propose merely takes note of the fact that most research done at Georgia Tech and in other technological institutions produces, in the final analysis, new pieces of technology and new technical systems. Whether these technical systems are electronic, chemical, mechanical, or are in the form of new processes, new physical devices and systems, or are embodied in computer software, they represent technical systems that are generally embedded in larger, *human* systems. My

observation is simple. The knowledge and perspective of the human systems within which technical systems are embedded would make significant and positive contributions to the design, marketing, and implementation of technical systems. The modest additions to Georgia Tech's research portfolio suggested is one way to add intellectual strength in a way that complements and adds strength to current activities. Such an approach also has the virtue of placing more purely technical work in a larger, more significant context.

Strategically, it is important to build on strength. Just as we have done in areas such as materials handling, computer aided design, defense electronics, and microelectronics, and as we are doing in manufacturing and superconductivity, I anticipate new research initiatives on a regular basis. We are already exploring initiatives in software engineering, digital signal processing, management of technology, public policy and the environmental sciences.

Future directions for research in a university must focus on creating the right environment, incentives, and infrastructure. To be a great research university, we must be competitive for the best faculty and research colleagues. We must have adequate equipment and facilities. And, the research and educational missions at Georgia Tech demand both a strong library, and an advanced, coherent, and accessible computing environment. *There will be no great 21st Century university without a great computing and information environment.* There are important human elements of the research infrastructure -- graduate students, or researchers in training, and technical staff. All are important ingredients in achieving our potential.

Access to real problems, technical and otherwise, is an important driving force for shaping research and scholarship. Georgia Tech needs access to rich and demanding problems and providing technical, engineering, and management services to Georgia businesses is one way of doing so. Helping attract economic activity to Georgia is another. There are ways of

disseminating knowledge other than in a classroom. Economic development contributes directly to our other missions.

I do not accept that research and teaching must be separate goals. I do not accept that education is diminished by research and scholarship. I do not accept that a truly great research university can be a less than great educational institution. Universities, like Georgia Tech, have as one of their main purposes changing the world of practice -- reshaping the professions. By giving students an exposure to research and scholarship, faculty are giving their students an early glimpse of the future of the larger society.

*Great universities owe their greatness to the quality of their human resources. Great research universities have to be able to compete for the best faculty in the nation in terms of salary, benefits, research equipment, and facilities* We at Georgia Tech share the ambition of the Chancellor and Governor to make the Georgia State University System among the best in the nation. Georgia Tech and the University of Georgia, of necessity, have the major roles to play in this transformation and we are eager to play those roles.

### The Challenge for Georgia Tech Today: An Educated Person for the 21st Century

*There is no great university without a great student body. Georgia Tech has a great student body today. Our principal means of continuing to attract and retain a great student body is through an outstanding and adequately sized faculty , coupled with an appropriate mix of educational opportunities.*

I feel a special obligation to the outstanding young men and women who make up the Georgia Tech student body to help prepare them for the 21st Century. The question is, "What should constitute an educated person for the 21st Century?" We need to prepare 1988's students for leadership positions in an uncertain and unknowable world 20 to 30 years hence. The careers of Georgia Tech alumni -- from President Jimmy Carter, to Senator



Sam Nunn, to Mayor Ivan Allen, to the dozens of CEOs and Presidents of Fortune 500 corporations -- tell us that a technically-based education from Georgia Tech has been a good starting point in the preparation for a variety of challenges and responsibilities.

A central problem in higher education throughout most of the 20th Century is that we have developed two kinds of students, the products of two kinds of educational programs. We have technically literate students, trained in engineering and other technically-oriented professions such as architecture and, more recently, management. We have students trained in the liberal arts; largely in the humanities, social and behavioral sciences, and the arts.

A truly educated person in modern society ought to be able to function well in both technical and non-technical areas. This will become even more important in the 21st Century as technology changes more rapidly and assumes an even greater importance in society. Under any circumstance, students in a technology-based university will benefit from a broader intellectual base, a broader education, and a broader range of educational opportunities.

Even if we were to confine our examination to engineering education, there is a need for expanding the view of what is intellectually relevant. The experience at Georgia Tech is instructive. A very high percentage of our alumni assume significant, non-technical responsibilities shortly after leaving school. It is clear that an engineering education that included a broader mix of skills and perspectives would be beneficial.

To prepare for an uncertain but challenging 21st Century, Georgia Tech must become more than a "single product" enterprise. As we diversify, we cannot lose the uniqueness of our identity or forget our essentially-technological mission. We do this by building on our strengths and by

bringing all of the technical areas in the university up to a level where we can be proud of them.

Georgia Tech can become a new form of technological university by adding breadth, by broadening our intellectual base, by adding intellectual strength and degree programs in non-technical areas in the behavioral, social, and policy sciences and in the humanities. We do this *not* by becoming a traditional liberal arts college. Far from it! We add strength in non-technical areas in ways that clearly build on and complement our core strengths in engineering, science, and technology. We add strength through strategic selection of areas in the humanities, social and behavioral sciences that complement technical areas -- in areas like cognitive psychology, rhetoric and technical writing, public policy and management, and history of technology. By explicitly attending to the connections between theory and application, between engineering and science and the humanities and social sciences one can create a broader, more coherent educational base upon which careers and productive lives can be built.

*Georgia Tech is well positioned to define what is meant by an educated person in the 21st Century. I believe any technological institution is better positioned than traditional liberal arts institutions to re-define what we mean by an educated person in an increasingly technological world; I believe Georgia Tech is in a superior position to adopt that broader perspective which will characterize and help define an educated person for the 21st Century.*

Adding non-technical dimensions to a technical education is much easier than adding engineering, science, and technology to a traditional liberal arts institution. Not only is it easier intellectually and organizationally, it is far more feasible financially. To some, it may seem that I am advocating an engineering and science "takeover" of the liberal arts. Not at all, but *I am advocating making technology one of the liberal arts of the 21st Century.* If this proposal seems audacious, remember that the seven "liberal arts" in the

Middle Ages -- the Trivium and the Quadrivium -- were grammar, rhetoric, and logic; music, astronomy, geometry, and arithmetic.

Current Georgia Tech students clearly have the ability to perform at a very high level in technical areas. They are equally capable of high levels of performance in non-technical areas, if asked to do so. We need only provide them with a broader range of educational options, supported by a broader intellectual base and faculty, then step out of the way and watch them perform. Students like Georgia Tech students are a tremendous asset for an institution that seeks to provide leadership in education through change.

In re-examining undergraduate education at Georgia Tech, we want to explicitly set out to define a new genre of university, to explicitly define a new game, not take the easy way out and try to "be just like MIT" or some other excellent institution. This task demands a major leadership role from our faculty and academic leaders. Completion of this task will not only lead to success in reshaping our educational programs but also will spawn a variety of important, mini-intellectual revolutions in scholarship and research.

Who is educated is nearly as important as how they should be educated. *If the society in which we live is to be significantly better in the 21st Century than it is now, one reason will be that in the 21st Century, there will be substantially full participation in all segments of society by all segments of society -- by women, blacks, and Hispanics in particular. Before my stewardship of Georgia Tech is finished, Georgia Tech will be seen as the major source of women and black Ph.D.s in engineering, science, and the other technical disciplines, and as a place where the faculty and student communities are hospitable to all, without regard to gender, race, age, or what-have-you.* Georgia Tech can show higher education that full participation in higher education is both possible and desirable. Our location in Atlanta represents a significant asset as we move toward full participation in a technological world

*What does "Education" Include?* In helping design and shape the environment at Georgia Tech, in helping create an environment at Georgia Tech that allows a variety of individuals -- faculty, staff, and students -- to grow and prosper, and to do so happily, it is important to look beyond the research laboratory and the classroom. For faculty, every intellectual interaction also has an important social dimension. For students as well, individual development goes well beyond the classroom. A disproportionate percentage of the leaders among Georgia Tech alumni turn out to have been inter-collegiate athletes while at Georgia Tech. Bobby Dodd was a great educator by being a great coach. A disproportionate number of our most successful alumni were active in student activities, fraternities, sororities, or student government. Leadership is generally better learned "by doing," than in the classroom. *"Education" is broad. We as faculty and administrators might make even greater contributions by thinking about the kind of undergraduate educational experience we want for our children, not simply the kind of formal education we want to provide for our students.*

The kind of society we create for ourselves in a university has a direct impact on the intellectual and scholarly productivity of the faculty. Ethics and morals are learned daily and through human contact. From the way we treat each other, to the administrative style of deans, school directors, and presidents, the informal and extra-curricular may, in the end, be more important. For students, faculty, and staff my hope is that somewhere between a philosophy that says "work can and should be fun" and "work hard, play hard" lies the path for Georgia Tech.

For students, intercollegiate and intramural athletics, student activities, and the social life on campus are extremely important parts of a modern university and they will not be neglected as we strive for academic excellence and to create a new educational model.

As we move into the future, to create the kind of picture I have sketched for Georgia Tech, we need an enlightened citizenry and an enlightened public

sector as partners. We are developing, I believe, a new and complementary partnership with the University of Georgia. It is a partnership based on the realization that higher education as an investment is every bit as important to the social and economic progress of Georgia and the southeast as a great international airport and state highway system (when it is finished!). It is a partnership built on the realization that an affordable, high quality education simultaneously attracts business, culture, and leadership to an area, and helps populate an area with educated and well-trained citizens, forming the basis for the next century of progress. It is a partnership that realizes that research is good business, now and in the future.

The real payoff of Georgia's \$70m annual investment in Georgia Tech is not the \$500m per year in direct, economic impact that results. The real payoff is in the new economic activity that is generated through Georgia Tech research; it is in the human capital and future cadres of corporate leaders and entrepreneurs; it is in the creation of political and social leaders with a firm grasp of technology so that we, collectively, are not victimized by technology, but are served by it.

We have a full and challenging agenda. Our journey, if we are to have the energy and will to complete it, must be personally and socially rewarding, and it must be fun. It is a collective agenda and a collective journey upon which we embark. It demands a partnership. Chancellor Propst, I accept the challenge to be Georgia Tech's ninth president and I invite those of you here today -- Georgia Tech's students and alumni, faculty, staff, and friends, Governor Harris, the Regents, and you Chancellor Propst -- to join in that partnership.