Where: LaGrange Rotary
When: Wednesday, February 11, 1998

Good morning. It is a pleasure to be in LaGrange and to speak to fellow Rotarians. Today, I would like to talk with you about something that is important to this state... the value of its research universities and how they must adapt in the face of dramatic changes occurring in telecommunications and computing technologies.

Part of our problem is that it is hard to get excited about change before it engulfs us. A good example of this occurred recently when a teacher said to one of her students, "Johnny, what is the difference between ignorance and apathy?" Johnny, who was busy staring out the window, yawned and said, "I don't know and I don't care." Johnny was right in his own way, but his attitude would not be what is necessary if we are to deal with the challenges that are coming.

At first glance, our research universities here in Georgia and the rest of the nation seem healthy. Looking back, it is apparent that much of America's economic strength can be attributed to discoveries made at research universities. Discoveries leading to the pacemaker, digital computers, space-based weather forecasting, the Internet, and jet airliners were all made in research university laboratories. Much more lies ahead.

At Georgia Tech our faculty are making discoveries that will revolutionize what computer chips can do, create new means of stimulating tissue and organ growth, help reduce air and water pollution, improve the efficiency of textile operations, design new generation stealth technologies for a stronger defense, and speed the flow of information on the Internet. Only this past week we announced our joint plan with the Medical College of Georgia to commercialize our telemedicine-based home care units through a new company called Cybercare. These units use a computer technology that measure six basic indices critical to your health – e.g., blood pressure, temperature and blood-oxygen content. The measurements are automatically recorded by a computer and sent to your doctor's office or the hospital. The units also provide for teleconferencing with your doctor so you can conduct an examination without ever leaving your home.

Cybercare is an example of a development that has grown from collaborative work supported by the Georgia Research Alliance. This Alliance, created by Governor Miller and supported vigorously by the State Legislature, has provided the state with a powerful engine for research and economic development. Its Board, consisting of many of the state's most prominent businessmen and women, is chaired by Columbus's own Jimmy Blanchard.

In a speech this past spring, Governor Miller spoke of the important link between research universities and economic development, saying: "But it is not enough just to build up a well-educated workforce. We are also determined to be on the cutting edge of innovation, because the future will belong to those who can put hand-in-hand: 1. the ideas and research that will drive technology forward, and 2. the educated workforce that can make something of those ideas." Governor Miller's words ring true across the nation. Areas in the Southeast with the most nationally competitive wages and the highest rates of job creation are those linked to locations with research universities that are willing to reach out to their communities. Examples include

Austin, Texas; the North Carolina Research Triangle; and metro Atlanta and Georgia. In fact, Georgia was recently cited by the American Electronics Association as second in the nation in high-tech job growth for five years prior to this year, and first nationally the past year. That growth would not have been possible without the contributions of Georgia's research universities.

In addition to contributions to knowledge creation, Georgia's research universities serve to educate more than 70,000 students and they are receiving more applications than ever before. It is estimated that admissions to these same universities will be even more sought after as the children born during the '80s baby boom come of age. As we speak, some 100 students are enrolled at Georgia Tech from Troup County and the surrounding four counties. Our research universities are also bringing recognition to the state for steadily improving national reputations. I would be remiss if I did not note that this year Georgia Tech was named as one of the nation's top ten public universities by U.S. News and World Report, a remarkable accomplishment. Also, this year 13 of our young faculty were named by the National Science Foundation as CAREER award winners, with the next closest competitor in the nation being MIT with 9 such awards.

All in all, the situation of the State's research universities looks to be enviable and sailing full steam ahead. However, there is a train bearing down on us in the form of a revolution in telecommunications and computing technology that at once threatens us and offers enormous opportunity.

Approximately a year ago, Peter Drucker said in Forbes Magazine, "Thirty years from now the big university campuses will be relics. Higher education is in deep crisis. Already we are beginning to deliver more lectures off campus via satellite or two-way video at a fraction of the cost. The college won't survive as a residential institution."

What is it that creates this kind of thinking? Consider the following:

Ownership of personal computers has reached 1 out of 4 homes in the U.S.; in the Atlanta metropolitan area, a recent survey showed as many as 65 percent of the households own computers with fully 50 percent of these linked to the Internet. Ninety percent of teens report using computers frequently, and they come to education with a different mode of thinking than past generations, with more emphasis on self-learning and interactive dialog via the network.

We are all learning the usefulness of the Internet. For this very speech, I was able to research LaGrange, Georgia and learn that you are a town of 26,000, with thirty-five major industries and numerous Fortune 500 companies. Although I already knew the strong reputation of LaGrange College, I was able to read about its programs and its history. I even went so far as to look up Rotary jokes--and found the following, submitted by Rotary speaker Harold Davis. It seems Mr. Davis was attending a Rotary luncheon club meeting much like this one. He was seated at the head table with that town's Rotary president and commented that the meeting seemed to be going exceptionally well; there was a lot of laughter and camaraderie among the group. The president looked around, and then commented, "You know you're right. Do you think I should

continue letting them have fun or should I introduce you?" Besides jokes and fact-finding, the use of the Internet for electronic course delivery is growing.

It is estimated that one million people received courses via video and other media last year. This figure is up considerably from previous years and approaches one tenth of the number receiving courses in traditional classrooms. Phoenix University, a fully virtual university that can be found only on the Internet, now enrolls 40,000 students and expects to grow rapidly to one hundred thousand.
This is impressive, but there are ample reasons to believe the potential of telecommunications technology is only beginning to emerge. Capabilities of computer chips, fiber optic transmissions, and wireless transmissions are expected to double about every two years for the next decade. What this means for higher education are the changes wrought to date by telecommunications and educational technology are going to accelerate rapidly in the next twenty years.

In his book, **Being Digital**, Nicholas Negroponte contrasts the case of a surgeon and a faculty lecturer from the 17th century who are both transported to the 21st century. In the operating theater of a modern hospital, the 17th century surgeon would recognize little and be unable to contribute to the surgery. But, the 17th century faculty lecturer would feel right at home in most of today's classrooms. This is not a good sign.

Without question, change is coming and research universities must adapt or lose pre-eminence in higher education. Fortunately, we have some advantages that will buy us some time. For starters, virtual institutions haven't yet found a way to field a football or basketball team. More seriously, no one can yet replace the value of a residential college experience, or eliminate the need for hands-on laboratory work in science and engineering courses. These values give us time, but we have to adapt if we are not to become roadkill on the information highway.

Here are some of the steps I believe we should take:

1. We must embrace educational technology and offer more opportunities for self-learning. We have to do this while maintaining quality of our programs and degrees.

   At Georgia Tech, we have taken some of the needed steps. Because of the Olympics, Georgia Tech gained FutureNet, a network that provides high-speed voice, audio, and computer links to the entire campus. We have begun building on this strong foundation and are now requiring freshmen to own computers. We use these elements to create an innovative teaching and learning environment. For example,

- Classrooms with video feed and electronic whiteboards that allow faculty lectures to be directly recorded, along with student notes from their own electronic pads, then immediately accessed by students' in-room computers.

- Multi-location design project interaction where team-to-team information is exchanged via electronic whiteboards and the Internet.

- On-demand learning offerings delivered directly to desktop machines at the home, office, or dorm room via the Internet.

- Instant access to knowledge through linked libraries and custom-designed search engines using personal agents that know your own preferences and needs.

2. We must address the growing continuing education market. Currently, the average U.S. worker now switches jobs nine times in a career, and switches careers three times. According to a survey entitled, "What the Public Wants from Higher Education," eighty-one percent of surveyed Americans think that getting additional education is important for them to be successful at their place of employment. Last year more than 17,000 working professionals participated in more than 900 Georgia Tech continuing education and distance learning courses. Many, did not once set foot on our campus. Our offerings have grown at a rate of fifteen percent per year for the past two years and we believe this is just the tip of the iceberg. The supporting technologies are rapidly being improved, including on-line delivery using the Internet.

As we speak, Governor Miller has recommended funding of a $2 million pilot for the University System of Georgia to develop a formal on-line learning network. Therefore, those of you who in the past drove the seventy or so miles into Atlanta to complete your degrees or take extra courses at an Atlanta college could soon complete your degree or course right here in LaGrange drawing from courses at multiple universities in Georgia!

3. Finally, our survival depends on our suppliers. And, in order to continue to attract top-quality students to our universities, we need higher quality elementary, middle, and high school programs. A significant improvement could come from enhanced interaction between higher education and secondary education. At Georgia Tech we are using telecommunications technologies to help. Examples include:

- Using distance learning technology to offer calculus classes to a group of high schools to help prepare their students for their college experiences.

- Teaming up with ZooAtlanta to enable students to learn about and monitor zoo animals' progress via the Internet--therefore encouraging students to both learn on their own and master computer skills.

Conclusion

The state's research universities have never been as important as they are today, and working together in the Georgia Research Alliance they provide a potent force for economic development. Yet they face a major challenge as they seek to adapt to the exciting revolution that is coming in the form of the converging fields of telecommunications and computing. Steps are being taken, but a huge effort faces us if we are to keep pace. If we don't succeed, then Drucker will be proven right and our research universities will become interesting relics for

society. If we do succeed, then we will become even greater positive forces in our society, providing enriched educational opportunities for all of the citizens of Georgia. LaGrange Georgia will be able to attract industry because degrees and continuing education will be delivered on demand from any of the University System of Georgia colleges and universities. I am excited about the future, and I hope you will work with us as we seek to meet and overcome the challenges ahead.