REMARKS BY GEORGIA TECH PRESIDENT G. WAYNE CLOUGH
IBM Software Employees, January 18, 2007

• Proud to have GT alumni in this group.
  o Over 800 GT alumni presently work for IBM.
  o Grateful that IBM helps us support our programs - have had student winners of IBM University Relations PhD Fellowship, faculty recipients of IBM Faculty Award. Just this last week Jim Stallings was our keynote speaker at FOCUS, our leading program that helps us stay among the top producers of minority engineers.

• Other aspects of IBM’s relationship with GT:
  o GT one of 7 US universities working with IBM on the The Open Collaboration Research Principles – promotes an open approach to sharing university-industry collaborative research in improving software quality, speeding creation of IT healthcare tools, privacy and security solutions.
  o GT-IBM joint research produced world’s fastest chip last summer: over 500 gigahertz.
  o The Razor (1,000-node Cluster 1350 system built on IBM BladeCenter systems). Used by Jeffrey Skolnick and his team for cutting edge research in computational systems biology – foundation for next revolution in biomedicine.
  o Recently IBM purchased Atlanta-based ISS, a company founded by two Tech alumni and one with loads of Tech graduates doing things for Internet security.
  o Personal level: Rod Akins of IBM is a member of the GT Advisory Board and I have had the pleasure to work with Sam Palmisano and Nick Donofrio on national policy issues. Work locally with your own dynamic Ann Cramer.

• National Innovation Initiative (NII) an initiative of U.S. Council on Competitiveness to help U.S. develop action agenda to encourage innovation. You are proof that Sam knows a thing or two about that. Learned from Kenneth Lee that you are celebrating the significant growth you achieved in 2006, and that 2006 was your third year in a row of such growth. Congratulations on that achievement; pleased to join you as you celebrate and prepare for another successful year.

• GT, IBM both technology-focused enterprises, both have history dating back into the 1800s. Ongoing challenge: continually reinvent ourselves – be fresh, creative, innovative.
  o Early 20th century, Austrian economist Joseph Schumpeter coined term “creative destruction.” New generation of technology eclipses old; new technology comes from new companies that eclipse established companies.
  o GT, IBM challenge: buck that trend, continue to be vital across the generations – be innovate, entrepreneurial; take some calculated risks, make some calculated investments; be out there on the fringe as well as in the mainstream.

• IBM has demonstrated you know how to do this:
  o Went from old-generation office machinery to computers.
  o Continue to be a leader in high performance computing – Blue Gene.
Now transformed much of your operations to lead in software and services.
One of few companies that still conducts significant level of research designed to keep you out on leading edge.

- But how does a university do it? (institution known for hidebound tradition, slow stodginess)
  - Similar to industry, face challenge of function in fast-paced global economy; competition from emerging world-class research universities in places like China and India. Market for students and faculty now international.
  - We believe engineers and scientists for tomorrow cannot be the same as those of yesterday. What does this mean?

- Innovative approach to educating skilled workforce: Engineer of 2020: anticipate future; take wholistic approach to helping students begin to grow into the role they will play in the future.

- Aspirations for Engineer of 2020 (everyone else, too):
  - Ingenuity of Lillian Gilbreth, who created the concept of ergonomics;
  - Problem-solving capabilities of Gordon Moore, who founded Intel;
  - Scientific insight of Albert Einstein;
  - Creativity of Pablo Picasso;
  - Determination of the Wright brothers;
  - Leadership abilities of Bill Gates;
  - Conscience of Eleanor Roosevelt;
  - Vision of Martin Luther King, and
  - Curiosity and wonder of a small child.

What does this mean?
- Graduates need to understand deeply the way technology works:
  - For example, the social impacts (technology, social change a double helix – 2 strands inextricably woven together). Case in point – technology that is sustainable.
  - Cross over impacts – e.g. that computing is a tool with wide variety of applications. At GT: humanities + computing = digital media; music + computing = Haile, the robotic drummer; mapping of human genome + computing = bioinformatics.

- Must incorporate concepts of collaboration/teamwork:
  - Hot spots for innovation in spaces between traditional disciplines, fields of study. Eg. Systems biology, foundation of next revolution in medicine, brings together biology, chemistry, computer science, math, physics, and applies to medicine.
  - Need ability to collaborate across disciplines, across quantitative, qualitative.
• Must have the ability to think critically:
  o Define problems rather rote application of formulas; find patterns in disparate
data; piece together creative solutions from variety of resources; look at what
everyone else sees and realize the unique opportunities.
  o GT: 40% undergrads engage in independent research – wrestle with problems
with no foregone solution in the back of the book; learn that framing the question
can be just as important as finding an answer; learn to think outside the box in
asking critical “what if…” questions.

• Learn to be citizens of the world:
  o Understand dynamics of global economy; comfortable with cultural diversity
  o GT: 1/3 undergrads study abroad; Metz, Singapore; dual degree agreements;
international internships; degree programs with international flavor; modern
languages + global economics; modern languages + international affairs; global
economics + international affairs.
  o Projects that assist needy parts of world – helping Angola and Liberia recover
from civil war, addressing sanitation in Brazil, water supply in Honduras, and
community development in Ecuador

• Have desire for learning over a lifetime
  o Unfolding career – new knowledge, skills.
  o Engineers: 2 years out wish more tech courses; 5 years out wish more
management courses; 10 years out, wish more humanities courses. We have built
one of the most advanced centers for lifelong learning in nation – GLC.

• Considering all the broad issues, it is clear the universities that are innovative in all they
do will win. Old days of “open wide, here it comes” education are over. Need to offer
options that can be blended together to create an educational experience that may be
different to some extent for each student. Will come in part from the curriculum and in
part from the co-curricular experiences that residential campuses offer. At Georgia Tech:
  o Changing the new curriculum in our College of Computing: “Threads” tie
computer science theory to practical application in broader world; “roles”
envision career opportunities.
  o New interdisciplinary degree offerings such as “human-computer interface,”
digital media, systems biology, bioinformatics.
  o Options to delve into the innovative process – TIGER; internships in our
incubator.
  o Outside of the classroom we offer leadership programs, independent research,
study abroad, co-operative learning and a range of opportunities for creative
expression (music, poetry, athletics).

• This approach to learning opens new career opportunities for engineering and science
students outside of the traditional. Recent survey of top professional schools (medicine,
law, business): GT is one of top suppliers they look to. And the new approach is fun!!
• Universities must conduct research in new ways – attract creative people into a focused environment that encourages cross-disciplinary collaboration. Place the highest priority on this at GT. Eg, our centers of excellence – photonics, nanomedicine, photovoltaics, electronic packaging, systems biology and nanotechnology to name a few. (Building world class nanotechnology research center with unique characteristics). In nanomedicine – partnership with Emory is an important concept!

• Research is well-spring for innovation that drives high-end economic growth; universities need to use new models for commercialization. Here at GT we have a full complement of tools – VentureLab, Advanced Technology Development Center, and Technology Enterprise Park. Each designed to seek investments and move ideas to market rapidly.
  - Aggressive use of Bayh-Dole Amendment = federal law that allows universities to take ownership of intellectual property created through federally funded research
  - Our incubator, ATDC, is always full and we have spun off 76 new companies from GT alone in past decade. Connects venture capitalists with companies.
  - Example: CardioMEMS. Collaboration between Mark Allen, electrical engineer, and cardiologist from hospital in Cleveland. MEMS = micro-electro-mechanical systems (interdisciplinary to begin with). Sensor for jet engines on drones; readings to ground by radio waves. Developed microscopic sensor to plant in human body, monitor cardiovascular problems, send reading out by radiowaves. Replaces CT-scan, which uses dye in repeated use damages kidneys. First sensor now coming into use; already implanted in over 100 people.
  - External recognition – among top five in R&D for schools without medical school, second in R&D in engineering, top ten in nation in patents for a university and recently named by Milken Institute as among top ten in world in biotech startups.

• Being an international player
  - Friedman: “The world is flat.” Richard Florida: “No, the world is spiky.” Friedman right – technology research, skilled workforces, markets now spread around the globe, not just in U.S. Florida right – Innovation is a hands-on activity that tends to happen at particular geographic “hot spots,” whether Silicon Valley, Shanghai, or Bangalore, based on where the talent is.
  - Florida’s spikes centered on communities that have world-class research universities at their heart, venture capital, friendly policy climate, critical mass of high-tech industry and its suppliers.
  - Research universities that collaborate around globe will connect the spikes and become important force on leading edge of innovation.
  - GT: Metz, Singapore; Ireland; others in the making. Invited to be there by local universities, government, industry – ability to forge collaborative relationships.
  - One of best compliments GT ever got: Tom Friedman: we know how to operate in the flat world.
Recent report from the National Science Foundation: “The big winners in the increasingly fierce global competition for supremacy will not be those who simply make commodities faster and cheaper than the competition. They will be those who develop talent, techniques, and tools so advanced that there is no competition.” This applies equally well to companies, countries and universities.

- This is GT’s challenge and aspiration.
- At core, innovation is quest to make the world better. Dynamic search for imaginative new ways to cure disease and deliver healthcare, to make us more secure, to develop new environmentally friendly energy sources, to assure plentiful supplies of fresh water, and to improve the quality of life for all of the people and creatures that inhabit our world.