Building an innovation economy

Dr. G. Wayne Clough

President, Georgia Institute of Technology

Georgia Economic Development Department Board

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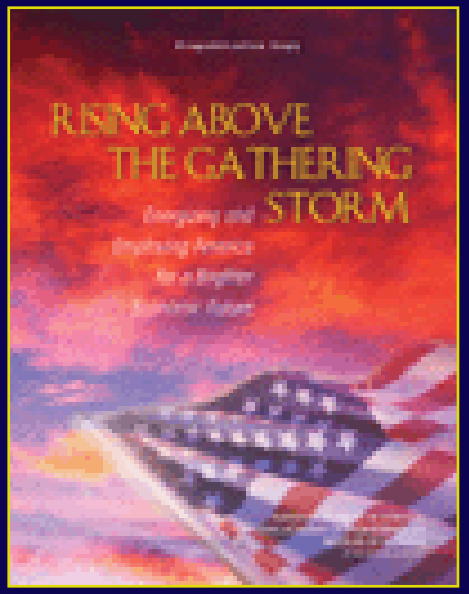
The United States must learn to compete in a world in which…

- The largest technological workforces reside in other nations.
- We generate only one of four or five major inventions.
- Our wages and health care costs are higher than our global competitors.
- The domestic market we offer is very small in size compared to Asia.



"The scientific and technical building blocks of our economic leadership are eroding at a time when other nations are gathering strength…

We fear the abruptness with which a lead in science and technology can be lost – and the difficulty of recovering a lead once lost, if indeed it can be regained at all."

Rising Above the Gathering Storm
The National Academies

"The National Innovation Initiative defines innovation as the intersection of invention and insight, leading to the creation of social and economic value."

InnovateAmerica
NII report, December 2004

Innovation puts the discoveries and inventions of science and technology to work to solve problems, address society's needs, meet market demands, and even create new markets. It is a social activity that emerges from interdisciplinary conversation and collaboration.

Purpose of the NII

- Brought together 400 of America's top minds on innovation.
- Sharpened our understanding of how the innovation process is changing and how it can be harnessed for economic growth.
- Advocated a strategic action agenda to create a fertile environment for innovation that respects the right and values the participation of other nations in this space.

Characteristics of an innovation leader

- Large corps of scientists and engineers
- Flexible and skilled workforce
- Strong investment in R&D
- Reliable utilities and infrastructure
- Policies that support and value innovation
- Competitive tax and investment climate
- Trade agreements and IP protection that provide a level international playing field

The resources for innovation

- Talent, the human dimension

- Investment, the financial dimension

- Infrastructure, the physical/policy dimension

"We came to India for the costs, we stayed for the quality, and now we're investing for the innovation."

Dan Scheinman, Senior VP, Cisco

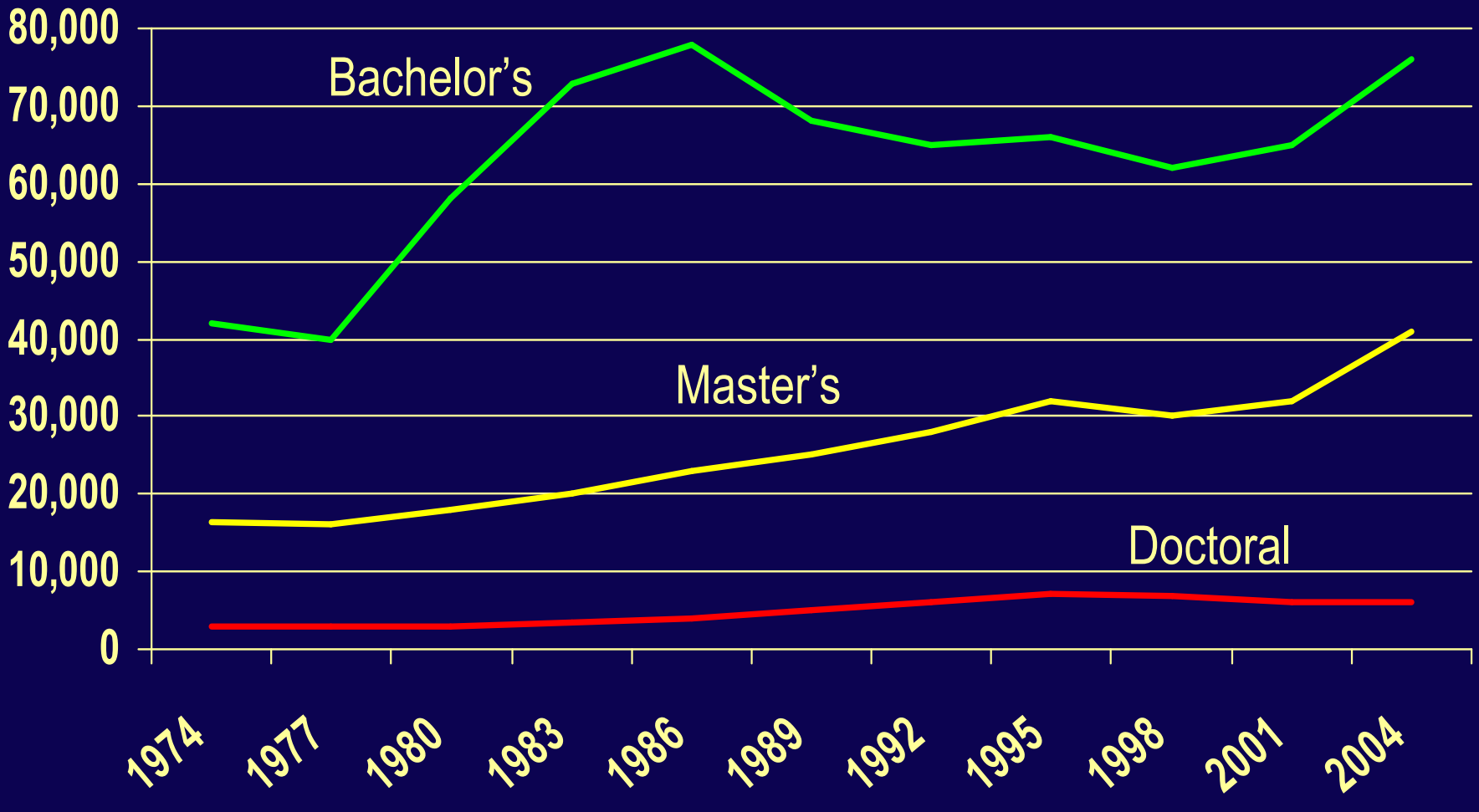
Human capital concerns

- China graduated 351,500 engineers last year, India 200,000, the United States 72,900.*
- Visa restrictions, “deemed exports” stifle flow of international students to U.S.
- Women, minorities are under-represented in science and engineering.
- Creative disruption increasingly displaces workers, requiring career changes.

* *Christian Science Monitor* December 20, 2005

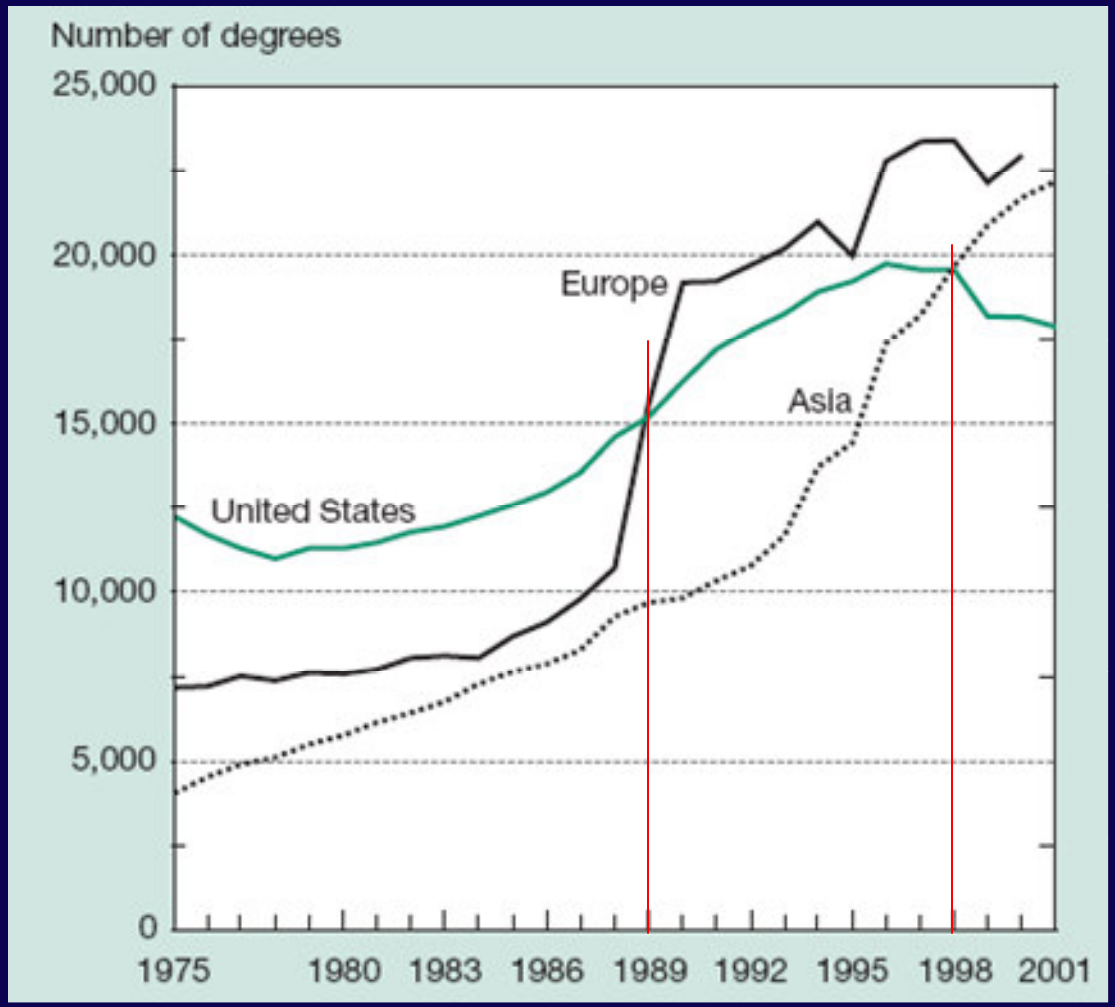
U.S. engineering degrees

1974-2004



American Association of Engineering Societies 2004

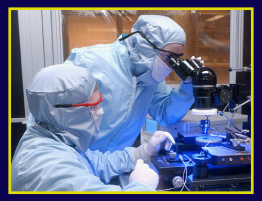
U.S. outstripped in science & engineering doctorates



NSF Science & Engineering Indicators 2004

Talent: NII Recommendations

- Build the base of scientists and engineers:
  - Graduate fellowship programs
  - Attract best talent from around the world
- Catalyze the next generation of innovators:
  - Internships for students with start-up companies and small businesses
- Empower workers to succeed in the global economy:
  - Lifelong learning opportunities
  - Health benefit and pension portability



Research portfolio needs work

- Overall federal research funding declined from 2% of the GDP in the mid-1960s to less than 1% today.
- Research funding for the physical sciences and engineering has lagged compared to funding for the life sciences.
- Budget deficits, wars in Iraq and Afghanistan have strained resources, requiring higher level of coordination among government, industry and higher education.

Refocusing capital investment

- Venture capital concentrated in regional pockets; not widely distributed.
- Need for more innovation “hot spots” based on regional economic clusters.
- Markets emphasize short-term returns, low risk; innovation requires long view, risk tolerance.

Investment: NII recommendations

- Revitalize and balance research investment.
- Energize the entrepreneurial economy:
  - Coordinate economic development policies to promote innovation.
  - Build regional “hot spots.”
- Reinforce risk-taking and long-term investment in the financial markets.

Infrastructure falls behind

- The U.S. has fallen to 13th place in the global rankings for broadband Internet usage and is the only industrialized nation without an explicit national policy to promote broadband access.*
- The patents process needs to be modernized for speed, searchability, and greater focus on quality.
- Nationwide systems such as health care suffer from high cost, low productivity, limited coverage.

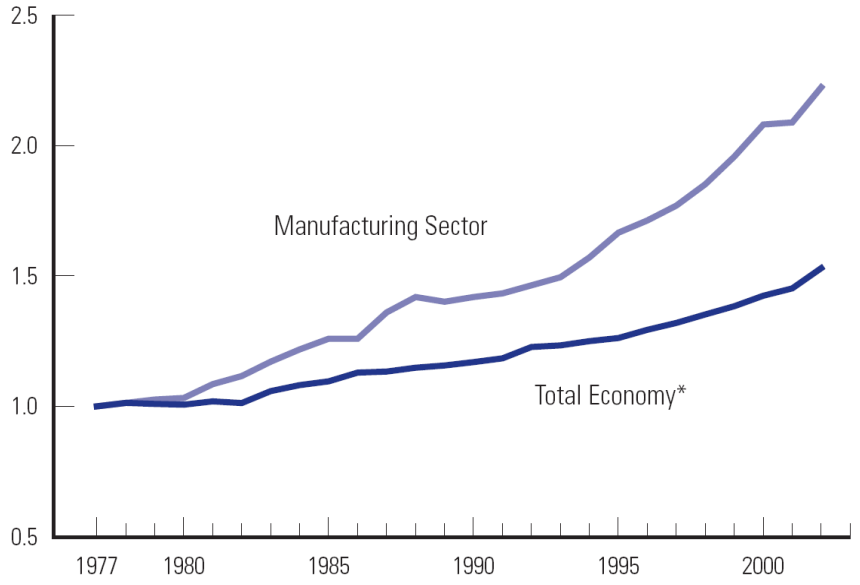
* *Foreign Affairs*, May 2005

Helping manufacturing compete

- Need to bring new manufacturing technologies more rapidly into the production cycle.
- Shifts in manufacturing model:
  - From mass production toward customization
  - From centralized to distributed production
  - From centralized control to collaborative relationships between distributed sites
- Manufacturers who are innovating have higher growth, profitability, and productivity rates.

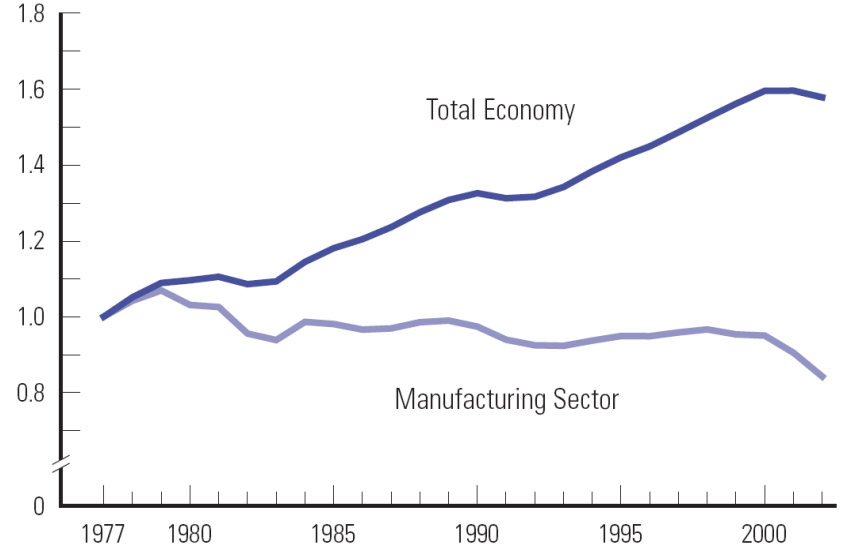
Improving productivity shrinks the manufacturing workforce

U.S. Productivity (1977-2002)



* Excludes government and agricultural sectors.
Index: 1977 = 1.0
Source: U.S. Department of Labor, Bureau of Labor Statistics.

U.S. Employment Growth (1977-2002)



Index: 1977 = 1.0
Source: U.S. Department of Labor, Bureau of Labor Statistics.

NOTE: Manufacturing's contribution to real private output growth has remained roughly the same since 1977.

"More than 80 percent of respondents indicated that improved quality, increased variety of products and services, increased market share, and increased production capacity were relevant impacts from the introduction of innovation."

Georgia Manufacturing Survey, 2005

Innovation metrics

- Markets focus on 20th century measures of value (land, facilities, equipment, etc.) but innovation relies on intangible human and intellectual assets.
- 2003 Accenture global CEO survey:
  - 49% believe intangible assets are the primary source of wealth creation for their company.
  - 5% have metrics to measure intangible assets.

Infrastructure: NII recommendations

- Bring intellectual property policies and the patenting process into the 21st century.
- Strengthen U.S. manufacturing capacity.
- Develop new metrics to measure and manage innovation.
- Address national systems like health care.
- Create best practices/awards programs to recognize and promote innovation.

Implementing NII recommendations

- Engaging Congress:
  - Omnibus legislation to address recommendations sponsored by Senators Lieberman and Ensign
  - Meetings with Senators and Representatives
  - Innovation Day on Capitol Hill July 20
- Engaging the federal government:
  - Department of Labor
  - Department of Commerce
  - Department of Energy
  - National Science Foundation

Implementing NII recommendations

- Engaging communities:
  - National Summit on Regional Innovation
  - Regional summits: Atlanta hosted the first one in October
- Global innovation
  - European Union summit, The Hague
  - Japan

President joins the effort with the American Competitiveness Initiative

- Double federal research funds for physical sciences over next 10 years.
- Permanent R&D tax credit for private-sector technology initiatives.
- Strengthen math and science education: prepare 70,000 HS teachers to teach AP courses; bring 30,000 professionals into classrooms.

"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."

Ensuring Manufacturing Strength through Bold Vision
National Science Foundation report

How states are responding

- **California**
  - Committed over $3 billion to stem cell research.
  - Provided over $500 million in seed funding for biotechnology initiatives.
- **Florida**
  - $30 million Technology Development Fund to create university-based centers of excellence at $10 million each.
  - $510 million to establish a branch of the Scripps Research Institute, expected to create over 6,500 high-tech jobs, inject $3.2 billion into state economy.

How states are responding

- **Massachusetts**
  - $600 million plan to boost innovation-related job growth.
  - $35 million in state funds to create the John Adams Innovation Institute to promote Boston's innovation economy.
- **Michigan**
  - $2 billion state fund proposed by governor to invest in cutting-edge technology businesses
  - SPARK, non-profit regional Ann Arbor collaboration created to attract high-tech companies, triple number of high-tech jobs over 5 years.

How states are responding

- **North Carolina**
  - $650 million over 5 years to grow state's biotech industry to 48,000 jobs by 2013, 125,000 jobs by 2023.
  - $65.4 million parallel private sector commitment for statewide network of biomanufacturing training centers.
  - $3.1 billion in bonds for university system facilities.
- **Washington**
  - $1 billion state Life Sciences Discovery Fund to provide grants for promising university research in bioscience.
  - Goal is creating 20,000 new jobs over next decade.

How does Atlanta/Georgia stack up?

- Strengths
  - Leading industries in logistics, telecommunications, manufacturing, software, transportation
  - Headquarters for significant number of large corporations (Coca-Cola, Home Depot, UPS)
  - Quality of life, location, climate
  - Large number of colleges and universities
- Weaknesses
  - Not a recognized leader in innovation, science, technology industries
  - No national R&D lab; low level of industry R&D activity
  - Low rate of venture capital investments
  - Lack of business development incentives

Attributes of strong regional economies

- Significant investment/support for research universities
- Significant public/private investment in emerging industries
- Favorable regulatory environment and incentives that encourage growth
- Strong leaders in industry, education, and politics
- Marketing initiatives and support that can impact public support
- Interconnected partnerships and alliances
- Strong companies committed to regional growth and development

Top economically performing regions

Top Economically Performing Regions Highlighted Regions Show Strong Correlation b/w GMP & Federal S&E Awards				
Rank	Region	GMP Per Capita	Region	Federal S&E Awards
1	Boston	$67,861	Baltimore	$1,415,000
2	Raleigh Durham	$54,556	Los Angeles/Orange County	$1,019,000
3	San Francisco/Oakland	$52,549	San Francisco/Oakland	$1,018,000
4	Dallas	$49,837	New York/Nassau/Newark	$895,000
5	Washington DC-MD-VA-WV	$49,339	Boston	$843,000
6	San Jose	$47,146	Raleigh/Durham	$773,000
7	Denver	$46,805	San Diego	$603,000
8	San Diego	$45,845	Seattle	$577,000
9	Los Angeles/Orange County	$45,659	Detroit	$561,000
10	Minneapolis-St Paul, MN-WI	$45,473	Houston	$541,000
11	Seattle	$41,197	Denver	$500,000
12	Cleveland	$40,733	Chicago	$494,000
13	Houston	$40,421	Pittsburg	$488,000
14	Chicago	$40,227	Philadelphia	$480,000
15	**Atlanta**	$40,195	Madison	$394,000
16	Phoenix	$39,700	St. Louis	$381,000
17	New York/Nassau/Newark	$39,120	**Atlanta**	$338,000
18	Tampa-St Petersburg	$38,439	Cincinnati	$336,000
19	Detroit	$36,316	New Haven	$334,000
20	Philadelphia	$35,593	Minneapolis-St Paul, MN-WI	$327,000

Major Georgia initiatives
driving high-end economic growth

- Georgia Research Alliance
  - $400 million in state funds has attracted over $2 billion from non-state sources.
  - Georgia now ranks 7th in the infrastructure it takes to start new companies.
- Georgia Cancer Coalition
  - $235 million since FY 2001.
  - Building state's reputation as cancer center.
- Broadband design initiative
  - Pirelli moves North American broadband headquarters to Technology Square.
  - Samsung opens major broadband lab at Tech Square.

Georgia Tech: Institute profile

- 17,100 students
  - 11,800 undergraduates, 5,300 graduate students
  - Added 4,150 students during past 10 years
  - One-third of undergraduates study abroad
  - 40% of undergraduates engage in structured research
- 923 academic faculty; 955 research faculty; 185 post-doctoral fellows
  - 115 endowed chairs, professorships
  - 30 members of the National Academies
  - 101 NSF CAREER Awards, PECASE Awards (2nd in nation)
- 4 campuses on 3 continents
  - Atlanta, Savannah
  - France
  - Singapore
  - Shanghai?

Georgia Tech: Institute profile

- Among the nation's top 10 public universities for past 7 years
- Among the nation's top 5 engineering programs
- Nationally ranked computing, architecture, management, and selected science and liberal arts programs
- Among nation's top 5 public universities in average SAT score for incoming freshmen
- No. 2 among public universities in number of National Merit and National Achievement Scholars
- Nation's largest engineering program; national leader in graduating minority and women engineers
- Among nation's top 35 universities in research volume
  - $357 million in awards; $425 million in expenditures for FY 2005
  - 16 national centers of excellence
  - Over 300 invention disclosures filed during FY 2005

Georgia Tech: Institute profile

- Created in 1885 with an economic development mission
- Georgia Tech Enterprise Innovation Institute
  - Entrepreneurship Services: includes Advanced Technology Development Center (ATDC), which manages 5 incubators, state seed funds.
  - Commercialization Services, which evaluates discoveries from GT labs, develops a commercialization plan, develops start-up companies to the point of incubation.
  - Business and Industry Services (formerly EDI), which provides technical support to small and mid-sized businesses through 17 offices around the state.
- Georgia Tech Research Institute
  - Applied research focus, $100 million + in research annually
  - Over 1,000 employees; 10 U.S. locations + Ireland

Economic impact: GT alumni

- Georgia Tech graduates more engineers than any other university in the nation, plus a significant number of architects, business managers, and scientists.
- Annually Georgia Tech Awards:
  - Over 2,500 bachelor's degrees
  - Nearly 1,400 master's degrees
  - Over 300 Ph.D.s
- More than half remain in the state, earning an annual combined salary of $111 million and paying nearly $7 million in state taxes.
- Georgia Tech supports its alumni throughout their careers with professional education.
- Georgians with bachelor's degrees earn more than twice as much as those with high school diplomas; Georgians with graduate degrees earn more than three times as much as those with high school diplomas.

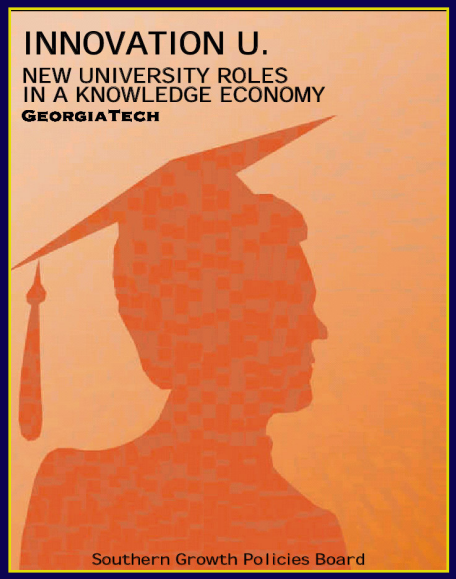
Economic impact: GT Enterprise Innovation Institute

- In FY 2004 ATDC member companies:
  - Employed more than 5,5000
  - Had annual revenues of over $1.7 billion
  - Attracted nearly $117 million in venture capital
  - Delivered a 6.8% return on investment
- In FY 2004 Business & Industry Services led to:
  - 11,750 jobs created or saved
  - $8.1 million in operating cost savings
  - $500 million in new or saved company sales, government contracts

Economic impact: technology transfer

Georgia Tech's Office of Technology Licensing highlights

Tech transfer measure	2001	2002	2003	2004	2005
Start-up companies formed	8	7	10	15	9
Invention, software disclosures	141	188	226	277	324
U.S. patents issued	35	40	41	35	43
Software licenses executed	16	39	37	22	25
Invention licenses executive	13	25	28	35	34
Licensing income (in millions)	$4.6	$2.24	$2.4	$2.3	$3.9



"Virtually every combination of industry relationship or economic development activity can be found at Georgia Tech, and in a very real sense the school is an operating partner with Georgia state government…. **Perhaps more than any other research university in North America, economic development is an integral, critical component of the mission of the Georgia Institute of Technology,** and this has been true from its very inception."

Southern Growth Policies Board
Innovation U study