

REMARKS BY GEORGIA TECH PRESIDENT G. WAYNE CLOUGH
National University of Singapore, September 4, 1999

I am honored to be here at the National University of Singapore to congratulate you and join with you in celebrating the 30th anniversary of your school of engineering. Georgia Tech is proud to be a partner with the National University of Singapore in creating the Logistics Institute-Asia, and we are pleased to have this opportunity to learn to know you better.

Your senior minister, Lee Kuan Yew, has compared Singapore to “a man on a flying trapeze who has let go of one swing and is now sailing through the air.” And that is a wonderful image to describe this nation. You are small, with few natural resources by the traditional definition – no land, forests, ores or minerals to serve as your economic anchor. But you have built a thriving economy based on shipping, trading and adding value to goods from other places. Like the trapeze artist, your strength is in nimble and finely-tuned movement.

The ability to refine and move goods will be crucial in the world economy of the next century; it will be the economic wealth of the future. Singapore is positioned to be a leader in the logistics of doing that, and engineers will be the people who make it happen.

We engineers look to the future. We are always trying to make a better mousetrap or a better microchip. But today, before we look to the future, I want to spend a few minutes looking to the past. Winston Churchill once said, “The farther back you look, the farther forward you are likely to see.” So I’d like to start by looking far back, because I believe it will help us to see ahead.

There are many in the United States who consider the idea of a global economy to be something new that has emerged with the past few decades. But in Singapore, you know that the global economy has been around for centuries. Your history is written in the milestones of ocean-going trade.

A thousand years ago, the early settlers in Sea Town on the south coast of Singapore were fishermen and traders. Marco Polo came by here on his world travels in the late 1200’s. Then came the traffic of the Chinese cargo ships from Canton and the Portuguese, British and Dutch schooners from Europe. In 1819, Sir Thomas Stamford Raffles made Singapore a free port, and your harbor soon bristled with the tall masts of sailing ships. International cargo to and from Southeast Asia has passed through this port for centuries.

The invention of the steamship and the opening of the Suez Canal to provide a short cut between Asia and Europe, also had a significant impact on your economic development. Today Singapore floats a merchant fleet of 400 freighters, bulk carriers and tankers. And you rank among the top 20 ports in the world by volume of both imports and exports.

Of course, the invention of the airplane revolutionized international passenger travel. Eight hundred years ago, it took Marco Polo 24 years to travel from Italy to China and back. By comparison, it took me less than a day to get from Georgia to Singapore. But 95 percent of the world’s cargo still moves by ship, just as it has for hundreds of years, and it will continue to be water borne for the foreseeable future.

What has changed is the volume, speed and complexity of it. Political and economic barriers to trade have been coming down, and new markets are opening around the globe. Corporate giants used to be the importers and exporters. Today companies of all sizes are active on the international market, and small entrepreneurial firms are among the liveliest traders. And the speed of everything has gotten faster.

Something else that has changed commerce, and changed it dramatically, is communications. When Marco Polo finally got back to Italy after a quarter-century of travel, he wrote a book called "Description of the World." In it, he outlined the many amazing innovations he had seen – a postal system that used a network of courier stations with horseback riders relaying messages between them; the mining of coal and its use as fuel; the use of paper money.

But none of them were adopted in Europe, because nobody read his book. The European printing press had not yet been invented, and copies of the book had to be made by hand. Moveable type was already in use in China at the time, but because communication was so minimal, no one in Europe knew about it. Another 140 years went by before the printing press was invented independently in Europe.

Prior to the 20th century, poor communication meant that inventors worked in isolation, without the benefit of exchanging ideas with others who were working on the same things. Once they invented something, the news of it was slow to travel. And until the factories of the industrial age, commercialization of inventions was even slower than the news of them.

Four thousand years elapsed between the invention of the wheel and the appearance of the wheelbarrow, and it took another century to get from the wheelbarrow to the four-wheeled wagon. Paper took a thousand years to get from China to Europe. The electrical storage battery was invented in 1796, but 50 years later only a handful of scientists knew that it existed. And it took 100 years to get from the wet-cell battery to the dry-cell battery, because inventors worked independently and their progress was not shared.

Today, information shoots around the globe at the speed of light by satellite and fiberoptic cables, and the Internet tells us more than we ever wanted to know. The old analog broadcasting technology has been replaced by digital signals, opening a wide range of wireless communication opportunities. New inventions abound, and they are turned into products faster than you can say "commercialization."

The American computer company Hewlett-Packard says that 60 percent of its sales come from products developed in the past two years. IBM has recently begun to measure the life of its products in "web months." One web month is equal to three calendar months. That's four potential product cycles just in the course of one year. I'm sure your electronics companies here in Singapore are having the same kind of experience.

Information technology is also changing the way we do business. Electronic commerce is racing forward at high speed, creating new challenges for logistical centers like Singapore. For example, by the end of the year the Asia Travel Network plans to increase its Internet wholesale

offerings from 5,000 products from 54 countries to 15,000 products from over 100 countries. And many of those products will probably come through Singapore if they are not made in Singapore.

Thirty-thousand small retail companies now sell products over the Internet, up from 200 in 1996. By the year 2003, the number of small retail companies on the Internet is expected to reach 400,000.

It only takes a few keystrokes to send orders and money anywhere in the world. But the rapid growth in electronic commerce will be a nightmare for those who actually have to ship the goods unless they have good logistics programs and good engineers.

Information technology also means that engineers of all kinds are finding ways to collaborate through computer systems and networks. The creation of the Boeing 777 is an example of how industry is changing as a result. This airplane has 132,500 uniquely engineered parts that were designed and manufactured by hundreds of suppliers in 12 different nations. But no full-scale model of the plane was ever assembled to make sure all of these disparate parts would fit. Designers from the 12 companies around the world shared design components over the Internet and Boeing put them together. The plane was built and flown in record time.

The talent and knowledge base that makes all of these things happen is engineering, which has a long history of its own. If you define engineering as solving technical problems in creative and practical ways, then the first engineer known by name was Imhotep, who built the Step Pyramid in Egypt in 2550 B.C. And a Roman named Vitruvius wrote the first engineering text in the first century A.D. It was a 10-volume work that covered building materials, construction methods, hydraulics, measurement, and town planning.

But the first to actually be called engineers were the military specialists of the Middle Ages. They designed and built catapults, floating bridges, assault towers and other machines that were called war “engines” and gave engineers their name. The first modern engineering discipline emerged from this context in the mid-18th century, and the term “civil” engineering was coined to refer to these civilians who designed and built bridges, large public buildings, water systems and the like.

More disciplines have emerged at a faster pace during the latter part of the 20th century, and some of the newer disciplines – like systems engineering and bioengineering – cross several traditional disciplines.

Engineering by its broadest definition has always been important, because it has always helped to move society forward and to solve the problems. Here in Singapore engineers have designed your oil refineries and helped create your electronics and biotechnology firms. But this traditional role is changing.

The new entrepreneurial culture that is expressing itself in both traditional and electronic commerce is one of continuous motion and continuous change. Today’s engineers must not only be technically competent, but also flexible, adaptable, perceptive about the global economy and

able to communicate their ideas. Singapore is the perfect place for engineering students to become globally aware and to see engineering in this larger context.

In the rapid pace of today's economy, engineers need a high level of nimbleness in responding to change in the world around us. With your ability to coordinate and orchestrate commerce in a smooth and organized way, Singapore is a wonderful place to demonstrate and teach that skill.

This university, with its engineering school, is uniquely equipped to help Singapore prosper in the economy of the 21st century. Georgia Tech is pleased to have the opportunity to work with you as a partner in the Logistics Institute –Asia, which we hope will be a resource to help Singapore move into even greater commercial prominence.

When you decided 30 years ago to establish an engineering school in this special commercial environment, it was more than a good educational decision. It was a wise and important economic investment that will continue to serve you well and contribute to your economic strength and success.

Congratulations on your 30th anniversary! We at Georgia Tech look forward to learning to know you better and to working more closely with you in the future.