Tech's POWs

- Entrepreneurs on Rules of the Game
- Tom Peters' Business Odyssey
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Entrepreneurship 101
Drawing from years of experience, seven Tech entrepreneurs discuss the rules of the game for business start-ups and reminisce about creating their companies.
By Gary Goettling

Tech's POWs
Vietnam prisoners of war recount the pain of their captivity on the 30th anniversary of the raid on the Son Tay prison camp.
By Kimberly Link-Wills

Formula for Success
It is all about high-tech computer design and low-tech grease under the fingernails.
By Neil B. McGahee

2001: A Business Odyssey with Tom Peters
A wired Tom Peters — business guru and author of best-selling books — says executives have to remain distinct to avoid becoming extinct.
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Rainy Day Blues

Cover: The North Vietnamese re-enacted Tech alumnus Wayne Waddell’s capture for German photographer Thomas Billhardt in 1967. See page 44.
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Kudzu's Reprieve

Relative to the article "Kudzu Killer" (Fall 2000 GEORGIA TECH ALUMNI MAGAZINE), please advise if there is any commercial source for the referenced strain of fungus that might be used on our farm to eradicate 10 acres of kudzu infestation.

Robert Jinright, Arch 53 Thomasville, Ga.

Jeremy Farris, a Tech freshman and President’s Scholar, says he has no immediate plans for commercial production of the kudzu killer fungus that he isolated as part of a high school science project. "I plan to finish my studies at Tech," he says. "Then I'll work on developing the fungus." Since kudzu can grow at a rate of up to 60 feet per year, and you have 10 acres, please don't stand still, Mr. Jinright.

Cage Kudzu

Your kudzu story is timely in that the October issue of Smithsonian coincidentally had a generous feature on this "plague," which nonetheless shaped our childhood imaginations as natives (and 50-year residents) of Georgia until IBM brought us to Dallas in 1983.

People west of the Mississippi are skeptical, although we have at least one columnist who periodically gives a "kudzu invasion report" — "kudzu is rumored to have been seen at the corner of..." etc. Kudzu lore is received with incredulous smirks, as if you were fabricating tales of mythical beasts in a long ago time and faraway place. You have to see it to believe it.

I personally would hate to see it eradicated altogether. Controlled perhaps — maybe contained in a KudZoo somewhere?

Harriet S. Kelley
Dallas, Texas

Continued on page 6

Stay Connected via the Web

The days of the calendar fly by. At the end of 2000 — an astonishing year in so many respects — I'd like to look at evolving opportunities on the electronic frontier. Our best and most productive focus is on the future. We continue to build the Alumni Association to be a relevant and desirable part of your life.

Along those lines, we have a couple of electronic services you should consider using, if you're not already doing so.

The first is a monthly e-mail about Tech called BUZZwords. Recently updated, the first "new" BUZZwords came out this month. Only about 10 percent of our alumni population are currently subscribing. It's an excellent way to interact with Tech and the Alumni Association. So give it a shot — go to the Web site www.gtalumni.org and sign up.

The second cool way to connect with Tech is our new Web portal — MyGTHome. As you know, portals serve as your window to the Net. You can customize the features to your own liking. It has news, weather, sports, a Web-based e-mail service and, of course, (to borrow a phrase from one of our great alumni) "lots of really good Yellow Jacket stuff." The picture of the month is something to see.

Like any business, we have limited resources, so it's imperative that we make the best use of them. That's why we depend on you to tell us what's important. And you do so in a lot of ways — whether through answering formal market research, attending our events, joining our clubs, volunteering for us, using our services, or writing and calling us.

Please continue to do so. It's easier than ever to contact us using e-mail, our Web site, calling 1-800-482-5867 or writing to us at the Alumni/Faculty House.

Our sincere thanks for your support in the year 2000.

Joseph P. Irwin
Executive Director
Georgia Tech Alumni Association
Politics & Technology

In the article "Politics & Technology" in the Fall 2000 issue, political science professor Georgia Persons said the greatest impact technology could have on election campaigns is transforming the way people physically vote — and the technology to do that already exists.

After all the hoopla about chads, dimples and mangled ballots in the Florida ballot count, recount and appeal, it is definitely time to put new and improved election technology into use. Let's hope future elections are without either chads or lawyers.

Terry Hicks, Cls 72
Hampton, Ga.

First-Class Experience

I have very warm memories of 60 years ago when I graduated from Georgia Tech. After the ceremony, we were out in front of the Naval Armory saying goodbyes to classmates who would soon scatter in all directions. (One of my invited guests was a girl from Agnes Scott named Nina Broughton. Next year we will celebrate our 60th wedding anniversary.)

There were a couple of us who had been close friends all through school, and we promised that we would meet here again in 50 years. Well, even though we had been through wars and health problems and traffic on Atlanta's freeways, we did all meet at the 50th reunion, and we had a wonderful time.

Now, 10 years later, I am the only one left from that group.

Suddenly, you realize you are old — and you know you are when you are packing to go on a trip and it takes you longer to pack your pills and other medications than it does your clothes.

The organizers and staff of Homecoming 2000 deserve a star rating. The events were great, and the food was absolutely first class. And Tech really has a bevy of pretty, young gals — which was missing in the 1940s.

Thanks to all who put the events together, and to the football team for a great win over Wake Forest. It was a great couple of days for an old man and his Agnes Scott wife.

John G. Gaines, ChE 40
Prairie Village, Kan.

Sorry, No Hot Dogs

I worked with Tom Gordy, a PhD, at General Electric in Massachusetts in the 1960s. He was from Georgia. Is there any connection between him and your "Gordy Room"?

John Home
Shenandoah, Va.

There is no connection that we can determine. The Gordy Room in the Wardlaw Center is named for the late Frank Gordy, Cls 27, founder of Atlanta's Varsity, which became the world's largest drive-in restaurant. Gordy died in 1983, and his widow, Evelyn Gordy Rankin, made a $1 million contribution to Georgia Tech's Centennial Campaign for the Gordy Room.

At the dedication of the room, which can be used for dining, it was jokingly agreed that any food could be served in the facility except hot dogs. The Varsity has a lock on those.

Strikeout

The article on lightning strikes in the Fall 2000 alumni magazine was well written, but Michael Faraday's name was misspelled. We're an engineering school and, given that, we're supposed to know about these things.

Neale C. Hightower Sr.,
EE 69, MS EE 70
Stone Mountain, Ga.

Order of Eggs, Hold the Cholesterol

I loved the article on the Waffle House in the fall alumni magazine, but I was disappointed I could not find the company's e-mail address. They need to stock up on heart patient chow. Egg Beaters, a non-cholesterol egg concoction, is not bad. I have to have just plain grits at the Waffle House without it. There are millions of old geezers who want it. Most persuasive argument: Huddle House has it.

Preston Stevens Jr.,
Arch 52
Atlanta

A good Waffle House e-mail address is marketing@wafflehouse.com.

We Want to Hear From You

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Three-Peat!

Yellow Jackets collar dogs for third straight time in 27-15 Athens triumph
TechNotes

Peach Bowl-bound Georgia Tech combined a dazzling first-half offense with a stout-hearted defense to defeat arch-rival Georgia 27-15 "between the hedges" in Athens.

It was the first time the Yellow Jackets had won three straight over the Bulldogs since 1961-63. It was also the first time since 1996 that the outcome of the game wasn’t decided in the final minute. Junior quarterback George Godsey, who scrambled into the end zone for Tech's first touchdown, directed a balanced Tech attack to a 27-3 halftime lead, and big plays by the defense kept Georgia from ever threatening.

75 Years Ago
Permanent copper plates were made of Georgia Tech's already famous Rambling Wreck fight song and its alma mater "in order to keep them exactly as they are now for future days."

50 Years Ago
The female student body of exclusive Stephens College in Columbia, Mo., chose Georgia Tech as its favorite men's college in 1951. The Georgia Tech student council promptly invited the women to visit the campus. The next year, Tech became co-educational, admitting two female students.

25 Years Ago
Students in Techwood Dorm earned a place in the Guinness Book of Records for the longest, continuous Monopoly game ever played. The Monopoly marathon, which lasted 1,176 hours, began on Jan. 22, 1976, and continued through March 11.
Disaster Drama

New technologies developed at Tech help emergency teams deal with chemical, biological hazards

By Maria M. Lameiras

In a Georgia Tech lab, a bottle containing a hazardous chemical overturned, creating a noxious cloud that hovered in the air and leaving three victims twitching on the floor.

Using hand-held devices developed by the Georgia Tech Research Institute that can “see” through walls and doors to detect and identify chemical and biological agents at an accident scene, emergency response teams from the Atlanta Fire Department and the Marine Corps’ Chemical-Biological Incident Response Force entered the building to rescue the victims and “sniff out” the source of the hazardous spill.

Just up the hill from the lab, dozens of Marine and Georgia Tech personnel sat in a large tent, drinking coffee while watching the drama unfold on television screens.

The mock disaster was an opportunity for the two teams to learn how they might work together during a chemical or biological accident and to test new technologies developed to aid response teams.

“Our goal is to experiment with technologies that help first responders cope with releases of chemical and biological agents and hazardous industrial chemicals,” says Tom Bevan, director of GTRI’s Center for Emergency Response Technology, Instruction and Policy.

Among the devices tested were the radar flashlight, which can detect if people are alive by sensing gross movement, heart rate or respiration through walls, doors or debris; the ChemBio Decision Aid, a chemical-biological device similar to an electronic checklist that provides a series of questions to help responders identify medical symptoms or appropriate triage for victims; and the Medical ReachBack System, a network of portable computers that transmits information to a server at a remote command post in order to relay information on chemical agents, plan emergency response or retrieve and send medical information.

Newer devices tested were the Optoelectronic Chemical/Biological Sensors, which can detect and identify chemical and biological agents at the scene of an accident.

Marine Col. Carlos Hollifield, commanding officer of CBIRF, says the new technology enhances the ability of teams like his to handle chemical and biological accidents with less hazard to team members.

“To take hand-held computers and other existing technologies and adapt them to use by first responders is very beneficial to our field,” Hollifield says.

The advanced technology experiment was part of Project Atlanta, a partnership between GTRI and the Marine Corps Warfighting Laboratory in Quantico, Va., to help national, state and local officials develop command and control procedures in case there is ever a chemical or biological disaster in a major urban center.
Tech on the Coast

Regional engineering initiative will have permanent $5 million home by 2004

Funding is being sought for a new $5 million facility to house the Georgia Tech Regional Engineering Program outside Savannah.

With Board of Regents support, GTREP will move from its current home in Savannah to a larger, 6,200-square-foot facility.

With only 60 students in its inaugural class, the program has grown to 210 students in less than 14 months. Facing a growing demand from both students and private enterprise, GTREP needed a new home.

“It was evident within the first nine months that we were growing rapidly. We expect that by 2019, we will have 2,500 undergraduate students and 300 graduate students in the program,” says David Frost, director of GTREP.

Continued growth is incorporated into the Regents' long-range plans for the new 170-acre facility.

When completed, the multi-building complex will incorporate educational facilities with incubator spaces and offices for private sector technology companies.

Budgeting may come in the state’s 2001 supplemental budget. The Savannah Economic Development Authority has already donated the land and pledged $2.5 million in infrastructure development.

Initially designed to meet private enterprise's growing need for qualified engineers, GTREP's overarching goal is to expand learning opportunities in engineering statewide.

Local Tech faculty teach junior- and senior-level courses and are supplemented by Tech faculty in Atlanta through distance learning.

Participants are eligible to receive a Georgia Tech undergraduate degree in either computer engineering or civil engineering while matriculating in southeast Georgia.

Chemistry Without Chemicals

Supercomputer takes research into fast lane

An IBM SP supercomputer — one of the best in the world — is allowing the newly opened Center for Computational Molecular Science and Technology at Georgia Tech to conduct research that would have been impossible before.

Georgia Tech theoretical chemists Rigoberto Hernandez (left) and David Sherrill (right) are using the computer to study protein folding, anti-cancer drugs, polymerization and molecules that are key to the vision process.

The $2.5 million supercomputer was acquired through a $1.25 million grant — and a huge price discount — from IBM.

Hernandez says the 72-processor supercomputer is ranked No. 331 on the list of the world's top 500 computers. The machine boasts 47 gigabytes of memory and 764 gigabytes of disk storage. The air conditioning required to cool the supercomputer is equal to that needed in a mid-size auditorium.

The supercomputer dramatically increases the speed at which simulations can be run. It can accomplish in a few hours what would have taken a week on smaller computer workstations.
Charitable Claustrophobia
Tech alum Rich Shertenlieb goes underground to raise Toys for Tots

By Maria M. Lameiras

The holidays are a time of year when we all are more apt to do something for charity — buy a toy, donate food, entomb yourself in a 4-by-6-foot box covered in 3 tons of concrete.

That last one sounds a bit extreme, but that's exactly what Atlanta radio personality Rich Shertenlieb, Cls 99, did in mid-November to solicit toys for the Marine Corps Toys for Tots program. Shertenlieb, known on air as Rich Shortersleeves, is associate producer for the Morning X radio program on WNNX 99.7 in Atlanta, where he is known for the outlandish stunts he orchestrates. An offhand comment during a show in early November ended with Shertenlieb spending 48 hours in a wooden box covered in a 3-ton layer of concrete in the parking lot of a local music store.

"There was a news story about a coal miner who had fallen into a mine shaft and was stuck in a fairly enclosed space for 48 hours," says the 24-year-old Shertenlieb. "I was joking around on the air and I said that would be cool, it would let me catch up on my sleep."

During a break, the idea was born to entomb Shertenlieb to benefit Toys for Tots. When the show went back on the air, the disc jockeys announced that Shertenlieb would be buried alive to collect 4,800 toys.

"The night after it went out on the air that I would do this, I really couldn't sleep. I woke up thinking I was in a box and I remember saying to myself, 'What have you gotten yourself into?'" Shertenlieb recalls.

In preparation, he consulted a hypnotist, a dietician and even a swami to teach him how to cope with the physical and mental challenges.

Meanwhile, the station worked with an engineering firm to construct a box that would hold Shertenlieb and not crumple under the weight of the concrete that would seal him in his crypt.

At 8:30 a.m. on Nov. 13, Shertenlieb crawled into what would be home for the next 48 hours. Within 30 hours, loyal listeners had met the goal and Shertenlieb was about to be released when he made the decision to stick out the rest of the 48 hours.

"It's like if you've ever gone on a long drive and you have to decide whether to pull over and spend the night at a hotel or go ahead and finish the drive," Shertenlieb says. "I figured I was in this and people were bringing toys, so I'd stay."

When bystanders — including Shertenlieb's father, Gary — and construction crews finally broke a hungry, tired Shertenlieb out, listeners and businesses had donated more than 12,000 toys.

Other than being overwhelmed by the number of toys raised, Shertenlieb says the most emotional moment came when a Marine gunnery sergeant unpinned from his uniform a medal he earned for valor in Beirut and presented it to Shertenlieb.

"It was one of those moments when you can't say anything because anything you could say would be inferior to the emotions you feel," Shertenlieb says.
Georgia Tech physicist Uzi Landman has won the 2000 Feynman Prize in Nanotechnology (Theoretical) for his pioneering work in computational materials science for nanostructures.

Such computer modeling provides insights into the nature and properties of matter at the nanoscale, and is essential in predicting what could be built at the molecular level, reducing time spent on expensive "wet" lab experiments.

"Suppose we are studying the behavior of certain molecules where they may undergo chemical reactions and cause an explosion," Landman says. "In the lab, this can be hazardous and difficult to achieve. In a computer simulation, nothing explodes — we can quantum mechanically describe the interaction and give detailed and accurate predictions about the outcomes of such processes."

The Feynman award recognizes the contributions, importance and potential of materials simulations in the development of the science and technology of nanoscale systems.

Landman, who holds degrees from the Weizmann Institute of Science and the Israel Institute of Technology, joined Tech's School of Physics in 1977. He is a Regents' and Institute professor and has held the Fuller E. Callaway Chair in Computational Materials Science since 1995.

"I started developing the methodologies of computer simulation when I joined Tech. At the time, no more than a handful of people in the whole country were involved in computer simulations and they were very simple compared to what we are doing today," Landman says.

Because it was such an unusual methodology of research, some traditional physicists argued his was "a very weird way of doing physics," Landman recalls.

"This recognition is a vindication of an idea that, 25 years ago, I believed would happen and it did."
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The final tallies are yet to be completed, but Georgia Tech is the clear winner in its five-year campaign to raise $600 million toward securing the future of the Institute as a technological and educational leader in the 21st century.

Tech President Wayne Clough says the phenomenally successful campaign will enable Tech to shape its destiny.

"I am grateful for the remarkable support our friends have given us through our successful capital campaign. Georgia Tech is a place of extraordinary aspirations and we are on the move like few other universities in the nation," Clough says. "Much of the campaign funding is already at work helping us fuel our momentum and I, like many others here on campus, are excited to be a part of the action."

The steady support of alumni and friends over the years of the campaign — buoyed by a last-days flurry of confirmed commitments to the effort — boosted the campaign well beyond its record $600 million goal, more than double the initial goal of $300 million, and brought the five-year effort to a spectacular end.

"What the final numbers will be, I really can't tell you," says Barrett Carson, vice president for development. "Until the books are closed and all the gifts bearing Dec. 31 postmarks are completed, we won’t have a fully clear picture."

The campaign’s success is the launching pad for fashioning Tech as a global power in technology education and technological innovation and leadership.

"Initially, the campaign will be measured in terms of the bottom right-hand corner of the balance sheet. Unfortunately, that is the easiest indicator of success," Carson says.

"But the campaign isn’t just about money. It’s about money well-invested for the future of Georgia Tech — in our faculty, in our students and in our facilities. It’s about stewardship of the funds invested, and about engaging the next generation of volunteer leadership."

The impact of 50 endowed chairs will not be felt for many years to come, but just one endowed chair can make you a world leader if it is held by the right person. Imagine the impact of 50," he says. "It took Georgia Tech 110 years to establish less than two dozen chairs and in five years we have established 50 more. That is a huge step for any university."

The campaign success will also change the physical face of Tech.

"The impact of campus facilities is currently only felt by the number of construction cranes and road closings and the lack of parking, but imagine the campus when these buildings have been completed," Carson says. "A four-building complex housing bioengineering, environmental sciences and molecular science, a new information technology complex, a new student athletic complex and the Fifth Street/Technology Square project. These buildings will be the tangible evidence of the campaign, but what goes on inside them is what will be important."

Carson also mentions the hundreds of outstanding students who will be drawn to Tech through the President’s Scholars program endowments raised by the campaign.

"Ultimately, this is simply a means to an end and not an end unto itself. Georgia Tech now has a destiny to shape the technical university of the 21st century and that doesn’t come cheap," Carson says. "That is an aspiration that carries with it significant responsibility. These gifts will help us get there, but we realize money alone cannot achieve those objectives. It has to be married to vision — venture capital, if you will. This Institute now has the whole world watching and no longer do we simply have to react, but it is now our role and responsibility to shape."
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Entrepreneurship 101

Rules of the game for business start-ups

By Gary Goettling
Photography by Caroline Joe

Entrepreneur and venture capitalist Ben J. Dyer, IE 70, tells a story about a man who approached his company for $6 million in start-up funds. There was only one catch. The would-be entrepreneur wouldn't disclose his business idea — it was a secret.

Dyer's visitor might have stood a chance had he known some of the basic rules of entrepreneurship and the way venture-capital firms operate. At the least, he should have known such lenders have too much stake in their reputations to steal ideas or spread gossip about some great innovation they've seen.

Long a tradition among Georgia Tech alumni, entrepreneurship is drawing even greater appeal as new technology brings new business opportunities. The attraction of starting and owning a business is also driven by the general economic climate in which company loyalty to employees, and vice versa, is unreliable.
“Never overestimate the amount of control you have over things. In any business venture, there is a certain amount of luck,” warns Ben Dyer, chairman of Intellimedia Commerce.
Commitment, determination, perseverance all exist in the entrepreneurial mind-set, says Bill Goodhew, IM 61, vice president of Intelligent Systems Corp. and chairman of Navision Software. “You have to keep on keeping on and never, never quit.”

Tapping into this interest and the need for more information about new business start-ups, Dyer joined seven other Tech alumni to talk about some of the basic information every potential entrepreneur should know. Their comments fall into five categories that might be called the “rules of the game.”

1 Cultivate an entrepreneurial attitude.

Perhaps the most important personal attribute of an entrepreneur is a consuming desire to start a business. On the face of it, that would seem obvious. The key term is “consuming desire,” for many people would like to start a business, but a much smaller number actually possesses the ambition to do it. The motives behind that desire vary with the individual — creative or financial independence are common reasons — but the overwhelming majority of successful start-ups owe their existence to individuals with an almost evangelical passion for their endeavors.

“There are groups of people who get together just because they want to start a business, even though they have no preconceived idea what kind of business,” says Andrew T. Hunt, PhD CerE 93, founder and CEO of MicroCoating Technologies. “In the beginning, even before they have a concept and a formal business plan, the most important thing is their drive and commitment to follow through.”

Hunt, who invented the thin-film deposition process his company provides, is the author or co-author of more than 35 patents, patent applications and technical publications in the field of thin-film technology.

Commitment, determination, perseverance — all the adjectives of a high work-ethic ideal — exist in the entrepreneurial mind-set, according to J. William “Bill” Goodhew, IM 61, vice president of Intelligent Systems Corp. and chairman of Navision Software.

“You have to keep on keeping on and never, never quit,” says the Southeastern Software Association’s 1990 Entrepreneur of the Year. Goodhew was also named that group’s Software Executive of the Decade in 1993.

Charles D. Menser Jr., IM 64, MS IM 66, seconds that observation.

“You need the tenacity to put up with a protracted term of disappointment,” says Menser, a co-franchisee of Waffle House restaurants in Arkansas, secretary-treasurer of A&M Leasing, which leases real and personal properties, and president of Dome Parking Co., which provides parking and industrial warehousing space. “Most every entrepreneur has a tremendous amount of sweat equity in the transaction. If you’re not willing to provide that work, you probably won’t be successful.”

Fear of failure thwarts many a business proposition, but successful entrepreneurs don’t let risk get in the way of their greater vision. They know that business ventures, as with everything else in life, come with bad times as well as good.

“Every entrepreneur has to be able to face and manage risk,” explains David M. McKenney, Phys 60, IE 64, president of the Georgia Tech Alumni Association board of trustees. As president of McKenney’s, an “old economy” family-owned heating, ventilation and air-conditioning contractor, he emphasizes the traits common to entrepreneurs in all fields.

“A long-term view is useful because it keeps your eye on the ultimate objective and you’re not distracted or bogged down by relatively minor issues,” he says.

A successful entrepreneur turned venture capitalist, Don L. Chapman, IM 61, founder of Opti-World and Peachtree Report, is Investment Committee chairman of Legacy Capital Investors, a venture capital firm.

“It’s not uncommon for an entrepreneur to have failures,” says Chapman, Business Atlanta’s 1989 Entrepreneur of the Year. “You can’t let it get you down. Use the experience as part of your education and it will push you forward.”

Dyer, chairman of e-business developer Intellimedia Commerce and general partner of Cordova Intellimedia Ventures, a venture capital concern, advises new entrepreneurs to allow for the unpredictable influence of chance to keep the ups and downs of business in perspective.

“Never overestimate the amount of control you have over things,” he says. “In any business venture, there is a certain amount of luck, and when things work out right, there’s often
"It’s not uncommon for an entrepreneur to have failures," says venture capitalist Don Chapman, IM 61, of Legacy Capital Investors and Business Atlanta’s 1989 Entrepreneur of the Year. "You can’t let it get you down. Use the experience as part of your education and it will push you forward."

Earlier in his career, Dyer served as chairman and CEO of Comsell, a multimedia-development company he started, and was also one of the founders of Peachtree Software.

A good idea is not enough to make a business work.

A good idea is just the first 1 percent of what it takes to make a real business," says Ed Underwood, IE 71, executive director of Crescent Capital Investments and COO of the First Islamic Investment Bank. "You may think your idea is the greatest thing in the world, but is it something people will buy? It’s not the idea, it’s how you execute the idea that counts."

Underwood and his partners started Bahrain-based Crescent Capital and First Islamic Investment Bank in 1997 to bring private equity and real estate financial products to Middle Eastern clients.

According to Menser, whose entrepreneurial credentials include 25 years as a general partner in numerous real estate investment syndicates, "You have to ask yourself: ‘Does my idea solve some specific need or does it address some function or purpose for which there is an economic justification?’ Some ideas, like the Gem clip, are very simple. Others are so complex I can’t understand them, but they all serve a need. You have to be sure you know what that need is."

An idea with no further development as to marketing, commercialization and economics is a starting point but little more, Goodhew says. "That’s where the whole idea of putting together a business plan comes in," he explains. "A business plan requires you to think through all the different factors involved in a successful business and put it down on paper. You have to start with a good idea, but that by itself is not enough."

Dyer agrees, noting four elements that are essential to any functioning business. "You have to think about who will buy your product or service, how you will sell it to them, what kind of salesperson is required and what the distribution channels are."

One measure of an entrepreneur’s grasp of his or her idea is the ability to convey the essence of that idea concisely. Among venture capitalists it’s called the “elevator speech,” meaning the business can be described to someone in the short amount of time one spends on an elevator. "You need to be able to explain simply, in layman’s terms, how your idea works not only from a mechanical point of view, but from an economic point of view — how it will make money," Menser says.

The process of sharpening the business description helps an entrepreneur internalize all facets of the venture and provides a summary basis for developing a business plan. In addition, a summary in verbal and written form is a hook for attracting interest from potential investors, employees or customers. "You don’t reveal proprietary secrets in a business plan or summary," says Dr. David Ku, MS AE 82, PhD AE 83. "They are meant to entice potential investors. Getting into a lot of technical detail and equations at this first level would probably turn them off."

Ku, who holds the Huang chair in engineering entrepreneurship at Georgia Tech, earned a medical degree from Emory, where he is also a surgery professor. He is also a co-founder of MediZeus, a company that has developed Internet-based tools to help radiologists improve diagnostic accuracy and reduce the time required to prepare medical-image test reports.

Goodhew recommends an approach he saw at Peachtree Software while serving as general manager and then president in the early ‘80s. "The first thing you do is write the press release," Goodhew says. "A press release only has a paragraph where you describe the whole thing — what it is, who it’s for and why it’s valuable."

The second step would be to "write the copy that goes on the [product] box." That’s a figure of speech in some cases, but a useful exercise in getting to the point. "In a retail environment, when prospects are
"The quality of the people you bring in is critical," says Andrew Hunt, PhD CerE 93, founder and CEO of MicroCoating Technologies. "The future of your company depends on it."

4 Hire the best people and solicit the best advice.

The quality of the people you bring in is critical," says Hunt. "The future of your company depends on it."

Venture capitalists agree that the quality of the people behind the proposal is among the top considerations in making an investment decision. Individuals with no background in the business they want to start will have little chance of attracting venture capital. But that doesn’t mean a start-up company has to shoulder a payroll before seeking outside money. Sometimes having a talented management team lined up will suffice.

"One of the reasons investors are so interested in the quality of the people involved in a potential investment is because they want to be sure that if Plan A doesn’t work out, there’s going to be rapid development of a Plan B," says Goodhew.

Venture capital criteria aside, an excellent workforce simply makes good business sense. "People are your best resource," Underwood says. "Just because you come up with a solution to a problem doesn’t make it the best solution. There is often more than one answer, and you should use your people wisely to solve problems. They may not go about it precisely as you might, but they can still get to the goal line, and that’s what’s important."

In recent years, a growing number of high-tech start-ups has been formed by partners with separate, complementary expertise in technology and management. Most desirable of all, according to Chapman, is the individual with both skills.

"One of the most valuable resources in the world — and the hardest to find — is an entre-preneurial engineer with a sense of the business," he explains. "You can get good engineers who stay on track forever making the product a little better, but it never gets to market. If you can marry the engineering talent that Georgia Tech has with entrepreneurship and the sense of what it takes to make a business model work, you’ve got a great resource."

5 Take advantage of your Georgia Tech connections.

In many circumstances, Georgia Tech can be a rich resource for entrepreneurs. In addition to the technical and management expertise of its faculty and staff, the campus is home to the Advanced Technology Development Center, where dozens of start-up companies have been launched.

Both Ku and Hunt started their businesses with Tech’s help.

"ATDC provided access to some of the very sophisticated equipment I needed, like scanning microscopes, which I could not have afforded on my own," Hunt says.

But perhaps Tech’s most important asset is its alumni, "the world’s greatest network group," Goodhew says.

The shared experience — some might say "tribulation" — of earning a Georgia Tech education has fostered a ready source of employees, business partners, subcontractors and consultants among the alumni ranks. Or, as more than one alumnus has put it: "There’s nothing more valuable than a Georgia Tech education, and half of it is who you meet along the way."

"Companies are not loyal to people anymore, and people are not loyal to companies," Goodhew explains. "But you are loyal to your personal network — people you know from church, school or work experience. You’re going to get along in the world by working your network. If you make a point to build your personal network, starting with your time at Georgia Tech or earlier, you’ll have the most valuable tool you could have in whatever you want to do." GT

Gary Goettling is a freelance writer in Tucker, Ga.
A lumnus David Ku practices what he teaches. Dr. Ku, MS AE 82, PhD AE 83, who holds the Lawrence P. Huang Chair for Engineering Entrepreneurship in the DuPree College of Management, is co-founder of MediZeus, a company using patent-pending computer technology to increase the accuracy of interpreting radiological images while communicating the information quickly to a health care team.

A Regents' professor at Tech, Ku is a professor of surgery at Emory University School of Medicine and leads another company — Restore Therapeutics, which is commercializing a new artificial cartilage material designed to treat arthritis.

Founded in October 1999, MediZeus' first product, SmartMamm, increases the accuracy of mammography to detect cancers at an earlier stage. SmartMamm offers medical personnel a computerized "second opinion" from an advanced artificial intelligence system made "smarter" through its collective, comparative database of images.

Patients whose mammograms are evaluated by SmartMamm become part of an anonymous database used to continually improve the technology. Accuracy grows as the archive grows. Introduced in Georgia in 2000, the MediZeus system will be launched in New York and California this year. The artificial intelligence component developed as part of a Georgia Tech doctoral thesis offers a second chance to note abnormalities.

"After the radiologist looks at the traditional film mammograms, a click of a mouse button calls up the artificial intelligence analysis — a computerized colleague," says alumnus Harris Bergman, MediZeus' co-founder and developer of the artificial intelligence component. "The system is very good at finding subtleties in the image that could easily be overlooked. It would offer one more opportunity to identify something in the test."

Ku, president and CEO of MediZeus, says the artificial intelligence could increase the accuracy of mammograms from 75 percent to 90 percent.

MediZeus also serves as a secure electronic intermediary for mammography image data and diagnostic reports, speeding the flow of information between mammography clinics, radiologists, referring physicians and patients.

"For the doctors — both referring physicians and radiologists, we increase the accuracy so they are practicing better medicine, and we increase their efficiency so they can get more reports out in less time," Ku says.

Mammogram images are sent to MediZeus electronically. The company forwards them to radiologists, who analyze the images and attach their diagnostic reports to the image files. Physicians then use a Web-based interface to view the images and reports. The information also becomes available to patients using the same Web-based interface.

"This has the same advantages as e-mail," he says. "Radiologists can get to them when it's convenient. We provide all the reporting forms, so they can actually generate a report online faster than they can dictate it. They can sign it electronically and forward it immediately to the referring physician."

Once the technology is proven in breast cancer screening, Ku plans to extend the MediZeus system to other health care testing such as X-ray and magnetic resonance angiography.
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On Oct. 28, I spent the day with Tom Peters. It wasn’t an interview. Along with a throng of executives and business managers, I attended a Tom Peters seminar in Atlanta. And, joined by several Georgia Tech colleagues, I took my seat at the feet of the master — the author of In Search of Excellence.

By JOHN DUNN * Illustrations by BOB BRAUN

TOM PETERS IS WIRED. • "I am scrambling to reinvent myself, at age 57, to not just ‘cope with,’ but to exploit the new communications and connection media," Peters professes passionately to a capacity audience at Atlanta’s downtown Marriott Hotel. "There are young management gurus hot on my trail." Peters pauses. "Hot equals Web speed." • Since 1982, Peters has been one of the leading management gurus in the world. That was the year "In Search of Excellence," written with co-author Robert H. Waterman Jr., became an instant classic, staying atop the New York Times best-seller list for three straight years. Peters has kept ahead of the pack by writing 10 management books and presenting business seminars. The Tom Peters Company has also adopted a slogan: Distinct or Extinct. • Tom Peters intends to remain distinct. He keeps his ideas before the public with bylined articles and columns that appear in Time, BusinessWeek, Forbes ASAP and other leading magazines. And he presents management seminars across the country and around the world to business executives and managers who pay about $400 each to profit from his business insights.
Tom Peters is fully connected to what he calls

Peters delivers. He dispenses a mixture of management acumen, philosophical barbs and business principles in rapid-fire bursts as he moves from concept to concept, slides flashing across a giant screen reiterating quotes and facts as he sweeps around and through the audience.

It's information overload and Peters knows it. So he provides each of those attending the seminar with a packet of small paperback books with such titles as "The Work Matters," "We are in a Brawl with No Rules!," "The Death Knell for 'Ordinary': Pursuing Difference," and "Brand You — 50 Ways to Transform Yourself from an 'Employee' into a Brand that Shouts Distinction, Commitment and Passion!"
The information-packed essence of the seminar can be gleaned from the books — and a glimpse of the passion.

"I've devoted my career to one thing: PUTTING PASSION BACK INTO BUSINESS," Peters asserts in "We Are In A Brawl With No Rules!" The capitalized words are his. "Call me THE PATRON SAINT OF TECHNO-COLOR."

Elsewhere, Peters says, "I am routinely chided for using capital letters. So be it. These are Capital Letter Times."

The new century and the new millennium represent a monumental time, Peters asserts. It is a time, he says, for reinventing the world.

In his seminar, Peters intersperses provocative, seemingly random thoughts — "I have a recurrent nightmare. A tombstone epitaph that reads: 'I woulda done some really cool stuff, but my boss wouldn't let me'" — with thought-provoking assessments of a rapidly changing work world.

"I believe that 90 percent of white-collar jobs in the U.S. will either be destroyed, or altered beyond recognition, in the next 10 to 15 years," he says, and a slide appears on the screen to reinforce the thought.

"That's a catastrophic prediction, given that 90 percent of us are engaged in white-collar work of one sort or another," Peters declares. "Even most manufacturing jobs these days are about the provision of white-collar services in finance, human resources, engineering, etc."

It is not an outrageous prediction, Peters says. In 1970, it took 108 dockhands about five days to unload a timber ship, he says. But containerization has changed that. A comparable task today takes eight workers one day — a 98.5 percent reduction in "man days" from 540 to just eight.

Peters says his prognostications are dire if you are a 48-year-old white-collar staffer or middle manager "entombed in a corporate tower." But they can be liberating — the changes will eliminate the drudge from white-collar jobs, he insists.

Dressed in a sweater vest and khakis and constantly moving about and engaging audience members, Peters has enough of a paunch to look like a mid-level manager, but clearly he doesn't think like one.
The Internet, he says, is driving change, and he lists five ways it will make an impact.

✓ Traditional business is facing competition from the dot.coms, and the business landscape that exists today is about to be radically changed. The old economy must adapt or die.

✓ Peters foresees new software creating “white-collar robots” to perform the same roles in the white-collar business world that forklifts, robots and containerization did in the blue-collar world.

✓ White-collar services will be “outsourced.” It’s already happening in India, Peters says, where tens of thousands of skilled Indian engineers are working on outsourced white-collar tasks for global banks, insurers and airlines.

✓ The Web is the “white-hot world” of business-to-business electronic commerce, which will soon envelop trillions of dollars of transactions. For example, Peters observes, in February 2000, arch-rivals Ford, General Motors and DaimlerChrysler created an Internet supplier marketplace linking tens of thousands of suppliers into a single Internet-based network. It promises to be an operation approaching a trillion dollars.

✓ Time is compressed. “It took 38 years for the radio to get to 50 million users,” he says. “The Web got there in four. Hence my belief that, while it took about a century to revolutionize blue-collar job practice, this brave new white-collar regime will be mostly installed in a tenth of that — 10 years.”

The Web world equals everything, Peters says. “Halfway is no way!” Peters declares, injecting an exclamation point. “As General Electric CEO and Web true believer Jack Welch says, ‘Where does the Internet rank in priority? It’s No. 1, 2, 3 and 4. One cannot be tentative about this.’ Delay and you risk being cut out of your own market, perhaps not by traditional competitors, but by companies you never heard of 24 months ago.”

Peters is fully connected into what he calls the New Wired World of Work.

“Between Palm VIs and pagers and cell phones and featherweight laptops and Global Positioning System devices in your car — and now wired campsites at the bottom of the Grand Canyon — you and I are perpetually plugged into hundreds of millions of minds and gazillions of bits of up-to-date info from every cranny on the planet,” Peters says.

In the “weird, wired, wild, woolly, wobbly age of work,” Peters says, every project requires a specially formed team — and he uses the word “team” deliberately.

“White-collar accountability has until now been mostly an oxymoron,” Peters says. “Show up. Suck up. Bury your face in your in-box. Process your paper flow with a modicum of efficiency. And you could count on a pretty decent end-of-the-year evaluation, a cost-of-living (plus a point or...
two) raise, and a sure-as-death-and-taxes 40-year tenure at Desk No. 263 in the GM purchasing department.”

In the wired world, Peters says, that ethic will no longer work.

He uses a sports team analogy to define the future role of workers, many of whom will operate as free agents, contracting their unique skills. “Tiny company or behemoth, we will be working with an eclectic mix of contract teammates from around the globe, many of whom we’ll never meet face to face,” Peters says. “Every ‘player’ will be evaluated — pass by pass, shot by shot — for the quality and uniqueness and timeliness and passion of her or his contribution. And therein lies the rub, the peril and the remarkable opportunity.”

Employees of the near future will be evaluated for their ability to contribute, he says, whether it is the 23-year-old college graduate or the 56-year-old middle manager “who envisioned himself on a pain-free coast toward retirement.” Team members on projects “will be mercilessly evaluated by the toughest audience of all — your project-peer-teammates,” he says.

“The New World is a floating crap game,” Peters says. “New projects, new teammates, the constant need to tack and jibe — those who can adjust and turn fast and operate in the absence of laid-out metes and bounds will be the winners, and most important, the leaders. They may not wear chevrons of formal rank on their sleeves, but they clearly will be the most valued players, and the best paid.

“We are in the opening innings of a world-class, unprecedented mess!” Peters says. “We are remaking the world! Business. Politics. Social interchange. With such madness afoot for the foreseeable future, we’ll all get it wrong far more often than we get it right.”

And because of that, Peters says, it will be important to have a sense of humor. “If we can’t learn to live with egg dripping down our face and a grin to go with it, then we’re in for a long, tiresome, anguished ride.”

Technology is changing everything, he says.

“Believe the hype,” Peters advises. “Grovel before the young. Youth will teach us the new rules. Make no mistake, this Web-driven thing is a ‘Children’s Crusade.’ Love it — and them — or quickly get left behind.”

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Women rule!” Tom Peters declares in a voice edged with defiance. A slide pops up on the big screen: “This just might be the biggest ‘thing’ in this seminar. Please think about it.”

Women represent a huge market opportunity and are virtually ignored, he says.

“The statistics are staggering,” Peters says. “American women, as purchasing agents for themselves and their families and as purchasing professionals for public and private enterprises, are, in effect, a $4.8 trillion economy — Earth’s biggest.

“Japan — all of Japan — is No. 2 and American men are No. 3,” he says. “Then consider American women business owners — 9 million strong — employing 27.5 million Americans (one in four in the entire workforce) and bringing in more revenue, at about $3.6 trillion, than the whole German economy.

“Women decide on two-thirds of health care expenditures, buy over half the new cars, are involved in 95 percent of family finance decisions (making about one-third single-handedly), buy over 90 percent of houses, make over 90 percent of vacation decisions. American women were a scant 1 percent of business travelers in 1970, but will make over 50 percent of business trips as of 2002. And, women now constitute 50-plus percent of Web users and 60 percent of new users; Web women in America are the primary family healthcare, finance and education decision makers in 83 percent of cases.”

Some women applaud. Everybody grins. A visual survey of the audience reveals, in fact, the majority are women.

Regardless, Peters asserts, women are often treated with contempt in the marketplace. “Most product and service providers do not have a clue,” Peters shouts, incredulous. “Women are opportunity No. 1!”

While men tend to want to complete a deal as soon as possible, women tend to be more thoughtful and thorough in purchasing a product, he says. They go about establishing a relationship rather than conducting a transaction. “Women want to get it right,” Peters declares. — John Dunn
minds and gazillions of bits of up-to-date info."
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SWEAT EQUITY — (FROM ABOVE LEFT, CLOCKWISE) Shamus Yandle and Mark Gibbs work on the engine. Chris Richburg and Heidi Alexis study computer readouts. Osman Ullah and Brandon Massie set up the suspension. Richburg and Yandle work on the fuel injection system.

It is all about high-tech computer design and low-tech grease under the fingernails.
The Georgia Tech campus is as quiet as can be expected at midnight on a Saturday in a city of 4 million people. In a deserted parking lot adjacent to the physics building, GT Motorsports team members place orange traffic cones in curving lines that eventually define a tight, 11-turn racetrack.

The silence is broken by the staccato shriek of a high-revving engine as it seeks air and more air. A small, low-slung racing car accelerates onto the track and begins clawing through the tight turns, its tires squealing as they cling to the edge of adhesion. The little car flashes past the start-finish line at 60 miles per hour. It has a top speed of 110 mph, but it seldom reaches it, since emphasis is on design, handling and braking.

Hard into the first turn, the driver leans only slightly to the side as the team-engineered chassis absorbs the g-forces. Number 33 is the ninth car built since Tech began competition in 1987. The number is an inside joke for the team. During the 1999 Detroit competition, officials forgot to signal the end of the 20-lap endurance run. They continued to race 13 more laps until the mistake was discovered. The car's number has been 33 ever since.

The Georgia Tech Motorsports team took on 100 teams representing schools from eight countries and drove its single-seat race car to a fifth-place overall finish at Birmingham, England, last July 4.

The Society of Automotive
Engineers (SAE), an international engineering organization, sponsors annual competitions at Birmingham and Detroit. Students design, fabricate and compete with small, open-cockpit, open-wheel racing cars called, fittingly, Formula SAE. These prototypes are built from scratch every year and restrictions are placed on the chassis and engine so the students’ knowledge, creativity and imagination are tested. Four-cycle motorcycle engines up to 610cc can be turbocharged or supercharged to add a new dimension to the challenge of engine configuration.

There are three categories of judging: engineering and design inspection, solo performance and high-performance endurance. A maximum of 1,000 points can be awarded for presentation, engineering design, cost analysis, acceleration, skid-pad performance, autocross performance, fuel economy and endurance.

GT Motorsports' car is built to strict SAE regulations. The outer shell, made of carbon fiber, rests on a chromemolybdenum tubular frame with a double-wishbone independent front-and-rear suspension. Thirteen-inch racing slicks fit on carbon-fiber wheels. Power from the 84-horsepower engine is transmitted to the wheels by chain drive and 6-speed manual transmission.

"A lot of these kids come in here not knowing the first thing about racing," faculty adviser Ken Cunefare says.
"Many companies are looking for engineers who understand cost analysis, presentation and working in a team environment. These students have learned to do that."

"They want to develop particular skills."

Those skills can prove very advantageous when searching for a job. The big three automakers — Ford, General Motors and Daimler-Chrysler — as well as adjunct businesses sponsor the competition.

"Many companies come to the competitions hoping to recruit future employees," Cunefare says. "They are looking for engineers who understand the concept of cost analysis, presentation and working in a team environment. These students have learned to do that through this program."

At the Birmingham competition, Tech scored first in acceleration, second in design, fourth in autocross, second in cost analysis and seventh in endurance for an overall fifth-place finish. It was a significant improvement over 24th at Detroit last year.

The little car slows and the driver steers it over to the side of the front straightaway. Hands seem to engulf every part of the car as the students inspect each part, searching for maximum performance.

The Detroit competition is only eight months away.

**Going With the Flow**

GT Motorsports team tests the wind in search of performance

GT Motorsports is applying advanced aerospace technology to its race car with help from the Georgia Tech Research Institute (GTRI).

"Up until now, there was only an unofficial relationship between the club and GTRI," says Bob Englar, principal research engineer for the GTRI Aerospace, Transportation and Advanced Systems Laboratory. "We’re a sponsored research agency, but a number of us are also professors or instructors at Tech. I’m a car enthusiast, but I’ve worked with airplanes for most of my career. I’ve always wanted to use aerodynamic technology for automotive applications."

GTRI interacts with the academic schools whenever possible, and lab director Dr. David Parekh suggested developing a course that teaches auto aerodynamics to mechanical engineers. Race-car aerodynamics was first presented in 1999 as an experimental course for mechanical engineering seniors.

"We frequently worked with aerospace and mechanical engineering students on projects," Englar says. "We had not included auto aerodynamics until now."

Students design projects in on-campus lab facilities, then test them at the wind tunnel and research labs at GTRI’s Cobb County Research Facility, adjacent to Dobbins Air Force Base, Marietta, Ga.

The labs and tunnel were once part of Lockheed’s Advanced Flight Sciences Department, but the five buildings were sold to Tech in the mid-1960s. Lockheed continued to lease the facility until 1989. When Lockheed left, most of its research equipment, including several wind tunnels and acoustics facilities, was given to GTRI.

GTRI has been working with a Formula One racing team designing advanced aerodynamic devices for its car. This has led to development of a new aerodynamic heat exchanger, which will combine an aerodynamic device with a radiator. Radiators on most cars are big, bulky devices that must sit perpendicular to airflow, creating horsepower-robbing drag and extra weight. The researchers will test a device on one of GT Motorsports’ Formula SAE race cars that will induct airflow into the radiator, allowing it to be much smaller and more streamlined.

"GT Motorsports was having a problem with cooling," Englar says. "And we needed a test platform for our device. After the device is tunnel tested in our facilities, we will rely on the students in GT Motorsports to incorporate it into their race car. What better place to test something for a race car than on a real race car?" — Neil McGahee
The Robert Ferst Center for the Arts at Georgia Tech is proud to present our 2000-2001 Season. We've lined up a delightful mix of world-class performers, from classical superstars like Itzhak Perlman to spectacular dance, classic opera, music, smooth jazz and more...all performers who are in a class of their own. You’ll enjoy these great performances in the intimate atmosphere of the Ferst Center, now with a newly enhanced, state-of-the-art sound system and remodeled interiors. There are literally no “bad” seats in the House. Every seat in our theatre is a “good” seat. Performers love our stage, and patrons love the great sight lines our intimate theatre offers.

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Vietnam prisoners of war recount the pain of their captivity on the 30th anniversary of the raid on the Son Tay prison camp.

By Kimberly Link-Wills

Neil Armstrong took a giant leap for mankind. A New York dairy farm became forever tied to rock 'n' roll history as the home of Woodstock. Alabama Gov. George Wallace was paralyzed by a gunman's bullet. The Beatles broke up. Rowan and Martin encouraged America to sock it to 'em. A break-in occurred at a building called Watergate that was later to bring down a president.

Six Georgia Tech alumni — Orson Swindle, Render Crayton,
Wayne Waddell, Jim Hickerson, Mark Gartley and Dick Dutton — missed it all. They were prisoners of war.

On Nov. 21, 1970, a joint force of Army, Air Force and Navy personnel raided the Son Tay prison camp outside Hanoi, North Vietnam, in a daring and dangerous attempt to rescue as many as 100 American POWs. The attack was deemed a military success in that some 150 servicemen got in and got out of enemy territory without the loss of a single American life. Unfortunately, the North Vietnamese had moved all the U.S. POWs prior to the raid.

The 30th anniversary of the rescue attempt was marked with a gathering of Vietnam War POWs and the "Son Tay Raiders" in Destin, Fla., over Thanksgiving weekend.

The passage of time has healed some wounds. Tech's POWs can laugh now as they recall sitting in a prison cell in North Vietnam reminiscing about football games and celebrations. They even can laugh as they recount horrific tales of torture and isolation. Their stories are profiles of courage, endurance and patriotism.
Six Years of Epiphanies

I was flying what was to have been, literally, my last mission," Orson Swindle, IM 59, begins with the first of many hearty laughs. The date was Nov. 11, 1966. "It was the 205th mission and I was hit by triple-A anti-aircraft fire just north of the demilitarized zone.

"I was going at a high rate of speed when I ejected — probably 500 miles an hour. I looked up to see if the chute was any good. Luckily, it was. Looking down, I could see all these people. It seemed like a cast of thousands, but it was probably a dozen or so," he recalls.

"I just said, 'Dear God, take care of [my wife and son].' Then I was busy trying to figure out what to do next. I didn't have many alternatives. I was coming down with bullets whizzing by me and an angry mob waiting for me.

"I got banged up a little bit. I landed in a trench and busted up my knees. That was nothing compared to what was about to happen," Swindle says.

Swindle, who had enlisted in the Marines through a platoon-leaders course, was bound, stripped of his survival gear and shoes and thrown into a pit the size of a king-size bed. "They'd spit on me and throw rocks at me and beat me with bamboo poles. It was pretty scary."

Captured in the afternoon, Swindle remained in the pit until the next morning, when he was pulled out for an interrogation, "which was a rather horrible experience. I was tortured rather severely."

Swindle was shoved into a grass-covered hut, where three North Vietnamese officers and a crowd of onlookers awaited him. An English-speaking officer demanded answers. Where was Swindle based? What was his mission when he was shot down? Swindle refused to answer and sought refuge in the Geneva Convention, which states a POW only is required to provide name, rank, serial number and date of birth.

"That worked for about 30 minutes," Swindle chuckles, recounting some of the most painful moments of the ensuing torture. His arms were yanked out of their sockets. He was strung up and hung from a rafter by his thumbs. "Then they commenced to beat the hell out of me for awhile. It was sometime thereafter that I decided I had better say something to them because this wasn't working."

"You just start telling lies and hopefully it's lies you can remember. They wanted to know who was in my squadron. I'm from Camilla, Ga., so I gave them the lineup of the football team from my senior year of high school. We went to the state championship and got our brains beaten out. It was something I could remember. I was scrambling mentally and physically. It was a very painful experience."

During his more than six years in the hands of the North Vietnamese, Swindle was moved from prison to prison and back again some 17 times. "There was a group of us that seemed to be their favorite targets to move around, but God only knows why. It was oftentimes their effort to break up our covert communications.

"But what they didn't realize is every time they exchanged us with somebody else in another camp, we would immediately start communicating there and tell the guys at (a POW camp dubbed) The Zoo what was going on over at the Hanoi Hilton and the people at The Zoo would get into the Hanoi Hilton and tell everybody what was going on over at The Zoo. So they never really effectively stopped us from communicating and we were able to pass along names and what was going on."

Swindle met fellow Tech grad Render Crayton while both were being held at the Son Tay POW camp. "Render was a wonderful leader. He was the senior ranking officer at Son Tay. We went through some bad times out there."

"One time they kept me awake for about 20 days, tied to a stool and beating me," Swindle recalls. "It was 10 and 10, 10 days awake with one day off, then right back on the stool. They were trying to get me to write confessions. I was in this room by myself and the only way I had any communication was at night when the guards would sometimes get away from the building and guys would rap on the wall real hard and say, 'God bless' and 'hang in there.'"

Swindle was being held at the Hanoi Hilton when he was released on March 4, 1973. "We learned of the peace accords a day or two after they were signed. Then we saw an American plane come in for a landing at the airport, which was a weird sight after six and a half years."

"Of all the emotions you could experience, we experienced them all — relief, the idea that it's OK now, you made it. There were times when we didn't think we would. When I left home, my son had just turned 4. When I returned home, he had just turned 11."

Swindle and his wife later divorced. The recipient of two Purple Hearts, two Silver Stars and two Bronze Stars, he remained in the Marines, retiring as a lieutenant colonel in 1979. He met Ronald Reagan in the 1970s and, impressed with the California governor, he campaigned for Reagan in Georgia and joined the administration after Reagan won the presidential election. Swindle worked as state director of the Farmers Home Administration in Georgia, then was appointed assistant secretary of Commerce.

Swindle remarried and moved to Hawaii. He unsuccessfully ran for Congress twice in Hawaii, served as Ross Perot's spokesman in 1992 and became one of the founding members of Empower America. He was appointed to the Federal Trade Commission in December 1997 and now lives in Alexandria, Va.
I just came out with a feeling that, for some reason, I got a break and there has to be some greater meaning to it than just coming home, Swindle says. "I've had my ups and downs like all of us have. But the one thing you'll find in common among 99 percent of us is that we can find something good to see — always.

"I went through six years of epiphanies," Swindle laughs, "coming to know what your weaknesses are and what you're capable of enduring and surviving, and all that makes you pretty honest with yourself, gives you an inner strength that helps you through difficult times. I've been very fortunate."

Moments of Sheer Terror

Render Crayton's memories of Feb. 7, 1966, haven't faded. "I was flying an A-4 from the USS Ticonderoga. I was on a road reconnaissance mission and I was shot down by anti-aircraft fire," relates Crayton, Text 54, who ejected from his aircraft after it sustained severe damage.

Crayton parachuted to the ground, suffering a broken shoulder and superficial cuts. He radioed U.S. planes in the vicinity to come toward his position, surrounded on three sides by a river and on the fourth by a village. A helicopter and escort aircraft were dispatched. Two A-4s remained overhead to fend off would-be captors.

Finally, Crayton radioed for the A-4s to leave the area because he knew their fuel supplies were critically low.

Render Crayton revisits the cell in which he spent years as a POW during the Vietnam War. At left, Crayton points to the same spot shortly after his release from the POW camp.
When the rescue helicopter arrived, only Crayton’s parachute could be found. He had been captured.

“They walked me to a village and put me in a hut for the night. For the next nine days, they walked me on the road at night. They finally picked me up in a truck and took me to Hanoi,” Crayton says. He was alone and in agonizing pain from the injuries he sustained.

“They hung me over a rafter. That didn’t help any,” Crayton cracks. “I was by myself. I was just trying to get through from day to day. I kept wondering why it happened to me.

“I didn’t see any other Americans for a long time. When I got to Hanoi, I knew there were Americans around. I could tell from the noises and some scratchings on the wall, some tapping.”

The tapping, Crayton learned, was a means of communication. “At first I didn’t know what it was. Then I saw on the wall somebody had scratched the matrix we used, the ABCs, this 5-by-5 matrix with the letters of the alphabet. Then I figured out what it was and I was able to tap to someone.”

That tapping would be Crayton’s only contact with other Americans for more than two years. “I was [in Hanoi] for six months by myself. Then they sent me to another camp and I was there for a couple years before I ever had a roommate. The other camp was called The Zoo.”

The hardest part of being held prisoner, Crayton says, was “the sheer boredom of the whole thing — interspersed with moments of sheer terror. At night you’d hear the guards coming and they’d jerk somebody out of his cell and take them to what we called ‘a quiz,’ and they may not come back that night. You never knew when they were gonna come get you.”

It was five years before he got a letter from home, LaGrange, Ga. “I think I got a total of three letters the whole time I was there.

“We spent a lot of time trying to figure out ways of beating the system, of communicating with other people. If somebody was lucky enough to get out to sweep the courtyard, he could sweep the tap code using the broom. Sometimes we were able to find things we could make marks on paper with. We would set up a drop spot and leave notes.”

Crayton grants it was a bit difficult to readjust to the outside world after his release with some 120 other Americans on Feb. 12, 1973. It wasn’t just being out of isolation: “Things had changed considerably in seven years. Guys started wearing long hair,” he laughs. “It was a different world that we came back to.

“I spent some time in the hospital and then went right back on active duty,” Crayton says. He was treated for a variety of health problems, including that broken shoulder that had never been set. Retired as a Navy captain in 1984, he now lives in San Diego.

Nearly 30 years later, the memories are still fresh and that shoulder still gives him trouble.

“It destroys my tennis game,” Crayton jokes. “But it’s a good excuse.”

Fraternity Brothers Reunited

These days, Wayne Waddell and Jim Hickerson communicate via e-mail. There was a time when the Class of 56 graduates and Beta Theta Pi fraternity brothers relayed messages by tapping on a wall between their prison cells.

“He went into the Navy. I went into the Air Force,” says Waddell, EE 56, of Marietta, Ga. “Two years after we graduated, we ran into each other at Homecoming. Then we each went off our own ways.”

Waddell was an Air Force lieutenant colonel flying a F-105D on his 47th mission when he was shot down by anti-aircraft fire on July 5, 1967. He narrowly escaped his aircraft, landing uninjured on North Vietnamese soil. He scrambled up a hill, where he radioed for help. He couldn’t make contact as blasts of gunfire burst around him. “I said to myself, ‘Anybody I see may be out to kill me.’”

As he had been taught in survival school, Waddell lay down to “play like a leaf and hide,” he chuckles. About an
hour later he heard a militia group sweeping the field. He lay flat, knowing his chances of being overlooked were slim. Waddell felt a tap on his shoulder. He rolled over and came face to face with the Vietnamese. At the age of 31, Lt. Col. Waddell was a prisoner of war.

He was transported to the Hanoi Hilton. Two weeks later, he was ordered to take off his prison garb and put his flight suit back on. Red ink stains — meant to look like blood — had been added to his gear. The North Vietnamese had decided to re-enact his capture — with embellishments — for German photographer Thomas Billhardt. (Waddell found Billhardt in Berlin in 1998 and bought the picture.)

“Later I was moved out to The Zoo. Originally, it was called The Farm because you could hear chickens and other animals and it was out in the country. Then one guy said it was the only farm where the animals came by and looked at the people. From then on it was The Zoo,” Waddell says.

Early in his stay, Waddell was in a cell with three other Air Force officers. “After four months, a Navy guy came in. He [knew] this tap code. We were never allowed to communicate. That's why this code was so appealing.

“My new Navy friend starts banging on the brick wall” with this newfound code, which was set up like an elaborate Tic Tac Toe board with letters of the alphabet in each square. “It was cumbersome, so we would send abbreviated words. There was no K. C was used instead.”

The men hurriedly began relaying their names. Waddell and his cell mates deciphered an H, followed by an I, then C

... C... E... R. “Some of the guys thought it must be a mistake — how could it be a name with two Cs. It dawned on me that C could be K. I said, ‘Tap back and ask: Is it Jim?’ It came back ‘Yes.’”

On the other side of the wall, Hickerson, CE 56, listened to the tapping. “All of a sudden, it was W-A-D-D-E-L-L. I said, ‘I know a Wayne Waddell, for crying out loud.’ I didn’t even know he’d been shot down.”

Waddell and Hickerson later became roommates, first in a cell housing 20 men. “We did a lot of reliving of our Georgia Tech days,” Waddell laughs. Later, they were moved into a room that held 57 prisoners who slept on two sloped concrete slabs. Ten men slept on the floor. “That’s where Hickerson and I slept, side by side, elbow to elbow. We had about 20 inches each.”

For six years, Waddell had only two outfits: a scratchy, long-sleeved shirt and pants or a scratchy, short-sleeved shirt and shorts, which the North Vietnamese initially considered underwear and a sign of disrespect.

The summer wardrobe hardly helped the POWs deal with the suffocating cells. Their mosquito nets could only be used at night. The long sleeves and long pants didn’t keep them warm when temperatures dropped to 30 degrees. Two rough blankets didn’t ward off the cold.

When they were allowed to bathe, prisoners could wash their clothes at the same time. Waddell says bathing was left to the guards’ discretion. “One time, they wouldn’t let us bathe for 46 days. Another time, it was 27 days.”

Waddell was given a towel in 1969, after North Vietnam President Ho Chi Minh’s death, an event that generally marked an improvement in camp conditions. Waddell still has that small striped towel, which also served as a game board. The POWs would use just about anything they could get their hands on to help pass the time. Toilet paper, closer to wood pulp, was used to make playing cards. Bits of bread were shaped, dried and marked for use as dice.

Prisoners were pulled out monthly for interrogation “quizzes.” Waddell remembers a humorous meeting during which he asked his interrogator if he would speak to the camp commander about the lack of rain. That night, a thunderstorm rolled through The Zoo and cooled off the camp.
Wayne Waddell holds the photograph staged by the North Vietnamese to reenact his capture.
The quizzes often were painful. Once Waddell's arms were twisted behind him and he was handcuffed. The handcuffs cut off his circulation. When the guards finished questioning him, his hands were stuck in a claw position. He had limited use of his hands for months afterward.

The weeks, months and years of confinement gave the POWs plenty of time to come up with ways to relay messages throughout the camp. In addition to the tap code, the POWs flashed porcelain plates in code and pressed their drinking cups to the walls and shouted into them.

Catholic church services were staged at Christmas. The North Vietnamese selected which prisoners would attend and often would film the services to show how well they were treating their American prisoners.

“One of the prisoners could play the organ and he was allowed to play at the church service the first year. The next year, he apparently asked them if we were going to have a church service. He said, 'If we do, I'd like to get the organ out here early and practice.' Sure enough, they brought the organ in before Thanksgiving. At these practice sessions, he would play hymns or Christmas carols with the keyboard and do the code with the foot pedals,” Waddell recalls.

The organist spent a couple hours each day practicing—and broadcasting news of Zoo happenings throughout the prison. “We could hear it all over the camp. It was just an attempt to see if he could do it, if he could get away with it.”

While this memory is pleasant, Waddell just as keenly remembers living the nightmare. His worst memory comes from his first year at The Zoo. “One of the guys had been beaten pretty badly and he was going insane. He wouldn’t eat. The guys were trying to force feed him. He would lay there and scream. I could hear him begging to die. And I knew there wasn’t a single thing I could do.”

The man did die—of starvation. Two others Waddell is aware of also starved themselves to death.

News from the outside world was extremely limited. The North Vietnamese made sure the POWs heard about anti-war protests in the United States. And sometimes the Americans would learn about the outcome of the World Series. But fewer than a handful of letters ever found their way to Waddell, despite the fact that he later learned his townsfolk in Bremen, Ga., had launched a letter-writing campaign. Four years into his ordeal, Waddell was finally allowed a birthday card. “It was signed, ‘Love, Mother.’ That’s how I found out my dad was gone.”

Waddell was released March 4, 1973, the same day as Swindle and 10 days before Hickerson. “The American flag was never more beautiful than on that C-141,” he says.

Waddell had worked for Lockheed Aircraft in Marietta after graduating from Georgia Tech and while awaiting assignment to flight training. “When I climbed on the airplane, I felt like I was home because I knew the people who had worked on it. I said, not too kiddingly, that I could smell the red clay out of north Georgia.” After his return home, Waddell was honored at Lockheed and presented a model of a C-141 with the same tail number as the plane that carried him out of Vietnam.

He will never forget that flight. “It was pretty subdued initially. Everybody was waiting to make sure we got airborne. When they called over the PA system that we were out of Vietnam airspace, the cheer went up. That’s when we were pretty certain we were on our way home.”

The plane landed at Clark Air Force Base in the Philippines. Doctors checked them out. Tailors measured and outfitted them with new uniforms. And for the first time in six years, Waddell enjoyed a soft bed and pillow rather than a concrete slab and a rough blanket. “I don’t know if I slept. It was just so exciting. The big thing I remember is the hot water and that I could take a bath or shower. And there was anything you wanted to eat 24 hours a day.”

Waddell was riding an emotional high. Then he was asked to join a small group that included a doctor and a chaplain. He braced himself for bad news. An aunt had died while he was away. An uncle had died. And, as Waddell suspected, his father had passed away. But there was more. His wife had divorced him while he was a POW.

Waddell called his children, to speak to the boy and girl who were only 6 and 3 when he last saw them. It was impossible to recapture the childhood moments he had missed.

After their release, fraternity brothers Waddell and Hickerson were reunited in May 1973 in Washington, D.C., where all released Vietnam War POWs were invited to a ceremony hosted by President Richard Nixon. The recipient of two Silver Stars, Waddell was put up at the Hilton, albeit one considerably more comfortable than the “hotel” in Hanoi. “There was more warm water,” he jokes.

That summer, Waddell, a career military man who retired as a colonel in 1987, was invited back to Georgia Tech. “A fraternity brother arranged to have all of Tech’s POWs honored at the first football game. It turned out that only Jim and I could make it. So Jim Hickerson and I were the two to walk onto the football field at halftime.”

In 1994, Waddell, who had remarried, returned to Vietnam, this time with his grown children and wife, Barbara. He wanted his children to understand where he had been while he missed so much of their childhood. At first, Waddell was apprehensive about setting foot inside the country he had only seen from the sky and the inside of a prison, but he found the Vietnamese people quite friendly. He took his family to see what was still standing of the Hanoi Hilton, originally built by the French in the 1880s. The family was struck by its grimness and the slits of windows. The air was stifling, just as it was throughout the hot summer months in all the prison camps.

Waddell also returned to The Zoo and the big double doors that had kept him locked inside. This time the doors were open and he could leave Vietnam at his choosing.
Coming Home with Honor

Jim Hickerson doesn’t think his story is any different from the nearly 600 other men held as POWs during the Vietnam War. “We tried to do our job the best we could. That’s about all you could hang on to. Coming home with honor was the big push. We wanted to come home with our heads held high,” says Hickerson, who retired from the Navy as a captain in 1986.

Hickerson grants that he suffered some beatings, but says he wasn’t singled out from any other prisoner. “Nah, not any more than anybody else.”

Hickerson, like many other college students in that era, had joined the ROTC at Tech. After graduation, Hickerson, a native of North Carolina who grew up in Atlanta and graduated from North Fulton High School, went into the Navy and flight training. “I got my wings in ’58, then had several tours on the West Coast and East Coast. Then I went into the first A-7 squadron. In fact, I was the first A-7 shot down. I was shot down the 22nd of December 1967 — a marvelous Christmas gift,” he jokes. “I was very lucky. I wasn’t injured, just a few bumps and bruises, nothing compared to what some guys had.”

According to a 1977 compilation of POW stories, “approximately one out of six Americans who were alive after being shot down in the Iron Triangle region of North Vietnam were recovered by U.S. rescue units. At best, a pilot could expect an extended stay in the Hanoi prison system. At worst, stories circulated about pilots who were literally clubbed and beaten to death in villages.

“Hickerson was lucky. Although the next five years were spent in the torture and deprivation of the North Vietnamese prisoner-of-war facilities, he survived to come home in Operation Homecoming in 1973.”

Captured immediately and taken to Hanoi, he was isolated for the first couple of weeks. He heard the tappings on the walls but didn’t know what they meant. Luckily, the prisoner who was moved in with him knew the tap code.

“They moved us around quite a bit. Every time you’d move to a new room you’d immediately — once the guards left — get on the wall to find out who was living next to you,” Hickerson says.

“One of the things you find out when you live with people like that 24 hours a day, seven days a week is that it doesn’t take long till you know ‘em pretty dad-gum well. And you’ve just about talked about everything you can talk about after awhile.

“That experience taught me a whole lot about me and about my country, a lot more than I probably ever would have known if I hadn’t gone through it. I don’t recommend anybody do it — don’t volunteer because it’s no fun,” Hickerson chortles, “but now that it’s over, it sure made a whole lot better person out of me. And I’m very, very fortunate.”

At one point, Hickerson suffered from pneumonia and, without treatment, his weight dropped to about 90 pounds. His cell mates guessed his waist measured only 20 inches. The Vietnamese “did start feeding us bananas and other stuff right before we left.

“It was about three years into the thing before I got a package. I got maybe one a year till, right at the end, about six of ‘em showed up. My wife at that time had been sending a package a month, along with a letter.” None of them made it to Hickerson, but occasionally the guards walked through the camp bearing the unmistakable scent of American soap and toothpaste.

After his release on March 14, 1973, Hickerson was hospitalized at the Oakland (Calif.) Naval Hospital. “As soon as they got through poking and checking me out, I went right back and started flying again. I was real lucky. There wasn’t anything wrong — certainly nothing that kept me from flying.

“The biggest adjustment, I think, was the change in what men wore and their hair and general appearance. When I left, the girls’ skirts were fairly long. When I came back, they were very short — that was wonderful. It wasn’t difficult to adjust to that,” Hickerson laughs.

“People were saying, ‘I guess you’ve noticed the girls.’ And I said, ‘Of course, how can you miss that?’”

“I was driving on the freeway in Oakland. My first wife had found somebody else while I was gone. So my antenna was up. I was in the search mode and looking around. I’m driving down the road and right in front of me is this beautiful head of long blonde hair. I said, ‘Oh boy, I’m gonna take a look at that.’

“So I whip up alongside and the she is a he!”

These days Hickerson is enjoying life in Hawaii with his second wife, Carole. “She’s just a marvelous lady. I couldn’t be any luckier.” He was transferred from California as part of his second career as manager of Anteon Corp., a company that sells information technologies to the government.

“I still try to keep up with Tech’s football team,” he says, calling up memories of his college days. “The fraternities and football games, the rat hats. You had to know all the songs or they’d shave your head with a T in the top. The camaraderie of the school. Georgia Tech was good for me.”
I was shot down by what we call friendly fire, a U.S. Navy F-4, my wingman. We were in an air-to-air engagement with a MiG 21. At first I thought there was another MiG 21 that I didn't see that shot me down,” says Mark Gartley, Phys 66, remembering the events of Aug. 17, 1968.

“I didn’t find out until two or three years later, when somebody came into the camps and told me,” he says, explaining that his emotions included surprise and relief when he learned a fellow American had shot him down. “I figured it was better to be shot down by one of your own folks than the enemy.”

Gartley and his radar intercept officer ejected from their aircraft near the village of Vinh in North Vietnam. “I was looking out and I could see the ocean and I knew if I’d been out over the ocean, I’d be safe. I looked down and saw the ground and knew it was going to be a long trip. They were shooting at me on the way down and I sustained a small injury from some bullet fragments, but it was just superficial.”

Gartley was beaten, blindfolded and tied up for a number of days before he was loaded onto a truck with two other prisoners to be transported to the Hanoi Hilton. “It was a very unpleasant trip. The roads were pretty tough and we’d have to stop at every village on the way up so they could show us off and beat us a little bit for the glory of the fatherland.”

After their initial interrogation in Hanoi, Gartley and two other Americans were thrown into a cell together. “We were fortunate in that we didn’t spend an inordinate amount of time in solitary like other guys,” he explains. “We were all young, junior officers, so I guess they didn’t feel we were worth much.”

Back at home, Gartley was listed as missing in action. “My folks were informed I was alive through other than government means, through this picture in a magazine from Poland, a Polish magazine quite similar to Life magazine. They had taken my picture on my way up to Hanoi. The picture was sent from Poland to Chicago, to some people who then translated it from Polish and sent it to some people someplace, some mutual friends, who then sent it on to my mother. That’s how she found out I was OK.

“The thing about my experience that is unique comes in
two pieces. One is how I got there, that I was shot down by my wingman, a U.S. Navy plane. The other is that I was released early," Gartley says.

“My mother became an anti-war activist after I was captured. She was a history teacher, very well-read. As the result of my capture, she came to believe that the war was not in the national interest and she became an activist, not in the radical anti-war movement, in the intellectual part of the movement. And as a result of that, she traveled to Hanoi in the fall of 1972.

“She did her homework. And obviously, because she was the mother of a POW, she could get press and notoriety pretty much any time she wanted to. She made herself known at the highest levels. She knew the national security adviser by his first name," says Gartley, who adds the rescue mission to Hanoi included the wives of two other POWs and was funded by an anti-war group.

“I had no idea what was going on until they knocked on my door in the middle of September and said, ‘Come with me.’ I had no idea what was happening. And they said, ‘You’re going home. Your mother’s here.’”

The American POWs followed a code of conduct to “return with honor,” that no soldier could honorably return home unless all of the prisoners were released. Gartley was well aware of the honor code.

“At that point, I said, ‘Wow, what do I do? Do I go home or do I stay?’ What do you do? That was a very difficult situation for me. It was obviously a propaganda ploy on the part of the North Vietnamese to draw attention to the POWs and the war. There was a lot of press interest. It was a pretty big deal at the time. It was a tough spot to be in.”

Gartley decided to go home with his mother. “I know by going home early I did not live up to the honor code and I completely understand that. But at the same time, I know I was in a difficult situation and I made that choice the best I could.

“I think there were six released before my group. We were seven, eight and nine. So the precedent had been set but still it was not — under the code — the right thing to do. And I can understand that.

“You always have second thoughts. I mean, I’ve had second thoughts and I’ve always wondered what if I had stayed, what would they have done, either to me or to my mother while she was there. I don’t know. You just never know. You can always Monday-morning quarterback, no matter what it is. And I’ve certainly done my share of that. But again, you can’t change the facts. They are what they are.”

Because of those facts, and the hard feelings of some former POWs who criticized him for coming home before the war was over, Gartley stays away from reunions. “I did not go to Washington (in May 1973). I didn’t think it was appropriate in my circumstance for a couple of reasons. One, my mother had been an anti-war activist and that certainly was not Nixon’s policy. And my release was controversial when I came home. So it just wasn’t appropriate. I’m realistic. I recognize that.”

Still, Gartley wanted to continue serving his country. “One of the things that affected everybody over there was that we became more patriotic, not less. And I just became very interested in politics. I was sort of bitten by the bug, if you will. I was excited about it.”

In 1974, Gartley ran for Congress in his home state of Maine, losing to William Cohen. “By that time, he was on the House Judiciary Committee impeaching Nixon. I was buried. If you can say more than a landslide, it was more than a landslide.

“I was elected the secretary of state of Maine after that — a consolation prize, I guess. I served for four years. Then I ran for the House again. And I lost again.”

While still a self-professed political junkie, Gartley hung up his campaign shoes and settled down with work and family obligations. He now works for U.S. Cellular and commutes from his home in Maine to his office in New Hampshire.

Like Hickerson and Waddell, Gartley pledged Beta Theta Pi at Tech. From time to time, he gets back to Atlanta, where he first arrived to attend the Institute on a Navy scholarship. He feels fortunate to have been able to attend Georgia Tech. “It’s a spirit, it’s not just bricks and mortar. It’s just the spirit, the enthusiasm, the ethics of the school that stand out, plus all the friendships and all those sorts of things. It’s the spirit and the reputation that make you proud of being a Tech graduate.”

On Nov. 5, 1967, the F-105 flown by Maj. Dutton and Capt. Glenn Cobeil was struck by an enemy missile. “We tried to nurse the stricken plane but the time came when we knew we had to eject,” Dutton writes in a compilation of stories collected for the POW Network.

“I figured if I could hide until dark, perhaps I could get across the Red River, that being friendly territory. However, I landed right in the middle of a populated area. Quickly,
the peasants disrobed me, with no thought of unfastening buttons or zippers. They even cut my boots.

"With elbows tied behind my back, a loose blindfold over my eyes and a noose over my head, I was led barefoot down a rocky path. The civilians hit me with bamboo poles, rocks, dirt clods and fists. I had a gaping wound and one peasant woman stuffed it with a piece of cotton that had a Mercurochrome-like antiseptic on it," Dutton writes.

"We finally arrived at the Hanoi Hilton. Glenn was alive. I never saw him again, but I heard him. We were tortured continuously and, on the fifth day, I heard Glenn scream my name and then I heard the sounds of them beating and clubbing him. He did not come home alive.

"They beat, they shackled, they even played a game of forcing me to sit on a stool in the middle of a room and the guards would take turns knocking me off with blows to the head. The object was to see how far they could knock me. I think the record was 10 feet," writes Dutton, who suffered hearing loss in one ear from the repeated blows.

Dutton's daughter was 5 years old and his son 3 when he was shot down. Jean and the children were living off a military base outside Las Vegas. She learned her husband was alive through the North Vietnamese publicizing the capture of Americans.

"There was a Japanese news crew that went over there and took a photo of him," she says. "And at Christmas-time (1967), he and about five other people were on a shortwave radio broadcast coming from Cuba. That was broadcast all over the United States. I heard from people all over the country calling me to make sure I knew he was alive. These were people I didn’t even know. It really warmed my heart that there was so much concern."

Jean wrote to her husband regularly. "At first, there were no limitations on format. It could be a page written. Then the Vietnamese went to a form. There were only seven lines you could write on. It was about a 5-by-7 piece of paper. So you had to choose your words very carefully to make sure you didn’t use any superfluous words," she says with a chuckle.

"It was about once a month that you could write those letters. He got most of them. He was one of the lucky ones that was able to get pictures.

"Other people in the camp were not. It was different for everybody. One of the other guys in the camp wasn’t given anything from his family. His wife and I were on a trip together and I took a picture of Mickey Mouse and my two kids and their two kids and I sent it to Dick. Through the camp, he was able to get word [to the other man] that he had a picture and it would be in the bathhouse. That was the first time he'd seen a picture of his children in years."

Dutton was released on March 14, 1973, the same day as Hickerson. Jean grants that adjustments had to be made after her husband’s return. "It’s a challenge to have a whole family again. The children hardly knew their father. After being in control of the house, it was a little hard to relinquish it. But I was very glad to get rid of some of those responsibilities."

Dutton served at the National War College outside Washington, D.C., before being assigned to Hurlbert Field in Florida, where he was commandant of the U.S. Special Operations School when he retired in 1981.

Col. Dutton died of leukemia on Dec. 12, 1999. Dutton’s widow attended the Thanksgiving weekend POW reunion in honor of her husband of nearly 40 years.
Orson Swindle agrees with friend and former POW John McCain's assessment that he had "the honor of serving with heroes — and wonderful people."

The readjustment to life at home was not always easy for the POWs or their families. "You were trying to figure out how to get your family back together," Swindle says. "Obviously, for some of us, it didn't work out. It's understandable, no fault of either party, there was just a lot of tragedy and a lot of suffering in our own ways, perhaps too much to overcome. And that's just the way life is.

"A lot of tragedy happened to a number of people when we came home, some real sad things. Families were busted up, there was the enormous percentage of divorces, a couple of suicides. They aren't all happy stories and there are some lasting scars that we will never get rid of. You don't expect to get rid of the pain, but you can overcome it and the vast majority of us have overcome it," Swindle says.

"The American serviceman was asked to fight probably one of the toughest enemies we have ever fought in one of the worst places we ever fought, farther from home than we've ever fought and without the general support of the American people.

"To be maligned the way they were when they came home is a great tragedy. Slowly but surely, the perception of the Vietnam vet is changing. For so long we heard of all the bad cases. When you get right down to it, those numbers are a relatively minute percentage," Swindle says.

"The vast majority of Vietnam veterans have just done remarkable things for this country. They continue to serve in their own ways — be it in professional life or civilian life or whatever you wanna call it — in all aspects of our society. They're great people and I'm proud of be one of them."
This Georgia Tech professor is engineering medical breakthroughs

Name:

Don P. Giddens
- Lawrence L. Gellerstedt Jr. Chair in Bioengineering
- Georgia Tech/Emory Department of Biomedical Engineering
- Ph.D., Georgia Institute of Technology
- H.R. Lissner Award, American Society of Mechanical Engineers
- National Academy of Engineering

Current focus:

Dr. Giddens is leading the Georgia Tech/Emory Department of Biomedical Engineering, a unique collaboration between a private university and a public institution, which will revolutionize the intersection of medicine and engineering.

Recent accomplishment:

As a member of the International Canoe Federation Slalom Committee, Dr. Giddens was invited to be the chief official for the whitewater events at the 2000 Olympic Games. He declined, however, since his son Eric was coaching, and daughter-in-law Rebecca was competing.

The Lawrence L. Gellerstedt Jr. Chair in Bioengineering is one of 50 endowed chairs established during The Campaign for Georgia Tech.
Margaret Gathright-Deitrich spent most of her adult life helping others cope with illness, pain and loss. These days, a 6-year-old black Labrador retriever named Tuthill is helping the 53-year-old former nurse overcome her own loss. “In 1989, I was working in the intensive care unit and emergency room at a hospital in Norfolk, Virginia,” she says. “I began feeling pain in my hip. I had polio as a child, but through therapy I managed to completely overcome it — not even a limp.”

The pain felt a lot like the pain she had endured in childhood, but doctors initially dismissed any idea of a recurrence of the disease. When doctors made their diagnosis, however, it was post-polio syndrome. Doing the dishes, washing clothes, even opening a door became difficult, sometimes impossible. Gathright-Dietrich could only watch helplessly from her wheelchair as her career and independence faded.

“I had given in to the idea that I would be helpless for the rest of my life,” she says. “Then I heard of Canine Companions for Independence.”

A year later, after extensive training, Gathright-Dietrich was matched with her first service dog, Wallaby, a yellow Labrador retriever trained as a service dog by CCI. She was able to regain her independence and began a new career as a freelance writer and motivational speaker.

Founded in 1975 in Santa Rosa, Calif., CCI pioneered the concept of training dogs to assist disabled people in their everyday activities. These dogs, usually golden retrievers, Labrador retrievers or golden-Lab mixes are bred at CCI kennels and sent to volunteer “puppy raisers” for 14 months of training.

One of those volunteers, Cecelia Kurland, MS IM 78, has had her hands full lately training Keena, a yellow Labrador puppy. The young female is the fourth puppy the Lawrenceville, Ga., business consultant has raised. Kurland is a part of a large network of Georgia Tech students, alumni and faculty who volunteer their time and services to CCI. The work
Margo Gathright-Deitrich gives Tuthill a hug after a walk. "Tuthill is my very best friend," she says. Left: Keena, a yellow Labrador retriever puppy, is in training to become an assistance dog.
requires an inordinate amount of patience, time and energy to ready these pups for a life of service — and then they are gone.

"It's hard to watch them walk out of your life," Kurland says. "But you take great pride in knowing that your dog will be helping those who can't help themselves."

Kevin Ugan, AE 88, MS AE 89, knows the feeling all too well. He recently had to say goodbye to Tom, a 16-month-old golden-Lab mix he had trained since Tom was only a few weeks old. Ugan took a few days off from his Tucker, Ga., software design business and flew with the dog to an advanced training facility on Long Island, N.Y., where Tom will spend several more months in training and be thoroughly evaluated by the CCI staff. After a successful evaluation, he will be matched with a client.

Before they left, Ugan threw a private "graduation party" for Tom, complete with frozen doggie snacks. "I'm missing him already," he says. "He was such a fun guy; he was kind of a party-animal type dog. He really kept things lively."

Tom was the fifth puppy Ugan had raised.

"It doesn't get any easier to say goodbye," he says. "The only difference is that you know what to expect the second time around. The first time, it's very traumatic for you to lose the dog that you're connected to, but you also feel very proud."

Only half the dogs in training make it through the entire cycle. The other half are removed for a variety of reasons ranging from temperament problems to fear of their surroundings. That doesn't mean, however, that they can't still assist people.

Melody Moore, MS ICS 88, PhD 98, an assistant professor at Georgia State University, is conducting research in direct brain/computer interfacing with people who are paralyzed. Two of Moore's dogs couldn't meet CCI medical standards and could no longer be certified as service dogs. They were retrained to be therapy dogs and help Moore conduct the research.

"An electrode implanted in the brain's cortex intercepts neuro-signals and sends them to a computer allowing the person to control the computer with their brain," Moore explains. "After the electrode is implanted, however, the person must relearn how to generate the brain signals that drive the cursor. Some electrodes are implanted in the motor-cortex area of the brain that controls left-hand movement. Although the person cannot move his left hand, he can think about..."
Canine companions make life easier — and more rewarding — for those they are trained to serve.

moving it. We use physical stimulation of something touching the skin to augment that signal while the person is thinking about it.”

On command, the dog will lay its head on the person’s lap and the patient’s left hand is placed on the dog. The stimulus of the dog’s silky fur under the hand augments the generation of neuro-signals making communication easier.

Doug Lee, MS CI 78, an IBM software sales specialist also from Tucker, trained Boda, a yellow Labrador pup, after reading about the CCI program in a suburban Atlanta newspaper. Lee, whose wife, Fran, has a form of muscular dystrophy, saw an opportunity to help others achieve greater independence.

“I felt very fortunate to have had the opportunities that I’ve had,” he says. “My years at Tech taught me how to work hard and achieve things that were often very difficult. Raising a puppy to become an assistance dog is hard work, but it’s a great feeling to have the opportunity to help others achieve things that might be difficult for them.”

That training took on a more personal meaning when his wife began to use a wheelchair more often. Boda had completed almost two-thirds of his advanced training before he was dismissed by CCI. He is now being trained privately to work as an assistance dog for Fran.

“Boda is part of the family now,” Lee says. “He’s there to help Fran whenever she needs him. Who knew when we were training him that he would come back to help us?”

Gathright-Dietrich understands the close bond between a disabled person and his or her dog.

“Tuthill is my very best friend,” she says as she rubs his ears. “He enables me to continue to be the active high achiever that I have always been, even though I use a wheelchair.

“Tuthill’s willingness to do repetitive, mundane tasks allows me to save my limited amount of energy so that I can use it to do what I want to do rather than what I have to do.

“He has given my life back to me.”

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A Passion for **Planes**

The sky's the limit for Air Canada CEO Robert Milton

By Karen Hill

When Robert Milton was a little boy living in Hong Kong, he would beg his grandmother to take him to the airport so they could watch the planes.

When Milton went to college, he chose Georgia Tech because it was close to Hartsfield International Airport, where he could watch an infinite variety of planes from around the world take off and land on what was then the world’s second-busiest tarmac.

When he graduated with a degree in industrial management in 1983, he spent the money his father gave him for a new car to lease an airplane instead and founded an overnight delivery service.

Now, Milton is the chief executive officer of Air Canada, the 11th-largest airline in the world, with $7 billion in assets and 39,000 employees. And his desk faces a large window so he can watch the planes take off and land at Montreal’s Dorval Airport.

“I guess I’ve always been an airplane nut,” says Milton, adding that he’s never considered a line of work that didn’t include airports. He says the fascination came from frequent travels as the son of international entrepreneur David Milton, IE 58, and growing up on three continents.

His dad suspects genetics has something to do with it, noting that he also used to spend hours as a child watching planes come and go.

Whatever the root, a lifelong memory of smooth landings has held Robert Milton in good stead. He’s survived a year in which he fought off a hostile takeover bid launched just 18 days after he became CEO in August 1999, acquired rival Canadian Airlines in a $2 billion deal that included a contentious debt restructuring, and oversaw a $726 million buyback of Air Canada stock.
Milton gained a reputation as an operations whiz in the seven years he worked for Air Canada before being named CEO at age 39. But it was his youth and inexperience in corporate finance that led Gerry Schwartz, described by a Toronto business publication as “the quintessential corporate raider,” to strike.

“He’s 39 years old,” Schwartz told Report On Business, a monthly magazine published by the Toronto Globe and Mail newspaper. “He has never handled any corporate matter in his life before.”

But Milton, perhaps recalling the intricate ballet of planes swooping up and down on crisscrossing runways — the unseen but vital pas de deux between pilots and airtraffic controllers — knew how to time his response. And he knew where to go for help.

Milton assembled top-flight consultants, who launched a court battle declaring the takeover illegal, then — knew how to time his response. And he knew where to go for help.

Milton assembled top-flight consultants, who launched a court battle declaring the takeover illegal, then — knew how to time his response. And he knew where to go for help.

In November 1999, two-and-a-half months after launching the takeover bid, Schwartz called it quits.

Early in 2000, Milton began merging Air Canada with its bankrupt rival, Canadian Airlines. It’s been a bumpy ride, with customer complaints about high ticket prices and service disruptions.

Despite the turbulence, Robert Milton says the merger was the highlight of his year. An unexpected, but welcome, boost came when Aviation Week and Space Technology magazine named Air Canada the “Best Managed Airline” in North America, and third best in the world.

“It came at a time of great operation stress at Air Canada and it came as a very pleasant surprise indeed,” Milton says.

Customer-service problems have now eased to the point where he can focus on other goals for the expanded airline.

“Our immediate priority at Air Canada is to complete our integration and move on with our growth plans for the coming year,” he says. “We’re in the middle of a fleet growth and replacement program and, with long-term agreements now in place with the majority of our unions, we’re uniquely poised for a period of stability and growth in the coming years.”

That stability will allow time for another priority: incorporating more technological advances into customer service.

Already, Milton notes, Air Canada uses express check-in kiosks “which allow our customers to check in for a flight much as they withdraw money from an ATM.” The company also recently introduced voice-recognition technology for employees who handle bookings.

His youthful enthusiasm for airplanes, airlines and airports remains undimmed. He never daydreams about what might have been if all those hours spent watching planes had been instead devoted to practicing the guitar or playing baseball or concocting potions with a junior chemistry set.

“I have always pictured my future in this industry,” says Milton, who turned 40 in July. “Whatever my future may be, I’m quite sure it will involve airplanes.”

That doesn’t surprise his father, who remembers a 4-year-old boy who led his grandmother to the Hong Kong airport, determined to take every opportunity to be around airplanes.

“I can’t say that I’m surprised by what Robert has achieved. I have always felt he had great potential and told him several times over the years that he was all I’d hoped for in a son and a lot more,” David Milton says.

“However, I am somewhat amazed by the speed of his achievement.” GT

By Maria M. Lameiras

A head of the third-largest soft drink company in the world, John Brock has managed to finesse his company’s products into his competitor’s machines, build up their market for those products and acquire other businesses whose beverages are already overwhelmingly popular.

For all of this, Brock, COO of Cadbury Schweppes, has been named Beverage Industry Magazine’s Executive of the Year.

And, since taking over as COO in March 2000, Brock now has the opportunity to work his brand of business magic on Cadbury’s confectionery business.

Though he now resides in London, Brock was born in Moss Point, Miss., and lived there until he left home for Georgia Tech in 1966. While at Tech, Brock married his childhood sweetheart, Mary. He finished at Tech in 1970 with bachelor’s degree in chemical engineering and immediately enrolled in graduate school. As part of his graduate experience, he took part in a six-month exchange program to England at Loughborough University, his first taste of living abroad.

“I loved it,” he says; “it gave me a very positive taste of working with the British.” Brock and his wife returned to Atlanta and he finished his master’s degree in 1971.

He joined Procter & Gamble in product development, working on fabric softeners, bleaches and soap products. Over time,
Brock was promoted to group leader and section head, then associate director of beverage product development.

In 1983, Brock was recruited by Cadbury Schweppes to head technical and operations functions in the United States for Schweppes and its sister business unit, Motts.

"I had the choice of continuing at Procter & Gamble and doing product development or going to a smaller company with a much wider set of responsibilities, from purchasing and production planning to manufacturing, engineering and product development," Brock says. "I'm an achiever from way back, and I saw an opportunity to broaden myself and even potentially to become general manager of a business. I didn't think that'd ever happen at P&G and I saw the positive opportunity at Cadbury Schweppes."

Brock and his family moved from Cincinnati to Connecticut in 1983. After three years, Brock went from running technical and operations functions for North American beverages to being in charge of the same function for the global beverage business of Cadbury Schweppes.

After two more years, Brock was made head of global marketing and in 1990 was named president of Cadbury Schweppes' international beverage division for markets outside the United States and Europe. In 1992, he became president of European Beverages, then president of North American Beverages. The company acquired Dr Pepper/Seven-Up Inc., and Brock became president and CEO of the total North American business in 1995.

In 1996, Brock was named managing director and CEO of global beverages for Cadbury Schweppes and relocated to England with his wife and their youngest child, Major, 13. The couple's oldest child, Rebecca, 23, works in New York, and their middle child, John IV, 21, is a student at Vanderbilt University.

In March 2000, Brock was named chief operating officer for Cadbury Schweppes, with global responsibility across the company's beverage and confectionery businesses, which have combined annual sales of $7 billion.

Brock credits his success in the beverage industry and with Cadbury Schweppes to solid strategic planning and a focus on the importance of people. "Setting out a strategic vision is something I enjoy. Our vision has been to be a leading beverage company and, ideally, the largest non-cola company, and we've now achieved that," Brock says.

In addition to Dr Pepper/Seven-Up, Cadbury...
Schweppes has also acquired A&W, Hawaiian Punch and, recently, Snapple.

“We think the non-cola category is the place to be. In the U.S. beverage business, there has been a continuing switch from colas to non-colas,” he says. “We just have a great collection of brands and we’re doing well.”

Another of Brock’s accomplishments is the network of bottlers and distributors he has woven for his company’s products across the United States.

“We’re with Coke bottlers, Pepsi bottlers and independent bottlers. In Atlanta, Dr Pepper is with Pepsi, in New York with Coke and in Dallas with an independent,” Brock says. “That is very much part of the Dr Pepper philosophy of going with the strongest bottler in any specific market.” Brock calls the strategy in distributing Cadbury Schweppes’ beverage products “a business school case study.”

“We are arch-rival competitors to the Coke and Pepsi parent companies, but in terms of Coke and Pepsi bottlers and independent bottlers, we pride ourselves on the relationships we have built with them and the competencies they have in the marketplace,” Brock says. “They value our brands and enjoy working with our people and we’ve managed to do it in spite of the hugely competitive marketplace in which we play. Our bottlers are a key part of our success and we are very proud of that.”

Now Brock is learning a new business as head of confectionery for Cadbury Schweppes in addition to beverages.

“I’m very involved with the confectionery side,” says Brock, adding that although Cadbury has a limited presence in the United States, it is “kind of the Hershey’s of the United Kingdom and other former British Empire members. Kids in the UK grow up loving Cadbury products.”

Brock has some ideas for pushing distribution and availability on the confectionery side of Cadbury along the lines of what he’s done in the United States with beverages.

“In the United States we’ve licensed our confectionery business out to Hershey, but we have some positive ideas for moves we can make outside the United States to grow our confectionery business,” Brock says. “Confectionery is different in that it is more dependent on the history, heritage and culture of a market and a people. The taste for beverages is more consistent around the globe, but with confectionery it varies markedly across the globe.

“In China, sugar confectionery is more important than chocolate because of the history and heritage of sugar confectionery there,” he says. “There is a greater variety in confectionery than in beverages, and the world is far less concentrated in terms of companies in confectionery than in beverages.”

Coke, Pepsi and Cadbury Schweppes own 75 percent of the world’s carbonated beverage industry, whereas the top six confectionery companies in the world control less than 50 percent of the world’s market. “There is possibly more opportunity in confectionery to find value-enhancing acquisitions, alliances and joint ventures,” he says.

Though his job carries substantial responsibility and is dependent on consumer tastes and preferences, Brock says he wouldn’t choose any other industry.

“Confectionery and soft drinks are fun,” he says enthusiastically. “There is no other business that’s more challenging and exciting day in and day out. It’s also a rewarding business as it creates moments of pleasure for people around the world.”

Brock embraces the challenge of working in a highly competitive field.

“The challenges of leading a company like Cadbury Schweppes are that you are competing against some of the best companies in the world — Coke, Pepsi, Nestlé/Mars. It’s really tough, but that’s what it’s all about — coming up with the right products, the right packages and the right marketing to appeal to consumers.”

In addition to leading Cadbury Schweppes, Brock is non-executive director of Reed Elsevier, an international publisher and information provider, and chairman of the National Soft Drink Association in the United States.

Brock credits his training at Georgia Tech for his versatility in problem solving. “I think my background in engineering — learning to make assumptions and then to come up with real-world solutions — is the ideal background for business management.

“I’ve also always been a people-oriented person. I have a knack for knowing who is really good at doing something and who’s not,” Brock says.

“My business philosophy is simple: have the best people in the right jobs, focused on the right objectives — that gives you a high probability of success.”

“I spend more time on people — development, training and growing the people we have — than on any other single area in business, and that’s the solution. It doesn’t matter what the objective or what the challenge is. With the right people, you can accomplish anything.”
George Lee solves Georgia’s noisy problems — from an Atlanta milk plant to a Cobb County firing range to the Okefenokee Swamp.

Lee is director and senior research engineer at Georgia Tech’s Economic Development Institute at the regional office in Macon, part of Tech’s field-office network that provides technical and management assistance to businesses and industries throughout Georgia.

"Industry is primarily our focus," Lee says, adding that his business attire often consists of a hard hat, jeans and work boots. "We go in there and get dirty. We are on site and hands on to answer people’s questions.”

A 1970 aerospace engineering co-op graduate from Tech who earned his master’s degree in 1971, Lee worked as a design engineer for Rockwell International, then as an instructor at Albany Area Vocational Technical School before joining the Georgia Tech Research Institute/EDI as director of the Macon regional office.

Lee, who has been with the Macon office since 1978, is a specialist in community/industrial noise control. The Georgia Society of Professional Engineers named him Engineer of the Year in Government for 2000.

Lee travels around the state to help industries solve noise problems. “In the beginning, noise control meant helping companies control noise that was exceeding OSHA regulations. The federal government would come in and say there was a problem, but they wouldn’t tell them how to solve it,” Lee says. “It’s evolved into work with communities that have complaints and quality-of-life issues. We sort of get in the middle between a company and the citizens and the county commission — not always something we cherish doing — but it certainly is a service to most of our constituents.”

In early November, Lee spent two nights in the 396,000-acre Okefenokee National Wildlife Refuge. A devel-

Georgia Tech’s George Lee is Engineer of the Year in Government for 2000.
oper had recently broken ground on a 27,000-person amphitheater about three miles outside the park in Charlton County and Lee was gauging the baseline of noise and light in the refuge to determine the impact the development will have on wildlife.

"I was in the swamp from 4 p.m. to 2 a.m. one day and from 10 a.m. until 12:30 a.m. the next taking readings," Lee says. "We'll have to go back at different times of the year to get different readings because the noises are different. Like right now, the gators aren't bellowing the way they would be in the spring."

Lee will also train refuge workers to use noise measurement equipment so they can monitor noise levels on their own at different times of day and of the year.

“We’re not generally in an adversarial role; we’re trying to work with companies and communities to remedy the problems,” he says.

For instance, complaints were coming in about a chip mill — an industry that strips and processes the bark from trees chopped down for the lumber or paper industries — and the noise from the company’s drum de-barkers, large pieces of machinery into which the logs are thrown and tumbled to remove the bark.

“There was this ‘rumble, rumble, rumble’ like a giant clothes dryer with a couple of tennis shoes in there,” Lee says. “I looked at the problem, then had database searches done by some of our campus folks, and we found a product to line the drums that made the process quieter and at the same time cleaned the logs better and made maintenance easier on the machines. Everyone wins. Those are the sorts of things we do.”

Lee is proud of Tech’s field office system and the benefits it has provided to Georgia’s industries.

“We are one of a few programs like this in the country,” he says, adding that Tech’s field offices have been in place since the 1960s. “We’ve led the way in our industry for all these decades. Georgia Tech’s efforts through EDI are a model for a lot of other states.”

“We’ve led the way in our industry for all these decades. Georgia Tech’s efforts through EDI are a model for a lot of other states.”

The field offices provide confidential assistance with everything from problem solving to management training to streamlining manufacturing and business practices. The offices employ about 150 engineers, many of them Tech graduates, in 19 field locations and at the Atlanta office, as well as drawing on the expertise of Tech faculty and staff.

“We have different people with different areas of expertise — we have folks who do ISO work, we have people who do a lot of in-plant work, in areas such as layout work or lean manufacturing,” Lee says. “We’ve grown from seven offices in 1978 to this and I think all that demonstrates a real appreciation for our services from the industry in Georgia.”

The field offices also assist counties and cities with environmental, regulatory and development questions.

“We are sort of Tech’s go-to people out in the state. We don’t recruit students, but we administer the President’s Scholars program and we certainly deal with parents and students who ask questions. We also find co-op students for companies. We are sort of their vital link to campus resources,” Lee says.

The office currently is helping lay the groundwork for air-quality studies in Augusta, Columbus and Macon, three cities identified by the federal government as areas for possible future non-compliance.

Using a software program it developed, EDI has helped more than 100 Georgia communities gauge the economic impact of potential industrial development.

“They want to know what the impact will be of giving this or that tax waiver. This program basically does a cost-benefit analysis, projecting it out over 10 to 20 years and looks not only at the income side, such as ad valorem tax and sales tax, but the cost side in terms of cost of schooling for kids who will be in the households that are part of the new employment in the county. Certainly the infrastructure improvements of roads and sewer and water lines need to be done before the industry will come in,” Lee says.

“There are always a lot of intangibles you can’t capture in a software program, but it’s a start. We’ve done over 100 in the state and we’re called upon more and more to do those studies.”

EDI provides its services at no cost on a short-term basis — three to five days of work — to businesses, industries and communities. It is funded by state and federal funds, as well as by fees charged to companies that request or require longer-term or contracted services.

“We are conscientious about not competing with private consulting firms. We are the ones to prime the pump for companies, helping with a small project or serving as a third party to help them pick a consulting firm. We also have consultants who call us up for guidance,” Lee says.

Lee says Tech’s faculty is a fantastic resource for the state’s industries.

“We’ve got some outstanding faculty,” Lee says. “When we tap the right faculty to solve a problem, it takes half the time to solve it. When you get the one who knows what you’re talking about, when you get just the right one for the problem, it’s dynamite.”
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It's About Time

Georgia Tech researchers recreate 335-year-old clock experiment

By John Toon

While recovering from an illness in 1665, Dutch astronomer and physicist Christiaan Huygens noticed something odd. Two of the pendulum clocks in his room were beating in unison — and would return to this synchronized pattern regardless of how they were started, stopped or disturbed.

Huygens, who had patented the pendulum clock eight years earlier, set out to investigate this phenomenon, and the records of his experiments were preserved in a letter to his father. Written in Latin, the letter provides what is believed to be the first recorded example of synchronized oscillators, a physical phenomenon that has become increasingly important to physicists and engineers in modern times.

More than 300 years later, physicists at Georgia Tech have recreated Huygens' experiment. They hope this straightforward mechanical system of gears, springs, weights and levers will offer insights into complex synchronized oscillators.

"We might be able to learn how this system is like laser systems or superconducting electronic systems. If there are general mecha-
nisms affecting coupled oscillators, then perhaps we can learn about these mechanisms by using the clocks as mechanical analogs for electronic systems," says Kurt Wiesenfeld, physics professor.

"It's a very old-fashioned idea, not the way people who study coupled oscillators have been thinking about nonlinear dynamics over the past decade or so. Classical physics still has things to teach us."

In recreating Huygens' experiment, Tech researchers attached two spring-powered pendulum clocks to a platform fitted with metal weights. The platform is set on wheels, free to move along a level metal track.

Although Tech's clocks are smaller than Huygens', the relationship between the masses of the pendulum bobs and the overall platform is similar. But the modern clock system includes a feature not available to Huygens: laser monitoring that records the pendulum swings for computer analysis.

The clocks have shown an ability to synchronize only in anti-phase, that is with their pendulums swinging in opposite directions. This is true even when the pendulums are started swinging in the same directions, in-phase. Huygens' letter recounts that he, too, observed only anti-phase synchronization, helping confirm that Tech researchers have successfully duplicated the 17th-century experimental conditions.

Tech's clocks display something Huygens did not describe — what the researchers call "amplitude death." Instead of synchronizing, one or both pendulums ultimately stop moving altogether. This becomes more likely as weight is removed from the platform carrying the clocks.

Working 20 years before Sir Isaac Newton formulated the laws of mechanics, Huygens was hampered in his ability to explain what he saw. But Tech researchers have their theories.

"In modern times, the general motion of pendulums can be roughly described as a combination of in-phase and anti-phase synchronized motions, which are normal modes," explains Michael Schatz, assistant professor of physics.

"A key feature of our understanding of Huygens' clocks is that the in-phase motion doesn't couple to the platform in the same way as the anti-phase motion. In-phase motion can drive the very small platform movement, which drains energy out of the system through friction between the platform and the surface on which it rests," Schatz says.

But when the clocks are synchronized in anti-phase, the swinging pendulums balance each other, generating no movement in the platform. This conserves their energy, thus providing a mechanism for favoring anti-phase motion by the system, he suggests.

"The heavier the platform, the smaller the coupling between the two clocks," Schatz says. "If it's really heavy, the platform doesn't move at all and there is no coupling and no synchronization. But on the other hand, if the platform is too light and there is too much motion, it will damp out the clocks' energy and create amplitude death."

Recreating Huygens' experiment required a considerable amount of deciphering. Heidi Rockwood, head of Tech's Department of Modern Languages, helped translate Huygens' Latin, which turned out not to be as scientifically clear as the researchers had hoped. And questions remain.

"There's a lot of detective work in this," Wiesenfeld says. "You can get some pieces of it, but you're not sure what to fill in. The more you think about it, the more you can imagine other possibilities."

John Toon is manager of the Georgia Tech Research News and Publications Office.
for trailers, increase traction and augment braking. Also known as pneumatic control, this aerodynamic system also could create lift on the trailer, effectively reducing its weight. That would cut rolling resistance on tires, reduce wear and increase fuel economy.

The pneumatic system works by blowing compressed air from slots located on different parts of the trailer. Air blown over curved surfaces on top of the trailer smooths airflow there, decreasing drag and making the entire trailer act like a wing to lift as much as 15 percent of the weight off the tires. Blowing air from slots on the bottom of the truck would have the opposite effect, multiplying downward force on the tires to improve traction and braking when needed. Combined blowing from all sides would further reduce flow separation and drag.

Blowing slots on each side of the trailer could counter crosswinds, giving the driver a way to fight jackknifing. And, by selecting the right slot combination and blowing rates, the pneumatics could be used to increase drag to augment aerodynamic braking.

"Producing aerodynamic drag and increasing resistance on the tires could really help truckers in difficult downhill areas or for emergency stopping. Beyond the fuel-cost issue, there is a lot of interest in this from the standpoint of improving safety," Englar says.

Englar's research team at the GTRI Aerospace, Transportation and Advanced Systems Lab has begun testing small-scale truck models in its low-speed wind tunnel. This initial program will evaluate the effectiveness of the pneumatic system and pave the way for eventual testing on full-size tractor-trailers.

Circulation control systems were developed and tested on fixed-wing and rotary-wing aircraft by Englar and his associates in the 1970s and 1980s as a simplified means of greatly increasing lift, improving control and reducing takeoff and landing distances.

During the 1990s, GTRI engineers applied the technique to automobiles, demonstrating significant savings in drag and energy use, as well as controllability.

Protected by two patents, the automotive application — known as GTRI FutureCar — produced drag reductions of up to 35 percent by altering the flow separation and vortex formation around the rear of the vehicle.

Englar believes even larger reductions may be possible on tractor-trailers, which will gain substantial drag reductions above the basic streamlining already used in passenger cars.

Robert Englar and Graham Blaylock place a model truck into the wind tunnel for testing.
Professor Z.L. Wang is one of Tech’s nanoscience researchers.

including the physical sciences, computing and more than a half dozen areas of engineering. In September, a new Center for Nanoscience and Nanotechnology was formed to unite the multidisciplinary research and its 50 faculty members.

The premise of nanoscale science and technology is simple: If scientists can learn how to control matter on the nanoscale, at the level of atoms and molecules, then they can create new materials, devices and systems that could have a profound impact on almost every aspect of our lives.

For instance, carbon nanotubes are 10 times stronger than steel and one-sixth the weight, and nanoparticles can target and kill cancer cells. Nanoscale systems have the potential to make supersonic transport cost-effective and to increase computer efficiency exponentially.

In 1998, Dr. Neal Lane, adviser to the president for science and technology and former National Science Foundation director, said, “If I were asked for an area of science and engineering most likely to produce the breakthroughs of tomorrow, I would point to nanoscale science and engineering.”

The federal government’s National Nanotechnology Initiative — Leading to a New Industrial Revolution increased the annual investment in nanoscience, engineering and technology research and development from approximately $255 million in fiscal year 1999 to $457 million in 2001.

The new center will bring coherence to Georgia Tech’s existing nanoresearch activities and help the Institute secure more funding. Over the past three fiscal years, support for Tech faculty involved in nanoscience and nanotechnology research amounted to more than $13 million, $4.8 million of which came from the Board of Regents and the Georgia Legislature. During that time, the faculty brought in more than $36 million in research grant money, representing a ratio of return on Tech’s investment of almost 3-to-1.

“Even at these early stages, that’s a real success story,” says Charles Liotta, vice provost for research and dean of graduate studies.

Tech researchers — in partnership with other universities, government and private industry — are requesting approximately $17 million to establish an NSF Center for Excellence on campus. Tech would match that grant with $6 million. In addition, proposals from four smaller groups and four individuals have been submitted, bringing the number of NSF nanoscale research proposals to nine.

The new center could facilitate collaboration, internally at Tech and externally with other universities, corporations and government institutions.

“By its nature, nanoscale science and technology requires a multidisciplinary approach,” Liotta says.

Z.L. Wang, professor of materials science and engineering and director of the new center, points out that Tech is in a unique position to capitalize on its strengths.

Wang says the center can distinguish itself by focusing not only on scientific breakthroughs, but also the ways in which those breakthroughs can be applied.

Tech has a history of interdisciplinary collaboration, he says, and a long-standing engineering ethos that values the practical application of knowledge.

The new center positions Tech as the Southeast’s leader in the field. As a core university associated with the management of science and technology at the Oak Ridge Laboratory, Tech is already providing leadership in nanoscience and nanotechnology.

The First Georgia Tech Conference on Nanoscience and Nanotechnology was conducted on campus in October. More than 200 researchers exchanged information and explored opportunities for collaboration. The keynote speaker was Mihail C. Roco, NSF senior adviser for nanotechnology.

Lee L. Riedinger, deputy director for science and technology at Oak Ridge National Laboratory, says, “The conference not only presented a lot of exciting new science, but provided a good meeting ground for different institutions.”

Riedinger says universities like Georgia Tech have the “best minds” in the form of faculty and graduate students, and national laboratories often have specialized tools. “If you can bring those two together, you can make progress much faster. The conference got people together, and that’s the important thing.” GT
## Men's Remaining Home Schedule

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<td>Jan. 13</td>
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## Women's Remaining Home Schedule

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<td>Wake Forest</td>
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- **Women's Home Opener:** Feb. 9th vs Georgia State at 2 p.m.

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- **2001 Home Meets:**
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Biomedical Maneuvering
Mark Prausnitz is developing ways to get drugs where they need to go in the body

By Maria M. Lameiras

Mark Prausnitz hopes that someday 100 needles will take the place of one. Rather than intensify pain, he hopes the change will eliminate the pain of routine injections altogether.

An assistant professor of chemical and biomedical engineering at Georgia Tech with a joint appointment as an adjunct professor in biomedical engineering at Emory University, Prausnitz has been working for the past six years on more effective methods of drug delivery and a major component of that research is microneedles.

In a prototype he and electrical engineering professor Mark Allen have created, 100 of the tiny needles, each a fraction of the width of a human hair, fit in a centimeter-sized space on a special head that fits onto a traditional hypodermic syringe.

Although the needles could have other applications, more efficient drug delivery is the overriding issue driving Prausnitz's research.

"How can we get a drug from the bottle to the place in the body where it needs to be in the most effective way?" Prausnitz asks. "Billions of dollars are spent developing drugs with real promise in the petri dish, but when trials go beyond that, many drugs fail. The cause of many of these failures is drug delivery. In the petri dish, the drug goes straight into the cell, no problem. In the body, because it has to be delivered systemically, it may have problems getting to where it needs to go and thus it may cause side effects."

The traditional ways to deal with the problems of drug delivery have been to alter the structure, formulation or form of the drug (capsule to liquid, etc.).

"What we're trying to do is change the body," Prausnitz says. "We are trying to alter the transport properties of the body to make drug delivery more effective. All of the technologies we investigate involve ways to temporarily make cells or tissues more permeable so drugs can get where they need to go."

For example, nicotine or nitroglycerin patches are used extensively to administer those drugs, but Prausnitz says the majority of drugs won't permeate the skin the way nicotine or nitroglycerin will. If a patch were fitted with microneedles to painless deliver the drug past the skin, more drugs could be administered in patch form.

Microneedles could also make gene therapy a viable medical treatment.

"There has been a lot of hype about gene therapy, but the reason people have died as a result of gene therapy is not because of the gene, but the gene delivery method, the virus used to deliver the genes to the cells. If you could temporarily make cells more permeable, you could just put the gene right into the cell and then it would seal itself back up," Prausnitz says.

The other two areas being studied to make cell membranes and tissues more permeable are electrical fields and ultrasound, Prausnitz says.

"If you subject a cell to a short, high-voltage electric pulse, many sub-microscopic holes form in the membrane," he says. This phenomenon, called electroporation, is used by molecular biologists to put genes into cells in the laboratory. "Our challenge is to turn this lab technique into a medical technique, taking that known phenomenon and learning how to take it into the clinical setting."

The final research area is ultrasound.

"It has been observed that if you expose cells to low-frequency ultrasound, under certain circumstances you will have holes open in those cells. This is a phenomenon, unlike electroporation, that has only been seriously studied over the last few years. What is going on, what causes ultrasound to make holes, how can one control it and..."
how can ultrasound be used for drug and gene delivery have still to be determined," Prausnitz says.

Of all his research, however, microneedles are closest to clinical trial.

“We have used them in the laboratory, and we are hoping to do some human testing in 2001,” Prausnitz says. In limited testing, Prausnitz and his colleagues have determined that the microneedles are painless and, in testing on diabetic rats, have seen success in controlling blood-sugar levels using microneedles as the delivery system for insulin.

“Something that is important to me is seeing the work I do not only as good training of graduate students or good science for papers or journals, but that our technology goes out, does good and makes an impact.”

To that end, Prausnitz and Allen have started a company called Redeon to market microneedles commercially when the time comes.

“We are still a few years off. The first hurdle is to develop a system we are confident in and then to convince the FDA to be comfortable and confident in it as well,” Prausnitz says. “Once we have a microneedle-based device we’re happy with, we have to develop a manufacturing process that is feasible. If we have this technology, but it costs $10 each to make, then it’s interesting, but not practical. We think we can make them for 10 cents each, but manufacturing is a challenge.”

Another interest Prausnitz has pursued since arriving at Tech in 1995 is a technical communications course he developed.

“In the class I ask how many people have heard of Leif Eriksson and a few hands go up. Then I ask how many people have heard of Christopher Columbus and all of the hands go up,” Prausnitz says. “I tell the students that both men made exactly the same discovery, but Leif Eriksson was a Viking who went to America and told a few people about it, whereas Columbus effectively communicated his discovery and he changed the world.

“You can do good science, but if you want to have an impact, you need to communicate it effectively,” Prausnitz says. “You must be able to tell the people who matter so they can appreciate it.”
Rainy Day Blues

Three-month-old Keena, a yellow Labrador retriever, gazes through a rain-splattered window as if looking for a ray of sunshine and a chance to play during a break in training as an assistance dog for Canine Companions for Independence. GT
Robert W. Cruger, AE 1943, of Haines City, Florida
- Originally from Decatur, Georgia
- Aircraft carrier duty in World War II and Korean War
- Manager of Research and Development of Gulf & Western Industries in Swarthmore, Pennsylvania from 1951 to 1980
- Golf enthusiast when not restoring, building, and flying light aircraft
- Married the former Kathleen Mallon

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