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THE E-POWERED SUPPLY CHAIN
by Rosemary Faya Prola

Information and communications technologies are transforming business practices at the beginning of the 21st century - perhaps none more so than supply chain management

You have a window into the dynamic, complex, and global business activity called supply chain management. It's as close as your Internet-linked PC, the telephone on your desk, or the wireless device you hold in your hand. By entering a sequence of numbers, you can track the journey of a package or order as it happens across town or around the world.

Amazing as this tracking capability would have been a few years ago, it now is almost commonplace. It's a simple demonstration of how the speed and power of information and communications technologies are transforming the flow of products and information at the beginning of the 21st century.

While logistics management commonly refers to managing the flow of goods and information between a firm and its suppliers, facilities, and customers, supply chain management describes the integrated management of the entire distribution channel from raw materials to ultimate customer across firms. This process, states Curt Grimm, professor and chair of the Smith School's logistics, business and public policy department, "increases the opportunity for cost savings, shortens response time, increases end-user value, and results in joint competitive advantage for all members of the supply chain."

The Internet and related computer technologies are powerful tools for realizing supply chain efficiencies. "Not too long ago, managing the supply chain was limited to handing off shipments to a fleet of trucks," remarks Sandor Boyson, co-director of the Smith School's Supply Chain Management Center. "The Internet has revolutionized the concept of supply chain management. Now, utilizing the Web, a single event triggers multiple actions simultaneously across the supply chain."

An example of the Web-enabled or electronic supply chain at work is the order fulfillment process at Compaq. After receiving a phone order from a business customer, the company uses an online system to search its inventory and those of its network of suppliers for components, automatically schedules assembly and delivery of the order, and confirms the delivery details with the customer. And the entire process takes less time to execute than it takes to read this sentence.

Sharing information with suppliers, customers, and business partners in real time over the Internet and other digital networks is part of the global phenomenon known as netcentricity. The Smith School has launched a research initiative to develop, test, and share best business practices in the new networked world. The description of Compaq's order fulfillment process comes from a report on the study, "Harnessing the Power of Netcentricity," conducted by the Smith School for the U.S. Defense Advanced Research Projects Agency (DARPA). Many of the school's netcentric research efforts are taking place in the area of supply chain management, utilizing the resources of the school's Supply Chain Management Center (SCMC).

"At the Supply Chain Management Center, we are doing the kinds of research and training that can enable enterprises to understand how the Internet is changing management practices associated with supply chain management," states Boyson. The Netcentricity Lab, established in 2000 and located on the ground floor of Van Munching Hall, is a unique supply chain research resource.

Major organizations are supporting the Net Lab through their contributions of state-of-the-art hardware and software for dynamic supply chain management, including Sun Microsystems, Oracle Corporation, Tibco Software Inc., and Manugistics. Additional supply chain research support has come from SAIC, the Maryland Department of Transportation, Logistics Management Institute, Institute for Business Markets, U.S. Department of Defense, and the National Science Foundation (NSF).

Exploiting the Potential of the E-Supply Chain

"The degree of speed that the Internet has introduced into the supply chain has been phenomenal," Boyson states. "Although there's a lot of hype around, we need to understand how to use this power."

Heading the research agenda of more than a half-dozen Smith faculty and graduate students is a three-year study funded by NSF, "Scalable Supply Chain Infrastructures: Models and Analysis." Michael Ball, director of research and Orkand Corporation Professor of Management Science at the Smith School, is directing the project. Scalable supply chain infrastructures (SCIs) include software systems used to support enterprise resource planning and supply chain management.

The project's principal investigators come from a number of disciplines within the school, reflecting the cross-functional nature of supply chain management. Co-investigators include Ball; SCMC co-director Boyson, who is also Smith's chief of information strategy; Louiqa Raschid, associate professor of information systems who holds a joint appointment with the university's Institute for Advanced Computer Studies; and V. Sambamurthy, associate professor of information systems.

"The most critical issue in supply chain management today is harnessing the power of SCIs to improve day-to-day decision making," Ball says. "Accomplishing this involves both developing appropriate decision support tools and models and also determining how

organizations should adapt their structures and management strategies to best take advantage of SCIs."

"Improving 'real-time' managerial decision making (DM) has not received much attention in the past," Ball notes. "Researchers in the fields of operations research and management and operations have generally concentrated on longer term DM models." It was need, not novelty, that motivated Smith researchers to focus on developing synchronous DM tools and models. "We asked companies how we could help them make their supply chain operation more efficient," says Ball. "They told us they needed tools that would enable them to make better day-to-day decisions."

One year into the NSF-funded study, Ball can report on a number of projects in this area. "We have developed and improved an advanced version of the available-to-promise (ATP) model that automatically takes into account real-time production constraints," he says. "In addition, we are working on a cost-of-customer-service model which calculates the cost of responding to a customer in terms of efficient utilization of resources."

A third modeling project currently under way could ultimately provide a guide for managers forced to respond to disruptive incidents in the supply chain, for example, if a machine breaks down or a supplier is late. To facilitate use of the tool, the user will be able to graphically display possible scenarios.

"We also have an ongoing project with the School of Engineering's Center for Integrated Manufacturing Lab," Ball states. "There, S.K. Gupta and other researchers are building an agent-based system that can monitor the price of a product posted online by suppliers. When the system detects a price change, the data is transmitted to our lab, where we're developing a model that uses this information to change the amounts of the product the system orders from different suppliers." Eventually managers will be able to use this model to make real-time, cost-saving purchasing decisions.

Internet and information technologies not only have the power to improve decision making, as demonstrated by the projects described above, they also have the potential to transform an organization's structure. Ball gives one example: Current technologies can make the supply chain highly "visible," i.e., employees throughout the organization can have immediate access to critical information on orders, inventory, and other supply chain events. "How does the organization adapt to this?" he asks. "How does this situation affect the shipping clerk's duties, or the department head's? Our study will investigate issues at the interface between organizational structure, management policies, and technology infrastructure."

Exploring Tech-enabled Supply Chain Processes

Smith's logistics faculty enjoys an outstanding national reputation for the high caliber of its research. They consult with leading corporations, associations, and government agencies, and their research has been published in journals worldwide. Books written by department faculty include Logistics and the Extended Enterprise: Benchmarks and Best

Practices for the Manufacturing Professional, co-authored by Sandor Boyson and Thomas Corsi, the co-director of the Supply Chain Management Center and professor of logistics.

A number of faculty members and Ph.D. students in the Department of Logistics, Business and Public Policy are currently involved in studies related to the impact of technology on the supply chain. Among the most active is Martin Dresner, an associate professor.

"The biggest advantage of Internet technology is that it's lowered the cost of transmitting data," Dresner says. "In addition, the development of XML (eXtensive Markup Language), which is more robust than EDI (Electronic Data Interchange) and facilitates online data exchange with trading partners, has allowed integrated supply chain management to expand to smaller companies." The professor has collaborated with Smith colleagues on supply chain research in the food and electronics industries, and in manufacturing.

A recent study, conducted by Dresner and Jonathan Palmer, assistant professor of decision and information technologies, and Oliver Yao, Ph.D. candidate in logistics, studied the adoption of e-commerce technologies in the food and consumer packaged goods industry. The results of their study were published in a special supplement to the industry journal, Food Logistics, titled "The Coming e-Supply Chain" (July/August 2000). "Members of the food industry - manufacturers, distributors, and retailers - tend to be early adopters of technology," Dresner notes. "They use scanned product information to create supply chain efficiencies such as vendor managed inventory and efficient consumer response."

An excellent example of integrated supply chain management, described by Dresner in the journal, is the scan-based trading system shared by Andronico's, a small "upscale" food store chain in the San Francisco area, and Dreyer's Grand Ice Cream of Oakland, Calif. At considerable expense, the retailer upgraded its technology infrastructure to implement the system. Both companies have realized supply chain benefits through scan-based trading, from the manufacturer's expedited delivery system to the reduction of inventory costs by the retailer and better customer service.

Dresner and his colleagues have also mined data from their survey to examine the concept of disintermediation in the electronic supply chain. In disintermediation, the participation of an intermediary in a transaction is reduced or eliminated. The researchers found that, in the food industry, distributors were keeping up with manufacturers and retailers in their adoption of technology, counteracting possible disintermediation. "If the retailer sets up the Internet inventory management system, they control the information and the distributor loses," Dresner notes. "But if the distributor is able to initiate the system, they control the information and can realize better markups and higher profits."

Dresner is also involved in the following projects with Smith students and faculty that explore the impact of technology on supply chain processes. These studies include:

- the cost efficiencies associated with implementation of just-in-time inventory and just-in-time manufacturing systems in the electronics industry (with Ph.D. graduate and current University of Minnesota assistant professor Yan Dong, and Craig Carter, assistant professor of logistics);
- the impact of enterprise resource planning systems on inventory management in manufacturing firms (with Ph.D. student Elliot Rabinovich, and Philip Evers, associate professor of logistics);
- the impact of extranets and business-to-business exchanges on supply chain performance (with Venkatesh Shankar, Tyser Fellow and associate professor of marketing, Ph.D. student Rahul Kale, and Rabinovich).

The Future of Supply Chain Management

While it's impossible to predict with certainty the timing and scope of subsequent developments in the e-supply chain, certain trends are evident.

Supply chain software. To realize optimal supply chain efficiencies, some experts say, companies must adopt enterprise-wide software suites. These are integrated systems created by a manufacturer or Internet services provider that tie together an organization's applications for enterprise resource planning (ERP), logistics management, and extended enterprise exchanges. The benefits of implementing such a solution are many, including the creation of a single, enterprise-wide database and complete integration of business processes.

While some suites exist and others are two or three years away, major roadblocks remain. For some companies, the costs of converting existing information systems are prohibitive. In addition, "Integration across the supply chain is a huge challenge," states Thomas Corsi of Smith's Supply Chain Management Center. "Many middle-ware solutions that promise to deliver inter-operability among various systems have not delivered. Companies are still struggling with the transition.

"The best prospect for medium-sized companies and perhaps smaller ones, is to turn to application service providers or ASPs," Corsi says. "ASPs have the resources to support applications for each of the layers (ERP, supply chain planning, and extended enterprise) and to integrate across applications."

Broadband. The most anticipated development in e-supply chain management is the development of new broadband technologies. "Massive bandwidth availability will enable us to do things never dreamed of before in terms of real-time supply chain systems," Boyson asserts. With a capacity several thousand times the limit of digital systems, broadband technology will enable supply chain partners to share huge amounts of data in real time.

Smith Explores the Power of Digital Networks

School hosts first national conference on netcentricity
Global connectivity, real-time collaboration, and rapid, continuous information exchange - this is netcentricity, a ubiquitous force reshaping the global economy, and possibly one of the hottest areas of business research since the advent of the computer itself.

With its $6 million Netcentricity Lab, the newly established Center for E-Service, and the upcoming launch of a financial markets laboratory, the Robert H. Smith School of Business has established itself as a national leader in research and education in the netcentric economy.

The school's leadership role was very much in evidence this past March, when students, scholars, and business and government leaders gathered for the first national conference on netcentricity at the Inn and Conference Center at University of Maryland University College. Sponsored by Dell Computer Corporation under the auspices of the Smith School's Decision and Information Technologies Symposium Series, "Netcentricity: Measuring Its Impact, Mapping Its Future" brought together some of the country's leading authorities to share their thoughts and research on netcentricity.

Topics included assessing e-business value, recalibrating demand-supply chains for the digital economy, and the impact of the Internet on business strategy.

Rosy expectations or real growth?
"Given the recent demise of many of the dot-coms, it's tempting to think that the Internet is fizzling out," said keynote speaker Alice M. Rivlin, noted policy analyst and Senior Fellow in Economic Studies at the Brookings Institution. "But that's not going to be the case. The potential of the Internet to enhance productivity growth over the next few years is real," she said.

According to Rivlin, the greatest impact of the Internet won't be in Web-based businesses or new dot-coms. "We'll begin to see a wide range of "old economy" sectors, such as government and health care, use the Internet to enhance productivity."

For Rivlin, the healthcare sector - which makes up 14 percent of the domestic national product (DNP) - will be the area most benefiting from the netcentric revolution. "Assuming that the confidentiality of patient records can be addressed," Rivlin said, "patients and providers would benefit enormously."

Smarter, more agile organizations
A continuing challenge for both managers and researchers will be the lightning pace at which technology changes, and its impact on the business organization. In his keynote

address, Howard Frank, dean of the Smith School, discussed the technology trends that are making the future Internet, "an extraordinary business fabric, with capabilities far in excess of today's emerging systems."

The challenge to researchers, Frank noted, "is to accelerate the development of business applications, processes, and organizational strategies to match the rapid rollout of the new technologies."

"New technologies, especially networks, enable new and different forms of organization design," stated Hank Lucas, the netcentricity conference chair and holder of the Robert H. Smith Chair in Information Technology. "New economy firms create tremendous flexibility through alliances and outsourcing, all coordinated by communications technology."

During a roundtable discussion on the subject of organizations in the netcentric economy, Lucas predicted a continuing trend toward flatter organizations driven by technological advancements. "There will be more decentralized decision making and extensive electronic links to other organizations that are a part of their network," he said.

Network - it was a word heard frequently during the two-day conference. Inspired by the collective vision of the participants, it's easy to imagine a future gathering - a virtual conference in which not scores of people attend, but many thousands, in real time, over vast and powerful networks.

In the late '70s, Rosendo "Ro" Parra was a student at the Smith School and working at RadioShack. Around the same time, the first personal computer or PC was launched, with RadioShack eagerly embracing the new product. As did Parra. "I had considered going to law school after graduation," he says now. "But, I fell into the high-tech world."

Riding the Tech Wave to the Top

by Lisa Gregory

Today, Parra is senior vice president and co-general manager of Dell Computer Corporation's worldwide home and small business group. As such, he and a colleague share responsibility for the group's product development, manufacturing, sales, marketing, and customer service activities. Parra is also responsible for the U.S. small and medium business segment of Dell.
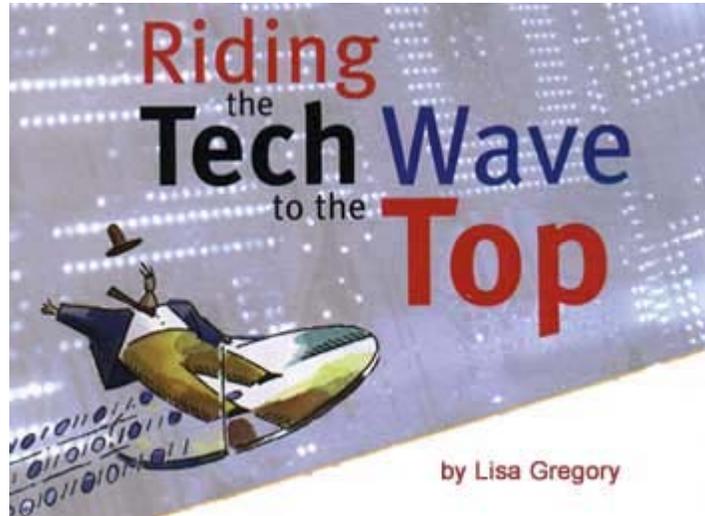
"I was at the right place at the right time," he says of his career. "There was such an explosion in this area, and I just rode the wave of pretty successful companies."

Parra, who is originally from Ecuador but grew up in St. Mary's County, Md., worked at RadioShack throughout college. After graduating in 1982 with a degree in marketing, Parra stayed put, focusing on computer sales. "I was learning what gross margins were and how to scale expense," he recalls. "I learned more by running a computer store in those early years than my contemporaries ever got exposed to."

Parra worked in various sales and management positions for the business products division of the Tandy Corporation (now the RadioShack Corporation), then RadioShack's owner, over an 11-year period. From there, he went to GRiD Systems Corporation, which was a leader in the laptop computer market and invented the first pen-based computer. At GriD, Parra held various sales and general management positions, ranging from regional sales director to vice president and general manger of GriD's PC strategic business unit.

However, in 1993, Dell came calling. "They sought me out," says Parra. "You have to understand that the high-tech community is very small, even while the industry is very large."

Michael Dell had launched Dell nine years earlier with $1,000 and the idea of bypassing the middleman and selling custom-built PCs directly to end-users. Headquartered in Round Rock, Tx., near Austin, Dell's revenues have grown to $32 billion. The company has offices in 34 countries and 39,000 employees and is ranked 56th on the Fortune 500 and 154th on the Fortune Global 500. Many of Dell's fellow American Fortune 500 companies are its corporate customers.

"The last eight years with Dell have been a tremendous experience," says Parra.

Parra has been senior vice president and general manger, U.S. public sector, where he was responsible for the federal, state and local government, K-12, and higher education markets in the U.S., as well as the Worldwide Public Council and the Worldwide Services Council. He has also been responsible for the company's operations in Latin America, Brazil, and Canada, as well as for Dell Direct and the major accounts business.

In explaining Dell's phenomenal success, Parra points to the company's ability to change and adapt to the needs of its customers, using corporate customer Boeing, one of the world's major aerospace firms, and his own mother, as examples.

"A big ah-ha moment for me was that somebody like my mother was receiving the same customer service that Boeing was getting. Fundamentally, the economics of that equation do not work," he says.

Key to this approach is that Dell has been careful not to grow faster than its ability to support customers, with customer groups broken down into specific areas. This segmentation process, says Parra, enables Dell to focus on the unique needs of each group.

For instance, Parra points to Dell's success in targeting wireless notebook computers to schoolchildren, K-12. "Typically that group lags behind any other group in sales," he says. "But with the recent explosion in student enrollment, there is great stress on the infrastructures of schools."

The use of the wireless notebook computer, says Parra, helps alleviate this problem and was marketed as a solution. "Instead of spending half a million for a classroom, you're providing 20 notebook computers and using the computer lab as a classroom," he notes. In addition, the Smith alumnus says, by adopting wireless technology and bringing the computer lab into the classroom, schools that once lagged behind in technology are now leading edge.

"We've been blown away by the success we've had in bringing the computer labs into the classrooms," Parra continues. "And this was the result of addressing a real need in a particular customer segment."

"I can think of a zillion other examples," he adds.

As he speaks, it is obvious that, 24 years after joining the high-tech industry, Parra is still excited by its challenges. "When coming to work is a chore, and I don't have the same amount of enthusiasm and energy that I did 20 years ago, then I will stop," he says.

But that seems unlikely, at least any time soon. Adds Parra, "Here at Dell I'm surrounded by great people, and we're winning in the marketplace. I can think of no better combination."

Transforming Logistics Support for the U.S. Military

A major transformation in the way the Department of Defense (DoD) looks at logistics support and its supply chain is under way. To give you an idea of the magnitude and scope of this transformation, DoD logistics programs and operations totaled about $84 billion in FY2000, accounting for about one-third of the department's budget. Such expenditures rival the cumulative operations of the 10 largest corporations worldwide. These expenditures support management of more than $60 billion of materiel inventories and annual depot maintenance workload of more than 70 million man-hours. DoD employs more than 925,000 full-time military and civilian logistics personnel.

James T. Eccleston,
Assistant Deputy
Under Secretary of Defense
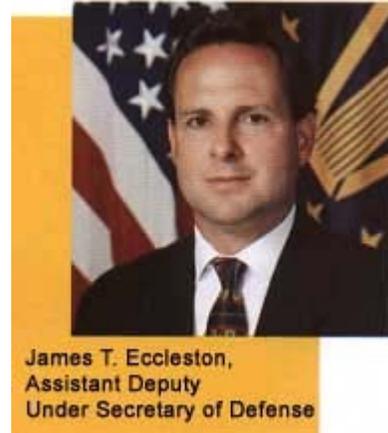
Despite the magnitude of the task, I am absolutely convinced that changes in the way DoD manages its supply chains hold great promise for improving military logistics support. I am also convinced that this change will not be easy. First, we must engender full confidence in supply chain management. Our leadership and our people must be convinced that our goal - to provide the right product, delivered to the right place, in the right condition, in the right quantity, at the right cost, and at the right time, all the time - is achievable.

Second, we must provide our people with the proper skill sets, the education, and the knowledge needed to understand and fully implement supply chain management as a way of doing business.

Finally, we can attain greater efficiencies by borrowing best practices and applications from successful organizations and applying them to our own requirements. In DoD, this is not just a simple process change. It's a change in culture.

As I said, our first challenge has been to educate and convince our leadership. We sponsored a series of symposia designed to promote senior level awareness and education regarding private sector experience in supply chain management. With the help of the Logistics Management Institute, our FY2000 symposia events focused on key topics such as day-to-day responsibilities of supply chain managers, collaborative planning, and supply chain metrics.

Our FY2001 symposia highlight supply chain management in the public sector; the latest technology products being used to enhance supply chain operations and performance; and the latest software applications that can enable supply chain improvement. Just recently, we formed a team consisting of CAMP Inc. and PricewaterhouseCoopers LLP to re-think

and re-write DoD's logistics policy and guidance, what we call our "Logistics Super-reg," with a new focus on supply chain integration.

In order to accelerate the adoption of the concepts of supply chain integration, we sponsored a series of management forums and education opportunities, including the first-ever DoD Supply Chain Operations Reference (SCOR) Model training. In partnership with the Supply Chain Council, DoD is prototyping the benchmarking of DoD logistics performance and developing modifications to the SCOR Model to address maintenance, repair, and overhaul.

I am pleased to report the Military Services and the Defense Logistics Agency have also recognized the critical importance of institutionalizing their supply chain implementation process. Within Military Services, responsibility for supply chain implementation has been given to the major logistics command, and in the case of DLA, delegated to the business process re-engineering group at headquarters. With this assignment of responsibility, the military logistics community has recognized the essential need to educate both command staff and operating personnel on the concepts and actions necessary to integrate supply chain management as a principal element of its logistics process.

To expedite the transformation process, we have formed a partnership with the Supply Chain Management Center of the University of Maryland's Robert H. Smith School of Business, recognizing its Netcentricity Laboratory as DoD's Supply Chain Integration Center. The purpose of the SCIC will be to provide an environment for furthering the application of technology to evaluate and monitor the real-time movement of transactions and supporting data throughout a very large, dynamic supply chain. We envision that SCIC will actually extend the capability of development projects by providing a site for evaluation of competing government and industry technology products and solutions that accelerate supply chain applications within a modernized logistics environment. Our first "target of opportunity," with the help of Sun Microsystems and General Electric, will be the B-1 Bomber F-101 gas turbine engine supply chain.

We also worked with Smith's Supply Chain Management Center to develop a distance-learning course, the Real-Time Supply Chain. We converted an existing three-credit, college-level course into a Web-based multimedia course that participants can access via their browsers. The course covers the history and evolution of supply chain management and introduces the latest application software technology used to integrate real-time supply chains. It takes a look at best practices and includes "lessons learned" from several global corporations. There is also a game simulation where participants can test their knowledge by making real-time data-based decisions in response to external supply chain disruptions.

We often use the term "warfighter" when we refer to the DoD. It's a way to remind ourselves of our ultimate mission: to defend and serve the nation by fighting on its behalf. We face a challenging task transforming DoD logistics and supply chain management. However, by teaming with the right players, including other government agencies,

support contractors, commercial enterprises, and academia, we can succeed. Our challenge is to improve logistics support to the "warfighter." Our goal is to create significant public value.

James T. Eccleston is assistant deputy under secretary of defense (logistics), supply chain integration. Appointed to this post in 1999, he is responsible for the full-scale implementation of supply chain business practices across the Military Services and the Defense Logistics Agency, as well as integration between the supply chain process and acquisition.

Dingman Forum is Matchmaker for VCs and Regional Entrepreneurs

Like romance, making a match between an entrepreneur and a venture capitalist has a little to do with chemistry and a lot to do with proximity. That's why attending the Dingman Center for Entrepreneurship's annual Venture Capital Forum is a must for entrepreneurs and investors in the region.

Hundreds of would-be suitors turned out for the 2001 event, which took place April 4 in Northern Virginia at the McLean Hilton.

The Dingman Center for Entrepreneurship at the Smith School of Business is the mid-Atlantic region's leading provider of support and opportunities for entrepreneurs.

Sponsored by Venable, Attorneys at Law, Deloitte & Touche LLP, and the Mid-Atlantic Venture Association, the forum featured cocktails, a light buffet, a panel discussion, coffee and desserts, and an entire evening of networking for a nominal cost.

"We're happy to sponsor the Venture Capital Forum because it's a perfect fit for us," says Chuck

Carr '85, audit partner at Deloitte & Touche and president-elect of the Smith School's alumni chapter board of directors. "It gives us the opportunity to identify emerging growth companies who can benefit from the myriad services we offer."

The forum, now in its sixth year, has become a magnet for the region's entrepreneurial community. "This is it," says Lee Cohen. "This is one of the best opportunities in the country for entrepreneurs and investors to get together." Cohen is regional alliance manager for Exodus Communications of Santa Clara, Calif., one of the leading providers of complex Internet hosting and professional services.

According to April Young, senior vice president at Imperial Bank, the Dingman Venture Capital Forum draws the widest array of venture capitalists in the region. "It's a mandatory event for anyone interested

in researching or investing in new enterprises. Each year, IÕm amazed at the turnout and the quality of venture capital people. ItÕs the best I've seen in the country."

"Many profitable venture relationships have arisen from connections made at this event in the past," says Don Spero, director of the Dingman Center. "It's exciting knowing that important business opportunities have been created as a result of the VC Forum."

If you're looking for a business match, but you missed this year's Venture Capital Forum, you're in luck. The Dingman Center for Entrepreneurship offers a range of programs designed to facilitate, support, and encourage entrepreneurship education and new enterprise growth. To get a preview, visit the center's Web site, www.rhsmith.umd.edu/dingman.

Controlling Growing Airport and Airspace Congestion

Workshop Co-sponsored by Smith Offers Some Solutions

Representatives of the airline industry, the federal government, and academia gathered at the University of Maryland University College March 15 and 16 to address the critical problem of airport and airspace congestion in the United States. More than 100 people participated in the event, the first national workshop on the subject, jointly sponsored by the National Center of Excellence for Aviation Operations Research (NEXTOR), the Robert H. Smith School of Business, and the Global Airline Industry Program at the Massachusetts Institute of Technology. NEXTOR is a jointly funded university, industry, and government research organization created by the Federal Aviation Administration (FAA). Michael Ball, Smith School director of research and Orkand Corporation Professor of Management Science, and Amedeo Odoni of MIT, organized the conference. Ball and Odoni serve as associate directors of NEXTOR.

"When NEXTOR was created in 1996, it was envisioned as a catalyst to bring together the FAA, the airline industry, and universities to work on issues of mutual interest," states Norman Fujisaki, deputy director, system architecture and investment analysis at the federal agency. "This workshop helps to fulfill NEXTOR's mission by bringing together key people to share their views and ideas and to

consider future collaboration to produce results not otherwise possible."

"Each of us in the industry tends to focus on their own problems," notes Roger Beatty, an operations coordinator for American Airlines whose job partly entails deciding which American flights are cancelled or delayed. "Service providers, for example, tend to focus on the effect of delays on individual airplanes," he says, "while airline planners tend to focus on events that induce large delays that are truly disruptive to the airline schedule." Beatty welcomed the chance to learn others' views on the problem of airport and airspace congestion. "I came to gain a new perspective and to learn what some of the solutions might be," he says. "I believe that breakthrough ideas can come from anywhere."

Jane Garvey, administrator of the FAA, gave the opening keynote address. Over the next two days, leading researchers, managers, and planners from academia, government, and industry presented papers exploring the extent of national airport and airspace congestion, its effect on airline profitability and service, and proposed operational, industry, and competitive strategies to alleviate the problem. Among the presenters were Smith School professors Martin Dresner and Robert Windle who discussed their research on the economic impact of airport congestion.

Michael Ball reviewed the progress of NEXTOR's main research project: the use of collaborative decision making (CDM) models to help improve air traffic management. The CDM paradigm has evolved over the past five years through the collective efforts of airline operational control personnel, FAA traffic flow managers, and researchers at Metron (a NEXTOR industry partner), the University of Maryland, and MIT.

CDM models take into account the interests of the airlines and the FAA in allocating takeoff/landing slots in the event of delays. A prototype CDM system, consisting of a communications network for real-time information exchange (CDMNet) and FSM, a decision support tool, was launched in 1998. A full-scale system is now in place and is used to plan and control ground delay programs at all major U.S. airports. The NEXTOR CDM research team, which is led by Ball, is now working on a next-generation version of the CDM model.

Many of the NEXTOR workshop presentations are available online at www.isr.umd.edu/airworkshop/agenda.html.

QUEST Creates Value

Program fosters student development and fuels corporate innovation

When the Navy Federal Credit Union needed recommendations on ways the company could add extra quality focus to its management structure, it called upon a team of students in the University of Maryland QUEST program. Once the project was completed, the credit union was clearly impressed by what the students had to offer.

"Let's just say, we've asked for resumes," states Rick Herrington, program manager.

A collaborative effort between the Smith School of Business and the A. James Clark School of Engineering, the three-year QUEST (Quality Enhancement Systems and Teams) program enables students to enter the workforce with advanced management skills. In particular, they excel in teamwork, customer value management, process and product design, project management, and customer satisfaction.

The program consists of four team-based courses led by an interdisciplinary faculty and culminates in a senior-level practicum that requires students to go into the workplace for research and group problem solving. To be eligible for QUEST, students must have completed one semester at the university, achieved a 3.0 GPA, and be what Tami Rosenberger, acting associate director, describes as "highly motivated and high achieving."

"The QUEST program provides value for both students and the companies that get involved," says William DeWitt, Smith teaching professor and QUEST executive director. "For students, it provides a unique learning community that fosters the development of skills sought after by industry. For companies, it provides the opportunity to benefit from the innovative ideas of quality-focused students and to recruit tomorrow's leaders."

Companies that have worked with the QUEST program include AT&T, Sweetheart Cup Company, Black & Decker, General Electric, Arthur Andersen LLP, Litton Advanced Systems, KPMG LLP, Proxicom, and Ernst & Young LLP.

These companies and others like them know the worth of a QUEST graduate, says Rosenberger.

"Starting salaries for students in the QUEST program are on average 15 percent higher than for other business or engineering students," she says.

"When I was interviewing for jobs I talked extensively about QUEST," says Sarah Ouslander, a senior majoring in human resources who was team liaison for the Navy

Federal Credit Union project. "Employers were amazed by how much training and hands-on experience the program provided for students. In addition to completing class projects, we have actual clients who are paying for our services. I think it's an excellent dose of the real world."

As part of its work for the Navy Federal Credit Union last fall, Ouslander's team was asked to research the Malcolm Baldridge Quality Award criteria because senior management is considering a Baldridge self assessment as a step in improving overall corporate performance. "We conducted a lot of research and benchmarking," says Ouslander.

"By bringing in these students, we get a fresh set of eyes looking at our procedures and how we do things," says Herrington. "You may have a student come into the program who says, 'By the way, did you ever consider doing x?' And, you're thinking, 'Gee, that works.'"

A team of QUEST students presents its recommendations for NBC's sports Website. L-r: Annie Fay, Melissa May, Bernard Steinberger, Sanjay Pant, and Ricky Wilson.

This past semester, in addition to the Navy Federal Credit Union project, QUEST teams were also involved with such projects as developing a case for implementing an electronic postal money order for the United States Postal Service; a sports Web site for NBC; and a model for identifying new clients and processing market information for Mitretek, a nonprofit corporation; among others.

"Even though QUEST is a lot of hard work and the classes are really challenging, the payoff for a student is immeasurable," says Ouslander, who already has been hired by Deloitte Consulting in New York and will join the company after graduation this spring. "QUEST isn't just a three-year program. It's a lifetime of confidence, discipline, and innovation."

Bringing the World Online
by Rosemary Faya Prola

It's in the interests of affluent nations to help poorer countries adopt Internet technology

Smith School Professor Henry "Hank" Lucas has been interested in issues related to the technology gap between developed and underdeveloped nations since his 1997-98 sabbatical in Singapore. He and his wife, Ellen, used the opportunity to travel throughout Southeast Asia.

"I was amazed at the interest in the Internet and the extreme poverty that exists in some countries," Lucas says. Faith in the promise of technology was illustrated during a brief stop for lunch in Ho Chi Minh City (formerly Saigon).

"Right across the street from the restaurant was a computer center for high school students," Lucas recalls. "The restaurant owner, recognizing us immediately as Americans, came over to our table and began to excitedly ask us about the Internet."

Lucas and former New York University Stern School of Business colleague Richard Sylla recently completed a paper titled, "The Global Impact of the Internet: Widening the Economic Gap Between Wealthy and Poor Nations." In their paper, Lucas and Sylla recount the diffusion of earlier innovative technologies such as the steam engine and railways and their impact on global economic equality. They argue that, while previously late adopters of technology were able to catch up with early movers, this may not be the case today.

"Information and telecommunications technology moves ahead very quickly," Lucas says. "The IT revolution is not the same as the Industrial Revolution. We're leaving people behind at a fast pace.

"My feeling, and our data support this, is that countries that do not invest in technology are going to fall further behind and accentuate global inequalities." These inequities, Lucas and Sylla state, could lead to an increase in human misery, political instability, and conflict.

To study whether the Internet will increase global economic inequality, the researchers sought to measure the status of Internet development around the world, and to identify factors that predict Internet use in a country. They used data drawn from the 1998 economic development indicators compiled by the World Bank, and information on the number of Internet hosts in each country from several sources. The economic development indicators they utilized as variables in their analysis included population, gross domestic product per capita, life expectancy rate, literacy rate, phones per 1,000

people (as a measure of information access), and percentage of paved roads (as a measure of physical infrastructure). From the data, they calculated a median Internet host count of 632.

In separating countries into two groups, Lucas and Sylla found that countries with fewer than 632 Internet hosts had a GDP of about half (54%) of those at or above the median. Life expectancy and literacy rates were also lower in countries with fewer than 632 hosts. This group also had fewer paved roads and fewer phones per 1,000 people.

Through their analysis, Lucas and Sylla identified a strong correlation between a country's adjusted gross domestic product, literacy rate, and phones per 1,000 and its Internet capabilities. Therefore, conditions that limit a country's development in these areas (indicators respectively of its wealth, education, and technology and communications infrastructure) also create significant barriers to Internet adoption. These conditions include culture, social influence, politics, lack of IT professionals, and poverty.

Lucas and Sylla note that a number of international programs are under way to spread Internet access to developing countries. But current efforts are piecemeal at best and not enough to bridge the widening technology gap between developing countries and more affluent nations. They propose a variety of policy measures for decision makers to consider to help reduce the global digital divide. Possible initiatives include:

- A sustained effort by the United Nations and individual, wealthy countries to build the most appropriate communications infrastructure in developing countries;
- The dedication of sufficient satellite transponders for two-way Internet access for poor countries;
- An Internet Corps within the United Nations or individual countries modeled after the
- U.S. Peace Corps;
- A concerted effort by aid agencies to encourage government policies in developing countries that favor innovation, venture capital, investments in research, and education about technology;
- A $1 per month surcharge on the Internet accounts of every user in wealthy nations to fund the activities above;
- A one percent tax on all electronic commerce with the income dedicated to expanding Internet use in developing countries;
- An International Developing Countries Venture Capital Fund to allocate the capital raised in the preceding recommendations; some of the capital should be applied to infrastructure and some to new ventures that involve the Internet.

While the proposed taxes and surcharges would not be popular, Lucas and Sylla state, "They can be justified on economic grounds. Substantial network externalities from the Internet and World Wide Web mean that both buyers and sellers benefit from increasing the number of users of the Net around the world."

"To create a well functioning world economy," Lucas concludes, "you need producers and consumers. Facilitating Internet adoption in developing countries is in the best interests of all of us."

Active Mutual Fund Managers Beat the Market

Do mutual fund managers who actively trade stocks add value? Yes, says Russ Wermers, assistant professor of finance at the Robert H. Smith School of Business.

Based on his research, Wermers found that the average mutual fund picks stocks that outperform the market by 1.3 percent per year, gross of all direct and indirect costs. However, he also found that the funds under-perform the market by one percent per year, net of all costs.

"Of the 2.3 percent difference between the returns on stock holdings and the net returns of funds, 0.7 percent per year is due to the lower average returns of the non-stock holdings (e.g., bonds and T-bills) of the funds during the period," Wermers writes in The Journal of Finance (August 2000). "The remaining 1.6 percent per year is split almost evenly between the expenses and the transactions costs of the funds."

Therefore, concludes Wermers, "mutual fund managers are picking stocks well enough to cover their direct costs," good news for shareholders looking for solid net returns.

For this study, Wermers measured how the mutual fund industry performed over a 20-year period, 1975-1994. He analyzed information yielded by the merger of two major mutual fund databases. The first database, purchased from Thomson Financial, Inc., contains quarterly portfolio holdings for all U.S. equity mutual funds during the studied period. The second database, from the Center for Research in Securities Prices at the University of Chicago, contains monthly data on net returns and annual data on portfolio turnover and expense ratios for mutual funds.

"Merging these two databases provides a complete record of the stock holdings of a given fund," says Wermers. It also provides the fund's turnover ratio, expense ratio, net returns, investment objective, and total net assets under management during each year of a given fund's existence.

The research also revealed several interesting trends in the U.S. equity mutual fund industry during the 20-year period. Among them are the following.

- When credit is given for capitalizing on the high returns of investing in small stocks, value stocks, and momentum stocks, actively managed funds match the net return performance of index funds.

- Trading activity of the average mutual fund more than doubled from 1975 to 1994, yet annual trading costs decreased substantially; the 1994 level was only one-third of the 1975 level.
- Funds with higher levels of trading perform better, handily beating the net returns of index funds.

Wermers points out that his results ignore the higher tax burden of actively managed funds. He stresses the need for studies of whether managers of actively managed funds add value, net of taxes.

A mutual fund expert, Wermers has amassed what may be the world's most comprehensive database of the industry. His areas of research include how managers pick funds and how well they invest, herding (several investors buying or selling stocks at the same time) in mutual fund purchases and sales, and investment risks versus style-based anomalies.

Wermers also is director of the new trading room under development at the Smith School. This state-of-the-art trading floor for education and research will feature a Reuter's financial platform. (Look for a story on this new resource in a future SMITHbusiness.) For more information about Wermers' research, contact him at: rwermers@rhsmith.umd.edu.

Metaphors Aid Cross-Cultural Understanding

The second edition of Understanding Global Cultures: Metaphorical Journeys Through 23 Countries, by Martin Gannon, professor of management and director of the Center for Global Business, was recently published by Sage (2001, Thousand Oaks, Calif.). Praised by reviewers as a creative approach to comparing national cultures, the first edition (1994) introduced the concept of cultural metaphors: any activity, phenomenon, or institution with which members of a given culture emotionally and/or cognitively identify, for example, the Brazilian samba or American football.

Most writers emphasize general dimensions to profile national cultures, such as power distance (a term for the degree to which a culture accepts an uneven distribution of power, status, and rewards). Gannon employs metaphors to develop dimensions specific to a national culture and uses these dimensions to describe the distinctive business activities taking place within each nation. He has created several cross-cultural applications and exercises in traditional business areas using metaphors.
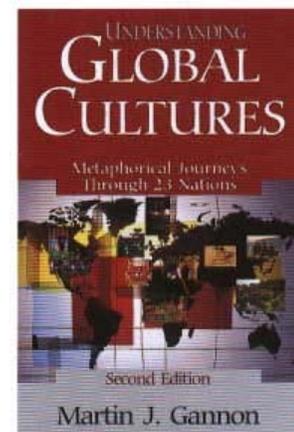
In the new edition, there is a discussion of a four-stage model of cross-cultural understanding, and of when culture does, and does not, matter. Using a seven-part framework, Gannon also classifies 23 nations and their respective metaphors into different types, for example, authority ranking and market pricing cultures.

Related books by Gannon include Cultural Metaphors: Readings, Research Translations, and Commentary and Working Across Cultures: Applications and Exercises, also published by Sage.

Chapter Enhances Placement Opportunities for Students

As part of its mission, the Smith School alumni chapter has supported receptions sponsored by MBA student groups that have brought together alumni and current students. These forums create opportunities for students to gain insight and knowledge that can assist them in the job search process.

In October 2000, students from the Smith School Black MBA Association (BMBAA) traveled to Chicago to participate in the National Black MBA Association Annual Conference. It is one of the largest gatherings for African-American business leaders, corporations, entrepreneurs, and business students in the nation. Attendees participate in panels and workshops covering critical business issues, employment policy, and career development.

This year Smith MBAs focused on the career fair that showcased more than 350 Fortune 1000 firms. The alumni chapter sponsored a reception for alumni attending the conference, and corporate representatives. This was a great opportunity to "showcase" our students. Anne Moultrie, Smith School acting assistant dean for communications, noted the increased visibility of the Smith School at the conference because of this event.

The National Society of Hispanic MBAs Conference was held in 2000 in Orlando, Fla., and 27 members of the Hispanic MBA Association attended, the second largest group there. "With well over 200 employers participating, the chances of landing a job with a fabulous company were greatly increased, making the trip a good investment," says Mario de la Garza, MBA Candidate '02. All 27 students interviewed at the conference; and, as of February, three have received offers and seven have been called back for additional interviews with major companies.

The alumni chapter also gave its support to a new Smith MBA group that hosted the first "Tek Trek" trip to Silicon Valley. Six students representing the Smith School MBA Association traveled to California during the winter break to visit Oracle, Ciena, IBM Infosys, CacheFlow, and eLance.

Many of our students seek employment in New York City and alumni in the area continue to be involved with Smith School activities. In January 2001, close to 60 alumni attended a cocktail reception at the Loews Hotel hosted by the Mayer Fund and Smith School Alumni Chapter. The Mayer Fund is an endowment portfolio actively managed by a select group of full-time, second-year MBA students. The fund provides the students with practical experience in portfolio management, equity research, and trading execution. Bob Butman '77, chairman and CEO of TQA Investors, hosted a meeting for Mayer Fund members in his offices.

The reception offered opportunities for New York area alumni to reconnect with former classmates and for showcasing students from the Smith School. Dean Howard Frank talked about the recent rankings successes and the new initiatives and industry centers that will continue to distinguish the Smith School from other business schools.

Firms represented at the reception included TQA Investors, Deutsche Bank, ING Barings, and MacKay Shields.

MBA 2001 candidates Bill Adams, Monica Burch, Cristina Velarde, and Nason Kowalski contributed to this story.

Making a Difference

STEPHANY HEAD, PH.D. '99

In 1969, young Stephany Head returned to the U.S. after living abroad with her family while her father worked for the Department of Defense. They traveled on the same ocean liner as the Duke and Duchess of Windsor, staying just down the hall from the famous couple. "We were treated no differently than they were," she recalls. But everything changed when the family landed in New York. "We couldn't get a cab or a hotel room," she says.
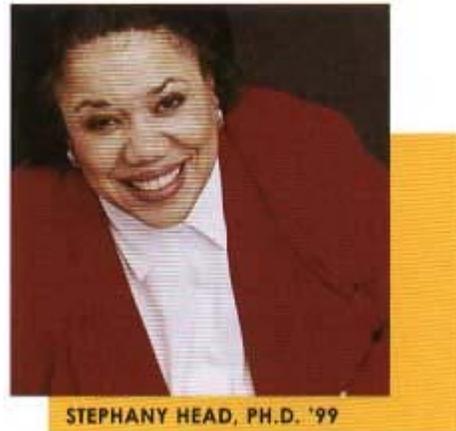
Head, who received her Ph.D. from the Smith School and now is director of strategic planning for the federal division of Electronic Data Systems (EDS), refused to accept this. "Living overseas, I had not grown up being told I couldn't do something because of my color," Head states. As a result, she has spent her life speaking out and standing up for what she feels is right and fair, hoping to impact and influence policies that affect minorities. And living as an example.

"I believe in adding value to my environment every single day," she says

She certainly has done this at EDS. Her accomplishments include supporting the identification of more than $70 billion in IT business opportunities in the federal sector and developing an EDS federal intranet site to support growth. Recently Head was named the 2001 Black Engineer of the Year in the Technical and Marketing Category by U.S. Black Engineer magazine.

In addition to her position with EDS, Head teaches college courses. "I knew that if I was going to change preconceived notions people have about race and gender, I needed to be standing in front of the class," she says.

"I work to make a difference," she adds. "And, I think I have."

Building a Legacy

Jennifer Fletcher's two years in the MBA program at the Smith School transformed her life. "My experience as a graduate student gave me a lot, personally and professionally," says Fletcher, now a management consultant at AMS, Inc. ÒIt convinced me that I could do anything I wanted to do."

Fletcher, who received her undergraduate degree from the University of Rhode Island, discovered a love of information technology while working at a progressive radio station. A few years out of school, she decided to study for an MBA. Fletcher recalls, "I went in thinking, 'can I survive and compete?'."

JENNIFER FLETCHER, MBA '00

She could and did, graduating with specializations in information systems and accounting in May 2000. While a student, Fletcher, who was vice president of the MBA Association and an active member of the Consulting Club, joined with the MBA Association's president to initiate a fund-raising effort on behalf of their class. "We want to name the graduate lounge of the new wing of the business school in honor of the Class of 2000, the Millennium Class," says Fletcher.

So far, the effort has already raised $35,000, with a goal of $100,000. And now, the Class of 2001 has joined in the endeavor.

"As an MBA student, you're part of a tight group," Fletcher says. "There aren't many of you and you're in the same classes together. You feel more connected because of that. This (project) is a way for us to leave our mark."

For more information on the Millennium Class Fund, contact Jennifer Fletcher at Jennifer_fletcher@ams.com, or Kathi Dantley Warren at kdantley@rhsmith.umd.edu; 301.209.3545.

Carey Receives Top Alumnus Award

Al Carey '74, Smith School friend extraordinaire and University of Maryland alumnus, received the Smith School of Business Distinguished Alumnus Award at the University of Maryland Alumni Association Awards Gala on April 21, 2001. Carey, senior vice president of sales and retail strategies, PepsiCo, is a member of Smith's Dean's Council of

Advisors and chair of the school's Campaign Leadership Committee for the Bold Vision - Bright Future endowment effort. Congratulations!

Carey also spoke at the Spring 2001 Smith School graduation ceremony.