

Industrial & Systems ENGINEERING

THE ALUMNI MAGAZINE FOR THE STEWART SCHOOL OF ISyE AT GEORGIA TECH

FALL 2008

The Stewart School of ISyE *Collaborators in Healthcare*

Georgia
Tech

College of
Engineering

H. Milton Stewart School of
Industrial & Systems Engineering

ISyE–Collaborators in Healthcare



Chelsea C. White III

Industrial engineers are versatile and flexible. They work in a variety of fields with a common goal of improving the performance of systems, including supply chains, transportation, finance, healthcare, manufacturing, humanitarian relief, security, sustainability, and others. In past issues of our alumni magazine, we have highlighted our faculty and alumni's contributions and impact on humanitarian logistics, energy, sustainability, and natural systems. In this fall issue of our magazine, we are continuing to show how versatile industrial engineers are by featuring work by our faculty, students, and alumni in the important field of healthcare, an area to which we are especially passionate about contributing.

According to the World Health Organization, characteristics of an effective and efficient healthcare system are threefold: improving the health status of the population as best as possible, responding to healthcare situations in a timely manner, and ensuring financial equity. In this issue, you will find highlights of some of the ways that we are investigating how we can be instrumental in the delivery of good healthcare.

The feature article summarizes our faculty and student work on the healthcare frontier. Our alumni spotlight features an interview with Mel Hall, chairman and CEO of Comprehensive Health Services, Inc., who discusses some trends and challenges in healthcare and how he became involved in this field of work. In keeping with the theme, our student spotlights feature the work of Jacqueline Griffin, who has been working with World Vision to improve the deworming process in Zambia, and Kristin Hermann, who works with Children's Healthcare of Atlanta to optimize patient flow. We also have several articles featuring the work of our faculty describing how their research is helping to make the world a healthier place to live. These articles address the development

of a childhood vaccination schedule, a flu pandemic prediction model, medical response capabilities in the public health arena, patient flow modeling, and how operations research is advancing cancer therapeutics.

In addition to learning about our work in healthcare, you will also learn about some of the Stewart School of ISyE's professional education programs that can assist you in remaining competitive in today's ever-changing market. Our Executive Master's in International Logistics program, an eighteen-month advanced degree program, is doubling in size with its new schedule, offering a broader opportunity to enter this program. You will also read about alumnus Jud Savelle, who has sponsored a project for senior design after going through the experience himself when he was at Georgia Tech. You will learn more about the Supply Chain & Logistics Institute's (SCL) Supply Chain Executive Forum, an exclusive biannual meeting of thought leadership across the supply chain, as well as about SCL's professional education program, which provides a comprehensive curriculum in supply chain and logistics management, operations, and technologies.

Finally, you may have noticed that we have a new name for the magazine, *Industrial & Systems Engineering: The Alumni Magazine for the Stewart School of ISyE at Georgia Tech*. We feel that this new name reflects more concisely our School and our magazine's audience.

We are proud of the work of our faculty, students, and alumni. And as an alumni or friend of the School, you provide a valuable connection to us. Please stay in touch.

All the best,

H. Milton and Carolyn J. Stewart School Chair,
Schneider National Chair of Transportation and Logistics,
H. Milton Stewart School of Industrial and Systems Engineering

Cover Photo

Seated: Martin Savelsbergh and Kristin Hermann. Standing: Mel Hall and Paul Griffin. The cover photo was taken at Children's Healthcare of Atlanta at Egleston's new Emergency Department.



Cover Photo: Rob Felt

4-15 Collaborators in Healthcare

One of today's most pressing worldwide concerns is the need for improvements in the field of healthcare. This issue's special section features an update on health-related activities at the Stewart School of ISyE. In addition to an overview on the latest in health logistics, health systems, biostatistics and bioinformatics, and public health research at the School, you will read articles about the other exciting developments we are making in healthcare.

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Clarence Wardell III, an ISyE PhD student, won First Place for his photo *Woman in the Rice Field* in the "ISyE Faculty and Students Exploring Other Countries" category in the Stewart School of ISyE's first photo contest.

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The Stewart School of ISyE Welcomes New Advisory Board Chair and Members



Christopher B. Lofgren

Christopher B. Lofgren, DR IE 1986, was selected to serve as ISyE's Advisory Board Chair for the 2008-2010 term. Lofgren is president and CEO of Schneider National Inc. and has more than

fourteen years of logistics experience. Schneider National is a premier provider of transportation, logistics, and intermodal services. Lofgren succeeds outgoing Chair J. Lawrence Bradner, who served as Chair from 2005-2007.

The new 2008-2012 Advisory Board members consist of Fred Keith, Andrea Laliberte, Charles "Butch" Price, John Quinn, and Jane L. Snowden.

This group of experts brings to the Advisory Board a wealth of knowledge from their information technology, program management, supply chain, and industrial engineering backgrounds. They make an exceptional addition to the Advisory Board, which is comprised of distinguished professionals and community leaders and serves as a sounding board for the School Chair and assists with the School's development goals.



Fred Keith

Fred Keith, IM 1957 and IE 1958, is president and CEO of Atlanta Bonded Warehouse Corporation and Colonial Cartage Corporation, family-owned asset-based logistics companies that

provide refrigerated service to the food industry. He holds an MBA from George Washington University.

A former participant in the National Metric Study Conference and author of articles on metric conversion in the logistics industry, Keith is a registered Professional Engineer. Keith also served in the Air Force and its reserve components for thirty-seven years, where he managed a joint tactical rocket program for the Pentagon and later retired as a Major General.



Andrea Laliberte

Andrea Laliberte, IE 1982 and MS IE 1984, is senior vice president of Distribution and Consumer Service for Coach Inc., a leading marketer of modern classic American accessories. She is respon-

sible for global distribution, customer service, transportation, and customs compliance. Laliberte joined Coach in 1991 as director of Operations Support and has held increasing leadership positions. In 2005 she was promoted to her current position where she assumed the added responsibility of global supply chain innovation.

Prior to joining Coach, Laliberte was in the retail management consulting practice of Coopers & Lybrand (now PriceWaterhouseCoopers). She is a trustee of the Girls Inc. of Jacksonville Endowment Trust and a member of the Women's Giving Alliance.



Charles Price

Charles "Butch" Price, IE 1972, is an independent consultant who has more than thirty-four years of experience as former vice president of Kurt Salmon Associates (KSA). He has significant

international experience; his positions within KSA included Asia managing director, North American regional director for the Northeast (Consumer Products Group) and the Southeast/West (Merchandising Group), director of global sourcing and manufacturing, and North American director of human resources.

Price is a former member of the Executive Board, the Technical Advisory Committee for American Apparel and Footwear Association, and the Executive Board for Hong Kong American Chamber of Commerce Textile Committee. He is a graduate of the Executive Development Program at Emory University's Goizueta Business School.



John Quinn

John Quinn, IE 1977, is the global treasury operations executive for Bank of America, where he supports treasury products and services around the world. Operational teams reporting to Quinn

include North America Treasury Operations (U.S., Canada, and Mexico), EMEA Operations, Asia Operations and Merchant Services Operations. Since joining Bank of America as a transaction services executive in 2001, he has led more than 10,000 associates who provide check processing, statement rendering, cash vault, and other services to customer households and businesses.

Previously, Quinn has held leadership positions at Procter & Gamble and FedEx. During his almost seventeen years at FedEx, he established transportation networks and expanded business across the Asia-Pacific region and was responsible for a portion of FedEx U.S. logistics business. He was born in Chicago and raised in Decatur, Georgia. Quinn received an MBA from the University of Memphis.



Jane L. Snowden

Jane L. Snowden, DR IE 1994, is a senior manager and research staff member in the Industry Solutions and Emerging Business Department at the IBM T. J. Watson Research Center

in Yorktown Heights, New York. She is responsible for developing strategies and coordinating research efforts worldwide to create innovative solutions for small- and medium-sized businesses in areas such as collaboration and social networks, security, systems management, cloud computing, and green supply chain.

Snowden is a senior member of the Institute of Industrial Engineers, a member of the Institute for Operations Research and the Management Sciences, and a member of the Connecticut Academy of Science and Engineering.

H. Milton Stewart School of Industrial and Systems Engineering

2009 Distinguished Lecture

The H. Milton Stewart School of Industrial and Systems Engineering cordially invites alumni and friends of the School to our 2009 Distinguished Lecture. On March 5, 2009, Philip McCord Morse Lecturer Lawrence Wein will speak on "Operations Research and Homeland Security: From Models to Implementation."



Lawrence Wein, PhD
Professor
Graduate School of Business
Stanford University

For more information, visit: www.isye.gatech.edu/news-events/dls

The H. Milton Stewart School of Industrial and Systems Engineering's 2009 Distinguished Lecture will be held on March 5, 2009, and will feature Lawrence M. Wein, PhD, of Stanford University and Philip McCord Morse Lecturer as this year's guest lecture. In this presentation, Wein will give a brief description of his research on four topics: homeland security and public health; preparedness and response to a bioterror anthrax attack and to a bioterror attack on the food supply; routes of transmission

and infection control for pandemic influenza; and biometrics (e.g., fingerprint matching) to prevent terrorists from entering the country.

For more information on the upcoming lecture, visit www.isye.gatech.edu/news-events/dls/wein.php.

The Stewart School of ISyE's Annual Distinguished Lecture was established last year to bring in highly prominent speakers who have made a significant contribution to society through research areas of interest to Stewart

School of ISyE faculty, students, and alumni.

The 2008 Distinguished Lecture featured William Pulleyblank, PhD, vice president of the Center for Business Optimization at IBM Global Business Services. His presentation focused on the numerous opportunities and challenges in computing, business, and operations research. If you happened to miss Pulleyblank's phenomenal presentation, visit <http://smartech.gatech.edu/handle/1853/21229> to download the video.

SCL and ISyE Commended for Grooming Internationally Savvy Engineers

In the 2007 edition of *Internationalizing the Campus*, NAFSA: Association of International Educators recognized Georgia Tech for its ongoing commitment to grooming internationally savvy engineers and maintaining a worldwide presence with satellite campuses. The publication, which features six to eight institutions each year, highlighted Georgia Tech in a section titled "Tech's Well-Engineered Engagement with the World." Each year, Tech garners plenty of international exposure. Study and work abroad programs, the International Plan, foreign satellite campuses such as Georgia Tech-Lorraine in France, and undergraduate and graduate international affairs degrees all contribute to Tech's reputation as a global institution.

NAFSA specifically commended the Stewart School of ISyE for its Supply Chain & Logistics Institute (SCL). An alliance with the National

University of Singapore (NUS) allowed SCL to create the Logistics Institute-Asia Pacific program, which offers master's degrees, conducts research, and hosts conferences.

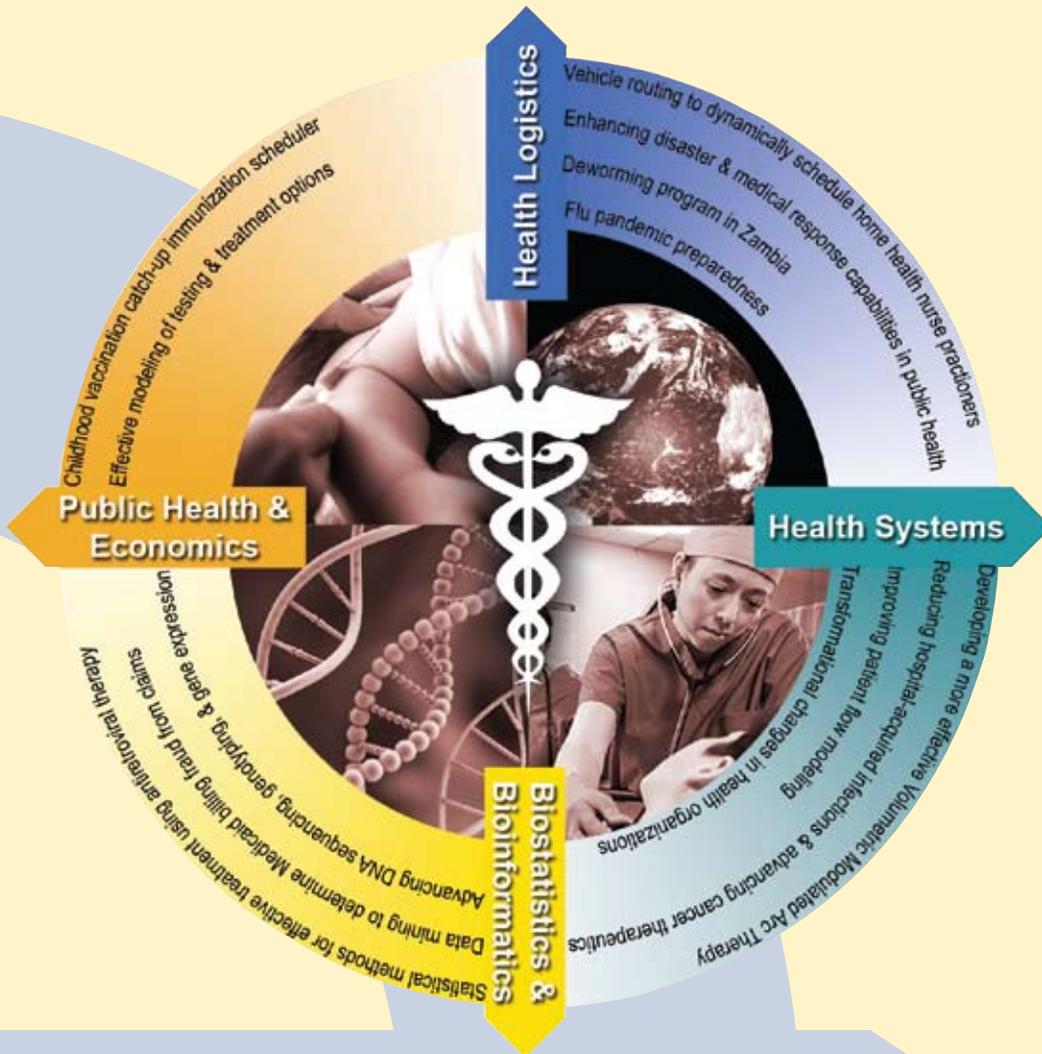
The report also recognized Stewart School of ISyE's Chen Zhou, associate chair for Undergraduate Studies and associate professor, for his summer study abroad program that takes undergraduates to Singapore and Beijing. Along with students from NUS and Tsinghua University in Beijing, Georgia Tech students study manufacturing, logistics, and modern Asian history.

At the time of the report, 80 percent of Tech undergraduates were in the fields of engineering and science. "Given the kind of university Georgia Tech is, it's remarkable that we have 34 percent of our students studying abroad," Howard A. Rollins Jr., a psychology professor and former associate vice provost of

International Programs, told NAFSA. Study abroad opportunities are available to all majors, and according to the report, nearly 1,000 Tech students participate in study abroad each year.

An international perspective is imperative to the modern engineer's success, according to former Georgia Tech President Wayne Clough. "Even if they stay in this country—which is unlikely—during their careers, they are going to be impacted by this global economy," Clough told NAFSA.

NAFSA: Association of International Educators is a member organization that advocates international education and serves the field by awarding grants and providing professional development opportunities. NAFSA offers networking opportunities and sets standards of good practice for international educators and their institutions.



Health-Related Activities in the Stewart School—An Update

The fall 2006 issue of the Stewart School of ISyE’s alumni magazine, formerly known as *Engineering Enterprise*, presented an overview of health-related research and education.¹ Since that publication, there have been a significant number of new activities in this area in the School. This special section, “Collaborators in Healthcare,” provides an update by highlighting several of the new research activities along with two student spotlights and an interview with ISyE alumnus Mel Hall.

¹The issue may be found at www.isye.gatech.edu/eemag/pdfs/20062Fall.pdf.



Photo: Rob Felt

The scope of health-related activities has broadened in recent years. In this introduction, a brief overview is given in four areas: health logistics, health systems, biostatistics and bioinformatics, and public health. A few of the many examples of research are provided in each section.

Health Logistics

One of the key areas for the Stewart School of ISyE has been in the area of logistics and supply chain management. It is not surprising, then, that the School would leverage its strength in this area to help address important healthcare delivery problems. For example, Associate Professor Alan Erera along with doctoral student Ashlea Bennett are drawing on vehicle routing research to dynamically schedule home health nurse practitioners to help deal with the significant growth in demand for services.

Last year, the Supply Chain & Logistics Institute (www.scl.gatech.edu) formed two new research centers in this area. The first is the Center for Humanitarian Logistics (www.scl.gatech.edu/research/humanitarian), co-directed by Professors Ozlem Ergun, Pinar Keskinocak, and Julie Swann. The focus of this center is to advance science and technology to improve humanitarian logistics planning and response in the long term, while working closely with NGOs, government, and the private industry to improve their

supply chain and logistics operations in the short term. One of the important health problems that the center has focused on is pandemic flu. Specifically, researchers Keskinocak and Swann are developing models to help organizations prepare emergency response plans around facility location, resource allocation, and food distribution. This work is presented in the article “Flu Pandemic Preparedness Models Help Determine Food Distribution and School Closing Strategies” on page 9.

The Center for Health Care Logistics (www.scl.gatech.edu/research/health), co-directed by Paul Griffin, PhD, and Martin Savelsbergh, PhD, was also recently started to develop and apply supply chain and logistics concepts to aid in optimizing healthcare delivery. One of the target areas for this center is for designing healthcare supply chains for developing countries. The article “PhD Student Helps World Vision Improve Deworming Process in Zambia” on page 12 is an example of such work.

Eva Lee, PhD, director of the Center for Operations Research in Medicine and HealthCare (www2.isye.gatech.edu/~evakylee/medicalor), has developed a decision support system developed to help U.S. state, city, and county healthcare departments create and test more efficient plans for emergency response logistics and treatment of infectious illnesses. This work is described in the

Martin Savelsbergh, PhD, and Paul Griffin, PhD, co-direct SCL's Center for Health Care Logistics, where supply chain and logistics concepts are developed and applied to aid in optimizing healthcare delivery.

article “Enhancing Disaster and Medical Response Capabilities in the Public Health Arena” on page 8.

Health Systems

Since the time Harold Smalley started the Health Systems program in ISyE in 1958, there has been a strong focus on hospital management, information systems, medical operations research, and delivery systems modeling. That work continues today by Stewart School of ISyE researchers. For example, Christos Alexopolous, Dave Goldsman, and Kwok Tsui are collaborating with the University of California at San Diego to improve patient and information flow in healthcare clinics serving the inner-city poor. This research, described in the article “Simulation Modeling in Healthcare and Pandemic Influenza” on page 11, involves using workflow data acquisition and simulation to better utilize resources. Several clinics in the San Diego area have made use of this work.

Eva Lee is working with the Memorial Sloan-Kettering Cancer Center for treating patients with prostate cancer. The project is described in the article “Operations Research Advances Cancer Therapeutics” on page 10. The research involved developing optimization modeling and computational techniques to implement an intraoperative (during surgery) three-dimensional treatment planning system for implanting radioactive seeds in malignant tumors in the prostate.

Shabbir Ahmed, PhD, and Martin Savelsbergh are working with researchers at the Emory School of Medicine to develop more effective Volumetric Modulated Arc Therapy (VMAT), a recent technology in the radiotherapy of cancer patients that makes it possible to deliver a continuous treatment dose during a single rotation of the treatment machine around the patient. The benefits are better patient experience and reduced treatment costs.

Griffin and Keskinocak have been working with Children’s Healthcare of Atlanta and the John Stroger Hospital of Cook



County to develop strategies to reduce hospital-acquired infections (HAIs). HAIs, infections that occur in hospitals where there was not evidence that the infection was present or incubating at the time of hospital admission, are responsible for approximately two million infected patients annually, of which more than 100,000 die.

The HAIs research follows a systems approach for understanding the spread of these infections and for evaluating the effectiveness of different practices, such as hand hygiene and isolation. Using simulation, they have modeled the hospital system by focusing in detail on a particular unit (e.g., an intensive care unit), considering how the pathogens spread through the flow of patients and healthcare workers. They are currently extending these models to the entire hospital and a system of hospitals to understand the effectiveness of local infection control practices in the absence of or in conjunction with system-wide adopted practices.

Kristin Hermann was part of a team of master's students that worked with Children's Healthcare of Atlanta at Egleston to improve patient flow. The team focused on the Emergency Department, Surgical Scheduling, Admissions, and Discharges, and developed strategies that reduced patient length of stay and decreased hospital diversions. This work is summarized in the article "Optimizing Patient Flow at Children's Healthcare of Atlanta at Egleston" on page 13.

The National Science Foundation recently awarded funding to the Stewart School of ISyE and the Texas A&M Health Science Center School of Rural Public Health to establish the Center for Health Organization Transformation. The center will focus on transformational changes in health organizations on issues related to

information technology implementation, quality and safety management, chronic disease management, clinical change initiatives and other evidence-based management approaches similar to Six Sigma and Total Quality Management. You can find out more about this center at www.isye.gatech.edu/NSF-CHOT.

Biostatistics and Bioinformatics

The statistics group in the Stewart School of ISyE has grown considerably in the past few years. Many of the newer faculty are working in the area of biostatistics and bioinformatics. Recent advances in DNA sequencing, genotyping, and gene expression have provided opportunities for studying complex diseases such as cancer. For example, Ming Yuan, PhD, is using statistical methods with new technologies to decipher useful information that is often hidden in the variation of the data for complex diseases.

When an individual is infected with HIV, the viral load usually increases sharply following infection and then drops rapidly to a steady state where it remains until progression to AIDS. This steady state is often referred to as the viral set point. Yajun Mei, PhD, is using statistical methods to estimate this set point, an important parameter to know for effective treatment using antiretroviral therapy.

J.C. Lu, PhD, has been applying data mining techniques to the health area. In particular, he is developing techniques to determine Medicaid billing fraud from claims data.

Public Health

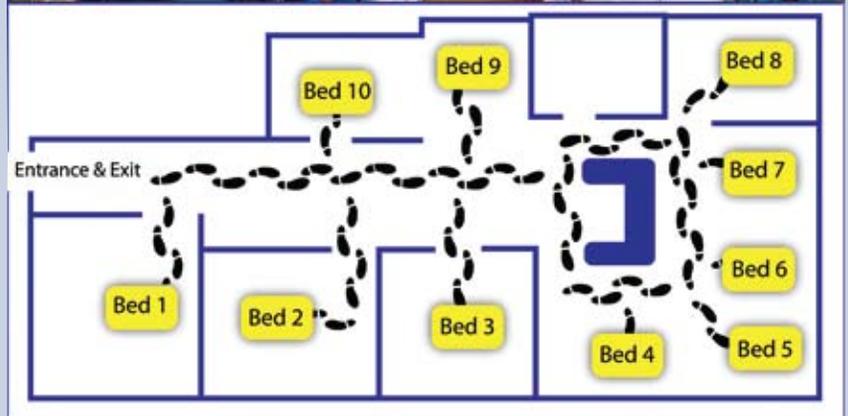
The Stewart School of ISyE has had a strong relationship with public health organizations such as the Centers for Disease Control and Prevention (CDC) for quite some time. Currently, several researchers in ISyE are applying industrial engineering methods to public health problems. For example, Pinar Keskinocak, PhD, and doctoral student Faramroze Engineer worked with the CDC to develop a downloadable software tool to recommend adjustments to childhood immunization schedules when one or more vaccine doses are missed. This work is described in the article "Tool Creates Personalized Catch-up Immunization Schedules" on page 14. Professors Paul Griffin and Julie Swann have been doing work with the CDC on cost effectiveness modeling of testing and treatment options and policy strategies. Examples include modeling the impact of various interventions on HIV prevalence and determining the optimal timing for testing for Hepatitis C.

The Stewart School of ISyE is dedicated to assisting in the creation of a better and fairer healthcare system for all. There are many ways that we could improve, so there are lots of opportunities. The challenge is to find the best solutions possible.

For questions or to become involved in our efforts, contact Paul Griffin at paul.griffin@isye.gatech.edu.

For development opportunities, contact Nancy Sandlin at 404.385.7458 or nancy.sandlin@isye.gatech.edu.

To assist in understanding the spread of hospital-acquired infections and for evaluating the effectiveness of different practices such as hand hygiene and isolation, ISyE researchers used a discrete event simulation that was built to run on a model of a physical intensive care unit, as depicted in the figure on the right.



Perspective: Mel Hall on Current Trends and Challenges in Healthcare

Mel Hall, IE 1967, chairman and CEO of Comprehensive Health Services, Inc. (CHS), was motivated to go into the field of healthcare many years ago when he was a management consultant. He investigated workforce support models for various health programs with oversight by the U.S. Department of Health and Human Services. As a result, he realized how much money was spent on healthcare in this country, the number of different market niches that existed, and the predictions of the growth in healthcare expenditures. He decided that an attractive opportunity existed to build a company serving the employee medical needs of corporate America and the federal government.

Now, in his current role with CHS, Hall has been at the forefront in one of the hottest trends in healthcare today—the development of on-site healthcare clinics that handle routine medical needs. Hall and CHS have been leading improvements in this practice by developing an analytical and management approach for changing the corporate on-site healthcare delivery model and health cost dynamics.

ISyE: Why are on-site healthcare clinics so successful?

MH: Health costs are rising faster than wage costs or inflation. The employee workforce is getting older and working longer. Companies have decided to take a direct hand in managing at least some portion of their healthcare expenses, and on-site clinics can become the focal point for managing healthcare expenses. Since companies generally don't have the in-house expertise to implement and operate these clinics, they usually outsource this responsibility to companies like CHS.

The economics of the on-site health clinic are attractive for many reasons, including: (1) employees save time in going to a doctor (two to three hours on average); (2) the mix of medical services offered can be tailored to the specific health needs and high health cost areas of the employees at that location; (3) health education, promotion, and wellness programs can assist in improving lifestyles and lowering health risks; (4) investing in an on-site clinic, with a strong health coaching and compliance focus, will reduce downstream health costs (hospital, specialists, etc.); and (5) ensuring that the most effective and right mix of pharmaceuticals are being used and prescription protocols followed. Like most significant problems, healthcare results improve when they are managed well.

ISyE: Are there any challenges that on-site healthcare clinics face?

MH: Yes. The on-site clinic should be a leverage point for other healthcare vendors—health plan, pharmacy benefits management company, disease management, health risk appraisal, etc. A true electronic medical record, of course, will be required to have a central source for aggregated information on a timely basis. To be successful, on-site medical personnel must not only be good medical people, but also good counselors and provide superior customer service levels. Health plan incentives need to



Photo: Rob Felt

Mel Hall, IE 1967, chairman and CEO of Comprehensive Health Services, Inc.

be established to motivate participation and compliance with various health initiatives and programs. Finally, a strong return on investment model and approach must be implemented that allows the client to determine the value proposition of the on-site clinic.

ISyE: What are some other successful trends in healthcare?

MH: Technology, specialty drugs, and physician focus has greatly improved treatment over the past several years. The advent of serious wellness programs has impacted lifestyle health risks. Identifying potential generic health risks early in life promises significant improved healthcare monitoring and treatment in the future.

ISyE: What do you see as the biggest challenges that the field of healthcare faces today?

MH: Changing healthcare dynamics in such a way as to improve treatment outcomes and reduce individual health risks, while simultaneously bringing healthcare costs under control. Today, the focus is on treatment, not the outcome of the treatment, and thus there is little incentive to assure that healthcare expenditures are cost effective.

Generally, no holistic (all encompassing) view of a person's health condition and situation is evaluated. The vast majority of healthcare dollars are spent fixing health problems once they are identified, rather than making a serious effort to identify, monitor, and change risk factors that can reduce the odds and cost of being sick. It is important to understand that from a health viewpoint, one cannot separate individual, lifestyle, or work-related health issues.



Enhancing Disaster and Medical Response Capabilities in the Public Health Arena

by Lisa Grovenstein

During a crisis situation, the logistics of handling a panicked public, overtaxed first responders, and other critical medical resources are overwhelming. And while emergency management agencies and health departments have response plans in place to mitigate public health disasters, it is very difficult to know how well those plans will perform when time is critical and the minutes needed to move medication to distribution points or patients to clinics could mean life or death for thousands or millions of people.

Researchers at the Stewart School of ISyE have developed a computer software system that allows flexible design of facility models, including various clinical models created by the Centers for Disease Control and Prevention (CDC). The system is designed to help federal, state, and local first responders design and test more efficient plans and policies for dealing with healthcare emergencies.

Known as RealOpt[®], the program was created by Eva Lee, PhD, an associate professor of industrial and systems engineering and director of the Center for Operations Research in Medicine and HealthCare. Since its initial deployment in 2004, the system currently is approaching four hundred users among the emergency preparedness community.

The appeal of RealOpt[®] is simple. No other system provides such an adaptive planning and assessment tool for large-scale emergencies. The program can assist in the design of an all-encompassing, flexible, and dynamic public health emergency response capability that requires strategic and operational systems planning.

“When it comes to medical emergency preparation, it is difficult to anticipate the outcome of a situation that has never occurred. Decisions must be made

quickly,” explained Lee. “RealOpt[®] not only helps policymakers better prepare and more efficiently deploy available resources, but the program also identifies gaps crucial to effective mitigation planning.”

Charged with administering medication to an at-risk population during a disease outbreak or exposure to a biological agent, radiation, or other harmful substances, the CDC and public health administrators must quickly ramp up point-of-dispensing (POD) locations and deliver appropriate emergency medical services in an orderly, expeditious, and safe manner. For this reason, they value RealOpt[®] as an effective planning tool.

“RealOpt[®] is flexible, adaptable, easy to use, and produces meaningful results to the user,” said Bernard Benecke, a CDC staff member at the Coordinating Office for Terrorism Preparedness and Emergency Response. “It allows for complex optimization of PODs that cannot be determined by the naked eye.”

With the capacity to process data in real time as emergency situations occur and to implement necessary dynamic changes, RealOpt[®] has been used for large-scale virtual drills and performance analysis to

help refine emergency response, planning, and treatment from terrorism, infectious disease outbreaks, and natural disasters.

According to Benecke, RealOpt[®] was used in several major exercises in 2007 and has been funded by the CDC again this year for on-site drills due to its usefulness to local planners in changing standard operating procedures and POD designs that maximize efficiency. One exercise involved a multiple-site analysis that evaluated POD sites for medications in the wake of a pandemic flu outbreak. “We learned that some local health departments had good plans in place, while others had more work to do,” noted Lee.

Besides pandemic planning, since 2004, Lee and her research team have participated in strategic planning and in time-motion studies for anthrax and smallpox drills. In addition, RealOpt[®] was successfully utilized by the City of New Orleans in 2007 for a mass vaccination drill that actually provided citizens with free flu shots. The program assisted in the clinic design and in determining optimal staffing rates. RealOpt[®] was also able to pinpoint bottlenecks and the numbers of individuals receiving flu shots proved to be close to what the system anticipated.

Beyond biological and infectious disease outbreak emergency response, RealOpt[®] is currently used by first responders in planning for a radiological crisis, especially in radiation contamination screening and health monitoring.

Lee also pointed out that the program is not confined to medical scenarios. It has been successfully deployed in manufacturing and industrial settings to help pinpoint where to locate manufacturing plants, personnel, and other resources.



Lisa Grovenstein is the director of public relations in Georgia Tech's Communications & Marketing department.

First responders, like the one in the exercise pictured on the right, could use RealOpt[®] to design plans for healthcare emergencies.

Flu Pandemic Preparedness Models Help Determine Food Distribution and School Closing Strategies

by Abby Vogel

The 1918 flu pandemic killed more than 40 million people worldwide and affected all age groups. While it is difficult to predict when the next influenza pandemic will occur or how severe it will be, researchers at the Stewart School of ISyE have developed models to help organizations like the American Red Cross and Georgia Department of Education prepare emergency response plans.

“The models are flexible so that multiple scenarios can be investigated to see which options meet a certain goal,” said Pinar Keskinocak, PhD, an associate professor in ISyE. “This goal can be different for various groups, such as serving the most people given the availability of limited resources or minimizing the number of people infected while not negatively affecting businesses.”

Keskinocak is developing the models with Stewart School of ISyE’s Associate Professor Julie Swann and graduate student Ali Ekici.

Knowing how many people will need food, how many food distribution facilities will be necessary, where the facilities should be located, and how the resources should be allocated among the facilities is very important, according to Marilyn Self, who is the manager of disaster readiness for the Metropolitan Atlanta Chapter of



Photo: Gary Meek
the American Red Cross. Self has been collaborating with Georgia Tech researchers on this project.

“These models have provided solid food distribution data that has helped us formulate the questions we have to ask and the decisions that we have to make about food distribution during a pandemic on a local and statewide level,” said Self.

The Georgia Department of Education is using Georgia Tech’s models to investigate whether or not schools should be closed during a pandemic.

“Closing schools affects both families and businesses because parents will have to stay home and take care of children,” said Garry McGiboney, associate state superintendent at the Georgia Department of Education. “We have to worry about important emergency workers like hospital staff members and law enforcement officers not being able to work because they have to tend to their children because schools are closed.”

To estimate the number of meals required for a given area or determine if closing schools would be beneficial, the researchers first needed to determine how many people and/or households would be infected. To do this, they constructed a generic disease spread model, which described how the influenza disease would spread among individuals.

The researchers used U.S. Census Bureau tract data—including household

ISyE Associate Professors Julie Swann and Pinar Keskinocak and graduate student Ali Ekici developed models to help organizations like the American Red Cross and Georgia Department of Education prepare emergency response plans.

statistics, workflow data, classroom sizes, and age statistics—to test the model. Crowded areas, including Atlanta and its suburbs, were always affected around the same time regardless of where the disease initiated. However, the time required for the disease to spread to rural areas depended on where the disease started.

With this information, the research team used the disease spread model as a forecasting tool to calculate the number of meals that would be required in metropolitan Atlanta during a flu pandemic. They tested three major scenarios: feeding every household with an infected individual (someone symptomatic or hospitalized), every household with an infected adult, or every household with all adults infected.

Interventions such as voluntary quarantine or school closures could also affect food distribution by changing the number of infected individuals.

“Voluntary quarantine means that if an individual is sick in a household,

Watch a Video



View a recent news broadcast highlighting the mathematical model that uses Georgia census data to track a pandemic before it actually hits. This model can predict when and where the pandemic would spread.

www.isye.gatech.edu/news-events/news/release.php?id=2066

Continued on page 15

Operations Research Advances Cancer Therapeutics

Associate Professor Eva K. Lee, in conjunction with Memorial Sloan-Kettering Cancer Center (MSKCC), has made an extraordinary difference in the health and well-being of prostate cancer patients. Working alongside Marco Zaider, PhD, attending physicist in Medical Physics at MSKCC in New York and professor in physics (radiology) at Weill Medical College of Cornell University, Lee devised sophisticated optimization modeling and computational techniques to implement an intraoperative (during surgery) three-dimensional treatment planning system for brachytherapy for malignant tumors in the prostate. Brachytherapy is a form of radiation treatment in which tiny pellets or “seeds” containing radioactive materials are implanted directly into a malignant tumor to deliver a high dose of radiation to the area. The difficult part is finding an optimal set of possible locations for placing the seeds inside the gland to attack the tumor while simultaneously protecting the healthy surrounding tissue.

One of the difficulties in solving this problem lies in solving the multidimensional aspects of the prostate and tumor. Traditional location analysis is generally concerned with two-dimensional problems. The prostate is three-dimensional (and possibly four-dimensional), as tumors tend to change in volume over time. The problem is further complicated by the need to solve it in real time in order to be of practical use in an operating room environment, something traditional planning or existing operation research techniques could not approach. Traditionally, location analysis was conducted pre-surgery so any change in the tumor from the point of analysis to surgery was not taken into consideration.

“We explained the clinical constraints to Eva Lee—for example, we needed an answer in minutes instead of hours—and she designed a number of remarkable programs and software that

accomplished all of our goals,” said Zaider. “In my view, her software is the next generation of intraoperative planning systems. Because her approach is general and flexible in nature, it can be applied to breast cancer and to many other types of cancer.”

Lee’s three-dimensional optimization models the treatment area identifying the shape of the organ being treated and the location of the tumor cells within the organ. Using algorithms, the optimization guides the doctor toward the most effective dose provided by each radioactive seed, keeping in consideration the critical structures for which radiation doses should be limited, the sensitivity of the tissues to radiation, and the expected shrinkage of the organ after treatment. The system’s goal is to provide consistent tumor-killing radiation doses to the tumor cells while limiting potentially damaging doses to nearby critical structures.

The real-time intraoperative planning system eliminates pre-operation simulation and post-implant imaging analysis. Based on the range of costs of these procedures, it is estimated conservatively that their elimination nationwide could save on the order of \$450 million a year for prostate cancer care alone.

Clinical studies have shown that real-time intraoperative planning improves the survival rate of patients with prostate cancer, reduces the side effects of treatment, and reduces costs to the healthcare system. Lee has also been working with medical specialists to use this optimization technique on improving treatments for breast, lung, cervical, brain, and liver cancers.

In 2007, Lee and Zaider won the prestigious Franz Edelman Award for their work in advancing cancer therapeutics, clearly demonstrating how operations research and mathematics are increasingly bringing improvements to healthcare, not only in the areas of policy, finance, and public health but also in diagnosis and treatment as well.

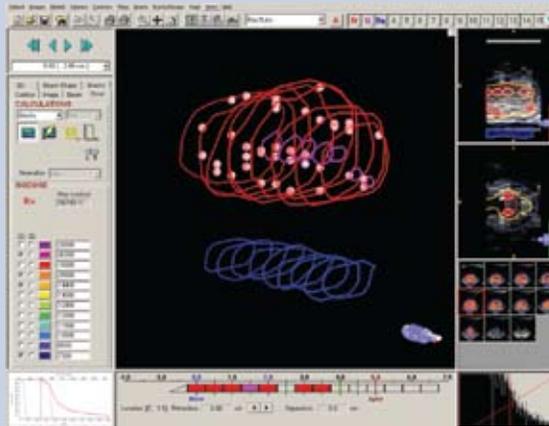


Figure 1

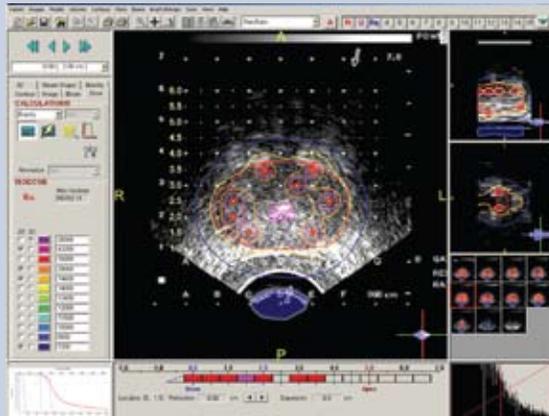


Figure 2

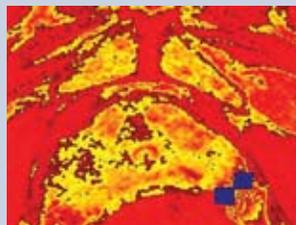


Figure 3

Figure 1: This figure shows the 3-D seed locations inside the prostate, as determined via the operations research–based treatment planning system. The blue structure is the rectum, and the purple indicates the urethra.

Figure 2: This figure illustrates the commercial system. Note the excellent conformity of the operations research plan. The brown isodose curve, representing points that receive 100 percent of the prescription dose, conforms well to the red curve, which delineates the boundary of the planning target volume.

Figure 3: Magnetic resonance spectroscopy (MRS) identifies pockets of high–density tumor cells in the prostate. These pockets are then translated from the MRS images to the treatment images for design of a dose–escalation plan, which helps to improve treatment outcome.

Simulation Modeling in Healthcare and Pandemic Influenza

by Christos Alexopoulos, Dave Goldsman, and Kwok Tsui

Today's healthcare management operates in a high velocity environment of aggressive price competition, tremendous technological advancements, and frequent changes in standards. Meeting the challenges of such a swiftly changing environment requires rapid response in identifying critical system processes, recognition of all relevant resources, access to real-time information, and the capacity to analyze "what if" scenarios. For instance, what happens if the number of women having babies at a large maternity center doubles in the next ten years? What can we do if a flu pandemic hits exposed healthcare professionals and temporarily decreases their availability? What if we don't have enough resources to carry out required vaccination regimens for all of the children in a certain population?

Generally speaking, these interesting, timely problems—which we often tackle in our health informatics group within ISyE—typically involve the flow of entities, such as patients, customers, or materials, through a system having limited resources to perform services on those entities. Solving these types of problems requires a wide-ranging combination of analysis techniques, such as data mining and statistics, computer simulation, queuing theory, database management, and optimization.

Over the last few years, we worked on a variety of health informatics projects with leading researchers at The Carter Center, the Centers for Disease Control and Prevention (CDC), Emory University's Rollins School of Public Health, Merck, the Pan-American Health Organization (PAHO), the University of California-San Diego (UCSD), the World Health Organization (WHO), and various Atlanta area hospitals. Much of our work with the CDC, Merck, PAHO, UCSD, and WHO has received research funding. Perhaps our most interesting work has dealt with flow problems, including those involving patients, doctors, supplies, information, and even disease.

One example of a successful, ongoing collaboration involves UCSD's Center for Management Science in Health.

Along with our UCSD colleague John Fontanesi, PhD, we are interested in improving patient and information flow in healthcare clinics serving the inner-city poor. Our analysis process typically encompasses a number of distinct steps: (1) creation of a workflow data acquisition tool to help collect and analyze data to better understand system flow; (2) using knowledge gained from the data acquisition to aid in developing an idealized clinic; (3) creation of a simulation of the idealized clinic model; and (4) synergistic, easy-to-use automation of this process, from data collection to simulation.

Our simulations are usually written in the Arena language, which we teach to students in ISyE. The application graphically illustrates patient information and personnel flows through the system; any developing bottlenecks; and continuous updates of system statistics (e.g., number of patients currently in the system). The simulation is also equipped with an easy-to-use Excel front-end that allows administrators to change critical parameters (e.g., number of providers, average time needed to give an immunization, etc.) during the course of various "what if" analyses.

So how has the package been used? Let's consider an implementation at a clinic in inner-city San Diego that had a number of challenging operational issues: a strange physical layout (the clinic had formerly been a church), a high no-show rate; very slow patient throughput (average well-child visits took 2.3 hours); a low rate of preventive service provision (e.g., the vaccination rate for two-year-olds was only 68 percent); high staff turnover; and poor financial stability. For these reasons, the County of San Diego gave the clinic under study a grant of \$300,000 to increase the number of exam rooms in its facility, thinking that more rooms would solve the throughput problems. Our simulation analysis quickly revealed that a bottleneck was developing in the registration process, and hence the exam rooms were being underutilized. By increasing the number of servers at registration, we were able to show that more customers could now pass through the system to the exam rooms,

yet not so many that the rooms would become over utilized. Therefore, our recommendation was not to spend money on more rooms, but on more personnel.

The clinic did indeed undertake our suggestions. Subsequently, the no-show rate dropped from 18 percent to 3 percent; the average well-child throughput time dropped from 2.3 hours to 1.1 hours; and the pediatric vaccination rate for two-year-olds rose from 68 percent to 93 percent.

Another example of ongoing work concerns the development of simulation models for pandemic influenza transmission, which has been funded by both the CDC and WHO. Over the last few years, a great deal of research has been undertaken to evaluate the design, performance, and use of disease-spread simulations and surveillance systems for such illnesses as pandemic influenza, the SARS coronavirus, avian influenza (bird flu), the Ebola virus, and bioterroristic disease agents. Even seasonal flu can cause great problems for our overburdened healthcare system, so the consequences of infectious diseases could be catastrophic.

The objective of this line of research is to develop a realistic, real-time, adaptable influenza simulator that is efficient, easy to understand, and easy to calibrate. The simulation is based on the "Susceptible-Infected-Removed" model, which has been popularly adapted in the mainstream literature and involves the simulation of individuals' activities as they flow through their daily routines in multiple mixed contact groups. Our simulator allows policymakers to effectively understand the effects of an unknown newly developed outbreak so that effective interventions can be developed. Further, the simulator can assist public health professionals in understanding and predicting local effects and in developing appropriate countermeasures. This work was presented at a special WHO Vaccine Research Workshop in Geneva, Switzerland on October 22, 2008.

Christos Alexopoulos, PhD, is an associate professor in the Stewart School of ISyE. Dave Goldsman, PhD, and Kwok Tsui, PhD, are professors in the Stewart School of ISyE.



Focus On: Jacqueline Griffin

PhD Student Helps World Vision Improve Deworming Process in Zambia

Zambia is a country of more than 11 million people with a life expectancy of thirty-eight years (compared to seventy-eight in the United States) and infant mortality per 1,000 of 102 (compared to seven in the United States). Worm infections are endemic in Zambia and cause a variety of health conditions, particularly in children. These include anemia, vitamin A deficiency, stunted growth, poor intellectual development, impaired cognitive function, and damage to the liver, intestine, and urinary tract. Simple interventions, such as deworming, have the potential to improve children's health and educational achievement, especially for those worst affected and most disadvantaged.

Jacqueline "Jackie" Griffin, a PhD student in the Stewart School of ISyE, spent the summer term in Zambia working with World Vision United States (WVUS). The purpose of the trip was to help WVUS assess their deworming program, and the work was sponsored by the Executive Master's in Logistics program. In particular, Griffin accounted for the use of donated medicines and explored whether improvements could be made to the performance of the program through more efficient organization, logistics, and service provision.

Griffin worked on three specific tasks for the project. First, she performed a cost-benefit analysis of the program by calculating or estimating the costs of the program (including the value of the medicines, the costs involved in supplying the medicines to the target populations, and the costs of service provision, program management, monitoring, and evaluation) and dividing this by the disability-adjusted life years (DALYs) saved as a result of the program. Griffin calculated the costs to WVUS of the deworming product supply chain, from arrival of the product in Africa to its delivery to the end-user. The second task involved measuring the quality of the program through a comparison of the program against "best practices" in deworming by assessing the effectiveness of the supply chain in decisions to bring medicines to the target population. She designed and conducted semi-structured interviews with WVUS program managers, gifts-in-kind staff and administrators, and other people involved in the supply chain. Finally, Griffin developed methods for improved and innovative supply chain systems based on good evidence.

Although the assessment was conducted in Zambia, observations and suggestions will be useful to the WVUS deworming program in other countries. A second country with contrasting conditions will be selected in which to conduct a similar assessment to increase the confidence in the assessment's findings and recommendations.

After completing a BS in Information and Systems Engineering and an MS in Management Science at Lehigh University, Griffin started the PhD program in the Stewart School of ISyE in 2006 as a logistics scholar in the Supply Chain & Logistics Institute (SCL). She was awarded a National Defense Transportation Association Scholarship in 2007. She currently works with Professors Paul Griffin and Martin Savelsbergh, co-directors of the Center for Health Care Logistics in the SCL in the Stewart School of ISyE.



Between visiting the district hospital and the rural Munyembe Health Center, Jacqueline Griffin spent some time in the Gwembe district in the southern region of Zambia.



Focus On: Kristin Hermann

Optimizing Patient Flow at Children's Healthcare of Atlanta at Egleston

Kristin Hermann always knew she wanted to apply her Industrial Engineering degree to service industries in a way that would make a difference to the community. After graduating in 2005 from Auburn University with a bachelor's degree in Industrial Engineering, Hermann worked for Walt Disney World. She shifted her focus to healthcare in 2007 when she pursued a master's degree in Health Systems Engineering from the Stewart School of ISyE. Her passion to work in healthcare sparked from a close family experience. Through this experience she realized the opportunity to apply engineering thinking to improve the care delivered to patients and the experiences that patients and families have in healthcare organizations.

Hermann had the opportunity to partner closely with Children's Healthcare of Atlanta at Egleston during her graduate studies. Through a joint venture among the Georgia Tech Health Systems Institute, Children's, and ISyE's Center for Humanitarian Logistics in the Supply Chain & Logistics Institute, Hermann and a team of master's students worked to optimize patient flow at Children's. Improving patient flow is critical to a hospital's operation and impacts both the patients and community.

The team's goals were to identify ways to reduce the time patients had to wait for care, prevent overcrowding in the Emergency Department, and ensure that access to care is always available for the children in Georgia. Under the advisement of Stewart School of ISyE Professor Pinar Keskinocak and Children's Quality and Process Improvement team, Hermann and her team conducted studies and analyses to identify opportunities for improvement. The team focused on four main areas to help align capacity with demand: Emergency Department, Surgical Scheduling, Admissions, and Discharges.

Recommendations generated by this research are helping to improve patient care, reduce the length of stay for patients, decrease hospital diversions, improve patient and staff experiences, and better utilize hospital resources.

"The recommendations brought forth by the Georgia Tech team are helping us move closer to our goal of optimizing patient flow at Children's Healthcare of Atlanta. Most of their work focused on the surgical schedule and its impact on capacity. We now have a starting point with the team's data and analysis to begin working with the Surgical Services Department on decreasing the variability of their demand," said Carrie Silver, a senior process improvement consultant in Children's Quality Department.

Hermann graduated from Georgia Tech's Stewart School of ISyE in August and is now working full time for Children's. In her current role as a service consultant, she works to improve systems and processes that will enhance the experience of patients and families. Additional projects she has worked on include: improving workflow in the pharmacy to reduce medication turnaround times, assessing caregivers' workflow in a new Pediatric Intensive Care Unit to give them more time at the bedside, and developing the measurement strategy to assess patient satisfaction for Children's.

Children's Healthcare of Atlanta, a not-for-profit organization, is committed to enhancing the lives of children through excellence in patient care, research, and education. Managing more than half a million patient visits annually at three hospitals and fifteen neighborhood locations, Children's is one of the largest clinical care providers for children in the country. Children's offers access to more than thirty pediatric specialties and has been consistently ranked among the top children's hospitals by *Child* magazine and *U.S. News & World Report*. Delivering more than \$98 million in unreimbursed care in 2007, the Children's mission is supported by generous philanthropic and volunteer support.

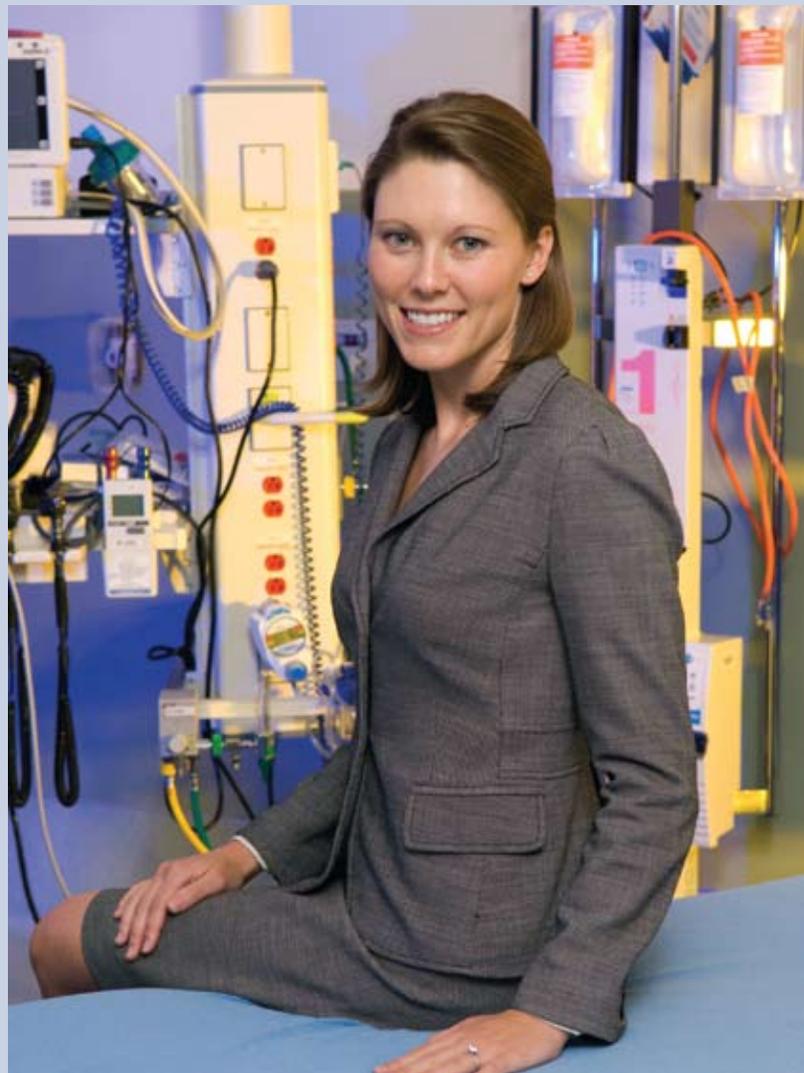


Photo: Rob Felt

During Kristin Hermann's, MS HS 2008, graduate studies, she and a team of other master's students worked to optimize patient flow at Children's Healthcare of Atlanta at Egleston.



Tool Creates Personalized Catch-up Immunization Schedules

Program Helps Doctors and Parents Plan After Missing Childhood Vaccinations

by Abby Vogel

A new downloadable software tool will help pediatricians, other healthcare professionals, and parents determine how to adjust complex childhood immunization schedules when one or more vaccine doses aren't received at the proper time.

Children commonly miss recommended times to receive vaccines. A report issued last month by the Centers for Disease Control and Prevention (CDC) found an alarming 28 percent of toddlers have not been vaccinated according to U.S. guidelines. Another recent survey found that only 9 percent of children received all of their vaccinations at the recommended times and that only half received all recommended doses by their second birthday.

Once a child falls behind in the vaccination schedule, healthcare professionals are left to figure out when it's appropriate to give any missed vaccines and any future vaccines. They typically have to construct a unique, personalized catch-up schedule for each child—often while the child sits in the treatment room.

Researchers at Georgia Tech are taking the guesswork out of developing individualized catch-up vaccination schedules. A new online tool allows parents and pediatricians to ensure that the missed vaccines and future vaccines are administered without violating guidelines regarding vaccines and doses.

"Physicians have been telling us for years that they needed a computerized program to tell them when to give vaccines after a child misses scheduled immunizations," said Larry Pickering, executive secretary of the Advisory Committee on Immunization Practices (ACIP) of the CDC and a collaborator on the project. "Now this tool is available for healthcare professionals and parents to use, and they are excited to use it."

The tool, designed by Pinar Keskinocak, PhD, associate professor in Georgia Tech's Stewart School of ISyE, and graduate

student Faramroze Engineer, is available for download from the CDC Web site (www.cdc.gov/vaccines/scheduler/catchup.htm).

The program removes the challenging task of simultaneously considering complex rules, guidelines, and discretionary considerations when creating a catch-up schedule. A physician or caregiver simply inputs a child's date of birth and previous immunization dates, and the program displays a personalized schedule of the recommended dates to administer all future vaccines.

The tool removes the numerical and computational aspects of constructing a catch-up schedule by hand and provides two options: administer the vaccines as soon as possible or administer the vaccines when recommended.

"Sometimes a physician sees a child that he or she knows will not return for all follow-up visits. In this case, the tool provides the physician flexibility in administering as many vaccines as possible while the child is in the office rather than waiting," said Pickering.

The body makes antibodies and stimulating cells that destroy disease-causing germs. If the immunized person is ever exposed to the real disease, the antibodies are there for protection. Sometimes additional doses of a vaccine have to be administered to boost immunity.

The vaccines included in the scheduler are those required between birth and six years of age: Hepatitis B, Diphtheria/Tetanus/Pertussis, Rotavirus, Haemophilus Influenzae Type B, Pneumococcal, Inactivated Poliovirus, Measles/Mumps/Rubella, Varicella, Hepatitis A, and Meningococcal. Influenza is contained in the recommended schedule, but it is not included in the scheduler. Each infant requires approximately twenty-seven vaccine doses administered before two years of age for protection from fifteen vaccine-preventable diseases.

The scheduler follows the guidelines developed and revised each year in

collaboration with ACIP, the American Academy of Pediatrics, and the American Academy of Family Physicians. These guidelines include the feasible number, timing, and spacing of doses of each vaccine based on the child's age, the number of doses, and the age at which each dose was administered.

In addition, each dose of each vaccine has a minimum, maximum, and recommended age for administration, and there are minimum and recommended gaps between doses. These gaps as well as future administrations of a particular vaccine may vary depending on the current age of the child and the age at which previous doses were administered.

If a child requires more than one live vaccine to be administered, there are two options: administer all live vaccines on the same day or wait twenty-eight days between live vaccine shots. There also may be discretionary considerations such as limiting the number of simultaneous administrations a child receives or the number of visits required to complete the series for all vaccines.

To solve the complicated problem of developing a personalized catch-up vaccination schedule in just seconds, the researchers used a technique called dynamic programming. Dynamic

Watch a Video



View a recent news broadcast highlighting the Childhood Vaccine Scheduler that will help doctors and parents keep up with the changing rules and requirements for childhood vaccinations.
www.scl.gatech.edu/news-events/release.php?id=1968

Left to right: Pinar Keskinocak, ISyE associate professor, Farmoze Engineer, ISyE graduate student, and Larry Pickering, executive secretary of the ACIP of the CDC, display the childhood vaccination catch-up scheduler.



Photo: Gary Meek

programming means solving an optimization problem by efficiently sorting partial results. For example, if two partial schedules are created for a child and they both administer the same number of doses, but one schedule administers them earlier than the other, then the partial schedule that administers the vaccines later is eliminated because a better option is already available.

The key to dynamic programming is to prove that one partial schedule is better than another without having to determine the entire schedule and without having to try every possible schedule.

“The benefit of dynamic programming is that it eliminates solutions or partial solutions that are not promising—those that won’t lead to the optimal solution,” said Keskinocak.

In providing such a tool, the researchers hope to improve the effectiveness

of childhood vaccination programs by improving timely vaccination rates. “In an ideal world, every child would receive their vaccines at the recommended times, but since this isn’t a perfect world, this tool developed at Georgia Tech allows children to correctly catch up once they fall behind,” added Pickering.

For more information on this project, contact Professor Pinar Keskinocak at pinar@isye.gatech.edu.

Abby Vogel, PhD, is a communications officer in the Georgia Tech Research News and Publications Office.

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Flu Pandemic Preparedness Models Help Determine Food Distribution and School Closing Strategies

everyone in that household should stay home,” explained Keskinocak. “However, we realize that not everyone will follow this rule, so the model assumes that only a certain percentage of infected individuals will stay home.”

The researchers investigated the effects of voluntary quarantine on disease spread, as well as the best time to begin the quarantine and how long it should last.

“These results are important because during a pandemic, communities have limited resources, including food and volunteers to distribute the food,” noted Swann. “If fewer people require the resources, especially during the peak time period, organizations like the American Red Cross can meet the needs of more people.”

The researchers also compared the two interventions—quarantine and school closure. The results showed that closing schools reduced the number of people infected with the virus. However, a four-week voluntary quarantine was found to be at least as effective as a six-week school closure for reducing the percentage of the population infected with the virus and the number of people infected at the peak time.

“Running all of these different scenarios has helped us realize that we will have a lot more people to feed in metropolitan Atlanta during a pandemic flu than we imagined. The models have provided us with a realistic idea of where we’ll need to locate community food distribution facilities and how many we

might need to have given certain assumptions and decisions,” said Self.

The researchers plan to conduct future work in two areas—developing models for other states and extending the model to also include vaccine distribution. The model may also be useful for other purposes such as estimating hospital capacity needs, according to Keskinocak.

“While we hope that a pandemic never occurs, our models will help Georgia and other states across the United States prepare response plans for the potential,” added Keskinocak.

For more information, e-mail humlog@isye.gatech.edu.

Abby Vogel, PhD, is a communications officer in the Georgia Tech Research News and Publications Office.

Remaining Competitive in Today's Market

Real-World Education for World-Class Executives

As the world flattens, having a firm grounding in international logistics is imperative for the success of many businesses. More and more, companies are leveraging their supply chains to compete in this global market as they struggle to stay in touch with the rapid changes in technology, strategy, and rules of engagement. To remain competitive, companies must expand collaborative relationships, enhance supply chain efficiencies, execute proven supply chain strategies, and educate and empower their brightest stars.

However, the importance of logistics education is often overlooked, but not with Omar Gonzalez, MS IL 2005, CEO and president of Almacenar Logistics in Bogotá, Columbia, and many of the other graduates in the Executive Master's in International Logistics (EMIL). In 2005, Gonzalez made a strategic decision to expand his knowledge in international logistics and supply chain strategy. Before joining EMIL, Gonzalez had never studied logistics in any systematic way. "I ran my company with intui-

tive knowledge," he said. Now he is using his EMIL degree to advance the logistics industry throughout Latin America. In 2006, Gonzalez was elected president of the Latin American Association of Logistics, a nonprofit organization that integrates and combines the resources of fourteen independent associations from Brazil, Venezuela, Paraguay, Peru, Uruguay, Chile, El Salvador, Cuba, Mexico, Argentina, and Colombia. Gonzalez's expertise in international logistics made him a prime candidate to lead the organization. "It is our dream that in the near future, merchandise will ride freely through our territories day and night, 365 days a year, transporting wealth and development to all corners of our lands," Gonzalez said.

EMIL, an eighteen-month executive master's program, is one of the first advanced degree programs to combine business management with the growing field of global supply chain management.

"EMIL was created specifically to groom executives at the world's leading companies," said Greg Andrews, IL 2005, and

"EMIL was created specifically to groom executives at the world's leading companies. The program incorporates five intensive two-week residences. Two of the residences take place in Atlanta, and the remaining international residences are held in Asia, Europe, and Latin America. For two weeks every three and a half months, students attend one of the residences. For the remainder of the time, participants are on the job using the practical techniques taught during EMIL residences to improve supply chain efficiencies for their real world problems." –Greg Andrews, IL 2005, managing director of EMIL

Residence I - Atlanta - Consumers
Revenue Management, Optimization, Variability, Analytical Methods, Supply Chain Models, Supply Chain Finance, Global Projects

Residence II - Asia - Global Logistics
Distribution, Global Sourcing, International Trade, Outsourced Manufacturing, Corporate Strategy, International Trade Finance, Geopolitical Issues, Cultural Differences

Residence III - Europe - Logistics Infrastructure
Distribution Models, Labor, Environment, Tax Strategies, Import-Export Compliance, Sourcing, Manufacturing in Central-Eastern Europe, Logistics Infrastructure, Geopolitical Issues, Cultural Differences

Residence IV - Latin America - Global Logistics
Distribution Models, Labor, Import-Export Regulations, Tax Strategies, Geopolitical Issues, Cultural Differences, Sourcing Models, International Trade Agreements

Residence V - Manufacturers - Atlanta - Mexico
Manufacturing in the Americas, NAFTA, Supply Chain Strategy, Risk Management, FTZ Applications, Import-Export Compliance, Supply Chain Security, Factory Physics, Cross-Border Logistics, Labor, Sourcing Models, Global Projects



managing director of EMIL. “The program incorporates five intensive two-week residences. Two of the residences take place in Atlanta, and the remaining international residences are held in Asia, Europe, and Latin America. For two weeks every three and a half months, students attend one of the residences. For the remainder of the time, participants are on the job using the practical techniques taught during EMIL residences to improve supply chain efficiencies for their real-world problems.”



Luca Mugnaini, MS IL 2006
Vice President of Logistics
Salvatore Ferragamo
Firenze, Italy

also able to see in person how logistics is handled in different parts of the world.”

EMIL may appeal to industry executives for a multitude of reasons. The flexible schedule, online assignments, and global residences allow professionals to make optimal use of their time while remaining employed full-time.

EMIL graduates also have a world of memories to go with their diplomas. During their busy international residences, students become immersed in the different cultures as they tour and interact with various international companies and their executives to see how they conduct business.

Luca Mugnaini, MS IL 2006, vice president of logistics at Salvatore Ferragamo in Firenze, Italy, said he was attracted to EMIL “because of the highly ranked reputation of Georgia Tech, the international distance-learning format of the program and, the ability to obtain my master’s degree while continuing to work full time at my job. In addition to learning from the distinguished professors and industry speakers, I was able to see in person how logistics is handled in different parts of the world.”

Not only are EMIL’s executive students exposed to the leading edge of industry trends from a global perspective, but they also build a network of other senior executives who have various levels of experience across supply chain management that they can draw from during the class and even after the program ends.

“Attending EMIL was a turning point for me,” said Bublu Thakur-Weigold, MS IL 2005, director of European Region at e³ associates, “The program exposed me to global operations and industries that I would never otherwise have seen. The peer group in class was another inspiration, something I continue to benefit from today.”

“ I was attracted to EMIL because of the highly ranked reputation of Georgia Tech, the international distance learning format of the program, and the ability to obtain my master’s degree while continuing to work full time at my job. I was

EMIL Program Doubles in Size with New Schedule

The directors of EMIL are themselves a lesson in international logistics. Strategic planning has allowed them to double the size of the program this year. Compared to previous years, 2008 has seen twice as many executives pursuing their master’s degrees through EMIL.

Typically, a class of top-level industry executives enters the program and spends eighteen months completing the five residences around the world. In the program’s history, one class began every eighteen months

and only after its graduation would the subsequent class begin. Now EMIL is accepting one class every twelve months.

The directors at EMIL make it a priority to recruit a variety of culturally diverse students from all areas of supply chain and logistics. According to Andrews, EMIL recruitment efforts emphasize different industry verticals with an interest in attracting not only high-tech supply chain strategists but also automotive, chemical, medical, retail, defense, and aeronautics professionals. The wealth of knowledge these industry executives bring with them is priceless. “Senior executives bring with them a suitcase full of knowledge, and we want to open that suitcase and share that field of expertise among their classmates. There is a lot of benefit to that because seldom do you get in a room with a climate that is fostering an exchange of ideas unabated,” said Andrews.

EMIL graduated its fifth class in August 2008. The sixth class recently came on board in April 2008 and is slated to graduate in spring 2009. The seventh class arrived on campus in October 2008 and will graduate in the summer of 2010. “These two classes firing off in 2008 have enabled us to sync up the class schedule to allow us to run concurrent classes. Our plans going forward will be to start a new incoming class each October. The eighth class, the class of 2011, will arrive on campus in October 2009,” said Andrews.

Prospective students can apply on the EMIL Web site at www.emil.gatech.edu.

Short Courses Boost Supply Chain Managers' Expertise

by Gary Goettling

Facility tours are a popular part of the Supply Chain & Logistics Institute's (SCL) short-course professional development program, but not all participants are as impatient to share their new insights as the fellow who pulled out his cell phone in the middle of a tour.

"He told me later that he was talking to his boss," said Carole Bennett, SCL's director of program development and marketing. "He just couldn't wait to tell him about something related to automation they had been shown."

Facility tours represent an important hands-on component of SCL's professional development curriculum.

"Before we visit a particular site, the course instructor talks about the concepts we're going to see," she said. "Then when our group gets there, someone from the company walks them through the distribution center and shows them how the conveyors and automation process work."

Practical, nuts-and-bolts knowledge is the hallmark of the twelve-plus two- to five-day courses SCL offers during the year on subjects such as transportation, warehousing, and supply chain management as well as on more specialized topics, including material handling, supply chain finance, and logistics optimization.

SCL's mainstay logistics course, dating back to the beginning of the short-course program itself in 1992, is typical, said Bennett.

"We'll have a different theme for each of the four days," she explained. "Like transportation and distribution on Tuesday, warehousing on Wednesday, third-party logistics on Thursday, and future trends on Friday. The course director will make presentations based on the day's theme, and we'll also bring in industry speakers and Georgia Tech faculty to talk about issues related to the theme."

By the end of the week, attendees will have received a broad but intense education on customer service and order processing, inventory planning and management, supply chain integration, transportation and warehousing, and distribution, according to Bennett. In addition, the class covers logistics performance measures and benchmarking procedures, logistics information systems architectures and implementation, third-party logistics strategies, and logistics organization design.

Some classes include breakout sessions while others ask participants to bring real work

problems to tackle in class. Another popular activity associated with certain classes is the supply chain game. "It's a board game with six people on a team, each one representing a different part of a supply chain," Bennett explained. "You keep score as you go through round after round, and pretty soon you'll see trends develop based on the decisions you make: This person has a lot of inventory, while this person has nothing on the shelf to sell—why is that? What's happening in the chain that's causing these things? The game forces people to interact and make choices, and then see the results of those choices."

SCL short courses may be taken individually or as part of a certificate program. Depending on the subject, participants earn either one or two continuing education credits for each course they complete. Eight credits earned within a four-year period from a prescribed series of courses qualifies the participant for a certificate in supply chain management.

While there are no prerequisites to enrolling in any SCL short course, "to earn a certificate, there are certain courses that you have to take, what you might call core courses," Bennett said. "But after that, you can choose classes from among the electives to match your specific interest."

Classes are held at the Global Learning Center on Georgia Tech's Midtown Atlanta campus. Many are also available online.

Since 1992, more than 6,500 logistics professionals have attended the program with more than 420 participants earning SCL's Logistics Professional and Management certificates from Georgia Tech.

"We work with a lot of experienced mid-range managers who want to step back from their jobs for a bit and focus on solutions they can take back to the office, and we also see people who are relatively new to the supply chain side of their company's operation," Bennett said.

"But all of our students are motivated and highly focused on learning as much as they can," she continued. "The people who get the most out of the professional development program are those who are looking for new ideas, new ways to improve what they're currently doing by implementing what they've learned here in their job—and of course their company benefits when they're able to improve systems and make them more efficient."

For details about course schedules, costs, and general information about SCL's professional development program, contact Carole Bennett at [404.894.9138](tel:404.894.9138) or carole.bennett@isye.gatech.edu.

Gary Goettling is a freelance writer who writes for Georgia Tech's Research Horizons and other alumni publications.

UPCOMING COURSES

FINLISTICS: FINANCIAL LOGISTICS WORKSHOP

Finlistics® focuses on the measurement and management of (1) Logistics operating costs—transportation, warehousing, distribution, administration, etc.; (2) Ongoing logistics capital charges needed to support investments—inventories, accounts receivable, warehouse, fleets, technology, storage and handling equipment, etc.; and (3) Sales growth from improved logistics practices—service levels, speed to market, etc. October 27–28, 2008

WAREHOUSE/DISTRIBUTION CENTER LAYOUT

This course is concerned with material handling and distribution problems, from the source of raw material through manufacturing and distribution systems to the final consumer. November 7–8, 2008

WORLD-CLASS TRANSPORTATION AND DISTRIBUTION

This course addresses all critical issues in domestic and international transportation including key financial and performance indicators for transportation, logistics network design, routing and scheduling, shipment planning and containerization, mode, carrier, and third-party selection, transportation regulations and documentation, transportation management systems, and transportation organization design. November 18–21, 2008

SUPPLY CHAIN ANALYTICS

The course is designed to carefully balance the "how-to" needs of the analyst/engineer and the "better decision-making results" needs of the manager. February 3–6, 2009

GLOBAL SUPPLY CHAIN MANAGEMENT PROGRAM

This program focuses on effective planning and management of highly integrated product and information flows from the supplier's suppliers to the customers. March 2–6, 2009

www.scl.gatech.edu



Supply Chain Executive Forum Tackles Contemporary Issues

by Gary Goettling

Over the past six years, supply chain executives have convened on the Georgia Tech campus for meetings of the Georgia Tech Supply Chain Executive Forum. Addressing key supply chain issues, the forum brings together up to forty executives from more than two dozen supply chain organizations for two days of discussion on a host of supply chain issues, problems, and challenges.

“Members and guests of the forum benefit from hearing leading industry speakers, both in plenary session and panel formats, and from discussing and debating key issues and supply chain best practices,” said C. John Langley, PhD, director of the forum and a professor of supply chain management at Georgia Tech. “Also, time is usually taken for executive breakout sessions for close-in interaction with others at the forum. A reception and dinner also help significantly with networking and interaction among members, guests, and Georgia Tech faculty and students.”

This important activity of the Supply Chain & Logistics Institute is held in the spring and fall at Georgia Tech’s Global Learning Center

in Midtown Atlanta. The two-day gatherings are designed to provide participants with new and practical ways to streamline operations that enhance profitability and integrate their supply chain strategy with corporate strategy, according to Langley. In addition, information presented at the forum helps them “transform their supply chains to respond to competition and changing business environments, as well as to grow professionally within and beyond their current organizations.” He added, “True supply chain integration occurs only when organizations work together effectively toward mutually agreeable goals and objectives.”

The Supply Chain Executive Forum attracts management professionals from the full range of companies that constitute and depend heavily upon robust and innovative supply chains. Included among the members are manufacturers, suppliers, retailers, wholesalers, transport providers, information technology firms, and consultants.

The topics discussed and presented at any particular forum have changed over the years to reflect the contemporary realities of business and supply chain environments. A few subjects

of current interest include: globalization, integrated supply chain management, information technology, dealing with supply chain complexity, sustainability, and managing through challenging business environments.

According to Langley, there are many benefits of participation in the forum. Of particular note, he said, “first it is a great opportunity for decision makers to listen and talk with experts from various areas of supply chain and business management. And second, it provides an opportunity for members and guests to interact with peers at other supply chain organizations who are either facing similar problems or who have complementary perspectives and solutions to common problems.”

For more information about the Supply Chain Executive Forum, contact:
 John Langley at jlanglej@isye.gatech.edu,
 Carole Bennett at carole.bennett@isye.gatech.edu, or visit
www.scl.gatech.edu/scef.

Gary Goettling is a freelance writer who writes for Georgia Tech’s Research Horizons and other alumni publications.



Finding Innovative Solutions Working with a Student Senior Design Team

Interview with Jud Savelle

When Jud Savelle, IE 2002 and MS IE 2005, manager of Delta Air Lines Inc.'s Airport Customer Service Airport Engineering, needed a fresh approach to some of the problems he faced in the airline industry, he turned to the Stewart School of ISyE's senior design program. Savelle has an interesting perspective on the program as he participated in senior design when he was in his senior year at ISyE. Now he is returning to Georgia Tech, but this time as a project sponsor.

ISyE: Why did you choose to sponsor students in senior design now that you are in the working world?

JS: My current company is a large U.S. airline in an industry ripe with problems of interest to industrial engineers. From my own experience in senior design, I know that an industrial systems and engineering education is not truly complete until you apply what you've learned in the classroom to the working world. I wanted to provide students this opportunity in an environment that I knew they could learn from. And, to be honest, most companies in my industry would never turn down free consulting services from six intelligent Georgia Tech industrial and systems engineering students.

ISyE: What was your experience like sponsoring a senior design project?

JS: Identifying the project was the easiest part of our experience. The most difficult was choosing a team from among so many qualified groups. Once we chose a group, they exceeded our expectations in many ways. The students asked many insightful questions and always accepted our feedback on their progress. They questioned our business rules and gave their own feedback in the most appropriate manner, and they always presented themselves professionally during office and site visits. We never felt the need to micromanage the team because they consistently kept us up to date on their progress. From start to finish, they represented Georgia Tech and the

Industrial Systems and Engineering program magnificently.

ISyE: What was the project that you set before the senior design student team?

JS: We presented our students with a routing and assignment problem at our largest hub here in Atlanta. The specific problem was to increase the utilization of drivers handling local departing and terminating baggage. We provided them with schedule, demand, and staffing data and in return asked for a solution that would minimize the time drivers spent deadheading, balance resources, and ultimately reduce the costs necessary to run the local baggage operation.

ISyE: Why did you choose that project for the students?

JS: Having been through senior design ourselves, my team at Delta and I were familiar with the project scope that should be presented to the students. This particular baggage project met the scope requirements and was also something my team had wanted to work on in the past but did not have the necessary resources to do so. We also knew the project would present opportunities to use specific industrial

engineering tools, such as simulation, in a business setting. I was very pleased when the students asked us to increase the scope of the initial project to introduce some components that would challenge them above and beyond the expectations of the course.

ISyE: Were the results satisfactory?

JS: The results were absolutely satisfactory. I was most satisfied with the way the students were able to minimize technology requirements necessary to implement the solution. They were very sensitive to our financial constraints for new technology and worked hard to keep those projected costs down by developing their own code and software tools. I was also pleased with the specific methods they brought from the classroom to apply to our problem, proving that seemingly complex assignment algorithms can actually be utilized in a business environment.

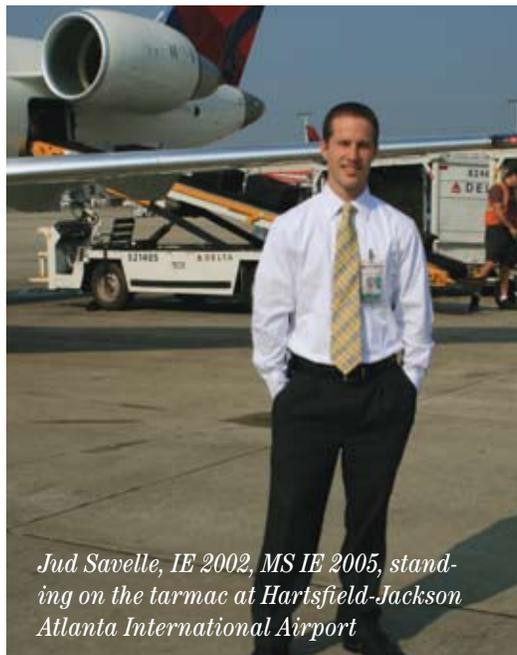
ISyE: Was your company able to implement or utilize any of the solutions presented by the senior design team?

JS: The solution has not yet been implemented. Our company recently announced a significant merger, and the students' proposal will soon be reviewed as part of an extensive list of best practices to be implemented in the combined company.

ISyE: Any plans for future collaboration with ISyE senior design teams?

JS: Absolutely. I and many others in my division recognize the value of this program, and we will continue to seek participation with senior design teams on future projects throughout the company.

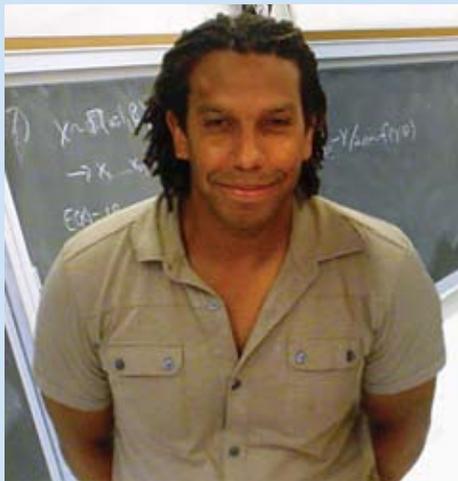
To learn more about how you can become a project sponsor for an ISyE's senior design project, visit www.isye.gatech.edu/seniordesign.



Jud Savelle, IE 2002, MS IE 2005, standing on the tarmac at Hartsfield-Jackson Atlanta International Airport

This interview was held in June 2008. Jud Savelle left Delta in mid-August. He and his wife Jenny, IE 2002, MS IE 2003, returned to his hometown of Albany, Georgia, to expand the family business.

FACULTY NEWS



Kobi Abayomi, PhD, joined the Stewart School of ISyE as assistant professor in July.



Ton Dieker, PhD, joined the Stewart School of ISyE as an assistant professor in August.



This summer Jeff Wu, PhD, received four prestigious awards for his seminal contributions to improve statistical theory and methods and applications to quality and productivity.

Kobi Abayomi, IE 2000, joined the Stewart School of ISyE as an assistant professor in July. Prior to returning to Georgia Tech as a professor, Abayomi was a visiting professor at Duke University and a Postdoctoral Fellow at Statistical and Applied Mathematical Sciences Institute (SAMSI).

Jane Ammons, associate dean of Engineering and ISyE professor, was elected as president-elect for the Board of Trustees of the Institute of Industrial Engineers (IIE) headquartered in metro Atlanta. Ammons has been a member of IIE for more than thirty years.

Ton Dieker joined the faculty of the Stewart School of ISyE as an assistant professor in August. He works in applied probability, and his research is motivated in part by applications to communication networks and to business processes such as workforce management and service systems.

Steven T. Hackman, associate professor, published *Production Economics: Integrating the Microeconomic and Engineering Perspectives*, a textbook that addresses productivity and resource optimization by incorporating both economic and engineering perspectives.

Paul H. Kvam and **Brani Vidakovic's** new book, *Nonparametric Statistics with Applications to Science and Engineering*, offers a new approach to studying nonparametric statistics.

C. John Langley Jr., professor of Supply Chain Management and director of Supply Chain Executive Programs, published the eighth edition of *Supply Chain Management: A Logistics Perspective*, which focuses on the relationship between logistics and supply chain management and how the nature of business is changing overall.

Donald Ratliff, the UPS and Regents' Professor, accepted an invitation to serve on the Advisory Committee for the Office of Polar Programs (OPP). OPP establishes and directs National Science Foundation funding for basic research and operational support in the Arctic and the Antarctic.

William "Bill" Rouse received an IBM Faculty Award for 2008. This is Rouse's fourth IBM Faculty Award. He has received one each year since 2005.

Jianjun "Jan" Shi joined the faculty of the Stewart School of ISyE as the Carolyn J. Stewart Chair of Industrial and Systems Engineering in January 2008. Before joining Georgia Tech, he was the G. Lawton and Louise G. Johnson Professor of Engineering in the Department of Industrial and Operations Engineering and the Department of Mechanical Engineering at the University of Michigan.

C.F. Jeff Wu, the Coca-Cola Chair in Engineering Statistics, garnered four awards for his innovative research: the esteemed 2008 Shewhart Medal from the American Society for Quality; an honorary doctorate from the University of Waterloo in Ontario, Canada; the American Statistical Association Quality and Productivity Research Conference Honoree; and the 2008 Pan Wen-Yuan Award. Also, Wu has been selected to serve on Tech's Presidential Search Committee to replace former Georgia Tech President G. Wayne Clough, who served as Tech's president since 1994 and stepped down on June 30, 2008, to become the twelfth Secretary of the Smithsonian Institution of Washington, D.C.

Bert Zwart received an IBM Faculty Award for 2008.

Dean Athanassiades, IE 1979, of Atlanta, Georgia was presented the 2007 Distinguished Fellow Award by the Healthcare Information and Management Systems Society at its annual conference in Orlando, Florida, in February. He is director of solution consulting for Philips Healthcare Informatics.

Matthew G. Browner, IE 1996, is an account director with Avenue A/Razorfish in Atlanta, Georgia. He and his wife Melissa live in Acworth, Georgia, with their one-year-old daughter, Lily Anderson.

Regent Hugh Carter, IE 1964, has been selected to serve on the Georgia Tech Presidential Search Committee to replace former Georgia Tech President G. Wayne Clough, who served as Tech's president since 1994 and stepped down on June 30, 2008, to become the twelfth Secretary of the Smithsonian Institution of Washington, D.C.

Gregory G. Dess, IE 1971, recently coauthored the fourth edition of his textbook, *Strategic Management* (McGraw-Hill & Irwin), which is used in many universities throughout the world. Dess is the Andrew R. Cecil Endowed Chair in Applied Ethics at the School of Management at The University of Texas at Dallas. He, his wife Margie, and daughter Taylor reside in Frisco, Texas.

Bob Erickson, IE 1979, moved from California to Asheville, North Carolina, in August 2008. Erickson is vice president of services for Pall Corp.

Steven L. Hale, IE 1980, of Fayetteville, Georgia, was selected to attend the annual Northwestern Mutual Forum, which was held in November in Scottsdale, Arizona. A financial representative with the Northwestern Mutual Financial Network, Hale was invited to the forum in recognition of his outstanding year of performance.

Mel Hall, IE 1967, was honored by the dedication of the Predictive Modeling Lab at Georgia Tech Health Systems Institute (HSI). The lab is named after Hall because of his contribution to and continued support of HSI. Hall is the chairman and CEO of Comprehensive Health Services, Inc. and a major concept contributor for the Workforce Health Assessment Model developed by HSI.

Justin Honaman, IE 1996, director of customer intelligence for Coca-Cola Enterprises Inc., was named one of "40 Under 40 Up & Comers" by the *Atlanta Business Chronicle* in October 2007. Honaman, who writes and sings country music in his free time, released his first CD in 2006. He now is working on a motivational book titled *1st and Ten* and a second album.

Warren A. Hood Jr., IE 1974, MS IM 1976, chairman and CEO of Hood Companies, has been elected to the Board of Directors of Southern Company. He served on the Mississippi Power Board of Directors from 2004 through 2007. Founded in 1978, Hood Companies is comprised of three corporations that manufacture and distribute packaging and construction products including lumber, plywood, and roofing materials.

Steve Hopper, IE 1986, has joined global management consulting firm Kurt Salmon Associates as senior manager and GoalPost business development leader. He will direct all sales, marketing, and business development activities for the GoalPost labor management system software, which boosts productivity in warehouses, distribution centers, and manufacturing facilities. He lives in Roswell, Georgia, with his wife and two children.

General Ronald L. Johnson, MS IE 1985, was appointed vice president of Referee Operations for the National Basketball Association on July 1, 2008. He will oversee all aspects of the league's officiating program, including recruiting, training and development, scheduling, data management and analysis, and work rules enforcement. General Johnson is a two-star general who recently retired from active duty as Deputy Commanding General of the U.S. Army Corps of Engineers.

Philip D. Kelly Jr., IE 1990, MS IE 1995, has been named president and CEO of Salem Printing Co. in Winston-Salem, North Carolina, and has been appointed to serve on the Board of Directors of Southern Evangelical Seminary in Charlotte. He and his wife, Lynne Stapleton Kelley, MGT 1992, live in the Winston-Salem area with their two children, Reece, 7, and Philip Kelley III, 12.

Jon Kerner, IE 1988, has joined MPS Group Inc. as chief information officer. He previously was CIO for EarthLink, where he was responsible for leading the company's internal and customer-facing technology platforms.



ISyE's Workforce Communication Program periodically hosts ISyE alumni to participate in an Executive Panel on Communications. The panels are designed to give senior-level students direct contact with CEOs regarding the communication skills necessary to be job competitive and move up the career ladder. On their visit, the panelists also receive a tour of the Workforce Communications Lab. During the September session, several panelists took a moment to pose with some of the ISyE students during their tour. Left to right: Ketki Kulkarni, ISyE master's student; Regent Willis Potts (IE 1969); international consultant Bob Martin (IE 1969); Gina Lee, ISyE senior; Judith Norback, ISyE director of Workforce and Academic Communication; Regent Hugh Carter (IE 1964); and Marc Zawko, ISyE senior.

ALUMNI NEWS

Lieutenant Colonel R. Shane

Kimbrough, MS OR 1998, has been assigned to the crew of NASA's STS-126, targeted for launch in November 2008. Space Shuttle Endeavour will deliver to the International Space Station a reusable logistics module that will hold supplies and equipment, including additional crew quarters, a second treadmill, equipment for the regenerative life support system, and spare hardware.

Howard E. McClaine, IE 1967, was appointed Superior Court Judge for the Alapaha Judicial Court by Governor Sonny Perdue on July 2, 2008.

Jim Pericles, IE 1982, of Bel Air, Maryland, accepted a position testing and evaluating air drop systems for the U.S. Army after spending a year in Iraq with the Army Reserve.

Regent Willis Potts, IE 1969, has been selected to chair the Georgia Tech Presidential Search Committee to replace former Georgia Tech President G. Wayne Clough, who served as Tech's president since 1994 and stepped down on June 30, 2008, to become the twelfth Secretary of the Smithsonian Institution of Washington, D.C.

Linda Ray, IE 1994, MBA 2006, has joined Nordson Corp. as the global business development manager for new markets in the adhesive systems group. Ray will be responsible for identifying, assessing, and managing new opportunities that leverage current and developing Nordson technologies across new markets worldwide. She previously was employed by Lafarge North America.

A. Richard Royal, IE 1962, was recently appointed to the Jekyll Island State Park Authority in September 2008 by Governor Sonny Perdue. Royal is president and owner of Royal Investments Inc. and is retiring from the Georgia House of Representatives, where he has served since 1983.

Cy Smith, IE 1985, received the Innovation Award at the annual Atlanta Telecom Professional of the Year awards gala in November 2007. Smith is the CEO and founder of AirSage, an Atlanta-based company with technology providing real-time traffic information. Prior to the launch of the company in 2000, Smith was president and CEO of Advance Technology Corp.

The Alumni News section highlights promotions, awards, scholarships, fellowships, and publication of books. Let us hear from you! It's a good way to stay in touch with your classmates.

Who: _____

What: _____

Where: _____

When: _____

Submitted by _____

Degree _____

Year _____

Street Address _____

City, State _____

ZIP _____

E-mail Address _____

Send your news by e-mail to: communications@isye.gatech.edu or by mail to:

Communications Department
Stewart School of Industrial and Systems Engineering
Georgia Institute of Technology
755 Ferst Drive
Atlanta, GA 30332-0205

2008 Photo Contest Winners Announced

Winners of the H. Milton Stewart School of Industrial and System's Engineering's first photo contest were announced on September 25, 2008. The theme of this year's contest was "interacting with and exploring other cultures" and was open to all faculty, staff, and students. Photographs were entered into one of two categories: "ISyE Faculty and Students Exploring Other Countries" or "ISyE International Students Exploring the United States." No limit was set on the number of photographs an individual could submit. For this first contest, seven members of the ISyE community submitted thirty-nine photographs. Two PhD students captured the attention of our judges and ran away with a majority of the awards. They were Clarence Wardell III and Feng Qiu.

ISyE Faculty and Students Exploring Other Countries



First Place

Clarence Wardell III, PhD Student

Woman in the Rice Field

"During the spring of 2008, I traveled to the INNOVATE Conference on Globalization and Technology as a part of the Georgia Tech delegation. The conference took us to Ho Chi Minh City, Vietnam, and Singapore for ten days. *Woman in the Rice Field* was taken in Vietnam during the course of this trip. As we traveled from the city center out to the Mekong Delta, our bus stopped on the road alongside a rice field. There were several workers harvesting rice in the field. The temperature was extremely hot, very near 100 degrees, and as you can see, the women are dressed to protect themselves from exposure to the sun."



Second Place

Clarence Wardell III, PhD Student

A Vatican View



Third Place

Pinar Keskinocak, Associate Professor

Alanya Coastline



Honorable Mention

Clarence Wardell III, PhD Student

The Mekong Market

ISyE International Students Exploring the United States



First Place

Feng Qiu, PhD Student
Lake Mendota, Madison, WI

"This is the first place in the United States that I visited. I have beautiful memories of the area."



Second Place

Feng Qiu, PhD Student
Chicago



Third Place

Feng Qiu, PhD Student
Georgia Tech Football



Honorable Mention

Feng Qiu, PhD Student
Merry-Go-Round: Disneyland

View the photo contest online at www.isye.gatech.edu/news-events/photocontest.



Consider a Bequest to Support ISyE's Future

Founders' Council is the honorary society of alumni and friends who have made life-income gifts or estate provisions of at least \$25,000 for the support of Georgia Tech. A bequest to Georgia Tech's H. Milton Stewart School of Industrial and Systems Engineering is a powerful expression of your belief in the Stewart School and its future. To make a bequest for ISyE, please include the following language in your estate plans:

I give and bequeath ____% of the residue and remainder of my estate (or the sum of _____dollars, \$_____) to the Georgia Tech Foundation Inc., a Georgia charitable corporation, for the support of the Stewart School of ISyE, Georgia Institute of Technology.

Please contact Nancy Sandlin at 404.385.7458 to discuss how you would like your bequest designated to benefit the H. Milton Stewart School of Industrial and Systems Engineering, whether unrestricted or for the support of a particular program.



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Lake Mendota, Madison, WI
Photographed by Feng Qiu, ISyE PhD Student
First Place in ISyE Photo Contest
"ISyE International Students Exploring
the United States" Category