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ORMS TOMORROW

The informs Student Magazine

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Letter from the Editors

Dear readers,

Welcome to the first thematic issue of OR/MS Tomorrow. As the new editorial team of this magazine, we believe that putting together issues around a specific topic can be much more interesting and useful for you. In this way, by the time you finish reading this issue, you will be able to not only know the latest news from the INFORMS community but also have a good picture of current research and practice on hot OR topics. Thus, it's about time we welcomed you to the OR/MS Tomorrow issue on OR/MS in Healthcare.

In this issue, we are very happy to host an interview with Professor Dimitris Bertsimas, the Boeing Professor of Operations Research and the co-director of the Operations Research Center at the Massachusetts Institute of Technology. Prof Bertsimas talked to us about the role of operations research in improving healthcare in the 2010s but also about the future directions of healthcare analytics. In case this interview raises your interest, our opinion article on how to apply OR in health should be next in your reading list. In this article, Margaret L. Brandeau from the Department of Management Science and Engineering at Stanford University describes a five-step path to a successful application of OR in healthcare and she recommends you give it a try.

Moving forward, we travel to Africa to understand the role of OR in developing countries in an article written by Kanshukan Rajaratnam at the University of Cape Town. Mr Rajaratnam highlights in his article several OR activities in South Africa by presenting the conferences and societies organized in this area. At this point, if you find yourself considering healthcare as an interesting research topic for your future career, you can find more information about which societies are interested in this topic in our article on the INFORMS Health Applications Society (HAS) as well as which conferences to attend in the healthcare conferences column.

This issue would not be complete without featuring INFORMS@USF, the INFORMS student chapter at the University of South Florida where you can read how the chapter's members support their local community through a number of different activities. In the pages of this issue, you can also find out more about the Winner of the2013 INFORMS/Organization Science Dissertation Proposal Competition and who knows, you might be the next one!

In the pages of this issue, you can also find out more about the Winner of the 2013 INFORMS/Organization Science Dissertation Proposal Competition.

Once again, we are very excited to introduce this new series of issues in OR/MS Tomorrow and we hope you will enjoy reading OR in Healthcare as much as we did while preparing it for you.

The Editors (Sara, Amanda, Vaggelis, Ruixue, Ryan, Christy)

Applying OR in Health: A Five-Step Path to Sure-Fire Success

By: **Margaret L. Brandeau**, Department of Management Science and Engineering, Stanford University

Health care in the United States is a mess. We spend more per capita on health than any other country; in fact, we spend more than twice as much per person as the next-closest-spending country. But for all this expenditure, we do not have the best health outcomes in the world, not by a long shot; in fact, the US ranks 36th in life expectancy among countries in the world and 34th in the rate of infant mortality. We have a patchwork of health policies, some rational and some not. For instance, we routinely pay for expensive care for chronic diseases such as diabetes and heart disease, but do not pay for inexpensive programs that could help prevent people from developing those diseases in the first place.

"Health care in the United States is a mess."

"If we could just prevent one infection, it will have been worth it." This statement by a public health official, which appeared in a front page article about HIV prevention in The New York Times in 1987, caught my eye. The article described a proposed policy for mandatory HIV screening for all couples seeking to get married in Illinois. How many infections would be prevented and how much would it cost to prevent those infections? And, if we knew the answer to these questions, how would we know if the proposed program was "worth it"? My back-of-the-envelope analysis showed that such a program would likely be quite expensive and prevent few HIV infections. The program was implemented in Illinois several months later – but was discontinued after one year when the program proved itself to be an inefficient use of public health funds. The same funds could have been spent on far more effective HIV prevention programs.

Other health decisions are more complex. Lifesaving antiretroviral drugs have extended life for millions of people infected with HIV – but for every person newly enrolled in treatment, an estimated two new people acquire HIV infection. How do we find the appropriate balance between saving lives now versus preventing future infections (and thus saving future lives)? As another example, the US federal government has created plans for response to potential bioterror attacks, including stockpiling millions of doses of antibiotics for treatment of anthrax. To what extent should stockpiles of such antibiotics also be held in local communities, enabling rapid use in a time of crisis? Should these antibiotics be stored in everyone's medicine cabinet? The complexity of the underlying systems and policy choices means that intuition alone is insufficient for making good policy decisions. We need models.

"The complexity of the underlying systems and policy choices means that intuition alone is insufficient for making good policy decisions. We need models. In particular, we need OR models."

Applying OR in Health: A Five-Step Path to Sure-Fire Success (continued)

evidence, imperfect as it may be, and that captures relevant uncertainties, complexities, and interactions, OR-based models can be used to evaluate the potential impact of alternative health decisions. My research group uses mathematical, economic, and systems analysis to evaluate public health policies. Our goal is to determine efficient allocations of limited public health resources and to work with policy makers to help improve public health decisions. We have evaluated a variety of public health policies (e.g., allocation of HIV prevention and treatment resources, control of hepatitis B infection, response to potential anthrax bioterrorism) and have worked with decision makers in a variety of organizations (e.g., US Centers for Disease Control and Prevention, Joint United Nations Programme on HIV/AIDS, US Assistant Secretary for Preparedness and Response) to help them make informed decisions.

"This is just the tip of the iceberg: many more high-impact health problems remain to be tackled."

This is just the tip of the iceberg: many more high-impact health problems remain to be tackled. As the Affordable Care Act takes effect in the US, health care providers are under increasing pressure to cut costs, improve quality, and report their progress in doing so. Health care providers need to design networks of care that appropriately cover their intended population and are financially viable. Hospitals need to determine how to run their operations more efficiently and effectively. Clinicians (and insurers) need to know which technologies and treatments are cost-effective and which are not. Again, OR-based models can play a key role in helping to solve these complex problems.

So, how can you, the young operations researcher, be successful in applying OR to health? Here is my five-step path to sure-fire success:

The **first step** is to find an important problem – a problem that decision makers care about. This problem might be identified by decision makers in an organization, such as hospital administrators, physicians, or public health officials. Alternatively, the problem might be identified through articles in the media, discussions with knowledgeable individuals, or personal observations. The most important thing is that the problem matters. A simple analysis of an important problem will have far more impact than a complex analysis of an unimportant problem.

The **second step**, which often occurs in conjunction with the first step, is to find appropriate collaborators who have domain expertise. For example, analysis of a clinical decision problem may involve physicians who treat such patients; analysis of patient flow in an emergency department might involve physicians, nurses, and other emergency department personnel. An OR-based analysis done in isolation is far less likely to have impact than an analysis that has been carried out with collaborators who have deep knowledge of the problem.

Applying OR in Health: A Five-Step Path to Sure-Fire Success (continued)

The **third step** is to develop an appropriate model. (Now the hard work begins!). Typically there is a tension between domain experts who would like a model to capture every detail of a problem and the analyst who needs a tractable model. The OR analyst must find the appropriate balance between model simplicity and complexity. The model needs to be complex enough to capture the essential aspects of the problem, but not so complex that it is unworkable, relies on potentially untenable assumptions, or requires significant amounts of unavailable data. A model that is too complex to be understood by knowledgeable decision makers is far less likely to be implemented or to influence decisions than a model that decision makers understand and believe in.

The **fourth step** is to use the model to identify good decisions. Although the model may have many wonderful mathematical features, decision makers do not care about that. They want to know what information the model provides about how to make good decisions for the problem at hand. If the output of the model is a self-evident insight such as "treat the sickest patients soonest," then the model has not been successfully designed, and it is time to revisit Step 3. A successful model will usefully inform decisions.

The **fifth and final step** is to work with decision makers to implement the results of the analysis. (Full disclosure: this is the really hard step!) If the analysis has been carried out in collaboration with the decision maker(s), then effective presentation of results to these decision makers – showing why and how the analysis identifies improved decisions – is needed. For problems where there is no single decision maker (e.g., many problems in public health), influencing decisions is a less straightforward process and may involve publication of the work in journals that the decision makers will read, presentation of the results at conferences, and meetings with interested individuals. Although this final step may be time-consuming and sometimes frustrating, it is critical if the work is to have impact.

Following in the long tradition of operations research (a discipline that grew out of a need to improve logistical decisions in military operations), the ultimate goal of OR-based analyses of health problems must be to improve decision making. OR analysis in health can help reduce costs and improve effectiveness – and may even save a life. Thus, I hope that young operations researchers will be at the forefront in finding solutions to critical health problems and forging a new future for our profession.

So, go ahead. **Take the first step on the path to sure-fire success!**

"…the ultimate goal of OR-based analyses of health problems must be to improve decision making."

Interview about the Role of Operations Research in Improving Healthcare – Today and Tomorrow!

I recently sat down with **Professor Bertsimas** to learn about Healthcare Analytics and how Operations Research can impact healthcare.



Professor Dimitris Bertsimasis currently the Boeing Professor of Operations Research and the codirector of the Operations Research Center at the Massachusetts Institute of Technology. He has received a BS in Electrical Engineering and Computer Science at the National Technical University of Athens, Greece in 1985, a MS in Operations Research at MIT in 1987, and a PhD in Applied Mathematics and Operations Research at MIT in 1988. Since 1988, he has been in the MIT faculty. His research interests include optimization, stochastic systems, data mining, and their application. In recent years he has worked in robust optimization, health care and finance. He has co-authored more than 150 scientific papers and he has co-authored the following books: "Introduction to Linear Optimization" (with J. Tsitsiklis, Athena Scientific and Dynamic Ideas, 2008), "Data, models and decisions" (with R. Freund, Dynamic Ideas, 2004) and "Optimization over Integers" (with R. Weismantel, Dynamic Ideas, 2005). He is currently department editor in Optimization for Management Science and former area editor in Operations Research in Financial Engineering. He has supervised 52 doctoral students and he is currently supervising 12 others. He is a member of the National Academy of Engineering, and he has received numerous research awards including the Philip Morse lectureship award (2013), the William Pierskalla best paper award in health care (2013), the best paper award in Transportation Science (2013), the Farkas prize (2008), the Erlang prize (1996), the SIAM prize in optimization (1996), the Bodossaki prize (1998) and the Presidential Young Investigator award (1991-1996).

Professor Bertsimas, thank you so much for your time; I really appreciate it, and I know that our readers will appreciate it as well. Everyone in the Operations Research (OR) community knows you through your books, your research and your articles. Why did you choose healthcare as one of the major applications in your research besides air transportation and finance?

One of the great things about OR is that it has the potential of affecting many aspects of human life. I started my involvement in healthcare in the early 2000's, and at the time, I was involved in a company called D2Hawkeye, a data mining healthcare company. We saw the potential of using the power of data, in that case big data, including millions of patient records, to positively affect the quality of life in predicting risk and understanding the quality of healthcare. Then, in the mid-2000's, my father was diagnosed with cancer. As I wanted to help him, I started reading medical papers, and I soon realized that there are diseases we don't really understand, and that our field would have something to say about it. I put a lot of emphasis on medicine, in trying to use data and models to improve our understanding of serious diseases, and doing something about it. That's the origin; it's a personal one.

Interview about the Role of Operations Research in Improving Healthcare – Today and Tomorrow! (continued)

I'm curious how you think OR can help the healthcare industry, which compared to other industries such as aviation and manufacturing, has had very few engineering tools applied.
It is fair to say that OR as a field has not made a significant impact yet in the healthcare industry. On the other hand, healthcare is 16% of the United States GDP, so there's definitely an opportunity. But the question is how. There are two ways, the first being medicine: improve the outcomes for patients. The second is processes: better design of insurance policies, scheduling, and so forth. And all of them are important. My personal affinity is on the first, on how electronic medical records and data, can lead to a much more objective evaluation of the patient and better treatments. And something I find particularly exciting is the way we measure value in healthcare. In the manufacturing and service industries, the way our field is measured is money, for example someone is benefiting millions and billions of dollars. In the healthcare industry, money is also measured, but a more important measure in my opinion is improving the duration of life and the quality of life for people. I find this to be a very noble goal and worth spending your life on it. The focus of my work is how to use data and models to affect outcomes for patients.

"In the healthcare industry, money is also measured, but a more important measure in my opinion is improving the duration of life and the quality of life for people."

How do you state your professional mission in this area, what is your end goal?
My vision has two parts: First, to understand human health objectively using data and rationality; Second, to positively affect the quality of care and the quality of life of patients.

How do you have access to the necessary data for your research?
It's different for different objectives; I'll give you some examples. Through my father's disease, I realized that for complex diseases like cancer, if you go to different doctors they will tell you different things, and recommend different drugs. And if you ask them which treatment is the most effective, the answers are not forthcoming. So in one of my research works we gathered paper records from about 1980, and then using them one by one, we created a database that summarizes clinical trials. We used this to predict outcomes. For instance, one trial uses drugs A, B, and C, and another B, C, and F, and so forth, can you now predict what outcome A, C, and F will have? This is combination chemotherapy. In this particular case we created the data, which took lots of work, 6 years, and is ongoing by a group of graduate and undergraduate students at MIT. In another environment, this is on some of my work on personalized diet and diabetes management, we actually get data from patients. For example, suppose you are pre-diabetic or diabetic; you eat some fruit and you measure the glucose level before and after eating it.

Interview about the Role of Operations Research in Improving Healthcare – Today and Tomorrow! (continued)

So it sounds like you don't always need health systems to provide data.
Not necessarily. For example, we are currently involved in a research project with the Boston Medical Center, where we have 1.4 million people over 10 years interacting with the health system. We have electronic medical records, for example their blood pressure and body temperature over time and the drugs they take. Then we can look at correlations and trends. In this particular case, we get data from the interaction of patients with the healthcare system. But various sources can generate data, such as electronic medical records, data from papers, or data directly from patients. There are also claims data, which is exactly the data D2Hawkeye used. Claims are data which are generated when a patient with insurance goes to a doctor, and the doctor must submit a claim to be reimbursed.

"The biggest challenge I see is that medical education is not particularly data-oriented."

What is the biggest challenge that you see in this area?
The biggest challenge I see is that medical education is not particularly data-oriented. Doctors have trained in a way that does not use large datasets, and as a result, there's not too much culture at the moment in the medical community to accept findings from such. So, the biggest challenge in my opinion is convincing doctors that the findings and the proposals out of this effort are in fact worth looking at and being utilized in the medical practice. And that's something which will need education and time.

Have you implemented any of your research projects in real systems?
Yes, quite a few! I have the following philosophy: If you believe you have something to say to the world, you'd better implement it yourself. Whenever I have a research idea that I feel has some significance, I start a company together with people who are similarly-minded. In this case, we have very recently started a company with a former student of mine, Allison O'Hair, a PhD graduate from MIT, called "Dynamic Ideas Health". The personalized diabetes management and diet system and the multidrug therapies in cancer are two of our recent projects. Another example is the company I started which is named "Benefits Science" and is looking at how to design healthcare benefits for employees of companies, how to use optimization to design the benefits in such a way that it is under-budget for the companies but also improve the quality of the offerings for employees.

Interview about the Role of Operations Research in Improving Healthcare – Today and Tomorrow! (continued)

So it sounds like currently there's a great amount of ongoing work and research exploring this area but what comes next? Where do you see healthcare analytics in 10 years?
My aspiration is to see aspects of analytics having greater impact on the medical profession. Ten years down the road: people who have been trained as doctors have also been trained in analytics; some of these findings that I and others have developed are being taught, so they know the key components of many of these methods and they themselves can actually use them, as users, to get insights from data. And I would not be surprised if there are classes in analytics in the medical curriculum for medical students. In addition, with analytics being a hot subject, my hope is that down the road, 10 years from now, we have focused analytics masters degrees; an analytics masters in medicine, an analytics masters in sports, an analytics masters in law, and so on. And I believe for the young readers of your magazine, this is a fantastic period for the field, unprecedented in my experience. I've been in this profession for 30 years, and I have never before had the feeling that this is a very growing field, where we can definitely affect healthcare; I'm convinced of it, but also believe we can affect many other fields as well. Of the young people who are being trained in analytics, I am envious.

"And I believe for the young readers of your magazine, this is a fantastic period for the field, unprecedented in my experience."

I'm sure a lot of students will be inspired by your thoughts and comments. If someone wants to pursue a career in analytics, which departments will be the best area to go?
I'm somewhat biased on this, because I have a long presence in operations research but I definitely believe for masters degrees, OR departments (sometimes called differently) systems engineering and so forth, are very good places. Some are also computer science degrees which have more of a machine-learning perspective. But my prediction is that in a few years is that there will be more and more masters degrees or PhDs in analytics, and the key thing that is missing at the moment in OR is that OR historically in the last 60 years and until today has primarily focused on models and decisions. Whereas analytics focuses on data, not just models and decisions. In other words, data is a very significant piece of the puzzle. It is my belief that the curriculums at many OR departments in the future, at the graduate program, even at the undergraduate level, will be very much in the direction of analytics, and it's definitely true at MIT, and I bet it's true at many other places as well. So I would say there will be even more opportunities for people in the future as well. And so just to give you an example if I may, we started an online class, we start it next semester for the first time, it's called "The Analytics Edge", and it is to illustrate at least my view of how we will be teaching in the future. So traditional courses typically start with the methodology; we teach linear optimization, simulation, etc. and the emphasis is on the methodology, and we give some examples at the end.

Interview about the Role of Operations Research in Improving Healthcare – Today and Tomorrow! (continued)

But the examples are a somewhat secondary aspect of the class. So this is a class that is different. We start with the data, the data is up front, and there's a real company that we try to focus on. So data, and the application is the center stage. By the way, we use various types of analytics, sometime we use regression and optimization, sometimes simulation, sometimes machine-learning, classification and so forth… So we teach the methods not as a principle finding, but we rather say here's the data, here's the application and we let them dictate what is needed. Because problems of practice do not come with labels.

"Because problems of practice do not come with labels."

Is this a graduate level course and is it only for MIT students?
It's actually an undergraduate course; but it's a class for everybody. It starts from applications to graduate-level methods. But because it's from first principles, it has a spectrum. So undergraduates can take it. It's an online course and it will be open to everyone, free of charge.

That's great! Is there anything else you would like to share with our readers, specifically the students?
I would like to share my philosophy on what type of problems is worth working on. This is exactly the philosophy that I try to communicate to my students at MIT. Suppose the student is completely successful in answering the questions we are trying to answer, that is we take ability aside. Does something change in the world? What do I mean by that… so if you're completely successful and you solved the problem; if it is a theoretical topic: will it affect what we teach in the 2nd year graduate year level courses? I note that if it affects what we teach in the 1st year graduate level courses this is a significant breakthrough. If the topic is more applied: would a company or the government use this in the foreseeable future? If the answer is no to these questions, and it often is, we should not be working on this problem. So these are my parting thoughts.

That's a very interesting perspective. And personally, as a PhD student I found it very fascinating.

Professor Bertsimas, thanks again for taking the time and doing the interview with OR/MS Tomorrow online magazine. I'm sure many of our readers will be inspired by your thoughts and opinions and will tremendously benefit from it. Thank you!
Of course, it's a pleasure.

Student Chapter Spotlight - The University of South Florida

The INFORMS student chapter at The University of South Florida (INFORMS@USF) was established in 2005 with the goal of educating USF students on topics in Operations Research and Management Science and exposing them to the rich opportunities that a career in industrial engineering can offer. Although our chapter is fairly young, it has been nationally recognized, having received the INFORMS Student Chapter Annual Award every year since 2009, with Cum Laude to Summa Cum Laude honors in the past three years. The chapter holds and coordinates many activities that benefit its members, the IMSE Department at USF, and the community at large.

INFORMS Lecture Series: Every year the chapter organizes approximately 12 INFORMS lecture series events. Eminent scholars or industry researchers are invited to visit the IMSE Department to share their experiences and views. A complete day visit includes a formal research presentation (open to all College of Engineering members), an informal lunch with chapter members to engage in a lively dialogue with a true leader in their field, and meetings with faculty members.

Community service: INFORMS@USF greatly values social engagements and takes advantage of any opportunity to get involved in community activities .Engineering Expoat USF is an activity designed to encourage K-12 students to pursue fields in science and engineering. In this year's EXPO, around 20,000 students were hosted. Exhibitions included computer simulation models and a lab dedicated to virtual manufacturing of medical devices. Another activity is the Project World Health, which is a student-run organization at USF College of Medicine that conducts a medical mission trip to provide medical services to an underserved population in the Dominican Republic every year. The chapter assisted the medical team in developing logistics that increased efficiency in the operations. The Great American Teach-In is another event carried out every year for all Hillsborough County public schools to encourage kids to study.

Chapter members also developed a layout design for Metropolitan Ministries Inc. to optimize donation, circulation and distribution processes in a tent used to supply food and toys to families, helping about 30,000 families in need in the Tampa Bay area. The chapter has supported summer camps, activity developed by students, teachers and resources in the sciences (STARS), providing volunteers and suggesting related activities. The chapter has also conducted various workshops in coordination with IIE(Institute of Industrial Engineers) organization on software packages (MATLAB, Minitab) for undergraduate students and others for graduate students on topics like writing skills.





Social events: The chapter starts the fall semester by holding a welcome party for new and senior students as well as faculty and their families in a close and friendly environment. In spring semester an International Potluck is held, where students cook and share their countries' food, culture and traditions. At the end of this semester an end-of-the-year event is also held with students, faculty and their families.

Media: The chapter has a semi-annual newsletter that highlights faculty, alumni and graduate students' research, A Facebook page informs members of important dates on the lecture series, social activities, conferences, and others; and a dedicated webpage on our department/university's website to obtain information on lecture series, social activities, and conferences.

Chapter Future: Future plans are focused on promoting interdisciplinary projects and expanding community activities through agreements with community service organizations in the Tampa Bay Region that have outreach programs, expanding connections with other INFORMS student chapters and developing a Workshop Series for undergraduate students in topics related to optimization and use of software such as GAMS, CPLEX and SAS.

ORMS Across the Globe - OR in South Africa

By: Kanshukan Rajaratnam, Department of Finance and Tax & The African Collaboration for Quantitative Finance and Risk Research, University of Cape Town, South Africa

In this piece, which will be the first in a series of articles on operations research in developing countries, we would like to highlight operations research (OR) in South Africa. OR has a long history in South Africa with initial application in the mining industry during the 1950's (Stewart, 1995). Since then, application of OR in South Africa has grown to encompass a wide range of application fields from supply chain and logistics to wine-making. (See Stewart, 1995; Ittmann et al, 2007 for more on the history of OR in South Africa.)

The Operations Research Society of South Africa (ORSSA) is a professional body for Operations Researchers and those engaged in OR-related matters in the country. It was formed in 1969 to promote OR in South Africa (Stewart, 1995). ORSSA is a national member of the International Federation of Operational Research Societies (IFORS) and the Association of European Operational Research Societies (EURO). In 2008, ORSSA hosted the IFORS Triennial conference in Sandton, South Africa, which was the first of such conferences to be held on the African continent. Since the early 1970's, the society has organized an annual conference to disseminate important research coming out of the country.

The 42nd annual conference of the ORSSA was held on September 15-18 in Stellenbosch, in the Western Cape province of South Africa, which is known as the wine-producing region of South Africa and is home to Stellenbosch University. The three day conference sponsored by FICO had over 70 papers presented, two plenary sessions, and a panel discussion on demand forecasting. For the past few years, peer-reviewed conference proceedings have been released within a few months after each conference. This has grown out of South Africa's research landscape, where the government provides subsidy funding to a university when its students or faculty publish a paper in an accredited journal or in conference proceedings: This has been instituted by the South African government in order to encourage research and research culture in the country.

An exciting feature of the annual conference is the award ceremony. The Tom Rozwadowskimedal is the Society's premier award for the best manuscript in OR by its members during the previous year. The winning paper this year was Stray, van Vuuren and Bezuidenhout (2012). The award for the best honours or fourth-year level study was awarded to R. Hagspihl of Stellenbosch University and the best masters level study award to R. Bennetto of University of the Witwatersrand.

ORMS Across the Globe - OR in South Africa (continued)

Members of the society also receive a newsletters and hardcopies of ORiON, which is the official journal of ORSSA and is published biannually. A special and inclusive feature of ORiON is that it accepts manuscripts in all eleven official languages of South Africa, but for all practical purposes only English papers are submitted and thus published. As with many established journals, ORiON follows a double-blind review process with at least two reviewers appointed to review each submitted manuscript. Further information on ORiON can be found here. I call upon readers to consider submitting their manuscripts to this journal.

Despite the various applications of OR showcased both through ORiON and the ORSSA conference, there has been little in the way of OR application in healthcare. OR is particularly needed in healthcare, given the government's policy to introduce national health insurance across the country, which requires high-level resource planning and policy input. An example of current research in this space is that of Shivani Ramjee of the Actuarial Science Department at the University of Cape Town. The aim of her research is to "provide a comprehensive overview of the South African hospital industry by describing the operational, competitive and regulatory environment of both public and private hospitals. This is part of a larger body of research on the evaluation and management of hospital efficiency in South Africa" (Shivani Ramjee, personal communication, September 18, 2013). Given the country's outdated infrastructure and limited resources, there is a strong need in South Africa for such similar research of OR application in healthcare given the country's outdated infrastructure and limited resources, (see Zachariah et al, 2009 for a discussion on OR in healthcare within low-income countries).

An exciting feature of the quantitative finance and risk landscape in South Africa is the formation of the African Collaboration for Quantitative Finance and Risk Research at the University of Cape Town. As an associate member, I see this research center as an avenue through which to encourage collaboration and interest in the application of OR in quantitative finance and risk research among students. See this website for more.

The author's personal view is that OR is thriving in South Africa. Given the range of presenters particularly students and emerging researchers at the ORSSA conference, the future for OR in the country looks promising. However, a greater exposure of OR to non-OR professionals will have multiple benefits for both the quality of research and quality of life in the country.

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Society Spotlight - Health Applications Society (HAS)

By Vedat Verter, INFORMS HAS President

The Health Applications Society (HAS) focuses on various facets of the healthcare sector, including policy design, process improvement and clinical decision-making. This is an active field of research in light of the current challenges across the globe and the sustained efforts of the policy makers and healthcare providers to improve the system. The aim of INFORMS HAS is to identify current and potential problems in healthcare and contribute to solving the problems; to lead in the development, dissemination, and implementation of knowledge, and to advance the research technologies on health applications.

"The Health Applications Society (HAS) focuses on various facets of the healthcare sector, including policy design, process improvement and clinical decision-making. This is an active field of research in light of the current challenges across the globe and the sustained efforts of the policy makers and healthcare providers to improve the system."

HAS sponsors a cluster of sessions at the INFORMS Annual, INFORMS International and INFORMS Healthcare meetings, where the society members have an opportunity to showcase their work and exchange research ideas. Also, HAS recognizes the best work in this field by the Pierskalla Award for the best paper in Operations Research and Healthcare Applications as well as the Bonder Scholarship for Applied Operations Research in Health Services. At INFORMS Healthcare 2013, HAS launched a student paper competition, which will become a regular feature of these bi-

Undergraduate Student Competition

The co-editors of INFORMS ORMS Tomorrow would like to invite undergraduates involved in research in OR to submit a synopsis of the work they are currently contributing to or have recently (within the last two semesters) contributed to. The best will be featured in a future edition of INFORMS ORMS Tomorrow. If interested, students should provide 1000-2000 words on the nature of the research and emphasize their contribution. All well written articles that indicate the significant contribution of the student will be included in upcoming issues.

Winner of the 2013 INFORMS/Organization Science Dissertation Proposal Competition

It is my pleasure to announce the results of this year's INFORMS/Organization Science Dissertation Proposal Competition. We received 69 proposals. Eight finalists were selected based on evaluations by three reviewers. This past weekend the eight finalists presented their dissertation proposals to a distinguished panel of judges at the INFORMS Annual Conference in Minneapolis, MN. All of the finalists did an outstanding job of presenting their proposals.

The **winner** of the 2013 INFORMS Dissertation Proposal Competition is:

Sujin Jang
Harvard Business School
Bringing Worlds Together: Cultural Brokerage in Multicultural Teams

The **runner-up** is:

Chad Murphy
Penn State University
Facing the Void: Identity and Legitimacy in Emerging Professions

If you know Sujin or Chad, or any of the other six finalists, please congratulate them for this significant accomplishment.
The other six finalists for the 2013 competition, listed in alphabetical order, were:

Jin-Hyun Bae, New York University
"The Impact of Institutional Differences on Immigrant Entrepreneurship"

Brad Fulton, Duke University
"Bridging and Bonding: How Social Diversity Influences Organizational Effectiveness"

Heeyon Kim, University of Michigan
Should Birds of a Feather Flock Together? Agglomeration by Nationality as a Constraint in International Expansion

KiYoung Lee, University of Minnesota
When and How Does Workplace Envy Promote Job Performance?
A Study on the Conditions and Mechanisms for the Functional Role of Envy at Workplace.

Matthew Lee, Harvard Business School
Mission and Markets? Organizational Hybridity in Social Ventures

Jean-Nicolas Reyt, Paris Dauphine University/NYU
Seeing the Forest for the Trees: A Construal Level Analysis of Employees' Mobile Technology Use

I would like to extend my sincere thanks to the panel of judges who evaluated all of the proposals. Each judge generously volunteered his
or her time and resources to attend the day-long competition in Minneapolis and provided the finalists with feedback on their dissertations. This year's panel of judges was:

Mary Benner, University of Minnesota
Joseph Broschak, University of Ariona
Ethan Burris, University of Texas at Austin
Don Conlon, Michigan State University
Karen Patterson, University of New Mexico
Jo-Ellen Pozner, University of California at Berkeley
David Souder, University of Connecticut
Libby Weber, University of California at Irvine
James Summers, Iowa State University (alternate)

Finally, I would like to offer my thanks to the close to one-hundred reviewers who volunteered their time in helping select the 8 finalists, and I would especially like to thank Dan Levinthal, Editor-in-Chief of Organization Science, Kathleen Luckey, Managing Editor of Organization Science and Tracy Cahall, for the tremendous amount of help and support they provided in managing the proposal review process.

Emily S. Block, PhD
Chair, INFORMS/Organization Science Dissertation Proposal Competition
Assistant Professor
Department of Managment
University of Notre Dame
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A Summary of Healthcare Conferences

Massachusetts in Amherst

Industrial engineering has been applied to health care systems since 1916 (Gilbreth, 1916). According to Linda Green in her M&SOM editorial, there has never been a more opportune time for operations research to provide guidelines on medical decision and to improve the health care delivery process (Green, 2012). With such growing importance, the number of conferences that are solely focused on healthcare applications are growing as well; INFORMS conferences has also experienced a dramatic increase in number of talks related to healthcare.

I was privileged to attend 2 conferences on healthcare applications over the summer. First, INFORMS Health care Conference in Chicago, USA and then the ORAHS (Operational Research Applied to Health Services) Conference in Istanbul, Turkey. They were both outstanding conferences, both in terms of the quality of work presented and social events as well.

INFORMS Healthcare conferences, designed by INFORMS Health Applications Society (HAS), started in Montreal in June 2011. Since then, it has become a biannual conference, with intriguing applications presented. There are three-day meetings on the health sector, with an objective of bringing health care researchers and stakeholders together to share information and insights that can improve the long-term efficiency, effectiveness and quality of health care delivery. It is a perfect mix of the deep research focus of a traditional INFORMS meeting with an emphasis on real-world application.

"These conferences have been a great opportunity to network and connect with both colleagues who are working on very interesting applications, ranging from clinical trials, HIV vaccination policies to radiation therapy, and healthcare professionals who emphasize the main problems that healthcare is facing."

Presentations span a wide range of problems including healthcare policy, clinical decision-making, global health, therapy and treatment delivery, public health and data-driven modeling. With presentations by researchers and practitioners from all around the world, the conference offered a cross-cultural view of health care systems. However, it was interesting to see that many countries were suffering from the same problems.

ORAHS on the other hand, has been continuing for a long time and it was formed in 1975. This group meets every summer for one week in in Europe. Meetings typically include study tours to local healthcare facilities that are arranged to discuss problems with local health services managers. In addition to being an intellectually stimulating group, ORAHS is also known for its well-developed social program that gives opportunities for informal discussions and friendly get-together with members.

These conferences have been a great opportunity to network and connect with both colleagues who are working on very interesting applications, ranging from clinical trials, HIV vaccination policies to radiation therapy, and healthcare professionals who emphasize the main problems that healthcare is facing. Health care OR is becoming recognized as an important part of OR research, with its own specialized journals and conferences.