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## FROM THE EDITOR

### *A EURO that's not in crisis ... and more!*

This issue covers the various events that took place at a special occasion in Vilnius, Lithuania last July. That occasion was the **25th conference of the EURO** – the regional grouping of European national societies within IFORS. The special silver anniversary celebration recounted the history of the organization - how it had grown and prospered, made real to the audience (and quite moving for me personally) with the presence of nearly all the past EURO Presidents. A report about the conference itself is also included here, along with an account of an IFORS first – the IFORS Tutorial Lecture series that was presented to a packed audience by **Erhan Erkut** during the conference.



EE talked about making OR a well-liked course. **Laura McLay** takes another tack and tells us how she has built interest among her students and others through her blogging about OR.

Meanwhile, another regional conference happened in Xi'an, China. Details of the APORS (regional grouping within the Asia Pacific) conference and its new leadership are covered here. You will also find reports of various conferences by our indefatigable IFORS correspondent **Willi Weber** who seems to be promoting OR at every conference!

Seeming to be everywhere too are earthquakes, floods, volcanic eruptions, tornadoes, tsunamis, wildfires, drought, and hurricanes that have happened in recent months. In their tutorial, **B. Vitoriano et. al.** share the technical side of disaster management and the potential role of OR in all these.

Meanwhile, the role of OR in organizations is showcased in our new feature, OR Impact. **Sue Merchant and John Ranyard** need your contributions in order achieve its aim to give everyone a feel for the outstanding results that OR has delivered to decision-makers all over the world.

In making decisions, are you a slow or a fast thinker? The case for not going with your gut, from the book Thinking, Fast and Slow, was featured just last September 11 in CNN's Amanpour <http://cnn.com/video/?/video/international/2012/09/11/amanpour-daniel-kahneman-politicians-decision-making.cnn>. Indeed, a timely choice for a book to review by our prodigious book reviewer, **Hans Ittman**.

IFORS activities in this issue covers the Summer School, which has a proven track record of contributing to the development and networking of Operations Researchers in the early stage of their careers. Good news about the IFORS publications IAOR and ITOR is shared by our new Chairperson of the Publications Committee, **Graham Rand**, who replaces **Hugh Bradley**. We take this opportunity to thank Hugh, who leaves the post after several years of involvement with various IFORS activities.

Don't you think that unlike the case of the currency, things are looking up for our own EURO and in fact, for our discipline?

- Elise del Rosario <[elise.del.rosario@stepforward.ph](mailto:elise.del.rosario@stepforward.ph)>



## A closer look at EURO

Elena Fernandez <e.fernandez@upc.edu> • • • • •



As you know, the “Association of European Operational Research Societies” (EURO for short), is one of the regional groupings of IFORS. Broadly speaking, it is an intermediate organization between the European national societies and IFORS that promotes communication and cooperation among European operational researchers. Formally constituted in March 1976, EURO now comprises some 30 national OR societies of countries located within or nearby (in a broad sense) Europe. Its president, M. Grazia Speranza, and president elect, Gerard Wäscher, work actively with the other members of the Executive Committee: VP1, Sally Braisford; VP2, José Fernando Oliveira; Secretary, Jesper Larsen; Permanent Treasurer (Marino Widmer); supported by the office manager, Sarah Fores, the website editor, Marie-France Rogge, and the webmaster, Bernard Fortz.

Owing to the enthusiasm and dedication of all the people that have been involved in its activities, EURO has become a well-established, highly active, association with various means for carrying out a wide range of activities in support of its objectives. These instruments include conferences, publications, working groups, various prizes, cooperation and educational programs. These are all available at the EURO website <http://www.euro-online.org/>. Below I highlight some of the most relevant ones.

EURO publishes several journals. The European Journal of Operational Research (EJOR) has for many years been the flagship and only journal of EURO, and it has become one of leading journals of the international OR community. EJOR is published by Elsevier ([www.elsevier.com/locate/eor](http://www.elsevier.com/locate/eor)) and its coordinating editor is Roman Slowinski. Recently, EURO launched three new specialized journals, namely: EURO Journal on Transportation and Logistics (EJTL), EURO Journal on Computational Optimization (EJCO), and EURO Journal on Decision Processes (EJDP). EJTL promotes the use of OR in the context of transportation and logistics. Its editor in chief is Michel Bierlaire, and some papers of the first issue are already accessible online at <http://www.springerlink.com/content/2192-4376>. EJCO is an effort to look at optimization models and solution techniques from a computational perspective. Its editor in chief is Martine Labb   and publication will commence in 2013. Manuscripts can be submitted through <https://www.editorialmanager.com/ejco/>. Also to be published in 2013, EJDP is envisioned to cover a range of theoretical, methodological, behavioural and organizational topics which contribute to the understanding and enhanced use of OR techniques in supporting different phases of decision making processes. Its editor in chief is Ahti Salo. Manuscripts can be submitted through <https://www.editorialmanager.com/ejco/>. Publisher of three journals is Springer.

One of the main activities of EURO is the EURO-k conference, which is broadly oriented and has recently attracted more than 2,000 participants. Intended to be forums for communication and cooperation among European operational researchers, these conferences also aim to attract the participation of a larger community of international researchers from the various OR areas and to serve as the venue for free exchange of ideas and results. EURO celebrated its 25th conference in Vilnius. EURO-k conferences are sometimes organized in cooperation with other associations such

as INFORMS, e.g., the 26th EURO Conference in Rome (Italy), will be a joint EURO/INFORMS International meeting, and will take place in July 1-4, 2013 (<http://euro2013.org>). A EURO-k conference is held every year, except on the years of IFORS triennial conferences. EURO-k conferences are complemented by EURO Mini Conferences, which assemble a limited number of specialists around a specific theme, and by EURO peripatetic conferences (ORP3), which provide a forum for promoting scientific and social exchanges between the members of the future generation of OR in academic research.

Along its principal objective of OR education and training in Europe, several initiatives have been launched. One which aims to help promote OR branding is the “24 Hours Operations Research” program (<http://www.24hor.org/>), which presents a collection of OR problems faced in everyday life with the appropriate solution approaches. It could safely be said that one initiative that has the most impact on future generations of OR people is the EURO Summer and Winter Institute (ESWI). Launched in 1984 at the initiative of J.P. Brans, each

**Owing to the enthusiasm and dedication of all the people that have been involved in its activities, EURO has become a well-established, highly active association with various means for carrying out a wide range of activities in support of its objectives.**

ESWI focuses on a particular theme and gathers together for about 10 days 20 early-stage researchers who present their material, discuss with peers and learn from invited senior experts in the field.

ESWIs are a good example of the collaboration between EURO and IFORS. Believing that OR professionals in the early stage of their careers should be supported, these organizations jointly fund researchers so that they can join in such activities.

I am honored to be the VP of IFORS representing EURO and extremely happy for the opportunity to get to know these two organizations in depth and, in particular, all the dedicated people that make them up. This knowledge enables and inspires me to do well in my task of facilitating communication and activities between the two organizations.

As its Program Chair, I take this opportunity to invite you to the upcoming IFORS Conference in Barcelona (Spain), July 13-18, 2014. Barcelona is a dynamic, open, and inviting city, which displays the characteristics of major Mediterranean cities and inherits a millenarian tradition in science, art and commerce. On behalf of IFORS, I invite you to learn, enjoy, and be part of the great IFORS community by participating in IFORS 2014. Please visit the webpage <http://ifors2014.org/> and plan to organize a session, give a talk and experience Barcelona! 



# An Alternative OR/MS Education – Starting by an Understanding of Enterprises

Heiner Müller-Merbach <hmm@bior.de>

OR/MS curriculae (and textbooks) are quite different in content and structure. Almost 50 years ago, I spent a Post Doc year at the Operations Research Center, chaired by George B. Dantzig, University of California, Berkeley. A friend of mine, Hansjörg Weitbrecht, a social scientist, spent the same year with C. West Churchman at the same University but in a different department. Their OR/MS programs were quite different (Müller-Merbach 2012).

## What is OR/MS?

What is *Operations Research (OR)*, what is *Management Science (MS)*? In many publications, OR and MS are considered as identical, and they are referred to as OR/MS. Consequently, the "*Operations Research Society of America*" (ORSA), founded in 1952, and "*The Institute of Management Sciences*" (TIMS), founded in 1953, were merged into "*The Institute of Operations Research and the Management Sciences*" (INFORMS) in 1995.

Anyhow, there exist two groups of different understanding (and orientation) of OR/MS within the international OR/MS community (Müller-Merbach 2007). The first one shall hereafter be referred to as "systems orientation" (S), and the second, "mathematics orientation" (M). The S orientation is based upon a familiarity with the system under study. In most cases, they are "man-machine systems", such as an enterprise or any other organization, or parts of them. The M orientation, however, is based upon a familiarity with mathematics, i.e. models and algorithms. Both orientations of OR/MS are represented by INFORMS and by the more than 40 other national societies of OR/MS, jointly represented by the "*International Federation of Operational Research Societies*" (IFORS), founded in 1959, a kind of umbrella of the national OR/MS societies. The new book "Profiles in Operations Research" by Assad and Gass (2011) is a collection of 43 pioneers and innovators in OR/MS. About half of them could be characterized by the S orientation, the others by the M orientation.

## The S orientation of OR/MS

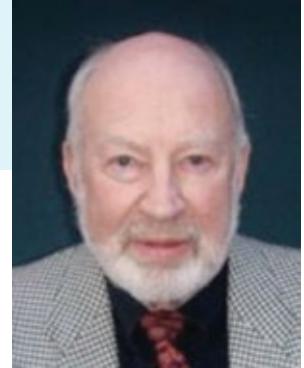
The systems orientation of OR/MS was explicitly emphasized by the Education Committee of ORSA: "Operations Research is concerned with scientifically deciding how to best design and operate man-machine systems, usually under conditions requiring the allocation of scarce resources" (ORSA, ca. 1977, p. 1).

Way back in 1948, Sir Charles Goodeve (1904-1980), a British pioneer of OR, suggested the formulation: "Operational Research is a scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control" (Gass, Assad 2005, p. 66).

The books, written in an S orientation, refer more directly to the enterprise and its functions. It begins with the titles, such as: "Planning Production, Inventories, and Work Force" by Holt, Modigliani, Muth, and Simon (1960). The content of the book has an enterprise orientation: A – Overview for Managers; B – Decision Rules for Planning Aggregate Production and Work Force; C – Order, Shipment, Production and Purchase of Individual Products; D – Design of Decision Systems; E – Generalization of Decision Methods.

## The M orientation of OR/MS

Quite different are the definitions of OR/MS by representatives of the M orientation.



Carter and Price begin their OR book (2001) with: "Operations Research can be defined as the use of quantitative methods to assist analysts and decisions-makers in designing, analyzing, and improving the performance or operation of systems" (p. 1).

The emphasis on mathematics, i.e. models, techniques, algorithms, is obvious from the content of the book: 1 – Introduction to OR; 2 – Linear Programming; 3 – Network Analysis; 4 – Integer Programming; 5 – Nonlinear Optimization; 6 – Markov Processes; 7 – Queuing Models; 8 – Simulation; 9 – Decision Analysis; 10 – Heuristic Techniques for Optimization; and an appendix "Review of Essential Mathematics" (vectors, matrices, linear equations etc.).

There exist two groups of understanding of OR/MS in the international community - one that is based upon a familiarity with the system under study and the other, based upon a familiarity with mathematics, models and algorithms.

Similar is the M orientation in the book "An Introduction to Management Science" (200812) by Anderson, Sweeney, Williams, and Martin. It begins with: "Management science, an approach to decision making based on the scientific method, makes extensive use of quantitative analysis" (p. 2).

Again, the content is M oriented: 1 – Introduction; 2 to 7 – Linear Programming; 8 – Integer Linear Programming; 9 – Network Models; 10 – Project Scheduling: PERT/CPM; 11 – Inventory Models; 12 – Waiting Line Models; 13 – Simulation; 14 – Decision Analysis; 15 – Multicriteria Decisions; 16 – Forecasting; 17 – Markov Processes; 18 – Dynamic Programming.

Save for "Inventory Models" (Chapter 11) none of the chapter headings refers to any characteristic term of business administration or of a function of the enterprise, such as procurement, production, sales, marketing, investment, finance, personnel leadership and organization, information management, or accounting.

## The Essentials of OR/MS

What, then, are the essentials of OR/MS? Is it predominantly mathematics, quantitative (mathematical) analysis, optimization, and algorithms? Or is it problem solving, decision making, design and operation of man-machine systems, based on an understanding of the enterprise?

The ORSA definition (above) does not at all emphasize mathematics, not even "quantitative methods". Rather, it emphasizes "scientifically deciding". And this orientation emphasizes the scientific approach, and this means interdisciplinarity, i.e. picking from any science which seems to be useful – mathematics included.

Students who are chiefly trained in mathematical models and algorithms, will certainly create a specific holistic understanding of OR/MS in their brains, consisting of such mathematical tools.



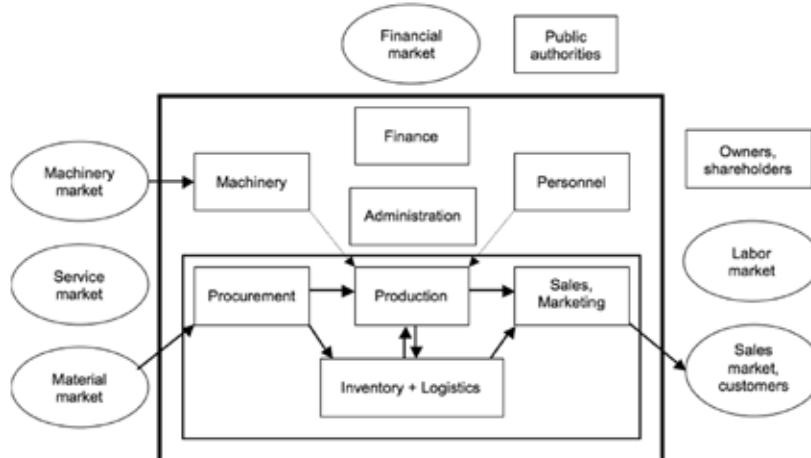
They will not, however, create a holistic understanding of enterprises which would require a systems orientation during their course of study.

### An Alternative Approach to OR/MS Education

The systems orientation of the OR/MS education would follow the structure of an enterprise (or any other man-machine system). It could start from a conceptual model of the enterprise (Figure 1) and then follow

- either the (dynamic) material flow, money flow, information flow etc. through an enterprise
- or the (more static) structure of the different functions, such as procurement, production, sales, finance etc.,
- or a combination of the dynamic and the static approach.

Taking this approach, at each function or at each process, respectively, the quantitative relations and the decision problems can be considered – including the appropriate mathematical models and algorithms, such as bill-of-material-processing, production scheduling, inventory control, product distribution etc. It is a matter of preference whether the mathematical tools (like linear programming, simulation etc.) are being discussed in connection with the emergence of corresponding



**Figure 1:** Conceptual model of the enterprise, embedded in a system of markets.

The arrows represent the material flow, the dotted arrows represent the usage of machinery and personnel for any processes. Another set of arrows could represent the financial flow, the information flow etc. (Müller-Merbach 2004, p. 22)

problems or in a separate sequence of tool-oriented lectures.

Students of such an approach would develop a holistic understanding of enterprises and their functions and processes (including links to the appropriate mathematical tools).

However, at the time being, there seems to be a lack of OR/MS textbooks following this path. 

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## FEATURE



### Beneath and Beyond Blogging for OR

Laura McLay <lamclay@vcu.edu>

I created my blog (*Punk Rock Operations Research* <http://punkrockOR.wordpress.com>) in April 2007 during my first year as a professor. In more than five years, I wrote more than 400 posts with the blog receiving more than 144,000 hits. Blogging has been an adventure, and in this article, I describe this journey. I start with my motivation for starting a

blog, describe my writing process, and continue with observations of being a blogging academic. I conclude with an advice for those who are interested in operations research blogging and end with thoughts on the future of OR blogging.

#### Maintaining a blog

Blogging about the successful application of operations research methodologies is great for evangelization. I feel strongly about making the world a better place through operations research, and this inspired my blog's name of Punk Rock Operations Research. Punk rock has a history of social awareness and instigating social change, and this sets the tone for what I blog about. I tend to blog about current events and sports, which are often the easiest topics since I think about them daily and from which I sometimes get inspiration. My most read topics, however, include my posts on vampires, zombies, and werewolves - as they relate to operations research, of course!

blog, describe my writing process, and continue with observations of being a blogging academic. I conclude with an advice for those who are interested in operations research blogging and end with thoughts on the future of OR blogging.

#### Why I began a blog

In October 2006, Mike Trick gave the keynote at the INFORMS combined colloquium dinner at the INFORMS Annual Meeting in Pittsburgh, where he encouraged everyone in the room—which was almost entirely filled with PhD students—to start an OR blog. I toyed with the idea of starting an OR blog since starting my first academic appointment two months earlier, but I was hesitant about starting a blog at the same time as my tenure clock. At this time, INFORMS had started its Science of Better campaign, when it asked its members to spread the word about operations research. An OR blog seemed like a nice contribution along this line.



Starting a blog is easy; maintaining one is difficult. The OR blogosphere is littered with abandoned blogs. My blog is thriving, and every year that passes is my blog's most read year. When I started my blog, I made the conscious effort to only write my blog for myself with the logic that if I did not like to read my blog, no one else would. I have found that it takes an average of two posts a week to keep readers interested. I do not quite hit that target, as I am often busy with many other professional responsibilities. I try to find time for it though because I truly enjoy it, and over time, have learned a few tricks for making frequent blogging sustainable. One trick is to multitask when possible by writing blog posts when I attend talks or seminars. Another is to write posts that involve systems thinking instead of equations, and OR insight instead of math programs. Occasionally, there would be exceptions, such as one post that develops a probability model for analyzing how many state license trips one would expect to see on a road trip. Ultimately, the more frequently I blog, the quicker I can post my next blog since I am in "blogging mode."

If I cannot find the time to research a blog post topic, I use my blog to start a conversation. Posts do not necessarily need to be complete standalone articles; rather, they can ask readers questions (e.g., *Why are ice cream trucks numerous when gas exceeds \$4 per gallon? What is the conditional probability of being struck by lightning?*). The comments to my posts are often better than the posts themselves. At almost every conference I attend, blog readers introduce themselves to me. The social aspect of blogging is quite rewarding, as I have gotten to know several colleagues through blog commenting.

I have had two children during my blog's existence—I have three daughters in total—and I am sometimes self-conscious about publicly discussing my ability to balance my personal and professional spheres. When I started my blog, I did not consciously decide to blog about motherhood and balance, but after I had my first baby as a blogger, it became important for me to blog about the issues that I face as a professional mother. Blogging is a fantastic medium for this. It has been reaffirming to receive such positive feedback from blog readers about my roles as a serious operations researcher, a wife and a mother. In this regard, having a blog has helped me to be more comfortable in my (professional) skin. I am genuinely touched that men frequently comment on these posts and send me articles about women in science, engineering, and technology (STEM) fields. Blogging leads to many enjoyable surprises.

### Blogging as an academic

I am frequently asked about how I found time for blogging before tenure. I try to limit blogging to the evenings or to a time when I need a mental break, so that blogging does not take away from productive time. I take advantage of blogging about teaching activities, since the time needed to write a blog post is usually less than the amount of teaching preparation time. Certainly, blogging can be a chore, like I when I feel pressure to write a post about something in the news before another topic grabs the headlines.

Writing blog posts has made me a better teacher and research proposal writer. In a blog post, I must explain or discuss a topic that is accessible to a wide range of people. I need this skill every time I prepare a proposal and step in front of a classroom. I now use past blog posts in the classroom to highlight the applicability of the topics in class. Even my silly examples (such as how to optimally prepare for a zombie outbreak or why celebrity deaths occur in threes) make rather abstract topics more tangible. Discussions in class sometimes motivate new blog posts. In answer to a question raised in class about Benford's Law, I posted the answer in a blog and went through



it in class. The students were delighted to see me follow through so thoroughly.

Blogging has made me better known among my peers, but blogs are neither necessary nor sufficient for tenure. My blog was not the highlight of any of my tenure letters, though many OR bloggers wrote tenure letters on my behalf. There are two reasons for this. First, tenure is usually granted for having a national research reputation, and it is hard to argue that blogging counts as research. Blog comments may count as "peer review," but the academic community has not accepted blog comments as part of the traditional peer review process that "count" towards promotion and tenure. As such, even after blogging for more than five years, I am not sure where I should include my blog in my curriculum vitae. I add it to teaching and professional service. I suspect that those who make tenure decisions are likewise conflicted about where this fits in. Second, people who read blogs are generally much younger than the people who write tenure letters, who are usually full professors. So while many operations researchers have heard of me via my blog, this is less true for the potential tenure letter writers.

I am often disheartened by the state of scientific literacy in the US, where a recent op-ed in the New York Times argued for universities to abolish the algebra requirement for incoming students and where politicians often cite federal grants for conducting basic scientific research as a symptom of government waste.

### Advice to would-be bloggers

Starting a blog takes about five minutes. Maintaining a blog is a long-term commitment. My first recommendation to potential bloggers is to start by microblogging on twitter to interact with our OR peers (search for the OR hashtag #orms to get started). Twitter, in my opinion, is the new water cooler. Moreover, twitter is the first step for successful blogging, since new blogs are best promoted via twitter.

Serious thought should be put into figuring out if a blog will be sustainable, i.e., at least one post a month. It takes time to attract readers – my blog received more than 61,000 hits in the past year, a tenfold increase since its first year. As a result, my blog posts today have a larger impact than they did when I started.

Many universities and employers have a tool for starting a blog on the university's domain. This is how I started my blog. I recommend against doing this for several reasons. First, if you ever leave your place of work, you will want to take your blog with you. Second, university/employer blogs likely have fewer bells and whistles. Being able to customize a blog with the tool *du jour* can be an important part of customizing your blog. I have been happy using Wordpress, which has been consistently rated as one of the best blogging sites online. My blogging colleagues have also recommended Blogger, Livejournal, and Edublogs.

Bloggers love to receive feedback via blog comments and tweets. For me, the best part of having a blog is getting to know my readers and colleagues better. Every email from a reader is a delight. I hope that everyone who reads this starts to read the many excellent OR blogs if they are not already doing so.



## Final comments

Blogging has been a very rewarding journey. While our fame (notoriety?) has passed—ABC News named Bloggers the 2004 People of the Year—blogging is still relevant and important. Blogs continue to be relevant despite being somewhat displaced by the massive rise of microblogging. Blogging provides content that cannot be conveyed in a 140-character tweet or short FaceBook post. Certainly YouTube videos, podcasts, and slidecasts also provide content that rival those in a blog post. However, it is simple to embed youtube videos in a blog post while the reverse is not. Blogs continue to be the best medium for a non-journalist to convey information in different formats accessible in the same place. I have been on several scientific blogging and social networking panels, and they have all confirmed the importance of blogs over other social networking tools.

People stumble across OR blogs for many reasons, and often they stick around. Reaching out to these readers is a tremendous opportunity to improve scientific literacy in the general public. I

am often disheartened by the state of scientific literacy in the US, where a recent op-ed in the New York Times argued for universities to abolish the algebra requirement for incoming students and where politicians often cite federal grants for conducting basic scientific research as a symptom of government waste. We need to continue to make operations research known to those who can benefit from the use of advanced analytics for making better decisions. OR blogging is important for making the case to increase competence in mathematics, as it is important for letting people know about OR.

(If this topic interests you, attend the social networking session at the INFORMS Annual Meeting, on October 15, 2012.) 

## Citations

[1] A. Hacker. Is algebra necessary? New York Times, 28 July 2012.

[2] <http://punkrockOR.wordpress.com> Please use the search bar on the blog to find the posts mentioned in this blog. The posts about teaching best practices are in the category entitled "Teaching with technology."

## First IFORS Tutorial Lecturer Shows the Way to an SRO OR class

Elise del Rosario <elise.del.rosario@stepforward.ph>



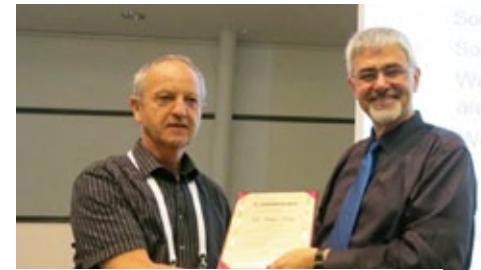
OR educators may, at first glance, think that making OR the "Most Liked Course in the Curriculum" is a tall order. Erhan Erkut (erhan.erkut@ozyegin.edu.tr), in his tutorial lecture delivered during the EURO XXV in Vilnius on July 9, 2012, did not say it was easy, but possible.

EE, as he is fondly called, starts by saying that, "As OR teachers, we may have exceptional training in analytical thinking and quantitative analysis, but many of us lack formal training in teaching and in the tools necessary for strategic planning, brand creation, and reputation management."

...he recommends a winning recipe for a successful OR curriculum that includes such ingredients as spreadsheets, real-time modeling ("slow learning"), course management systems, web tools, on-line communication, large classes, labs, student assistants, videos, guest speakers, on-line exams, and group projects

He suggests that a starting point towards improvement is to know oneself and suggests the SWOT analysis for this; know the audience through surveys and focus groups; know the resources (books, journals, webs, persons), and expect a lot of trial and error. As to errors, he advises teachers should not assume that students: are interested and motivated; have good quantitative background; can generalize, specialize, analyze, synthesize and apply. Moreover, teachers should not assume that they know all about teaching.

Drawing from his experience at the University of Alberta where along with colleagues, he experimented with various methods and tools over two decades, he recommends a winning recipe for a successful OR curriculum that includes such ingredients as spreadsheets, real-time modeling ("slow learning"), course management systems, web tools, on-line communication, large classes, labs, student assistants, videos, guest speakers, on-line exams, and group projects; all delivered with a heavy emphasis on applications, and with a student-



▲ IFORS President Dominique de Werra hands ITL certificate to Erhan Erkut, inaugural speaker of the IFORS Tutorial Lecture program.

centered pedagogical approach.

Along the way, these experiments brought up problems and he relates attempts at solving them as well as solutions that worked and those that did not. In the end, the results were very positive; the reputation of the introductory course became "most useful"; many of the best students took the electives, all members of the team won teaching awards, and through collaboration with industry, were able to establish a know-how transfer unit called Centre for Excellence in Operations.

EE then winds up with the 20 technology skills every educator must have. For more of his presentation, go to [http://ifors.org/wiki/index.php?title=How\\_to\\_Make\\_OR\\_the\\_Most\\_Liked\\_Course\\_in\\_the\\_Curriculum%3F](http://ifors.org/wiki/index.php?title=How_to_Make_OR_the_Most_Liked_Course_in_the_Curriculum%3F), available at the **IFORS Online Education Resources**\*. After all, the dream of having standing room only OR sessions has proven to be achievable!

Erhan Erkut is the first recipient of the IFORS Tutorial Lecture (ITL) award. The ITL is intended to encourage new research in emerging areas of Operations Research or to highlight new teaching technologies and approaches. The tutorials, given by outstanding scholars, aim to present the fundamentals of emerging OR technologies, application areas or teaching approaches to a large diverse audience. The tutorials are geared toward non-specialists, with the goal of inspiring and raising interest in pursuing these new ideas. The ITL speaker is chosen based on his or her knowledge of the sub-field and presentation abilities. IFORS supports a Tutorial Lecture at meetings of its regional groupings. 

\*Everyone is invited to visit the Online Education Resources <http://educationresources.ifors.org/> for a comprehensive listing of links to teaching materials classified into Lectures, Books, Videos, Slideshows, Online Resources, and Software. You are also welcome to submit to the webmaster your links and materials for uploading.



# Cutting and Packing Transactions Over Port Wine

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With the aim of bringing young researchers together with academic experts in a specific OR field, the EURO Summer Institute on Cutting and Packing (ESI-CP) was held in Porto from July 16 to 29. Also known as Oporto (in English), the second-largest city in northwest Portugal on the Douro river estuary was home for 14 participants from different countries for two weeks.

These 14 PhD students (or those with less than two years of research experience since attaining PhD) were guided throughout by the organizers composed of Professor Dr: António Miguel Gomes, Gerhard Wäscher, José Fernando Oliveira and Maria Antónia Carravilla, who put together an excellent scientific and cultural program. Profs. Wäscher, José Valério de Carvalho, Julia Bennell and Ramón Alvarez-Valdes completed the scientific committee.

The ESI-CP took place at a former seminary, Seminário de Vilar, with a daily agenda that consisted of experts' presentations and tutorials in the morning followed by an afternoon presentation of participants. Each of the invited speakers – well-recognized experts in cutting and packing – gave a tutorial on topics that are very current in the scientific community. Each afternoon, two participants presented their work, with each one allowed 45 minutes for the presentation and 45 minutes for discussions. Between sections and talks were coffee breaks when scientific discussions continued.

Prior to acceptance into the program, each participant was required to submit one unpublished high-quality paper for presentation. All the papers of the accepted applicants were made available to the others. The papers were double reviewed during the ESI-CP: during the discussion after the talk; and in a separate review by an expert and another participant. (The authors' papers were also made the basis for their selection as the IFORS EURO Scholars.)

The format of expert and participant presentations and interactions made the scientific program unique, interesting, and helpful for the ongoing research of all participants. Basics of metaheuristics, (e.g. tabu search, simulated annealing, variable neighborhood search, GRASP, genetic algorithms, and also some variants of construction algorithms) which are successfully applied in cutting and packing, were addressed in different talks. Another lecture was devoted to the classical 1D cutting stock problem, its Danzig-Wolfe decomposition, and arc flow formulation. Column generation method and branch-and-price algorithm together with different branching rules were discussed at a lecture and tutorial. A deep survey and interesting ideas of exact methods for the 2D strip packing problem were presented at another lecture together with branching strategies, dominance and symmetry of solutions, dual feasible lower bounds, relaxations,

and basics of branch-and-cut method. An improved typology of cutting and packing problems was presented. Also taken up was an introduction to constraint programming methods applied to cutting and packing, accompanied by a demonstration of the constraint propagation procedure during the tutorial. Participants gained a lot from the tutorial on algorithms and issues of the geometry in nesting. Appropriately, the ESI-CP ended with a very interesting and general talk on the integration of cutting and packing with other problems.

A memorable social program accompanied this extensive scientific program. The bus and walking city tour through the new and old parts of town continued onto the next day with the visit to one of the oldest Port wine cellars of the Burmeister family. After being shown the stages of preparing the best Port wine in the world, participants enjoyed wine tasting – while continuing discussions on cutting and packing! A full day boat trip in Douro valley gave the opportunity to enjoy relaxing conversations amid the grape fields. Given the chance to choose their activities in one of the days, some participants opted for Guimarães, the neighboring city and Portugal's European capital of culture in 2012 while others went to the beach to take surfing lessons.



▲ Participants learn cutting and packing from each other and the experts while enjoying Porto.

Participants also found it advantageous that they all received a copy of everyone's papers in advance. This allowed for better preparation for the discussion portion.

At the end of the two weeks, participants could not believe it was time to say goodbye. Nonetheless, communications among them – sharing ideas, scientific discussions and friendly personal messages continue, something that the organizers hope will be maintained and help enrich their professional and personal lives.

The authors are very grateful to: the members of the organizing and scientific committees of the ESI-CP and the institutions that supported the event, namely, the ESICUP, EURO, APDIO, INESC-TEC, FEUP and OVGU. For the bursaries and for the opportunity to attend such a unique event, the authors wish to express their gratitude to IFORS and EURO. 

\***Marat** (from the Department of Numerical Mathematics, Dresden University of Technology) and **Leonardo** (Department of Production Engineering, Federal University of São Carlos) are the two IFORS EURO Scholars sent to the EURO Summer Institute on Cutting and Packing.



## After 20 Years APORS Revisits China

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The Operations Research Society of China (ORSC) welcomed APORS meeting participants for the second time after the APORS1991Beijing meeting. Participants from member countries Hong Kong, China, Iran, Japan, Malaysia, Nepal, Philippines, Singapore, and South Korea as well as those from the United States, United Kingdom, Germany and Poland converged in Xi'an last July 28 to 30.

APORS President Prof. Yaxiang Yuan read out the greetings from German OR Society's Dr. Stefan Pickl as well as from Nepal OR Prof. Sunity Shrestha Hada. IFORS VP Prof. Xiang-Sun Zhang welcomed the participants and introduced IFORS and its newest program, the IFORS Tutorial Lecture (ITL). For the APORS meeting, the ITL was delivered by Prof. Xiuli Chao from the University of Michigan. APORS member countries, namely, the Philippines, China, Hong Kong, Japan, Nepal, and Iran presented their national contributions during the plenary sessions.



▲ IFORS VP Xiang-Sun Zhang awards the ITL plaque to Prof. Xiuli Chao.

Papers presented during the parallel sessions covered a wide range of topics including mathematical programming, simulation and scheduling, capacity planning, inventory, location, optimization, manufacturing, and finance.

Apart from actively participating in the academic presentations and discussions, participants had ample opportunity to enjoy various Chinese food, music and dance performances. Notwithstanding the hot weather that prevailed in the three days of the conference, everyone was impressed with the academic and social program, the latter featuring a visit to the world famous Terra Cotta Museum on July 30.

The council meeting held during the conference accepted the proposal of the Malaysian OR Society (MSORSM) to host the next APORS meeting in August 2015 at Kuching, Sarawak, Malaysia. Apart from taking up the APORS website and journal, the Council elected Ilias Mamat, MSORSM president and organizing committee chair of the next APORS conference as APORS president for the term 2013-2015. His team will include: Sunity Shrestha, president of ORSN, as APORS vice president, Chang Won Lee, KORMS representative, as APORS secretary, and Francis Miranda, president of ORSP, as APORS treasurer. The council meeting appointed Prof. Yaxiang Yuan, the current APORS president, as the next term IFORS VP for APORS.

The success of the conference owes much to the support of the host and organizer, ORSC. Special thanks are due to IFORS for its continuous support of APORS activities, and to the Natural Science Foundation of China and Chinese Academy of Sciences, which sponsored the event. 



▲ Members of the APORS Council: (seated, left to right): Tan Kok Choon (Singapore), Sunity Shrestha Hada (Nepal), Yaxiang Yuan (China), Tatsuo Oyama (Japan), Nezam Mahdavi-Amiri (Iran); (seated, left to right): Degang Liu (China), Xiaodong Hu (China), Francis Miranda (Philippines), Lee Lai Soon (Malaysia), Jinwu Park (South Korea), Xiaojun Chen (Hong Kong), Chang Won Lee (South Korea).

## EURO 2012 Highlights Role of OR in “Connecting Sciences”

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▲ Classic and elegant design for the conference abstract book and badge.

Focusing on the multi-disciplinary nature of operations research, the 25th European Conference on Operational Research (<http://www.euro-2012.lt/welcome>) was a worldwide event that gathered more than 1,910 presenters and over 2,100 participants from 68 countries. The conference was held in the center of Vilnius at five closely located venues: Radisson Hotel Lietuva, Cooperation College, Best Western Hotel, Holiday Inn Hotel, and the Lithuanian National Opera and Ballet Theatre. From the start, it was evident that the conference theme *OR Connecting Sciences* played a central role in planning the scientific program and activities, which encouraged cross-disciplinary dialogue and international cooperation.

The rich high-quality academic program included three plenaries, twelve keynote and tutorial lectures, as well as presentations by award winners, award candidates, invited and contributing speakers.



▲ EURO President Grazia opens the Conference

A versatile social program (<http://www.euro-2012.lt/social-program>) and tours both in Vilnius and its surroundings (<http://www.euro-2012.lt/Excursions>) offered the participants a unique opportunity to immerse in history, culture and traditions of this young Baltic nation at the cross-roads of Western and Eastern Europe.

The **Conference Topics** were combined in **26 Main Areas** with **153** streams and **524** parallel invited and contributed sessions. The scientific program included the following **Main Areas**:

Continuous Optimization, Control Theory & System Dynamics, Data Mining, Knowledge Discovery and Artificial Intelligence, DEA and Performance Measurement, Decision Analysis, Decision Support Systems, Discrete Optimization, Geometry & Graphs, Emerging Applications of OR, Energy, Environment and Climate, Financial Modelling & Risk Management, Fuzzy Systems and Soft Computing, Game Theory, Mathematical Economics, Location Analysis, Logistics, Transportation, Traffic, Metaheuristics, Multiple Criteria Decision Making and Optimization, OR Education, History, Ethics, OR in Health & Life Sciences, OR in Industry and Software for OR, OR in Natural Resources, OR for Development and Developing Countries, Production Management & Supply Chain Management, Revenue Management & Managerial Accounting, Scheduling, Time Tabling & Project Management, Simulation & Stochastic Programming and Modelling, Soft OR and Problem Structuring Methods, and Telecommunication & Networks.

The following three Plenary Sessions complemented the parallel sessions:

- Finn Kydland (University of California, Santa Barbara, USA; the 2004 Nobel Laureate in Economic Sciences): "Dynamic Programming and Economics",
- Hans-Jürgen Zimmermann (RWTH Aachen, Germany; EURO Gold Medal 1985, the Kaufmann Prize 1997, the Fuzzy Pioneers Award 2011): "40 Years of EURO: History, Applications, Future Potentials", and
- the **IFORS Distinguished Lecture** Ralph E. Gomory (New York University, USA; the Lanchester Prize 1963, the John von Neumann Theory Prize 1984, the National Medal of Science (USA) 1988, the IFORS Hall of Fame 2005): "Forty Years of Corner Polyhedra".

How OR connects the sciences became even more apparent in the keynote and tutorial sessions by: Ignacio Grossmann on "Challenges in the Application of Mathematical Programming

in the Enterprise-wide Optimization of Process Industries"; Erhan Erkut (IFORS Invited Tutorial Speaker) on "How to Make OR the Most Liked Course in the Curriculum"; Ceyda Oguz on "Computational Biology and Operations Research", Kenneth Sørensen on "Metaheuristics – the Metaphor Exposed"; Anita Schöbel on "Lines, Timetables, Delays: Models and Trends in Optimization of Public Transport"; Guy Desaulniers on "20 Years of Column Generation for the Vehicle Routing Problem with Time Windows"; Bjorn Nybo Jorgensen on "Accounting"; Jitka Dupakova on "Stochastic Programming – a Flexible Tool for Decision Making under Uncertainty"; Boris Polyak on "Robust Eigenvector Problem and its Application to PageRank"; Matteo Fischetti "On the Role of Randomness in Exact Tree Search Methods"; Jonathan Caulkins, "Providing a Scientific Basis for Managing Illegal Drugs & Markets"; and Karla Hoffman on "Auctions: Why are They Proliferating and What You Need to Know to Participate".

The *Opening Session* at the Lithuanian Opera and Ballet Theatre featured the Lithuanian Minister of Education and Science *Gintaras Steponavičius*, who thanked the organizers for choosing Vilnius as the conference site, and for the motivation this conference brings for young people to study natural sciences, having met the international experts of Operations Research.



▲ IFORS President Dominique accepts the EURO Distinguished Service Award.

At this same session, IFORS President *Dominique de Werra*, École Polytechnique Fédérale de Lausanne (EPFL) was declared the winner of the *EURO Distinguished Service Award* in recognition of his valuable long-term contribution to the profession and the European operations research community. Following this, *Boris Polyak* of the Moscow Institute for Physics and Engineering, Head of Y. Z. Tsyplkin Laboratory at the Institute for Control Science of the Russian Academy of Sciences was proclaimed winner of the *EURO Gold Medal* – the most important scientific distinction of EURO. His plenary presentation traced his academic path in conjunction with important contributions of the Soviet and Russian schools. He expressed gratitude to his teachers and colleagues and a hope that the Russian school will maintain its role in the development of Operations Research in the future.



▲ The Lithuanian Opera and Ballet Theater was a perfect venue to bring all the participants together for the special events.

The Committee of the *EURO Excellence in Practice Award*, *EEPA 2012*, short-listed the six high-quality versatile nominees who presented their work in the specialized award stream:



Felipe Caro and Jérémie Gallien (UCLA Anderson School of Management, USA): "Clearance Pricing Optimization at Zara"; Stephan Westphal (University of Göttingen, Germany): "Scheduling the German Basketball League"; Thierry Benoit, Frédéric Gardi, and Antoine Jeanjean (Bouygues SA, France): "Optimization of advertisement revenue for the French TV group TF1"; Daniele Vigo, Claudio Caremi, Angelo Gordini, Sandro Bosso, Giuseppe D'Aleo, and Beatrice Beleggia (University of Bologna, Italy): "SPRINT: Optimization of Staff Management for Desk Customer Relations Services"; Kees Roos, Dick den Hertog, Ruud Brekelmans, and Carel Eijgenraam (Delft University of Technology, The Netherlands): "Flood Prevention by Optimal Dike Heightening"; and winner Mikael Rönnqvist, Patrik Flisberg, and Mikael Frisk (the Norwegian School of Economics (NHH), Norway) "Logistic planning using DSS FlowOpt".



▲ Gala Dinner at the courtyard of the Vilnius Picture Gallery

The courtyard of the Vilnius Picture Gallery in the heart of the Old Town was the perfect place for the Gala Dinner, where everyone let their hair down amid the wine, band, and dancing. There was more live music and dancing on the last day during the farewell party held at the historic Grand Courtyard of Vilnius University. Founded in 1579, the university is one of the oldest and most famous establishments of higher education in Eastern and Central Europe.



▲ IFORS Presidents All: Future (Nelson Maculan), Present (Dominique de Werra, back to camera), Past (Paolo Toth, partly hidden) with Luisa Toth

Meanwhile, the Doctoral Dissertation Award went to Carolina Osorio. Best EJOR papers were recognized for the first time and awarded to Mikael Frisk, Maud Göthe-Lundgren, Kurt Jörnsten, Mikael Rönnqvist, Teresa Melo, Stefan Nickel, Francisco Saldanha-da-Gama, Alexander Stepanov, and James MacGregor Smith. Joint ROADEF/EURO awards were also presented to Wojciech Jaśkowski, Piotr Gawron Marcin Szubert, Bartosz Wieloch, Mirsad Buljabašić, Emir Demirović, Haris Gavranović for their solutions to the Google machine reassignment problem.

The social program was well thought out. The opening ceremonies featured classical music by a string quartet, *Quattro Amici*, who had been asked by popular demand, for a performance during the closing ceremonies. After the first full conference day, the delegates were welcomed by Vilnius Mayor Artūras Zuokas. The unique and captivating performance by the Vilnius Ballet Theatre that followed lived up to its reputation for a tradition of passion and innovation, combining classic and modern dance. This certainly put the participants in the mood for renewing acquaintances and meeting friends during the welcome reception which capped the evening.



▲ Farewell Party at the Vilnius University Courtyard had everyone dancing – including the EURO President!

Following an established tradition, this year's conference was accompanied by *satellite events* that took place in Vilnius and other parts of Lithuania, namely: EURO-2012 Workshop on Stochastic Programming (StoProg-2012) – "Stochastic Programming for Implementation and Advanced Applications", July 3-6, Neringa: <http://www.mii.lt/STOPROG-2012/>; 10th EUROPT Workshop on Advances in Continuous Optimization, July 5-7, Siauliai: <http://www.mii.lt/EUROPT-2012/>; EWG-ORD PhD Workshop OR for Developing Countries: Times of Economic Crises, July 7, Vilnius: <http://ewgord-2012.logiq-giad.org/>; Workshop of The State of The Art on Complex Problem Handling and Decision Making, July 8, Vilnius: <http://www.euro-2012.lt/satellite-events>; EURO 2012 pre-conference workshop "Optimization with FICO Xpress: Introduction and New Features", July 8, Vilnius: <http://www.fico.com/xpress-vilnius2012>.

EURO XXV was organized by *The Association of European Operational Research Societies (EURO; <http://www.euro-online.org>)*, *The Lithuanian Operational Research Society (LitORS; <http://www.mii.lt/litors/index.php?lang=en>)*, and *Vilnius University, (<http://www.vu.lt/en/>)*. Ensuring that every detail of the EURO XXV would spell success were Chairpersons *Marielle Christiansen* (Norwegian University of Science and Technology, Trondheim, Norway) of the Programme Committee (PC) and *Leonidas Sakalauskas* (Vilnius University, Lithuania) of the Organizing Committee. 

Main author is Krystsina Bakhrankova (SINTEF Technology and Society, Applied Economics, Trondheim, Norway) who successfully organized a stream and a session for the first time under the able guidance of Willi Weber.



▲ Krarup and Zimmermann reminisce over wine and pipe.



# A Special Silver Celebration

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The 25th EURO conference was the perfect opportunity to reflect on the history of EURO - its growth and development after the Association was set up in 1975.

Since the very first conference in Brussels in January 1975, the EURO conference series has been one of the most successful instruments in promoting OR within Europe and in demonstrating the benefits that a regional grouping can bring. Arranged at short notice, the first conference attracted 500 participants and was promptly followed the next year with a conference in Stockholm. Since 1979, EURO conferences have been arranged for the interim two years between IFORS conferences. Table 1 lists the EURO conferences held to date and the one planned for 2013.

Year	City	Year	City	Year	City
1975	Brussels	1989	Belgrade	2003	Istanbul
1976	Stockholm	1991	Aachen	2004	Rhodes
1979	Amsterdam	1992	Helsinki (joint with TIMS)	2006	Reykjavik
1980	Cambridge	1994	Glasgow	2007	Prague
1982	Lausanne (joint with TIMS)	1995	Jerusalem	2009	Bonn
1983	Vienna	1997	Barcelona (joint with INFORMS)	2010	Lisbon
1985	Bologna	1998	Brussels	2012	Vilnius
1986	Lisbon	2000	Budapest	2013	Rome (joint with INFORMS)
1988	Paris (joint with TIMS)	2001	Rotterdam		

Table 1: List of EURO-k Conferences

EURO-k conferences are global meeting opportunities with a unique atmosphere. EURO XXV was no exception, attracting 2,100 participants from 68 countries. The theme *OR Connecting Sciences*, which reflects the multidisciplinary nature of OR and its value to global decision problems, was addressed in the conference topics of 153 streams, broken down into 524 parallel invited and contributed high-quality sessions. Set in the beautiful Lithuanian capital, the conference offered a diverse scientific and social program. Exceptional plenary and keynote speakers stimulated thought and discussion.

A plenary session was dedicated to the celebration of the 25th EURO conference in Vilnius. It was appropriate that Professor Hans-Jürgen Zimmermann, the first EURO president, opened the session with his talk on *40 Years of EURO: History, Applications, Future Potentials*. Zimmermann gave a fascinating insight into the reasons for establishing an Association of European Operational Research Societies within IFORS in the 1970s, a broad overview of the history and of the successes of EURO, and a vision on the future and its challenges.

He reminded everyone that in addition to conferences, EURO also initially set up 7 working groups and a European journal (*EJOR*) which vastly improved communication and cooperation among individuals and national OR societies. Attributing this professional environment to the growth of OR, of national society memberships and of instruments used to promote and reward excellence in the discipline, he concludes, "EURO has become a very important and productive promoter for OR in Europe and the World." Nonetheless, he cites the remaining challenges for EURO and OR, including education and visibility, which calls for EURO to continue to play a vital role in promoting the value of OR globally.

It can be said that the growth of EURO owes much to the dedication, expertise and enthusiasm of each of the 18 presidents, each of whom has built on the work of predecessors. Table 2 lists of EURO presidents to date.

All the past presidents - with the exception of Tomlinson, Roy, and Shutler who were unable to travel to Vilnius for the conference - personally received a memento from current president M. Grazia Speranza and president-elect Gerhard Wässcher. Permanent Secretary for many years until January this year, Philippe van Asbroeck was acknowledged for his support of all EURO activities and for efficiently running the office. Gerhard spoke for everyone as he presented Grazia with a token of appreciation for her excellent presidency, which concludes in January 2013.

Following the tradition of recent EURO-k conferences, awards were announced during the opening and closing sessions. (Please see list of winners in related article on page 9 and 10 - Editor). EURO-k conferences also offer opportunities for specific groups of people to meet. For instance, in addressing the education challenge highlighted by Professor Zimmermann, the first meeting of national society education representatives took place.



▲ M. Grazia opens the Celebration session with plenary speaker, Zimmerman.

Duration	Name	Country	Duration	Name	Country
1975-1978	Hans-Jürgen Zimmermann	Germany	1995-1996	Paolo Toth	Italy
1979-1980	Birger Rapp	Sweden	1997-1998	Jan Węglarz	Poland
1981-1982	Rolfe Tomlinson	UK	1999-2000	Christoph Schneeweiss	Germany
1983-1984	Jean-Pierre Brans	Belgium	2001-2002	Philippe Vincke	Belgium
1985-1986	Bernard Roy	France	2003-2004	Laureano Escudero	Bonn
1987-1988	Dominique de Werra	Switzerland	2005-2006	Alexis Tsoukias	France
1989-1990	Jakob Krarup	Denmark	2007-2008	Martine Labbe	Belgium
1991-1992	Jaap Spronk	Netherlands	2009-2010	Valerie Belton	UK
1993-1994	Maurice Shutler	UK	2011-2012	M. Grazia Speranza	Italy

Table 2: List of EURO Presidents



The meeting was productive in identifying particular local challenges as well as examples of best practice, and further discussion will be held to identify areas of education, which EURO can support. Meetings of journal editors were held, which this year included the 3 new EURO journals. Satellite events for EURO working groups were scheduled. National society presidents and representatives attended the annual Council meeting where new initiatives were discussed.

As always, each conference brings a unique social program, which this time included classical music, ballet, historic places, and a live band, wine and dancing. (Please see page 10 for more on this.)



▲ Euro Presidents gather for the 25th Conference.

The 25th European Conference on Operational Research was a huge success and a fitting tribute to all previous conferences and to the individuals who have worked hard to ensure that EURO meets its objectives and develops according to the needs of its members. The silver anniversary of the EURO conference was made especially memorable through the exceptional efforts of the programme and organising committees chaired by Marielle Christiansen and Leonidas Sakalauskas, respectively. Gerhard-Wilhelm Weber's enthusiasm and commitment as advisor to EURO-k conferences was also key to the successful conference. 

## OR FOR DEVELOPMENT SECTION

### ***Operational Research in South Asia***

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It is hard to talk about *Operational Research for Development* without mentioning a region where this would be most relevant, namely, South Asia. Composed of Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka, the region has looked to India as leading Operational Research (OR) related initiatives since the formation of the Operational Research Society of India (ORSI) in 1957. Other countries where formal OR and OR-related organisational bodies have taken initiatives are Bangladesh, Pakistan, Nepal and Sri Lanka. At present, only Nepal has an active OR body, the Operational Research Society of Nepal (ORSN) which is the latest OR society to be affiliated with IFORS. ORSN organised an international conference in February 2012 and brought out various initiatives taken in the direction of Operational Research for Development. ORSN is very active in addressing various issues related to development in Nepal through OR methodology. Though the OR Society in Bangladesh was not able to sustain its IFORS membership, various universities and academic institutes within the country are carrying out OR related activities. In Pakistan and Sri Lanka, such activities are largely confined to academic institutes, although there are efforts to establish OR national societies in both places. Little is known of OR activities in Afghanistan, Bhutan and Maldives. Needless to say, OR could potentially have a huge impact in bringing about inclusive growth for these countries. There is room for IFORS to consider assisting the formation of OR bodies in these countries to enable OR to aid the process of their development.

India has been at the forefront of use and propagation of OR in South Asia and to a great extent, in the developing countries. During the first IFORS conference (1957, Oxford), India was the only country from the developing world present. The following year, ORSI was the first OR Society from a developing country to join IFORS. Earlier in the 1950s, OR was used for the first time in national planning. R.L.Ackoff highlighted this in his Presidential address to the Operations Research Society of America. The Council of Scientific and Industrial

Research (CSIR), the apex body facilitating scientific research in India, established a wing in its organisation to facilitate work on OR in the early 60s. University of Delhi has been running a post graduate course, M.Sc. in Operational Research, since the 1970s, one of very few such courses in developing countries.



Since then, OR has come a long way. Currently, ORSI publishes a journal OPSEARCH, the first OR journal from the developing world. Apart from organising regular annual conferences, it organises various conferences and workshops on specific areas of OR, including ones sponsored by IFORS. The first International Conference on OR for Development (ICORD), followed by another one years later, have been organised in India. In addition, many universities offer postgraduate courses and various institutes have research and teaching activities in the field of OR. ORSI is now joined by many other societies, academic bodies and institutes in organising OR conferences, workshops, programmes and courses. It can be said that Operational Research has become an integral part of teaching, research and practice in India. The organisational mechanism of societies and other similar bodies are already in place to disseminate and share the knowledge and practices.

In summary, there is currently a wide gap in the knowledge, teaching and practice of OR in South Asia. This brings about the important role of bodies such as OR national societies in taking the initiative for the propagation and practice of OR. 

\*Arabinda Tripathy, Editor of the OR for Development Section, invites contributions from readers on their regional/national perspectives on the state of OR for Development.



# Workshop Tackles Development Amid Economic Crises

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Eighteen participants from India, Tanzania, Tunisia, Algeria, Israel, South Africa, Japan, Ukraine, Ireland, Turkey, the UK, Belgium, the Netherlands and Portugal comprised the *EURO Working Group on Operational Research for Development (EWG-ORD) PhD Workshop* held this year in Vilnius (<http://ewgord-2012.logiq-giad.org/>). The event took place prior to the EURO XXV conference at the conference venue itself, the Radisson Blu Hotel Lietuva.

*Applications-based* contributions were presented in the morning and *methodologies* in the afternoon. Keynote speaker *Subhash Datta* of India ably bridged the two parts, with a thoughtful view on technology, resources and connectivity for sustainable development. He emphasised the importance of methodologies that empowered local communities in developing countries.

The morning session included *Youssef Masmoudi's* case study of a colouring approach for bus driver timetables carried out in Sfax, Tunisia. *Salima Nait Belkacem* followed with a transportation minimum cost flow problem. *Ron Adamy* described algorithms for the interesting application of extending battery lives in electric vehicles. *Alexander Makarenko* discussed OR approaches for managing election campaigns in developing countries. In the healthcare realm, *Honora Smith* presented an algorithm used to improve the efficiency of locations for laboratory testing of HIV/AIDS in South Africa.



▲ Cathal Brugha discusses his paper.

In the methodology session, *Cathal Brugha* presented a multi-criteria methodology for incorporating risk and uncertainty in projects, and *Joseph Kakeneno* followed on with his application of this methodology in rural communities in Tanzania. *Jorge Santos* described an efficiency analysis of primary schools in an area of Angola. *Willi Weber* presented system dynamics for education, development the environment and economy, under different assumptions of time and uncertainty. *Dorien De Tombe*, chair of the EURO-WG EWG *Methodology of Societal Complexity*, discussed what is considered a complex societal problem, global safety. W. Weber took the opportunity to encourage the participants to contribute to the *IFORS Developing Countries OR Resources* ([http://ifors.org/developing\\_countries/](http://ifors.org/developing_countries/)).

The lively discussion continued in a local restaurant that offered some local Lithuanian specialities, including potato dishes and soups. It was a special time spent together, renewing old friendships and making many new ones. The workshop was made possible by: *Youssef Masmoudi* for the website and materials preparation; *Chandra Sekhar Pedamallu* and *Fernando Crespo* for membership and



▲ Honora moderates the session of Subhash Datta

applications; and *Claudia Rave* for the programme; *Elise del Rosario* and *Willi Weber* dealt with sponsorship issues and announcements. As EURO conference advisor and honorary chair of the EWG, W. Weber gratefully acknowledged the Chair of the EWG ORD, *Honora Smith* who coordinated overall preparations for the satellite workshop and got things moving for the event.

Mention must also be made of the sponsors: *EURO* (through *José Fernando Oliveira*), *IFORS* (through *Hugo D. Scolnik* and *Elise del Rosario*) and *LOGIQ* whose support for travel and accommodation of participants made it possible for them to take part in the workshop and in the EURO conference itself. The EURO XXV worked hand in hand with the workshop, resulting in the following "*OR for Development and Developing Countries*" streams: *OR for Development and Developing Countries*; *Education, and Social Policy*; *OR for Sustainable Development*; *Sustainable Living: Cognitive, Social, Economical, Ecological and World View*; and *Optimization for Sustainable Development*.

This year, the work of all the people and organizations mentioned have brought about a rich scientific event, ending with the hope that the shared experiences and mutual encouragement will facilitate collaboration towards the improvement of living conditions all over the world. This has been the goal of the EWG-ORD since its establishment in 2006 during the EURO XXI in Reykjavik, Iceland. 



▲ Willi Weber and Honora Smith: ensuring a successful Workshop



## Understanding Decision Making Pitfalls

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*Thinking, Fast and Slow* by Daniel Kahneman, 2011, Penguin Group, London, England,  
pp 499. ISBN 978-1-846-14055-6, 15.50 Pounds.

As professionals in the business of making better decisions, Operations Researchers are commonly faced with decisions that are based on beliefs of the likelihood of uncertain events. It is thus useful for them to know how people assess the probability of an uncertain event or the value of an uncertain quantity. In the book "*Thinking, Fast and Slow*", the author shows

how easy it is for human beings and decision makers, in particular, to diverge from rationality and instead fall back on ingrained biases that lead to wrong choices and thus wrong decisions.

Kahneman's book is partly an intellectual autobiography and much of what is presented in the book is about "biases of intuition". In addition, Kahneman states that what is contained in the book is "his current understanding of judgement and decision making, which has been shaped by psychological discoveries over recent decades".

It would be relevant to mention at this point that author Daniel Kahneman is a psychologist who shared the 2002 Nobel Prize in Economics for his work on decision theory.

The book presents the thinking process as consisting of two systems. System 1 (Thinking Fast) "operates automatically and quickly, with little or no effort and no sense of voluntary control". System 2 (Thinking Slow), on the other hand, "allocates attention to the effortful mental activities that demand it, including complex computations. The operation of System 2 is often associated with the subjective experience of agency, choice and concentration". System 2 is therefore conscious, uses deductive reasoning and requires a lot of work. System 2 thinks it is in charge when it is really the irrepressible System 1 that runs the show. This is illustrated vividly by the following example, one of many, given in the book:

*A bat and a ball cost \$1.10. The bat costs one dollar more than the ball. How much does the ball cost?*

Using their intuition, majority of people answer \$0.10. The answer is intuitive, appealing and, yes, wrong!! Use System 2 to do the calculation and you will realise the answer is in fact \$0.05.

Another example used in the book is the "the Linda problem". Here participants were told about an imaginary young woman named Linda, single, outspoken and very bright, and who, as a student, was deeply concerned with issues of discrimination and social justice. The participants in the experiment were then asked which alternative

was more probable:

(1)Linda is a bank teller; or (2)Linda is a bank teller and is active in the feminist movement.

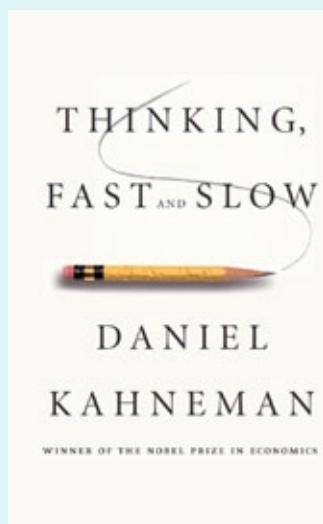
The overwhelming response was (2), i.e. "feminist bank teller" was more likely than "bank teller". This is a blatant violation of the laws of probability. Every feminist bank teller is a bank teller and adding "feminist" to the description of the bank teller can only lower the probability. About 85% to 90% of undergraduate students at several major universities chose the second option, contrary to logic. One student, informed that she had committed an elementary logical blunder, responded, "I thought you just asked for my opinion".

Many such (alarming?) examples are giving throughout the book. System 1 is hopelessly bad at the kind of statistical thinking that is often required for good decisions - it jumps quickly and easily to conclusions. System 1 is subject to a whole suite of irrational biases and interference effects which is covered throughout the book. Many such experimentally demonstrated breakdowns in rationality are described, which include, among others: the halo effect, the "Florida effect", base-rate neglect, framing effects, anchoring effects, the confirmation bias, outcome bias, hindsight bias, availability bias, the focusing illusion. The cumulative effect of all of this is fairly alarming and despairing for human reasoning.

The book is divided into five parts. Part 1 presents the basic elements of the two-system approach to judgement and choice as presented above. Part 2 answers why it is difficult to think statistically. The difficulties of statistical thinking are elaborated on and highlighted in Part 3. Our excessive confidence in what we believe we know and our inability to acknowledge this is likewise covered. The key concepts of prospect theory based on the initial work of Kahneman and Tversky published in 1979 is presented in Part 4. Finally the focus in Part 5 is on human well-being and happiness. A distinction between two selves is introduced namely remembering self and experiencing self. It is only in recent years that Kahneman has become interested in how people experience happiness and well-being. Following a very similar approach through experiments, very illuminating results have been obtained in this regard. The final chapter includes what organisations can do to improve the quality of judgements and decisions made on their behalf. Two papers of Kahneman and Tversky, "Judgement under Uncertainty" and "Choices, Values and Frames" are attached as appendixes to the book.

Listed among the top 10 non-fiction books of the New York Times for 2011, *Thinking, Fast and Slow* is an outstanding book, distinguished by its clarity and exposition of detail as well as material presentation. The book is rich, with some chapters more taxing than others - examples and the number of different effects becomes a bit overwhelming but do not require any special background.

Operations Researchers need to take note of why even experts rely on intuition and often get it wrong. Insight into cognitive psychology is thus important and this book certainly provides that insight. Many good books have been written on human rationality and irrationality, but *Thinking, Fast and Slow* must rate amongst the best if not the best. As one reviewer states: "(the book) is readable, wise and deep. Buy it fast. Read it slowly and repeatedly. It will change the way you think, on the job, about the world, and in your own life."



# OR IMPACT

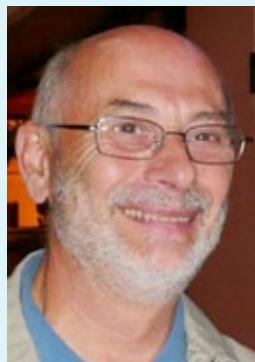
*Articles demonstrating direct benefits from implementing OR studies*

**Sue Merchant** <[suemerchant@hotmail.com](mailto:suemerchant@hotmail.com)>, **John Ranyard** <[jranyard@cix.co.uk](mailto:jranyard@cix.co.uk)>

*IFORS News starts what it hopes will be a regular feature that will help Operations Researchers know more about how improved methods are being taken up and used in practice, leading to real benefits for organizations. This column aims to showcase the best examples of OR practice, initially from the UK and with the help of readers of this Newsletter, from around the world. Our two columnists' involvement with OR practice in the UK are briefly given below. They will be happy to receive your contribution that shows **OR Impact** from your part of the world! - Editor*



**Sue Merchant** spent most of her career as a practitioner and senior manager in the Metropolitan Police. She is now an independent consultant and summer project supervisor at the London School of Economics. She is an ex-President of the UK OR Society and VP elect of IFORS.



**John Ranyard** was an OR practitioner in British Coal for nearly 30 years and an OR Manager for 20 years. He was External Liaison Manager for the Management Science Department at Lancaster University for 10 years but is now retired. He is an ex-President of the UK ORS and still active in the ORS eg Secretary of Heads of OR Forum for OR Managers in industry, government and commerce. He is a Companion of the OR Society.

## **The President's Medal: Celebrating good practice in the UK**

Since 2001, The Operational Research Society (UK) has awarded the President's Medal annually for the best practical application of OR, similar to the longer-established Edelman competition run by INFORMS. Experienced practitioners evaluate the entries and the best three are presented at the ORS national conference each September. The winner is then selected by a judging panel chaired by the President, assisted by the audience who are given the opportunity to vote on which of the contestants most deserve the award. The criteria used by the judges include: demonstrable delivered benefits (with references from the client), intellectual and novel content, longevity of solution and 'excellence' of the O.R. process. Over the years, these entries – and particularly the winners – have done much to publicise the value of OR in the UK and have also raised the profile of the OR activity concerned.

The OR Society's President's Medal for 2011 was awarded to Stephen Hammond and Keith Slater of National Air Traffic Services UK (NATS). The project was concerned with air traffic control over the UK and involved the development of performance metrics to show how the actions from air traffic control impact on the use of fuel in flights. These new metrics are leading to significant reductions in costs and environmental impacts (particularly CO<sub>2</sub> emissions) for the aircraft operating in U.K. air space and are the first such measures to be introduced internationally. Sean Jones, Head of Operational Analysis at NATS, said: "There's a great deal of industry leading research in which OA is involved. It's fantastic that we've gained some external recognition and from such a highly respected body as the Operational Research Society." Below is a general description of the project.

## **Air Traffic Control, Business Regulation and CO<sub>2</sub> Emissions**

NATS, a Public Private Partnership, is the major provider of Air Traffic Control (ATC) within the UK airspace and is the sole provider of en-route ATC services in the UK. As such, it is economically regulated by the Civil Aviation Authority (CAA), including price controls, which cap prices paid by airlines for the service, as well as incentivising cost efficiency, investment in future capability and high service quality.

NATS regularly consults its airline customers on their requirements. With the increasing cost of aviation fuel and the introduction of the Emissions Trading Scheme (ETS) for aviation in Europe, NATS customers highlighted the increasing impact of ATC on their costs and emissions and indicated a need for additional service quality measures. Fuel forms a substantial part of an airline's operating costs

and it is estimated that nearly 4.5 million tonnes of aviation fuel was consumed within the UK airspace in 2010 at a cost of approximately £600 per tonne, a total value of £2.7bn. In addition, significant emissions of CO<sub>2</sub> are directly related to this fuel burn.

### **The Project**

NATS Operational Analysis (OA) Department was tasked to consider what aviation environmental factors ATC could influence and hence, which areas it could be incentivised to improve. The primary objective of ATC is to safely and efficiently manage air traffic. This task has many constraints, including the need to maintain safe separations of aircraft in a dynamic and complex mix of traffic, as well as the need to interact with other ATC providers.



However, from a fuel burn (and CO<sub>2</sub> emission) perspective, each flight has an optimum height, speed and track profile, which almost always conflicts with these constraints.

Consultation with stakeholders indicated the need for a new metric, which would:

- » drive actions by ATC that would lead to reductions in aircraft fuel usage
- » measure the impact of ATC actions on fuel usage
- » not be unduly affected by factors beyond ATC influence
- » be fair and equitable across the NATS customer base (airlines)
- » be transparent and auditable

Initial research by OA identified that there was no existing metric or model for fuel efficiency in aviation. A new approach to estimate the additional fuel burn, due to ATC for each flight was needed, taking into account aircraft performance, aircraft origin and destination and the operators' requested cruise altitude.

### Flight Efficiency

A 'flight' is defined as a specific type of aircraft, flying from an origin airport (O) to a destination airport (D). Each flight has an optimal trajectory, which is the great circle track across the surface of the earth, and also the vertical profile, which is determined by the airline operators. Thus OA identified, through their analysis, two forms of deviation from the notional optimal aircraft trajectory as the primary ATC causes of fuel inefficiency: the additional distance flown (horizontal inefficiency) and deviations from the vertical profile (vertical inefficiency).



▲ Photo shows Sean Jones, Stephen Hammond receiving the 2011 President's Medal from ORS President Richard Eglese

Measures of the relative horizontal and vertical fuel penalties were then developed by OA, taking into account the detailed flight profiles and aircraft type performances. Next, taking a dataset in excess of 100,000 unique flights in UK airspace, the 'actual' fuel inefficiency was estimated using an OA-developed fuel burn model. Regression models were then built to enable a prediction of the 'actual' inefficiency from the measures of fuel penalties developed through this research. An overall 'score' of the fuel inefficiency was then derived and, since this inefficiency depends only on the deviations in the three-dimensional path of the aircraft, it is called the **3Di Score**.

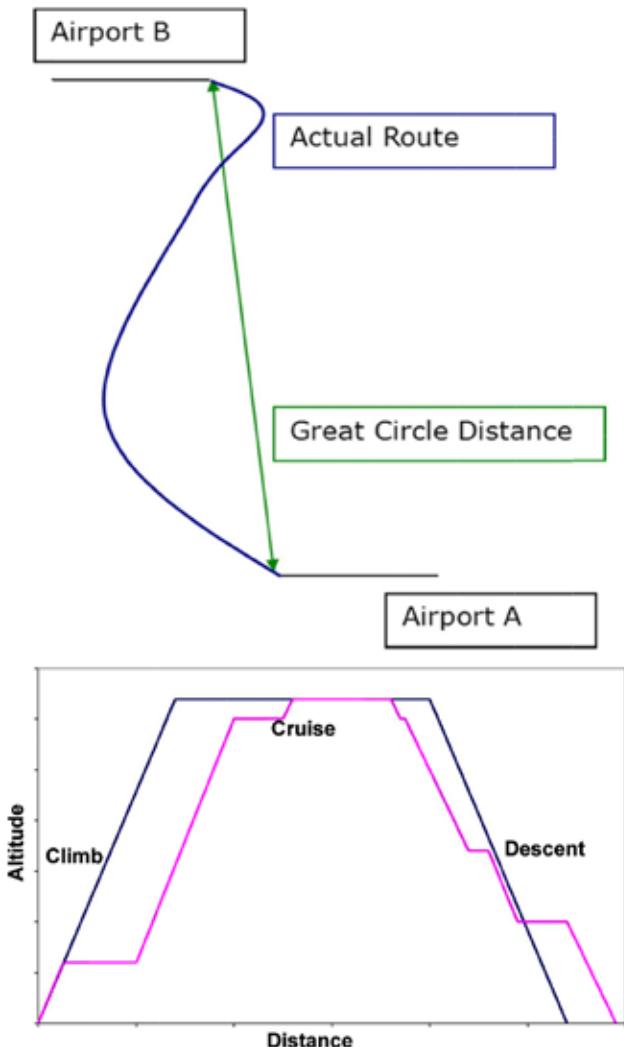
Hence, for the first time, it was possible to measure the fuel inefficiency resulting from the actions of ATC by recording a few simple, specific, straightforward components of a flight. A significant benefit of this approach is that it can be completed efficiently, without expensive data gathering and without complex calculations, making it transparent and meaningful to the stakeholders.

### The Outcome

On the basis of this novel analytical work NATS was confident to hold constructive discussions with the CAA on the incorporation of the 3Di Score within the existing service quality regulation scheme. Following acceptance of the new measures, the 3Di score was reported throughout the business on a monthly basis in 2011, before being introduced formally with financial regulation at the beginning of 2012. The first quarter's results were reviewed in May and confirmed that the new measures were working as expected, with the result that significant reductions in fuel usage in UK airspace – with consequential reductions in CO<sub>2</sub> emissions – are now being achieved.

### Reflections

This project demonstrated the use of analytics, using large amounts of data only available to NATS, to develop a tool that has gone further than simply to inform decisions - it has also influenced the shape the regulatory environment. In developing the model, it was essential to balance the need to model the situation as realistically as possible and with statistical rigour, against the need for a relatively simple and pragmatic solution. The last requirement is important because although OA has the capability to run very complex models, clarity and simplicity are important for our regulator and other stakeholders.



## Impact Factor for ITOR; IAOR vs. Google Scholar

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### ITOR

The most exciting news is that *International Transactions in Operational Research* has an inaugural ISI Impact Factor of 0.648, which means it is off to a really excellent start. This puts ITOR straight in at 49th out of 77 titles in the ISI's OPERATIONS RESEARCH & MANAGEMENT SCIENCE category, and 125th out of 166 titles in the big general MANAGEMENT category. It has been over 10 years since IFORS began the process of getting ITOR included in the ISI rankings, and having been rebuffed

several times, it was an achievement to hear last year that it would be included. To receive the news of this good ranking is of great credit to editor Celso Ribeiro and all the team involved.



### IAOR

Literature review is fundamental to research. Reviews allow you to improve your understanding of a subject, to gain insight into promising research directions, to focus the scope of the project, and to ensure that the research conducted is not redundant with prior published work. An in-depth, thorough review requires access to a corpus of source documents that is encompassing of the subject and to a search engine that accurately, efficiently, and comprehensively retrieves the appropriate documents.

What resources are available to the ORMS researcher?

Google Scholar (GS) is an obvious resource for a researcher to consider. GS indexes the full text of scholarly literature from a wide range of disciplines, including most online peer-reviewed journals. The GS corpus includes conference proceedings, scholarly books, non-peer reviewed journals, patents, class notes—essentially any documents that can be crawled on the web.

An alternative, specific to our profession, is International Abstracts in Operations Research (IAOR), a subscription journal of IFORS published by Palgrave-Macmillan. IAOR professional editorial staff collect and classify abstracts from over 180 journals covering OR, MS, and closely related disciplines. IAOR Online is the gateway to a continually growing database of over 60,000 abstracts dating back to 1989.

So which should a researcher choose? Specifically, does IAOR add any value? Lawrence Bonczar and Pres White (editor of IAOR), at the University of Virginia, looked at these questions, by giving each resource the same queries from the subject area of healthcare simulation modeling. This topic was chosen for a couple of reasons. First, the researchers have considerable experience in this field. They are currently developing patient flow and scheduling models for the University of Virginia Health System. Second, as an application of operations research, articles written about it may appear in journals and other sources that are not directly linked to OR, which will make

it a challenge for the IAOR database to detect such documents. Conversely, the GS database may draw results from too wide a sample, giving many irrelevant results.

A fuller description of the study is available at <http://www.palgrave-journals.com/iaor/index.html> so the authors' main conclusions may suffice for now. First, and most importantly, the results of IAOR and GS searches are complementary. There is comparatively little overlap in the relevant documents retrieved in response to the same query. Using both together is highly advantageous.

Second, subject overviews or introductions are highly ranked in GS retrievals. This is likely to be because of the high weight given to citation counts and because surveys are widely cited. This is a useful property for an initial review of a new research topic, allowing subsequent traditional searches of the typically large number of references provided by overviews and the foundational papers often cited in subject introductions.

Third, IAOR may be superior to GS if the user is determining input strings based on limited prior knowledge. Shorter query strings yield more relevant documents in IAOR. Conversely, the more terms that appear in a GS-based query string—the more bounded and focused are the results. These characteristics almost certainly can be attributed to the effect of expert opinion. Since the documents that constitute IAOR's database are screened and classified before entry in the database, the quality and relevance of an article to an ORMS topic are almost guaranteed to be higher than a sample article from a GS query.

Fourth, longer strings of conjunctive ("AND") queries naturally tend to have lesser recall. For IAOR, this opens the potential for queries that are overly specific, owing to the more limited corpus of source documents and the potential that an appropriate keyword may not correspond to an IAOR classification. The primary keywords applied in IAOR classification are published in each issue and can be used to create initial queries. Additional terms also are listed when applied as appropriate to a specific document. These terms are included in a large and extensible database of keywords.

Fifth, the vastness of the GS corpus is both a strength and a weakness. In particular, conference proceedings are an especially important resource. In the study, documents retrieved only by GS included many relevant papers from the Proceedings of the Winter Simulation Conference. While necessarily less thoroughly and stringently reviewed, proceedings papers are more encompassing of the potentially pertinent literature and do not suffer the delays in publication for many scholarly journals. This observation reinforces the complementary nature of the two search engines.

So why not try IAOR and encourage your students to do so? INFORMS members can access INFORMS Online beginning at <http://www.informs.org/Find-Research-Publications/Searchable-Databases/International-Abstracts-in-Operations-Research-IAOR-Database> and ORS members can go to <http://www.theorsociety.com/Pages/Publications/IAOR.aspx>





## IFORS Appoints Rand as Publications Committee Chair to Replace Bradley

Hugh Bradley has given exceptional service to IFORS, most recently as Chair of the Publications Committee. He was the second editor of IAOR (from 1968-79), edited the last IFORS conference proceedings volume (for the 1990 conference held in Athens), was treasurer from 1998-2006, and then continued to serve as Publications Committee Chair. Dr. Bradley was elected to the Operations Research Society of America (ORSA) Council in 1975. Over the ensuing fifteen years he served the Society as its Treasurer, Vice President, and President (in 1985) – and then a second time as Treasurer. Hugh was awarded the George E. Kimball Medal by ORSA in 1990 to recognize his distinguished service to ORSA and to the profession of operations research. We were distressed to hear earlier this year that he suffered a severe heart attack, requiring heart bypass surgery. He is making steady recovery, but he was unable to continue his service to IFORS. We thank him for all that he has done for IFORS.

Graham Rand has been involved with IFORS for a very long time. He was IFORS Vice-President (1998-2000), Editor of the International Abstracts in Operations Research, (1979-91), Editor, OR 1987 Conference Proceedings, Chairman, OR 1990 Conference Programme Committee, and Managing Editor, International Transactions in Operational Research (2001-2005) at which time he created the Operational Research Hall of Fame. Graham has been a member of TIMS and then INFORMS since 1980. Recently, he joined the editorial board of Interfaces, and will become President of Omega Rho, the international honor society for O.R. Graham has served his own society and in 2006, was honored with the Companionship of Operational Research, one of the highest awards bestowed by the Operational Research Society. His work has been published in several journals. He is currently Senior Lecturer at Lancaster University in Great Britain, is Director of Studies and Admissions Tutor for three MSc programmes.

## CONFERENCES

### Demystifying Mathematics, Enriching All

Dilara Yıldırım <ddilara.yildirim@gmail.com>, Elif Gümüş <elifgumus@gmail.com>  
Gerhard-Wilhelm Weber <gweber@metu.edu.tr>

Motivated by their wanting to better understand the importance of mathematics and its applications, students of the Suleyman Demirel University (SDU) in Isparta, Turkey conceptualized and organized a one-day workshop on February 28. What came out was a conference held at the SDU Lutfu Çakmakçı Cultural Center, a collaborative work of the SDU Mathematics Club, SDU Mathematics Faculty and guest speakers.

After the head of Department of Mathematics at Faculty of Science and Literature Bilender Pasaoğlu opened the workshop, Middle East Technical University (METU) professor Ersan Akaylıdız gave an introductory lecture on "A Look at Mathematics and Its Applications". TOBB Economy and Technology University's Ömer Akin talked about "Man and Mathematics" which dealt with the applications of mathematics in human sciences, technology and economy. "Applications of Topology in our Lives" was discussed by METU's, Turgut Önder, where he showed the role of topology in combinatorics, geometry, biology, physics, engineering fields, medicine and economics.

Again, from METU, Hakan Öktem, gave insights into "Forming Mathematical Models by Inference Methods" by showing examples from biological and medical research. He showed how by formulating equations using information about the units in the system and the relationship among these units, one could model the system and use this model to predict the system future behaviour or to control it. However, especially for systems that are newly developed or those which cannot be directly observed or which have many variables, detailed information is not enough to form basic models.

Concluding the workshop was METU's Gerhard Wilhelm Weber, who spoke on "Applications and Motivation in Finance, Education, Biology, Medicine and Economy Supported by Research in Modern Applied Mathematics". He emphasized the special role, impact and future potential of Operational Research for challenging applications.



Young people may gain inspiration from this account of how a group of students decided that they wanted to learn more about mathematics and organized their own workshop. They found out that faculty was only too willing to help.

The audience, consisting of mathematicians, students and faculty members of mathematics and of other departments, was one in proclaiming the workshop a success. The feedback of young participants just starting their mathematics studies indicating that they gained a lot of insights and were even more determined to pursue Mathematics as a useful field convinced the organizers that they have indeed achieved their objective.

The organizers themselves learned a lot not only about the subject matter but also on the process of consulting and organizing the activity with the faculty. The workshop made such an impression on them, that some them even dreamed of becoming part of the Mathematics faculty and speakers in a conference such as this one!

Local academicians who were instrumental in the organization of the workshop included: Bilender Paşaoglu, Salih Aytar, Duygu Aruğarslan Çinçin and Sırma Zeynep Alparslan Gök, with the latter having been involved as stream organizer at various EURO conferences on the subject of collaborative game theory. This goes to show that for every student who is motivated to learn Mathematics, there are willing, experienced and enthusiastic teachers who are ready to share their expertise!



# NGM 2012: A Learning and Networking Experience

Natalia Nikitina <nikitina@krc.karelia.ru>, Gerhard-Wilhelm Weber <gweber@metu.edu.tr>

The Networking Games and Management (NGM-2012) workshop gathered over 30 scientists and PhD students from 5 countries from June 30 to July 2 to discuss current advances in networking games and management at Petrozavodsk. Russia's North with its many lakes, forests and flowers enhanced the warm, friendly atmosphere that permeated the whole event. The talks took place in a quiet village hotel while the socials were held in the scenic landscape around Petrozavodsk, a capital of the Karelia region in Russia.

The 23 talks of the two workshop sections covered various current problems of networking games and management. A plenary talk given by Dmitry Novikov, a corresponding member in the Institute of Control Sciences of the Russian Academy of Sciences in Moscow started the day. His overview on the current advances in multi-agent systems was followed by three more talks on the subject. After a break, the first section continued with a talk on congestion games by host and chairman of the workshop, Vladimir Mazalov Head of the Institute of Applied Mathematical Research in Karelian Research Center of the Russian Academy of Sciences (RAS) at Petrozavodsk (<http://mathem.krc.karelia.ru/member.php?id=1&plang=e>).

Other presentations touched on game-theoretical models for social networks, wireless networks, characteristics of cycle-free directed graph games and cooperation in stochastic network games. The second section of the workshop covered emerging applications, and included discussions on properties of cooperative games, auctions, negotiations, as well as some currently important problems of queuing systems and job scheduling in multi-task systems.

The talks were complemented by social events – the dinner, welcome party and long walks in the open air, including an excursion to the wonderful Kizhi Island which, with its old wooden churches, is truly a jewel of the republic. Indeed, the unique combination of science and nature made memorable by famous Russian hospitality gave an excellent backdrop for the workshop participants to start new



▲ Workshop participants in a "networking" session

promising collaborations. It was in the late evening of the first day, under the sky of the "white nights" of Karelia, when leading colleagues from game theory in Russia, including Novikov and Mazalov, Leon A. Petrosyan (St. Petersburg State University) Alexander Vasin (Lomonosov Moscow State University) gathered together with friends and agreed to work for closer working relationships not only within Russia but also with the international OR community. These ideas including the possibility of organizing a stream at EURO conferences, resurfaced during the EURO XXV, which followed some days after the workshop. It was indeed a great networking opportunity! ☃

N. Nikitina is with the Karelian Research Center of Russian Academy of Sciences, Petrozavodsk, Karelia, Russia while W. Weber is with the Institute of Applied Mathematics, Middle East Technical University, Ankara, Turkey. The travel to Russia and the participation at three scientific events there by W. Weber was supported by EURO.

Other photos from the workshop are available at <http://resources.krc.karelia.ru/math/photo/ngm2012/big.orig/> courtesy of the local organizers. Cordial thanks to the organizational work of Dr. Julia V. Chirkova.

## Smoothly Run: Conference on Nonsmooth Optimization

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With its breathtaking sights, St Petersburg seemed like the most appropriate venue for an important international event: the commemoration of pioneers of Operations Research in the area on Nonsmooth Analysis and Optimization. The "Constructive Nonsmooth Analysis and Related Topics" conference took place at the Euler International Mathematical Institute, named after Leonard Euler who is often referred to as the father of Russian mathematics. Held from June 18 to 23, the conference emphasized the motivational, practical and applied aspects of optimization and OR as it dealt with the constructive aspect of the theme.

The medium size of the conference, which attracted 200 participants,



▲ Participants pose for posterity.

made it easy to locate old friends and make new ones. Main organizer Vladimir F. Demyanov (St. Petersburg University) welcomed all the participants both in English and Russian, though the official conference language was English. This was followed by the Opening Session, which featured Roger Wets and Ralph Tyrell Rockafellar. Presentations by Giannessi, Mifflin, Chernousko and Demyanov, Malozemov, Kurzhanski and Romanovski in the next two days were particularly enlightening.

The Plenary Session on the last day was dedicated to very important pioneers of Nonsmooth Analysis and Optimization, an area with numerous real-world applications.



Based on the topic's representation at EURO and IFORS conference streams, this area is starting to play a significant role in OR. A tribute to the great pioneer-scholars: Prof. Dr. J.-J. Moreau (France), Prof. Dr. B.N. Pshenichyi (Ukraine), Prof. Dr. A.M. Rubinov (Australia) and Prof. Dr. N.Z. Shor (Ukraine) were offered through personal, sometimes funny remembrances of conference and session participants such as Demyanov, Rockafellar, Wets, Malozemov, Mordukhovich, Kruger, Norkin, Weber. It was pointed out by W. Weber that in 2006, a few days before his demise, one of the honorees, Alexander M. Rubinov became the first *EUROPT Fellow* in the history of *EUROPT* (EURO Working Group on Continuous Optimization; <http://www.iam.metu.edu.tr/EUROPT/>, cf. the link *EUROPT Fellows*). His widow, Zari Dzalilov, honored the conference by her active participation.

The social program included a welcome party, a two -hour journey by boat along the channels and rivers of St. Petersburg, a visit to the Petershof with its wonderful fountains and gardens and a conference dinner at "Dom Aktyora" at the Nevsky Prospekt.

Apart from his talks on OR, finance and optimization, W. Weber did not miss the chance to promote *EURO-INFORMS 2013, IFORS 2014* as well as the annual *Summer School AACIMP 2012 in Kyiv* and *PCO 2012* in Las Vegas. 

A. Ruziyeva is from Fakultät für Mathematik und Informatik, Technische Universität Bergakademie Freiberg, Germany and W. Weber from Institute of Applied Mathematics, METU, Ankara, Turkey conveys his thanks to EURO and METU that supported his travel and stay in Russia and conference participations there.

## OR and Disaster Management

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**P**rotecting lives and welfare and when lost, recovering from the loss as soon as possible have always been a major concern for everyone. Many measures are adopted to achieve this, but disasters are out of control. Belonging to a global community, people are affected by disasters that happen far from their own locations. Thus, disaster management has become of great interest to Operations Researchers.

Below are standard definitions commonly used in disaster management.

- A *hazard* is a threatening event or probability of occurrence of a potentially damaging phenomenon within a given time period and area. It can be both natural or human-made:
  - *Natural*: naturally occurring physical phenomena caused either by rapid or slow onset events, which can be geophysical, hydrological, climatological, meteorological or biological (earthquakes, landslides, tsunamis, volcanic activity, avalanches, floods, extreme temperatures, droughts, wildfires, cyclones, storm/wave surges, disease epidemics, animal plagues, etc.). Some of them, usually related to weather, are cyclical (as the recent Philippines floods), but others happen suddenly without previous notice.
  - *Human-made or technological*: events caused by humans and which occur in (or close to) human settlements, such as complex emergencies/conflicts, famine, displaced populations, industrial accidents (toxic dumps or radioactive escapes), catastrophic transport accidents, etc. In this class, perhaps the most terrible event is war, absolutely avoidable, and one of the saddest is famine, also avoidable but currently even more difficult to prevent (e.g., the current disaster in Sahel, or worldwide data about hunger and malnutrition, an evil chronic which is not understood as a hazard because it is not related to a particular time period).
- An *emergency* is a situation that poses an immediate risk to health, life, property or environment. Emergencies arise every day in human communities and some of them can be managed by local entities (a building fire, traffic accidents, a heat wave, a big storm, etc.), but many others cannot.
- A *disaster* is the disruption of the normal functioning of a system

*When disaster strikes, OR must not be far behind.*



or community, which causes a strong impact on people, structures and environment, and goes beyond the local capacity of response. Sometimes, to declare an emergency as a disaster is a political decision, because of consequences such as the intervention of third parties and insurance implications.

- *Catastrophe* is another term used in disaster management. There is also a discussion in the literature about the difference between disaster and catastrophe. Usually a catastrophe is considered a large-scale disaster.

As stated by Quarantelli (see <http://understandingkatrina.ssrc.org/> Quarantelli/), "just as disasters are qualitatively different from everyday community emergencies, so are catastrophes a qualitative jump over disasters". This qualitative jump is reflected in several characteristics that are related to the consequences of the event (e.g., the 2010 Haiti earthquake). Since the logistics of the intervention strongly depend on these characteristics, it is of great importance to measure them properly. The following variables of interest (represented in Figures 2-4) are usually considered (e.g., EM-DAT, the most exhaustive database of historical disasters and emergencies, available at <http://www.emdat.be>):

- *Killed people or casualties*: persons confirmed as dead and persons missing and presumed dead
- *Injured*: people suffering from physical injuries, trauma or an illness requiring medical treatment as a direct result of a disaster
- *Homeless*: people needing immediate assistance for shelter
- *Affected*: people requiring immediate assistance during a period of emergency; can also include displaced or evacuated people
- *Total affected*: sum of injured, homeless, and affected
- *Estimated Damage*: There is no standard procedure to determine a global figure for economic impact; however, several institutions have developed methodologies to quantify these losses in their specific domain.

Natural disasters reported 1900 - 2011

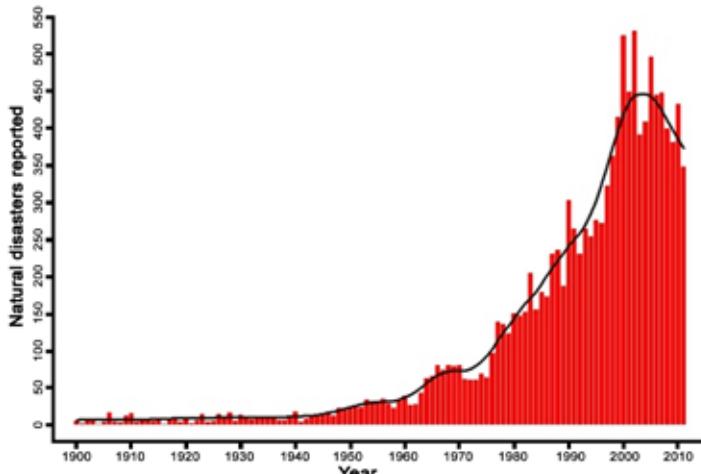


Figure 1

Number of people reported killed by natural disasters 1900 - 2011

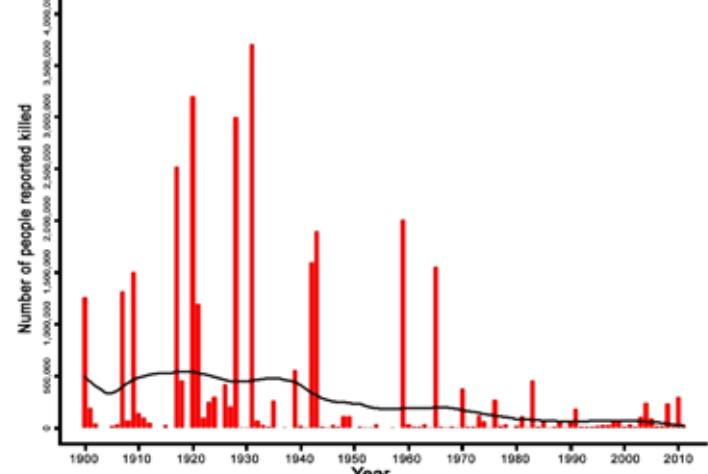


Figure 2

Number of people reported affected by natural disasters 1900 - 2011

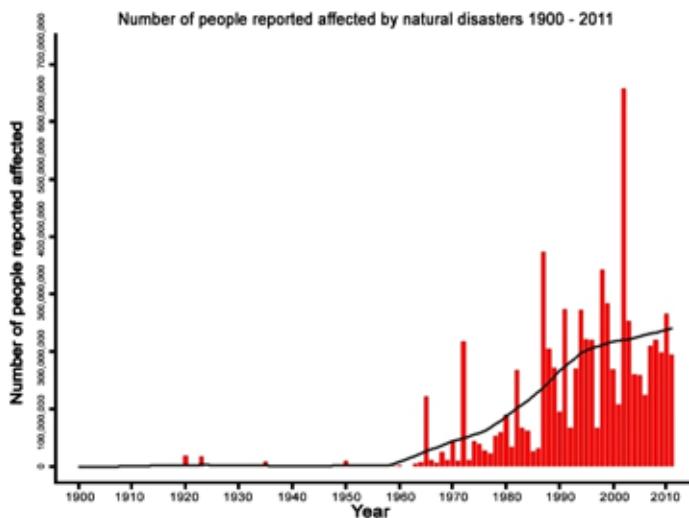


Figure 3

Estimated damage (US\$ billion) caused by reported natural disasters 1900 - 2011

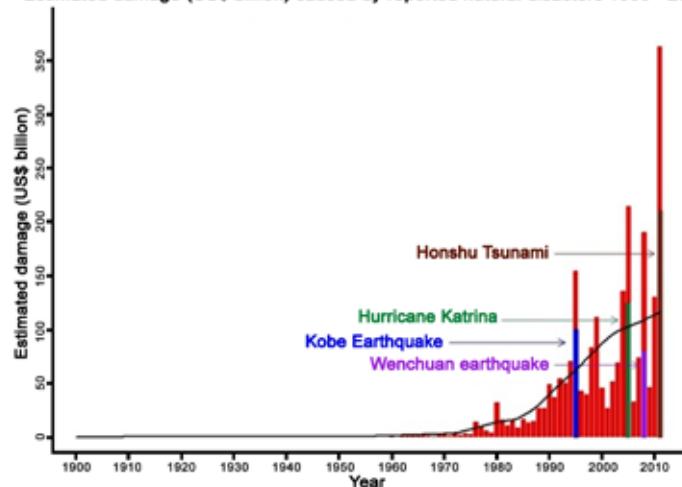


Figure 4

Despite the increase in the number of natural disasters (Figure 1, number of disasters from 1900 to 2011) in the last decades, Figure 2 shows a decreasing trend in the number of casualties. This could be attributed to increasing efforts and the improvements in disaster response management. Nonetheless, the number of affected people and the estimated economic damages (Figures 3 and 4) show an increasing trend.

Expectedly, decisions to be made vary widely between those that have to be made before and after the event. The decisions concerning preventive actions to mitigate the effects of future floods are very different from the decisions to be made just after the event strikes or several months later. The existing time pressure, together with the criteria of the involved actors, may be very different for each situation. The nature of the tasks to be performed and their temporal location with respect to the event are classified into four successive phases:

- Mitigation:** all middle and long-term actions and decisions aimed to prevent and mitigate the consequences of a future disaster, as long as it is not (known to be) imminent. Typical tasks of this phase are the identification of risk groups and vulnerability patterns and their treatment, or the development of prediction systems and emergency plans and the allocation of resources for them.

- Preparedness:** all short-term interventions once the available prediction systems have raised an alarm of an upcoming adverse phenomenon until it finally strikes. This includes setting off the emergency systems and evacuation plans, real-time tracking of the

hazard, analysis of the most probable scenarios, and reinforcement of critical infrastructures. This phase also includes some long-term decisions such as inventory prepositioning and network design.

- Response:** saving lives, characterized by a short duration with high emergency and high uncertainty. The first response phase is the rescue and urgent medical assistance of injured and affected people, which, depending on the disaster scenario, may last around one week from the moment of the disaster event. The middle-term response phase is estimating and mitigating the potentially unattended first needs of the affected population as a result of possible damage to life-line infrastructures and resources such as shelter, ordinary medical assistance, water and food supply. This middle-term stage usually involves the delivery of aid from outside of the affected zone and can last for weeks or even months from the moment of the disaster.

- Recovery:** achieving efficiency, characterized by long duration with low emergency and low uncertainty. This includes all long-term actions and decisions aimed to recover normal functioning of the affected community and reconstruct the social fabric, including life-line resources, services and infrastructure, and necessary improvements in order not to repeat the specific vulnerabilities shown by the affected groups and places. Sometimes, after certain disasters, a periodic flow of humanitarian aid will be needed to support particularly vulnerable people, which is outside the scope of disaster management.



The above division into phases is clear from a temporal and conceptual point of view. However, phases are not independent of each other and most of the time, are overlapping (e.g., attracting, interacting and managing of donors are continuous all over the process). Furthermore, the disaster management process is a non-stop cycle, in which each phase is based on the previous ones.

The management of emergencies and disasters is a complex process that involves several autonomous agencies to collaboratively mitigate, prepare, respond, and recover from heterogeneous and dynamic sets of hazards to society. Agents involved in disaster management usually depend on the type of disaster, its consequences and - since the vulnerability of the affected area is a key factor - the place where it strikes. In general, these agents can be classified into three levels:

- *Local level:* the first response level, usually addressed by local agencies, civil society organizations and civil protection. Typically, this level of emergency is not declared as a disaster.
- *National level:* the army and national civil protection, governmental organizations and NGOs are usually involved when an emergency is defined as a disaster. Sometimes, international organizations with local offices also participate at this level.
- *International level:* foreign governments and inter-governmental organizations, international NGOs for disaster response and the United Nations Agencies. Coordination at this level is a crucial matter, usually performed by OCHA (Office for the Coordination of Humanitarian Affairs) of United Nations, and the IASC (Inter-Agency Standing Committee), primary mechanism for inter-agency coordination, including key UN and non-UN humanitarian partners. This level is reached when national capacity of response is not enough (due to the scale of the disaster and/or the vulnerability of the country) and the national government authorizes an international humanitarian operation.

Since the types of agents involved are very different, a relevant question is: who are the decision makers? It is also important to recognize that the affected people are part of this decision process. Owing to the multiple actors involved and the complexity of the tasks addressed, decision-making processes in disaster management are extremely difficult.

*Humanitarian logistics* refer to the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials as well as related information, from the point of origin to the point of consumption for the purpose of meeting the end beneficiary's requirements and alleviate the suffering of vulnerable people (Humanitarian Logistics Conference, 2004 Fritz Institute). According to this definition, humanitarian logistics also appears in other contexts different from disaster management; for example, the World Food Programme (WFP) and the World Health Organization (WHO) develop operations that can be considered humanitarian logistics but are not related to a response to any particular disaster. However, it is in disaster management where the application of humanitarian logistics is more complex and difficult and where the expertise of operations researchers in dealing with difficult logistics problems can make a difference.

The problems arising in the management of humanitarian supply chains in the context of disaster management differ from the ones in business supply chains, as pointed out among others, by Balcik and Beamon (2008) due to the unpredictable demand, geographic location, type and quantity of commodity, short lead time, suddenness of demand for large amounts of a wide variety of products and services, lack of initial supply, human resources, technology, capacity and funding.

In order to help in these difficult decision making processes, different mathematical models are being developed. Altay and Green (2006) review literature on Operations Research models for disaster operations management up to 2005. Caunhye et al. (2012) survey optimization models in emergency logistics, highlighting the main difficulties and future research lines, while Van Wassenhove and Pedraza (2012) focus on the description of Supply Chain Management best practices that should be adapted to humanitarian logistics. Shortly, a book edited by Vitoriano et al. (2012) devoted to decision aid models for disaster management and emergencies will appear, including several surveys and new proposals.

Information systems for humanitarian logistics focusing in most cases on inventory control and information management, has increased during the last years. One of the first and most complete systems is the Humanitarian Supply Management System (SUMA) developed in 1992 by the Pan American Health Organization and the Regional Office of the World Health Organization. Mainly used as inventory support by many organizations, SUMA was in use until 2005. It was replaced by Logistics Support System (LSS), which facilitated information exchange among NGOs, donors and affected countries.

Another important system, focused on tracking supplies and financing from donation to delivery, is the Humanitarian Logistics Software (HLS). It was developed in 2003 by the Fritz Institute in collaboration with the International Federation of the Red Cross (IFRC) and Red Crescent, and was replaced in 2007 by HELIOS. The software enabled an increased transparency of donations and speeding up the relief chain.

Some other systems also used worldwide are the following: DMIS (2001), developed by The International Federation of Red Cross to allow access to real time information on disaster trends, available resources and databases; LOGISTIX (2006), developed by Doctors without Borders for inventory control of medical products; open source tools SAHANA (2004) and HFOSS (2006), developed by the Lanka Software Foundation and the HFOSS Institute, respectively.

It is important to note the gap between the decision aid models developed in the academic world and the systems actually used in practice by the organizations. We believe that this gap separating academics and practitioners needs to be narrowed. The information and communication technologies are becoming a key element in disaster management. Their use is growing among the agencies responsible for the management and the affected population (as we have seen in recent disasters in the use of mobiles, internet, etc.). However, it is time that these technologies take the step from being mere information management tools to producing intelligent suggestions that will help managers in the decision making process. In this framework, Operational Research must become the key tool for disaster management. 

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