

Editorial

The New Year celebrations are something of the past and I would think operations researchers worldwide are hard at work seeking solutions to complex problems!

From a sport perspective, 2010 is the year of the Soccer World Cup with many millions of people across the globe following this great event. Being from South Africa, it will be very special for us not only to welcome so many foreign visitors, but also because this will be the first time the event is being hosted in Africa. Travelling around one observes all the preparations taking place - road infrastructure and airport upgrades; a new rail commuter system is being built in the Johannesburg area that will hopefully be partially operational when the event starts. These are just a few examples of frantic preparations. We look forward to a great World Cup!

At the end of 2009, the three-year term of office of the IFORS Administrative Committee (AC) came to an end. Appropriately IFORS President Elise del Rosario reports in this edition on the activities and achievements of the AC over this three-year period. On behalf of the entire international OR community, we would like to thank them all for their dedication and commitment to run the activities of IFORS. From Elise's report it is clear that great progress has been made on many fronts within IFORS. Well done and congratulations!

The work, however, never stops and there are always new challenges. We would therefore like to welcome the new IFORS AC committee and the various portfolio members - we look forward to working and interacting with you. The March 2010 newsletter will introduce the new members appropriately.

This edition of the newsletter contains a short introduction to the Uruguayan OR society, which joined IFORS last year as the 49th member society. This is a small society but they have been active for many years. The Operations Research Society of South Africa (ORSSA) celebrated its 40th anniversary in September last year. One of the youngest members of that society was asked to reflect on this event and give her views on what turned out to be a very special occasion. It was very noticeable at the ORSSA conference that a large number of students presented their work. All of these presentations were excellent and of a very high standard - it bids well for OR in South Africa. There is also an article on the German OR society by Heiner Müller-Merbach. The article appeared in the newsletter that was issued to all the delegates to the EURO conference held in Bonn in July 2009. The Operations Research Society of Eastern Africa (ORSEA) held its 5th conference in Dar es Salaam, Tanzania, with Jim Cochran from the USA reporting on the conference. This society remains very active, which is very encouraging, given the initiatives of both IFORS and EURO to promote OR in Africa over the past number of years.

This newsletter carries two feature articles. A previous IFORS President, Andrés Weintraub, reflects on 40 years of OR in forestry. Andres is ideally suited to do this short review because of his many years of experience in the field of forestry. As is the case in many fields there is still a whole range of challenges facing OR in the field of forestry. The other article is written by a young researcher from Spain, Laia Ferrer-Martí, on an optimization model that was developed for a small electrification project in Peru. This work was presented at the EURO working group for OR in Development in Remagen just prior to the EURO conference in Bonn. It is a very interesting case study on the implementation of renewable energy in a very remote area. It also addresses the aspect of sustainability - very relevant and interesting.

A short article is published on the first IFORS secretary, Margaret Kinnaird, who passed away in 2007. For this first time a book review appears in the newsletter on a topic that is of huge relevance given the terrible situation in Haiti.

Finally I would like to thank all those who contributed to this edition of the newsletter and, as always, I would like to extend an invitation to anyone that wants to contribute in whatever way by sending me material.

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The participants in the JIIO-2008 workshop; AUDIIO board and award-winning Professors appear in the middle and the right side of the first row. See page 5 for the complete article.



Three years into the IFORS 50th

The 2007-2009 AC was in a unique position to steer IFORS into its 50th year. At the beginning of its term, the incoming AC revisited the objectives set by its founders and on this basis, set its sights on strengthening the professional bonds among the societies, regional groupings, and IFORS by “providing appropriate resources, creating links and communication avenues, as well as acting as a catalyst for the transfer and dissemination of ideas” (Del Rosario, 2007).

◀ *Elise del Rosario*

It was no doubt an enormous task, but tasks have a way of becoming manageable when shared among very responsible and dedicated individuals. IFORS was fortunate to have such people in the AC, who shared the tasks as follows:

Elise del Rosario <i>Philippines</i>	President, general oversight, administration, newsletter and website
Thomas Magnanti <i>USA</i>	Immediate Past President, adviser
Michel Gendreau <i>Canada</i>	Vice President, Publications, ITOR, IAOR, other publications
Peter Bell <i>Canada</i>	Treasurer, financial management and Teachers' Workshops
Tatsuo Oyama <i>Japan</i>	VP representing Association of Asia Pacific Operations Research Societies (APORS), regional scholarships, new societies
Horacio Yanassee <i>Brazil</i>	VP representing Asociacion Latino-Ibero-Americana de Investigacion Operativa-Latin American Ibero Association on Operations Research (ALIO), regional scholarships, new societies & International Conference on OR for Development (ICORD)
M. Grazia Speranza <i>Italy</i>	VP representing The Association of European Operational Research Societies (EURO), regional scholarships, new societies
Michael Trick <i>USA</i>	VP representing The Association of North American Operations Research Societies (NORAM), Conferences, 50th Anniversary, IDL, website review committee, bylaw amendment, conference manual review
Mary Magrogan <i>USA</i>	Secretary, general administration

An overview of the team's output, classified according to the objectives set, follows.

Creating links and communication avenues

This was perceived as a key area that needed attention. The regional VPs were tasked to be actively involved in the activities of the APORS, ALIO, EURO, and NORAM and its member societies. In response, they consistently brought to the attention of the AC the concerns, requirements for programs, and conferences in the regions. They were proactive in seeking the creation of new societies and represented IFORS in regional conferences. The secretary referred to them problems of communicating with the member societies in their regions.

New Societies

The energy of the VPs could be seen in the **new societies** which were welcomed into the IFORS fold: Slovenia (EURO) in 2007 and in 2009, Uruguay (ALIO) and Iran (APORS). OR societies from Peru (ALIO), Nepal (APORS), Romania (EURO) and Estonia (EURO), on the other hand, are in various stages of their application.

As President, I tried to get visibility for IFORS by complementing the regional officers' **presence in conferences**, to wit: 2007- Prague EURO Conference, ORSP's 20th Anniversary, ORSJ's 50th Anniversary; 2008- ORSC's Quadrennial Conference; 2009- Jonathan Rosenhead@70, Bonn EURO Conference, ISORA, and APORS.

Resource and personal time limitations do not allow for physical presence in all member society events, making it essential to have a regular and consistent vehicle by which information on the happenings in the global OR community can be shared. This was the role set for the **IFORS News** and the **IFORS website**, two initiatives that were put under the direct supervision of the President.

IFORS News

The IFORS News takes over from the IFORS Bulletin last published in 2000. While the Bulletin was a collection of member society announcements, the IFORS News under the editorship of **Hans Ittmann** (*South Africa*),

was able to provide the membership with a quarterly update of relevant and refreshing perspectives on the OR discipline. National events from member societies, reports from the IFORS scholars, perspectives both from IFORS distinguished lecturers and past IFORS officers, write ups of IFORS Prize winning papers, scholarly takes on various OR topics, Editorials from all the AC members, and even the latest news on the election of an Operations Researcher to the Prime Minister post of Japan were but some of the topics covered in the last three years. The IFORS News also covered main activities and initiatives of the Developing Countries Committee - it will be remembered that Hans had previously edited the *Direct Connection to Developing Countries* newsletter before he was handed the role of covering all IFORS activities through the IFORS News.

Aiming to provide member societies with a well balanced mix of IFORS news, insights and researches, the editor continuously innovated on ways of bringing interesting and timely news to its members. All the issues were downloadable from the IFORS website and alerts sent to the national societies when the issues became available. Only the June issue featuring the Annual reports was printed for distribution at conferences and sent to the members by post.

IFORS Website

On the other hand, the website evolved from the version developed and maintained several administrations ago by its dependable and long-time webmaster, **Moshe Sniedovich** (*Australia*). A professional web developer, Wilwix.com, was engaged to make the **IFORS website** an even more powerful tool for ideas exchange. Initial activities involved changing the “look and feel” of the site, putting in an improved layout and navigation as well as a news management system. The RSS Feed and Search facilities were also put up, soon after the Language Translation facility was used, both to gather information from the non-English member society sites as well as to provide visitors the option to view the page in another language. At the same time that the site was migrated to a new service provider, final additions to Moshe's TutORial modules, a web-based source of tutorials on OR/MS topics, were made. > >





In the next two years, activities included searching for national society sites and providing links to them, updating national society information, putting up a photo gallery, posting announcements for member society conferences, and introducing a members' area for on-line voting and discussion of IFORS and OR-related issues. The site remained current through constant updating of information. The continuously evolving web technology kept the web developer busy in looking for strategies that will make the site easier to access and maintain.

Kindred Societies

Attempts were made to restore and continue the links with kindred societies, but these did not yield results for the period. Reactivating old linkages and continuation of joint activities with related societies remains in the "to do list."

Providing Resources

During the past three years, many proposals for funding were discussed in the AC meetings. In its evaluations, the AC was guided by the extent to which the funding will bring IFORS closer to its objectives. Projects that had been prioritized for funding were those that involved contributing to the development of OR students and teaching skills, as well as to the improvement of OR practice in developing countries. Meanwhile a survey project that would provide a critical information resource for practitioners was also approved during the period. The IFORS Distinguished Lecture (IDL) program has, over the years, continued to provide regional conferences the opportunity to learn from internationally acclaimed OR experts.

For Students

The ALIO and EURO regional VPs were very active in soliciting, screening and selecting candidates for an initiative that aims to establish a network of promising young researchers (with less than 10 years experience in OR) and encourage future collaborative work among them. Under this program, IFORS pays for the air fare of the IFORS scholars while the local organizers provide the accommodation, program fees and living expenses. IFORS

also contributes to the expenses of the local organizers.

IFORS scholars were sent, and a contribution to the local accommodation expenses were extended to the ELAVIO (Escuela Latinoamericana de Verano de Investigacion Operativa) 2008 in Peru and the ELAVIO 2009 in Mexico. On the other hand, two IFORS scholars were sponsored to the ESWI (EURO Summer Winter Institutes) 2009 in Spain.

IFORS also sponsored the EURO Working Group workshop on OR for Developing Countries, prior to the EURO XXIII 2009 Conference in Germany. The workshop provided a forum for doctoral students and others involved in OR and development to share and discuss their research activities; encouraged students to establish and maintain a research network; and fostered a research environment to support career development in a practical OR discipline. Apart from helping defray expenses of the participants needing support, IFORS also seconded a speaker to this conference.

For Teachers

Spearheaded by the US national society, Institute for Operations Research and the Management Sciences (INFORMS), the program aims to hone the skills of OR teachers and improve their teaching effectiveness. Under this program, speaker expenses were paid for by the sponsoring organizations. IFORS sponsored speakers for both the 2008 Latin IberoAmerican Congress on Operations Research (CLAIO) held in Colombia and the 2009 APORS conference held in India.

For OR in Developing Countries

OR practice in developing countries continued to be one of the focal points of IFORS.

ICORD

The sixth triennial International Conference on OR in Development (ICORD VI) was organized and supported by IFORS in Fortaleza, Brazil in 2007. A call for proposals that would lead to the organization of smaller workshops leading up to the next ICORD was subsequently issued. To be supported by an IFORS allocation of USD 10,000 intended to defray the cost of such

workshops, the new structure aims to achieve:

- A greater momentum for the ORD programme through greater frequency and visibility of actions; and
- Improved focus for ORD activities on selected problem-oriented themes.

Three inquiries and a proposal have so far been received. A revision of the submitted proposal was requested from the proponent.

OR in Africa

During the period, IFORS provided funding for the Operations Research Practice for Africa (ORPA) conferences for 2007 (ORPA2) and 2008 (ORPA4). The ORPA2 organizing committee was chaired by DC committee co-chair, Theo Stewart (*South Africa*). While ORPA2 focused on applications of OR outside of South Africa, ORPA 4 focused on the use of operations research to address urban transportation and water resource management issues in Africa. ORPA4 was intended to help participants working on water or urban transportation problems in Africa to better understand how operations research could help them resolve problems.

During the Triennial Conference held in Sandton, EURO and IFORS joined hands in encouraging OR people from African countries to attend the conference. Together with EURO, IFORS sponsored 25 participants coming from Africa and other developing countries. The Local Organizing Committee took care of screening and selecting from among the applicants. Sponsorships for registration, travel and accommodation were extended, depending on the needs of each applicant.

IFORS Prize for OR in Development

Presided by IFORS Prize Chair Paul Fatti (*South Africa*), the 2008 competition is a continuation of a tradition that was started during the 1987 IFORS Triennial conference. The program aims to bring to the fore outstanding works that show how OR has been used to help specific organizations in their decision-making process within the context of a developing country and emphasizing developmental issues.

In order to attract more submissions and thus, gain a better view of the actual work in the area, the AC has approved the proposals put forth by the 2011 competition Chair Subhash Datta (*India*). Thus the Prize money was doubled to USD 4,000 and 2,000 for the first and runner up prizes, respectively. In addition, the requirement for authors to be nationals of developing countries had also been removed.

For Practitioners

While support for students, teachers and developing countries took the form of funds assistance, support for practitioners had been envisioned to come in the form of an information resource for practitioners. In 2009, the AC committed to undertake a project to carry out a **survey of OR practice** in countries belonging to IFORS. The survey had been designed to >>



enable a better understanding of the usage of quantitative tools, techniques and approaches and their impact on decision-making in organisations, as well as the background of the OR analysts involved. It is expected that the results will also enable IFORS to improve its promotion of OR in member countries. Responsibility for this project has been assigned to John Ranyard (UK) as project leader with support from Robert Fildes (Lancaster Management Science) and Alastair Robertson (Lancaster Management Science). Results are targeted for presentation at the 2011 conference.

For Regional Groupings

A regular IFORS contribution to regional conferences and which serves to recognize OR professionals who have excelled in their fields is the IFORS Distinguished Lecture (IDL). The nomination, screening and selection process for the 2008 IDLs was headed by Conference Chair. During this period, the following individuals were bestowed with the honour of delivering the IDL with the corresponding financial reward from IFORS:

2007, July	Robert Bixby
EURO, Prague, Czech Republic	
2007, November	Ralph Keeney
INFORMS, Seattle, Washington, USA	
2008, September	Stavros Zenios
ALIO, Cartagena de Indias, Columbia	
2008, October	Michel Balinski
Washington DC, USA	
2009, June	Richard Karp
CORS-INFORMS 2009, Toronto, Canada	
2009, July	Christos Papadimitriou
EURO XXIII, Bonn, Germany	
2009, December	Jonathan Caulkins
APORS, Jaipur, India	

2010 IDLs have been selected as follows: Garrett van Ryzin for the 2010 ALIO/INFORMS conference in Buenos Aires and John Nash for the 2010 EURO conference in Portugal.

Enhancing transfer and dissemination of ideas

Conferences

Conferences provide perfect venues for the transfer and dissemination of ideas. Historically, IFORS was born when the vice-president of the Operations Research Society of America (ORSA) in 1955 sent a proposal for an international conference to the secretary of the UK society, the Operational Research Society (ORS). The result was the 1957 Oxford conference, the very first in a long line of IFORS triennial conferences. (Rand, 2000).

For this period, the 18th Triennial IFORS conference was held in July 2008, marking not only the first such conference on the African continent, (auspiciously coinciding with the South African national celebration of Nelson Mandela's 90th birthday) but also IFORS 50th year. A fitting golden year celebration

was arranged by the Conference Chair, which included sessions on the IFORS Past, Present and Future and at the conference banquet presentations of mementos to the national representatives who took turns addressing the audience. This was on top of the excellent technical program prepared by John Bartholdi (USA) and local arrangements chaired by Hans Iltmann. The unique tours and receptions provided a venue for social interaction and sharing of ideas.

The current AC was also involved in announcing the selection of the 2011 Triennial site, namely Melbourne, Australia. Only a single bid from Spain was received by the AC, rendering the selection of the 2014 Triennial site moot and academic. Nonetheless, a discussion forum was put on the website to encourage members to express their views on the 2014 site for the conference.

IFORS website

Where physical exchange of ideas may not be feasible, cyberspace discussions are the next best medium. At this point, use of the IFORS website as a tool for this purpose is starting to be explored, but admittedly comprises another item on the IFORS "to do" list.

Publications

Initiatives started during the administration of Tom Magnanti for the **International Abstracts in Operations Research (IAOR)** and **International Transactions in Operational Research (ITOR)** were pursued.

IAOR was first published in 1961 (Rand, 2001). The method of collecting, indexing, and publishing material did not change until 2007 when the plan to respond to the challenges and opportunities of the internet was put in motion. The IAOR system development sought to modernize IAOR by making it an "online-based" rather than a "print-based" product. Development activities to improve speed and comprehensiveness in acquiring abstracts and allowing access to online subscribers continued under the direction of **Hugh Bradley (USA)** and IAOR editor **David Smith (UK)**. With effect from the third issue of 2009, all issues are being produced using the "Editor's Workbench" which facilitates the electronic capture of materials. The workbench is continuing to undergo testing and refinements with the strong support of our publishers. These development activities accounted for the 81% increase in expenses for 2008. A net income increase coming from increased revenues and normalization of operating expenses is expected to be felt onwards of 2010.

For the period, ITOR appointed **Celso Ribeiro (Brazil)** as the new editor. He has since implemented various innovations on the composition of the editorial board and launching of special issues. The increase in pages required for 2008 and 2009 reflected the increased paper submissions that have resulted from these initiatives. Furthermore, the new electronic editorial office powered by Manuscript Central was launched in 2008, enabling a decreased refereeing time and in general, greater effectiveness of the refereeing procedure. Results for 2008 showed not only

an increase in the number of issues, pages and papers published, but also an impressive earnings increase of 31% over the previous year. In addition, the editor and the publisher have started the process of obtaining ISI recognition for the journal.

Administrative Aspects

These investments in publications have contributed to increased expenses. Combined with flat revenues and unfavourable exchange rate effects, operating income dropped considerably. The publications initiatives, however, are expected to pay off in the following years. Backed by a conservative investment strategy, the Treasurer is confident that IFORS remains in good financial health and is well-positioned to tackle its projects.

Apart from sound financial health, a well-oiled administrative support is essential to the effective functioning of any organization. As such, a review of administrative costs and tasks was undertaken during the period. Guidelines that set expectations in the provision of internal and external administrative services were produced.

The period also saw a review of the IFORS Bylaws. An Amendment to Bylaw 1 (e) of the IFORS statutes was submitted to the general membership and subsequently approved. The change eliminates the need to publish a volume to act as proceedings of the triennial conference. Also along the line of updating administrative documents, the conference manual provided to the member society bidders for the Triennial conferences was reviewed and changes incorporated.

A new way of meeting, i.e., through conference calls, enabled the AC to meet twice in the first year and 5 times each in the succeeding two years. It provided a way to discuss and monitor progress on the various initiatives on a more regular basis.

In my inaugural editorial as IFORS President, I stated: "In 2009, when this AC's term ends, IFORS turns 50 years old. This AC will work to see that IFORS reaches its 50th year resplendent in its rich history as well as prepared - and raring - to take on the challenges and the uncertainties of the future" (Del Rosario, 2007). At this point, the 2007-2009 AC can only wish that it has satisfactorily delivered on this promise and that the next AC, led by Dominique de Werra, will build on its successes and make up for its shortcomings.

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The Uruguayan OR Society joins IFORS

Asociación Uruguaya de Informática e Investigación Operativa (AUDIIO)
Informatics and Operations Research Uruguayan Association (IORUA)

Operations Research has developed extensively in Uruguay since it started in the 1960's. Its development was closely linked to the currently-called Computer Science Institute of the University of the Republic. The first Uruguayan Society of Operations Research and Computer Science, SUDIOC (Sociedad Uruguaya de Investigación Operativa y Computación) was created in that decade. The year 1973 was the beginning of a period in which the development of science stopped in Uruguay. However, it made a strong comeback after the country's democratic opening-up in 1984. From that moment on, the OR community in Uruguay has shown major advances, especially with respect to scientific training of human resources.

Since 1994, the OR scientific community in Uruguay has been involved in the activities of the ALIO, the Latin-Iberoamerican Association of Operations Research; it has received significant support both from ALIO and IFORS, particularly with respect to the exchange of students and researchers. The increase in professional and academic activities resulted in strengthening OR in Uruguay. The scientific, academic and professional solidity shown by the community in the last years allowed AUDIIO, the Informatics and Operations Research Uruguayan Association, to make the decision to apply to be admitted to IFORS. We are proud of being the 49th national member society of IFORS - part of a growing international OR community.

AUDIIO membership, currently about 40 strong, is composed of academics, researchers and professionals whose activities in OR, Information and Communications Technology and Computer Science have been very successful. Most of them are working in the country's single public university and in the main private universities. The current board of AUDIIO is as follows: President: Juan José Cabezas, Vice-President: María E. Urquhart and Secretary: Héctor Cancela.

The following international events in Operations Research have taken place in Montevideo, Uruguay and we have participated in them:

- IV and X ELAVIO, the Latin Ibero-American Summer School of Operations Research; in 1997 and in 2004.
- ICIL 2005 (International Conference on Industrial Logistics), 2005.
- CLAIO 2006, the Latin-Iberoamerican Congress on Operations Research, November 2006.

The national workshop JIIO (Jornadas de Informática e Investigación Operativa) allows the Uruguayan Computer Science, Information and Communication Technology and OR communities to exchange ideas and experiences about the work they have done during the year. In the JIIO of November 2008 and during the celebration of the 40th anniversary of the arrival of the first scientific computer in Uruguay, a general assembly of AUDIIO was held. On that occasion, honorary memberships were awarded in recognition of scientific and professional achievements. Professor Erwin Reizes and Professor Jorge Vidart, members of the group



▲ AUDIIO's President, Juan Cabezas, and Secretary, Hector Cancela, giving Professor Erwin Reizes the AUDIIO Emeritus Member certificate for his contributions and academic and professional achievements in the area of OR.

of founders of OR and Computer Science in Uruguay, were awarded honorary membership. Figure 2 shows AUDIIO's President and Secretary giving Professor Reizes the AUDIIO Emeritus Member certificate for his contributions and academic and professional achievements in the area of Operations Research. Figure 3 is a picture of the participants in the JIIO-2008; AUDIIO board and award-winning Professors appear in the middle and the right side of the first row.

The most important applications of OR in Uruguay, both from an academic and a professional point of view, are in the areas of Transportation, Logistics, Communications, Finance, Electricity networks and Re-engineering.

The methodologies mostly used are Combinatorial Optimization (heuristics, metaheuristics, mathematical programming, in particular stochastic programming and dynamic programming) and Simulation (discrete event simulation, Monte Carlo methods, variance reduction methods).

The first OR work done in Uruguay in the 1960's was a simulation system for electricity planning. The model is still used by UTE, the state electricity office that is the only one responsible for generating and distributing electricity in Uruguay.

What are the challenges for our society? Firstly, to continue strengthening the capability to generate knowledge in the area we are concerned with, as well as the capability to solve real problems in Uruguay. Secondly, to continue training competent students, researchers and professionals so that they can address, understand and solve both small and significant problems, those that affect the society and the individuals in Latin America and the world, without neglecting basic theoretical training. Thirdly, to continue strengthening the existing bonds of cooperation both with strong and weak societies, providing the latter with our strongest support. Finally, it is very important to us to strive for thoroughness, seriousness, reliability and high quality in our work.

María E. Urquhart

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Forty years in three days

As a newcomer to the Operations Research Society of South Africa (ORSSA), I had no real appreciation of what the proud “40” on my optimally organised conference bag meant. Sure, I knew it was ORSSA’s 40th anniversary, but what connotations do I have to 40? It’s a few years less than twice my age, it signals the onset of the male midlife crisis and possibly female menopause, it’s the mark after which it is officially risky to bear children and is also the minimum semester mark to qualify for exam entrance at most universities. Obviously my frame of reference was not too positive. Little did I know the rich tapestry of camaraderie, culture, experience and, more importantly, academic and professional excellence those two white numerals alluded to!

My colleague and I arrived late and wearied at the conference venue on the eve of the opening. However, after a generous glass of fine wine and a few deep draughts of Stellenbosch mountain air, I was surprised to find that even we were making jokes about pareto frontiers and the tabu tenure. Immediately comfortable, I surmised at what I could only describe as the smell of old friendship drifting between the conversations. The conference was smaller than I had anticipated but boasted a well-balanced cross section of different age groups. After much laughing, eating (and a little less drinking) we retired to our varied accommodation to prepare for a conference that promised to be a sociable tribute to gastronomy – if nothing else.

However, any doubts about the academic substantiality of the conference content were promptly banished on Monday morning by distinguished keynote speaker, Professor John Bartholdi, III, from Georgia Tech University. Stunned and inspired by the positive impact his warehouse order picking approach is having in industry, we were left to make the first of many difficult decisions – which presentation should I go to now? The presentations varied greatly and the presenters seemed genuinely passionate about their work. Admittedly, I frequently found myself drowning in unknown theory and equations and – though I usually made it back to the shore of understanding by the concluding slide – there were a few presentations that left me stumped. It was clear that the premise of most presentations was that of research and theoretical development but here and there examples of practical applications popped out.

The undoubted highlight among the two and a half days of intensive presentations (social events aside) was the ‘40th Anniversary Discussion’ held after lunch on the first day. Six panellists were asked to present their views on OR and ORSSA – past, present and future. Gerhard Geldenhuys and Dave Masterson kicked off by reminiscing about the early days of OR within South Africa and specifically the founding years of ORSSA. What was striking to me was OR’s prominence in industry in those first few decades and the excitement and activity within the Society. Panellists Marthi Harmse and Hans Ittmann – both active members and past Presidents – agreed that judging by membership and participation, the Society was healthy and stable but that there is a definite need to market OR and ORSSA more aggressively, seizing the many opportunities and needs in South Africa and Africa at large. >>



▲ ORSSA President Professor Sarma Yadavalli - toasting the society at its 40th anniversary.



▲ Professor John Bartholdi, left, was the international, plenary speaker at the conference.



▲ Dr Hannelie Nel - Winner of the Tom Rozwadowski medal for 2009.



▲ Dr Gideon de Wet - ORSSA Award for service to OR.



Lastly, three younger panellists, Jacomine Grobler, Ian Durbach and Darian Raad, gave fresh insight to what they perceived as the state of OR, the Society and future possibilities. Jacomine commented on her experience of OR in industry as an Industrial Engineer – confirming that the basic approaches still do wonders, even though the tools might have changed. Ian expressed concern that the network of “OR people” is stabilised by only a few key role players currently in academia and industry. To make this network more robust would require identifying and establishing not only new talent, but innovative fields of application. Darian Raad proposed that an online platform for OR be established, providing software tools for scientific management and inter-organizational collaboration / optimisation. A common, open-source API, with specialised OR libraries and standard data formats, would boost research productivity and allow for rapid software development and algorithm benchmarking. The platform could function as a marketplace for decision-support systems, environmental models and consulting services, and enable new types of problems to be addressed at a higher level, leading to improved economic efficiency and service delivery.

What excited me was the fervour with which the panellists and the audience alike engaged in discussion regarding very relevant issues such as OR in development, marketing OR more effectively and taking OR to the country's policy makers. If we really believe in “The Science of Better” then we should recognise the immense value of the solutions we could propose to African mega-crises such as poverty, food security, HIV/Aids and conflict. The views and opinions expressed that day gave me hope that ORSSA has more than just the expertise; it has the passion as well.

After a day of serious discussion and feverish notes – yes, I took notes – we were treated to an illustrious wine tasting experience, presented by Simonsig. Unfortunately the conference venue imposed a sixty minute time window on the sampling of the eight wines which, for the introverts amongst us, was not nearly enough time to loosen up. Understandably it was thus necessary for the socialising to be continued at the popular venues in town. By that time I was thoroughly benefiting from the conference. My mind was alight with interesting ideas, I was enjoying all the different people and starting to get a clue about why ‘40 years’ is such a big thing.

Finally it hit home on Tuesday evening at the gala dinner. Forty years is a lifetime of commitment, to excellence, to OR, to South Africa, to each other. People may have come and gone but the Society carried on. The evening was filled with prestige. Not only were the annual Tom Rozwadowski award for best published contribution and the Honours and Master's student awards announced, but three members were awarded Fellowships and one non-member a Category III recognition. I was tempted to think these latter awards trivial when considering the volume but as the CVs were read and the acceptance speeches made I realised I was privileged to be at this historic conference. The Society anticipates a future filled with excitement and opportunity, and even though time and resources may always be constrained, there is no shortage of new ideas and eager hearts.

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▲ **Marthi Harmse - New ORSSA Fellow.**



▲ **Professor Jan van Vuuren - New ORSSA Fellow.**



▲ **Theo Stylianides - New ORSSA Fellow.**



▲ **Nadia Viljoen (almost in the centre) and a number of young ORSSA members with the ORSSA President, Professor Sarma Yadavalli.**



▲ **Prof Giel Hattingh (ORSSA Fellow) and his wife.**



Progress in the Use of Operations Research in Eastern Africa & the 5th International Operations Research Society of Eastern Africa Conference



▲ The 5-Operations Research of Eastern Africa International Conference. White sands Hotel, Dar es salaam, Tanzania. 16-17 July, 2009.

The influence of Operations Research (OR) is methodically working its way across Africa. While the Operations Research Society of South Africa (ORSSA, www.orssa.org.za/) has been in existence for 40 years, has held well-attended annual meetings featuring influential keynote speakers for the past 38 years, and publishes its own biannual peer reviewed journal ORiON, (www.orssa.org.za/wiki/pmwiki.php?n=ORiON.ORiON) and quarterly newsletter, professional OR societies have only recently begun to establish themselves and function in other regions of Africa.



▲ Jim Cochran listening to a presentation.



▲ Jim experiencing Africa!

One such group, the Operations Research Society of Eastern Africa (ORSEA), launched itself and became active early in this decade. This group is making impressive progress in establishing an important role for itself in Eastern Africa and becoming an active participant in the worldwide OR community.

While ORSSA comprises five chapters (Johannesburg, Pretoria, Vaal Triangle, Western Cape, and Kwazulu-Natal) from various regions of a single nation (South Africa), ORSEA takes advantage of the commonality in the challenges faced by East African nations and objectives of OR in these nations, and organizes itself by national chapters in Kenya, Tanzania, and Uganda. The ORSEA officers are now actively engaged in discussions with representatives of the OR communities in Rwanda and Burundi, and hope to foster the establishment of ORSEA chapters in these countries very soon.

The ORSEA recently held the 5th International Operations Research of Eastern Africa Conference at the White Sands Hotel in Dar es Salaam, Tanzania. The conference, which was jointly sponsored by the University of Dar es Salaam Business School, Makerere University Business School and University of Nairobi School of Business, was held on the 16th and 17th of July 2009 and attracted approximately 100 participants from Tanzania, Kenya, Uganda, and Rwanda as well as Great Britain, Italy, and the United States. The guest of honour was the Honourable Dr. Shukuru Kawambwa, Minister of Infrastructure Development for the United Republic of Tanzania. While Dr. Kawambwa

graciously acknowledged the contributions OR has already made to the quality of life in Eastern African nations, his focus was squarely on the conference theme (OR in Emerging Economies) as he passionately and knowledgeably addressed OR's potential for contributing to the resolution of persistent developmental problems in the region.

The two day conference comprised fifteen sessions and fifty-six research presentations on a wide variety of topics. As has been true of other OR conferences I have attended outside of North America and Europe, this conference was very strongly oriented toward applications. Recurring themes included the tourism industry, agriculture, finance and investment, trade, and education. Within these areas there was a great deal of discussion about supply chain management, quality, and soft OR. Presenters generally dealt more with the outcomes and implications of their research than with problem formulations and solution algorithms, and I was fascinated by the myriad of applications to problems with which I had little prior knowledge - I have heretofore had little exposure or need to understand supply chain issues faced by Tanzanian banana farmers, threats to food security for Internally Displaced Persons (IDPs) in the greater Trans Nzoia district in Kenya, or determinants of moral hazards in micro finance. The conference also featured an impressive banquet that included a fine meal and a memorable sukuma snake dance with two large pythons! >>



The ORSEA has a full agenda as the organization moves forward. During the conference, the officers of ORSEA met to discuss several issues, including:

- Time and location of the 6th International Operations Research of Eastern Africa Conference, as well as efforts to better promote ORSEA conferences and attract more participants from outside Eastern Africa. The ORSEA officers understand that it can offer its conference participants inviting cultures as well as the striking landscapes and wildlife, such as the Ngorongoro Conservation area, Bwindi National Park, Mt. Kilimanjaro, the Maasai Mara National Reserve, Serengeti National Park, Lamu, Mghinga National Park, Zanzibar and Pemba, Tarangire National Park, Lake Turkana, Ruaha National Park, Maralal, and the Virunga Mountains.
- Ongoing efforts to work with representatives of the OR communities in Rwanda and Burundi to establish ORSEA chapters in these countries, which together with Rwanda, Tanzania, and Kenya form the East Africa Community;
- Need to establish an ORSEA website; and
- Plans to establish a peer-reviewed OR journal for Eastern Africa to be published by ORSEA.

The organizers of the conference and the officers of ORSEA (Prof. Isaac M. Mbeche – Chairman, Dr. Marcellina M. Chijoriga – Vice Chairperson, Prof. Waswa Balunywa – Vice Chairman, Dr. Gituro Wainaina, - Secretary General, Dr. Isaac Nkote – Treasurer, Prof. Erasmus S. Kaijage - Organizing Secretary, Mr. Musa Moya - ORSEA Country Representative (Uganda), Mr. John K. Kenduiwo - ORSEA Country Representative (Kenya) and Dr. B. Mutagwaba - Country Representative (Tanzania)) did an excellent job – the venue was beautiful (the adjacent Indian Ocean beaches adjacent to the White Sands Hotel and the views of the Bongoyo Island Marine Reserve were spectacular) and the presentations were interesting and timely. I enjoyed the opportunity to learn from my Eastern African colleagues both in and outside of conference sessions and hope I established several long term collaborative relationships. I certainly recommend that you participate in the 6th International Operations Research of Eastern Africa Conference, which will be held at the Makerere University Business School in Kampala, Uganda on October 14 and 15, 2010. The theme for the conference is 'Innovation in OR and Economic Transformation.' The organizers hope the exciting opportunity to interact with researchers from around the world and enjoy Lake Victoria, the Kasubi Tombs, the Uganda Museum, Bujagali falls, and several nearby game reserves and eco-tourism sites will entice you to attend this conference. For more information contact Conference Chair Musa Moya of the Makerere University Business School at mmoya@mubs.ac.ug or +256-772-564-130.

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In Memoriam: Margaret Kinnaird Allen 1917 - 2007

I have just heard that Margaret Kinnaird died just two years ago. She was the full-time Secretary of the Operational Research Society(U.K.) in 1961 and was appointed to run the office in Cannon Street, London. IFORS had come into existence in 1959 and held its first meetings in Aix-en-Provence. For the first nine years the Federation was headed by a Secretary General and a Treasurer. From 1968 the Secretary General was re-titled President.

Inevitably members relied on her experience and knowledge when organising the various Society events.

In 1961 IFORS wished to have a permanent Office rather than rely on the services of the Secretary General's secretary. The O.R.S. agreed to provide this facility from their London Office and Margaret undertook this task in parallel with her Society duties. It was particularly appropriate that she was in charge of the office for the third IFORS conference in Oslo in 1963. She was proud to show off the sights of the city and to introduce us to the culinary delights of putrefied fish and Venison.

Older members will remember her as a cheerful and helpful lady but she had a difficult early life.

From a few personal snippets of conversation I believe she came to the U.K. at the age of 19 from her native Norway and at the beginning of the war married a British pilot who was killed in action. Subsequently she was parachuted back into Norway and acted as an undercover agent until the end of the war when she returned to Britain. I do not know where she worked before undertaking our appointment. She married Harry Allen, a member of the ORS, shortly before she retired at the time the U.K. operation moved to Birmingham in 1976.

She was succeeded by Mrs Helle Welling who was secretary to Professor Arne Jensen who was the President of IFORS at that time. Helle has written:

"I was IFORS Secretary from 1976 to 1998. I did have some knowledge of IFORS when I took over the Secretariat from Margaret Kinnaird. But Margaret became my mentor. She conveyed to me the IFORS spirit. When the take-over date of the Secretariat approached, she invited me to come and stay with her and her husband at their home in Wales. She was very anxious that the IFORS Secretariat activities were properly transferred. Continuity was important. I stayed about 5 days with her and I must admit that we did not look very much at the IFORS files. Instead we talked and talked, and in the most natural way, and without my noticing it, Margaret conveyed to me what IFORS was about. I am very grateful for having functioned as the IFORS Secretary, and I dare say that had it not been for Margaret and her wise and humorous way of conveying the IFORS spirit to me, I would not have been able to work for so many years as the IFORS Secretary. I owe her a lot. We remained friends and in contact throughout the years and I was very saddened when I learned about her passing away."

Margaret's influence on the foundation of IFORS and its early days were immense and we all owe a debt of gratitude to her for its success.

K. Brian Haley

(IFORS President 1992-1994)

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50 + 3 Years of OR Institutions in Germany

The institutions of Operations Research in Germany, beginning in 1956, include a variety of foundations, mergers, etc.: AKOR, DAUF, DGOR, DGU, GMÖOR, GOR (I) and GOR (II). A brief history of German OR and its institutions was published in German in OR News by Müller-Merbach (2007), seconded by Stahlknecht (2007) and Wiezorke (2007). The following contribution is based on those publications.

◀ **Heiner Müller-Merbach**

Two roots of Operations Research in Germany

The development of Operations Research (OR) in Germany is quite different from that of many other nations.

The term “operations research” or “operational research” (OR), respectively, was probably first mentioned in Germany by Siedentopf (1949). He gave an introduction to this field, particularly from a perspective of physics and mathematics. Four years later, Knayer (1953) gave a more enterprise oriented introduction to OR. Time was ripe to incorporate OR into science and liberal arts.

OR in Germany seems to have two major roots:

- One root was mathematics and its many branches, such as classical optimisation (calculus), linear algebra including matrices, probability theory and statistics as a basis for stochastic processes and simulation, combinatorial mathematics and diophantine equations (as a basis for integer programming etc.). It should not be forgotten that Leibniz (1646-1716) invented “computation with 0 and 1”, the dual number system, the basis for IT.
- The other root of OR in Germany was the well established field of business administration (Betriebswirtschaftslehre; BWL). Several publications kind of demanded appropriate mathematics.

German BWL was (and still is) quite different from British and American business administration and different from French “gestion d’entreprises”. The first Business Schools in Germany were founded in the 1890s. The core of German BWL was the holistic understanding of the firm, including production & logistics, sales & marketing, finance & accounting, accompanied by comprehensive views such as organisation, personnel, leadership etc. Particularly in production & logistics, many problems were considered (and partly solved) which could be fertilised and improved by OR techniques later on. Anyhow, prior to OR bill-of-material processing, lot-size optimisation and a few heuristics etc. for many different scheduling problems were in active use.

There was even an early LP problem presented and solved by Schmalenbach (1947, p. 66; see also Müller-Merbach 1973, pp. 144-147): the famous “zinc problem”. It was characteristic for the time right after World War II when raw material was scarce. Schmalenbach described a manufacturer who produced zinc vessels of three categories: I, II, and III. The amount of zinc per vessel was 2 kg, 0.4 kg, and 0.2 kg, respectively. The potential demand of the market was 1,000 vessels, 2,500 vessels, and 10,000 vessels, respectively. The profit per vessel was 0.40 RM, 0.30 RM, and 0.20 RM, respectively (Table 1); RM means “Reichsmark”, the currency prior to the “Deutsche Mark” (DM) which was introduced on 20th June, 1948. The total available amount of zinc was 2,800 kg.

Table 1: Schmalenbach’s „zinc problem“ (last column computed by column 4, divided by column 2)

vessel type	zinc per vessel (kg)	demand (vessels)	profit per vessel (RM)	profit per kg zinc (RM)
I	2.0	1,000	0.40	0.20
II	0.4	2,500	0.30	0.75
III	0.2	10,000	0.20	1.00

Schmalenbach asked for the solution with maximal total profit. LP was not yet available, and he solved it by means of the profit per kg zinc (last column of Table 1) which was 0.20 RM for vessels of type I, 0.75 RM for vessels of type II, and 1.00 RM for vessels of type III, related to the “opportunity costs” or “shadow prices”.

Schmalenbach suggested producing 10,000 vessels of type III first. That required 2,000 kg zinc. The remaining 800 kg zinc were just enough for additional 2,000 vessels of type II. The overall (and maximal) profit was $1 \cdot 2000 + 0.75 \cdot 800 = 2,600.00$ RM (calculated by the zinc) or $0.20 \cdot 10000 + 0.30 \cdot 2000 = 2,600.00$ RM (calculated by the number of vessels).

Schmalenbach regretted that only such simple cases with just one single raw material could be solved – i. e. prior to the invention of linear programming (LP).

Eugen Schmalenbach (1873-1955) was the most influential pioneer of German BWL. He would have become an enthusiastic user of LP if it were invented earlier.

Anyhow, BWL, i.e. German business administration, was well prepared for the integration of OR in the years right after World War II.

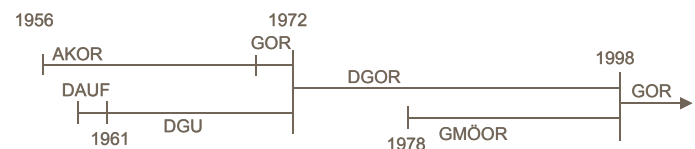
However, when the first German papers about OR were published in BWL journals in the early 1950s, the reactions of the BWL scene were quite controversial. Some readers applauded enthusiastically while others were afraid of the mathematics and the “non-economical thinking” of the OR mathematicians.

The first years of OR in Germany were thoroughly described by Brusberg (1965), a book of 413 pages, complemented by Müller-Merbach (1977, 1988, 2007) and others.

The German OR societies, a story of competition and mergers

The institutionalisation of OR in Germany (West) began 1956 and included seven societies (Figure 1), see also Gass and Assad (2005, p. 109) and Müller-Merbach (1973, pp. 10-12; 1977; 1988; 2007).

Figure 1: German OR societies (Müller-Merbach 2007, p. 6)



AKOR: It began 1955 when a study group of five visited the US in order to learn about the methods of OR and their applications. The journey was organised by the RKW (Rationalisierungskuratorium der deutschen Wirtschaft), and a report was published by the RKW (1958). An oral report was presented on 11th December, 1956, at an RKW meeting in Berlin. At that meeting it was decided to establish the “Arbeitskreis Operational Research” (AKOR). AKOR and its members were more or less practice oriented.

DAUF: In the late 1950s, many universities began to offer lectures in OR, and five scientific organisations (including AKOR) considered the foundation of a more academic OR society. For its preparation, >>



the five scientific organisations established the interim group “Deutscher Ausschuss für Unternehmensforschung” (DAUF) in 1960.

DGU: The purpose of DAUF was the foundation of the “Deutsche Gesellschaft für Unternehmensforschung” (DGU) which became final on 9th September, 1961. Thus, we had two societies for roughly ten years: the more practice oriented AKOR and the more academic oriented DGU.

DGOR: Since there were many double memberships, there was a tension to merge. Since AKOR was a subdivision of “Ausschuss für wirtschaftliche Fertigung” (AWF) it was necessary for AKOR to become independent first. This was done in 1971 by founding the (first) “Gesellschaft für Operations Research” (GOR), an interim solution. Anyhow, by 1st January, 1972, the “Deutsche Gesellschaft für Operations Research” (DGOR) was founded while AKOR (and GOR) and DGU were dissolved. DGOR existed for 26 years.

GMÖOR: However, not everybody was satisfied by DGOR, and they founded a new society called “Gesellschaft für Mathematik, Ökonometrie und Operations Research” (GMÖOR) by 1978. Thus, DGOR and GMÖOR existed independently for 20 years.

GOR: Finally, DGOR and GMÖOR merged and founded the (second) “Gesellschaft für Operations Research” (GOR) by 1st January, 1998.

In addition, there was an OR society in East Germany (DDR), but there was very little interaction between them and the societies of Figure 1.

The Journals

In 1956, two German OR journals were launched. From 1956 to 1959, AKOR and “Arbeitsgemeinschaft Statistische Qualitätskontrolle” (ASQ) published the journal „Qualitätskontrolle – Ablauf- und Planungsforschung“, a supplement of „Zeitschrift für Wirtschaftliche Fertigung“, the journal of AWF (see above). In 1960, it was renamed „Qualitätskontrolle + Operational Research“. From 1961 to 1971, AKOR published the independent journal „Ablauf- und Planungsforschung“.

Independent of any society, A. Adam and S. Sagoroff launched the journal “Unternehmensforschung” in 1956. Later on it became the journal of the DGU, founded in 1961 (see above).

With the foundation of DGOR in 1972, the new journal “Zeitschrift für Operations Research” was established, consisting of two series, “Serie A: Theorie” and “Serie B: Praxis”, as successors of “Unternehmensforschung” and of “Ablauf- und Planungsforschung”. It was renamed into “OR Spektrum” since 1979 and “OR Spectrum” since 2002.

In addition, DGOR began to publish a newsletter, the “DGOR-Bulletin” (May 1973 through February 1997: 65 issues). With the foundation of GOR, DGOR-Bulletin was replaced by “OR News” in March 1998, 35 issues so far.

International memberships

The German OR societies became active members of international networks, such as IFORS and EURO.

IFORS: In 1959, the “International Federation for Operational Research Societies” (IFORS) was founded by the three OR societies of UK, USA, and France. DGU joined IFORS in 1962. Since then, members of the German OR scene played a certain role in IFORS, such as:

- Müller-Merbach served as chairman of the Programme Committee of the 6th IFORS Conference, Dublin (Ireland) 1972.
- In the sixth Administrative Committee (AC) of IFORS, 1974/76, Müller-Merbach served as one of the two Vice Presidents.
- The 9th IFORS Conference, 1981, took place in Hamburg, and Dieter Pressmar served as chairman of the Organisation Committee.
- In the ninth AC period, 1983/85, Müller-Merbach served as President of IFORS.

EURO: The European subset of IFORS, the “European Association of Operational Research Societies within IFORS” (EURO) was founded in 1975. The initiator was Hans-Jürgen Zimmermann, RWTH Aachen, Germany. At the 6th IFORS Conference (Dublin, Ireland, 1972) he drummed up the European delegates and suggested to meet more frequently than every three years at the triennial international IFORS Conferences. Thus, the idea of “regional groupings” was born and EURO was the first one, followed by those of Latin America (ALIO), Asia-Pacific

(APORS), and North America (NORAM).

It was agreed that EURO Conferences should take place in any year safe for the “IFORS years”, that means in two out of three years, such as: 1976, 1977, 1979, 1980, ... 2007, 2009, 2010 etc.

So far, there has been one EURO Conference in Germany, i.e. 1991 in Aachen. Thus, EURO XXIII in Bonn, July 5-8, 2009, is the second EURO Conference in Germany.

Several Germans served as EURO officers:

- Hans-Jürgen Zimmermann, RWTH Aachen, was the first President of EURO and served from 1975 through 1978.
- Hans-Jürgen Zimmermann also served as chairman of the Programme Committee of EURO I, Brussels (Belgium) 1975.
- Ten years later, Christoph Schneeweiss, Universität Mannheim, served as Vice President, 1985 through 1986.
- Christoph Schneeweiss also served as President of EURO in the period 1999 through 2000.
- Gerhard Wäscher, Universität Magdeburg, served as chairman of the Programme Committee of EURO XIX, Istanbul (Turkey) 2003.
- The current Vice President of EURO is Gerhard Wäscher serving in the period 2008/2009.

EJOR: Alan Mercer (UK), C. Bernhard Tilanus (Netherlands), and Hans-Jürgen Zimmermann also launched the „European Journal of Operational Research“ (EJOR) and served as its Editors from 1977 through 1998, i. e. for 22 years. In these 22 years, they produced 111 volumes which cover over 3m in a book shelf.

OR Curriculae

German universities do not offer degrees in OR (save for RWTH Aachen). This is due to the fact that in most German universities OR is integrated in math programmes as well as in BWL courses. Thus, most university students in mathematics and in BWL have the opportunity to choose OR as a minor.

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Heiner Müller-Merbach

Kaiserslautern, IFORS President (1983 - 1985) ■





OR for RURAL ELECTRIFICATION projects in developing countries

OR has traditionally focused on the optimization of commercial companies' problems in developed countries. However, it can also be used to solve social problems and to promote human development. OR for development deals with classical routing, location, planning and scheduling problems, as well as social constraints and requirements. These OR applications are mathematically as challenging as any other and, in our opinion, can be much more inspiring and fairer. Here, we present the location and network problem of designing electrification projects for rural communities.

◀ **Laia Ferrer-Martí**

Electricity for development

In 2000, the United Nations established the Millennium Development Goals (MDGs): 8 targets to meet to assure human development around the world [1]. The MDGs set objectives to tackle key issues such as extreme poverty and hunger, primary school education, gender equality, maternal health, major diseases (AIDS, malaria, etc.) and environmental sustainability. None of the goals explicitly mentions the right to access energy and electricity, but it is accepted that a guarantee of energy/electricity access is indeed needed to fulfill the goals. In fact, there is a clear relation between electricity consumption and the Human Development Index (HDI), as shown in Figure 1 [2].

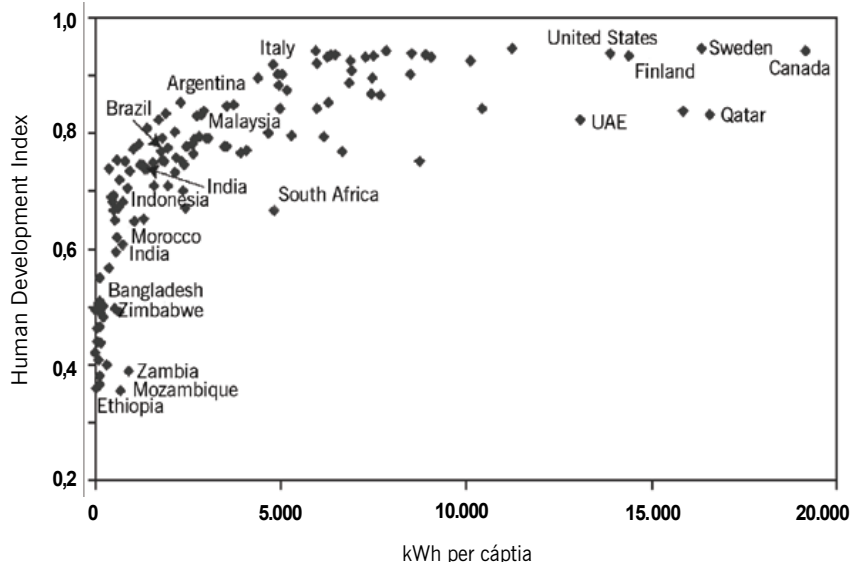
The recently published report entitled Energy Services for the Millennium Development Goals [3] states that it is necessary to "Provide access to modern energy services (mechanical power and electricity) at the community level to all communities" in order to achieve the MDGs, which were supposed to be fulfilled by 2015.

In 2004, over 2.500 million people depended on traditional biomass for cooking and heating, and about 1.6 billion lacked access to electricity [4], so a lot of work and effort is still needed. This lack of electricity particularly affects rural areas in developing countries.

The conventional strategy for increasing access to electricity in rural areas is to extend the national electrical grid. However, in some regions, due to an extensive terrain, a complex geography and the dispersed nature of villages, the expansion of the electrical grid would reach a limited number of people. Under these circumstances, autonomous electrification systems that use renewable energy sources are a suitable alternative to provide electricity to isolated communities, and are often much cheaper than grid extension. Moreover, one of their main advantages is that they use local resources and avoid external dependence, which can promote the long-term sustainability of the projects.

The available technical options include micro hydro, photovoltaic systems and micro wind. When water is available, micro hydro projects are usually the best option as they provide 24 h energy at a low cost per kWh. When there is no water, photovoltaic systems have frequently been chosen, although they are an expensive option. Wind power is also worth taking into consideration, though it has been used infrequently to date. In windy regions, wind systems can be much cheaper than photovoltaic ones. Moreover, wind turbines can be locally manufactured. The existence of local manufacturers facilitates system maintenance and has the advantage of promoting enterprise development. On the other hand, micro wind projects may be more difficult to design, especially due to the resource assessment that constrains the location of wind turbines. Thus, the key issues in decision-making in the design of an electrification project include the available resources, the technical capabilities of promoters, and the socioeconomic conditions of the region and the community.

Figure 1. Human Development Index (HDI) according to electricity consumption (kWh) per capita.



Wind electrification projects

Wind power has recently been used in electrification projects in Cajamarca, a region in the northern highlands of Peru [5]. The first demonstration of a community micro wind project in Peru took place in the village of El Alumbre. The project was promoted by the following non-governmental organizations (NGOs): Soluciones Prácticas – Intermediate Technology Development Group (Peru), Engineers without Borders – Catalonia (Spain), and Green Empowerment (USA) [6].

El Alumbre is located at 3,850 meters above sea level. It has 151 inhabitants and 33 families, who live in an area of 3.5 km². People in El Alumbre are mainly engaged in subsistence agriculture and livestock rearing. Most families subsist on dairy cows, sheep, guinea pigs, barley and native tubers. In the centre of the town are primary and secondary schools, a health centre with 3 permanent nurses and a church. >>





Figure 2. Centre of El Alumbre, one IT-PE-100 installed at a household and one SP-500 installed at the school.



Figure 3. Installation process of the turbines and the battery controllers.

The electrification project was designed to cover basic household needs and community services (the schools and the health center). In the first phase, 21 wind turbines of 100 W (IT-PE-100) were installed in 21 homes and a wind turbine of 500 W (SP-500) was installed in the school. In a second phase, 12 more family systems and a 500 W wind turbine at the health center were installed. Both types of turbine were models developed by ITDG and manufactured by local companies in Lima (Figure 2). At each point of consumption, the equipment included a controller, a battery bank and an inverter to facilitate the use of AC equipment. The inhabitants of El Alumbre actively participated in the installation process (Figure 3).

Wind turbines installed in each home cover the domestic use of electricity for 5 hours per day. Households use the electricity for lighting, weaving or knitting in the evenings, studying, listening to the radio and charging cell phones. Energy in the school powers four computers (with electronic encyclopedias) and a DVD for educational videos. The health centre, which provides care for people in 4 communities, now has electricity for lights and a vaccine refrigerator. As a result of the wind turbines, families state that they spend less on other energy sources such as kerosene or candles. Moreover, families have been using energy in a direct or indirect way to establish small business such as a radio station, a sweater manufacturer, and a cheese producer.

Improving wind electrification projects

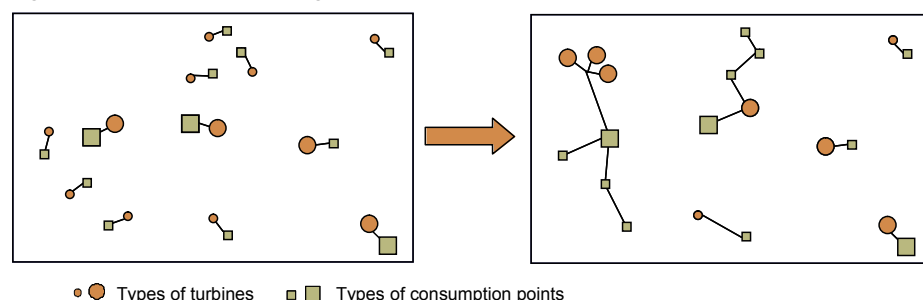
Due to the characteristic dispersion of households in communities, wind projects in the Andean region tend to install individual wind turbines at each consumption point. However, this solution scheme may have some potential limitations. First, in mountainous areas, the wind resource is not uniform, and may vary significantly from one point to another point of the same village. Therefore, the shortage of wind at some points may restrict the electricity consumption of some families. Furthermore, small individual turbines are proportionally more expensive than more powerful ones. Finally, individual systems are not easily adaptable to increases in demand: small increases may require the replacement or duplication of the entire system.

Alternatively, we propose a design solution that considers both individual generators and micro grids to ensure to meet the energy demand (Figure 4). Consumption points that are close to

each other could share the energy generated by more powerful turbines at a lower cost/energy rate. However, individual systems may still be the best option for isolated users, as micro grid extension may be too expensive. This solution has the following characteristics:

- The scheme does not constrain the energy of a consumption point to the wind resource of its location. Turbines can be placed at the windiest points and the electricity can be distributed to consumption points by means of a micro grid.
- The use of more powerful wind turbines is incorporated, to feed groups of consumption points at a reasonable distance. The cost of turbines is not proportional to their nominal power and the generated energy, so the use of more powerful turbines reduces costs.
- The system may be more easily adapted to increases in demand, specifically for those consumers fed by the micro grids. Extra turbines can be easily included >> in phases and their additional energy can be shared.

Figure 4. Individual and micro grid solution schemes.



The scheme of elements in these wind systems is as follows:

- As the energy generation is not constant and does not coincide with consumption, batteries are needed. The energy generated by the turbines is first stored in a bank of batteries and then consumed from the batteries.
- The capacity of the batteries is calculated according to the demand and the autonomy required, i.e. how many days with no energy production should be covered by the energy stored in batteries.
- Each bank of batteries has a battery charge controller (AC/DC) and an inverter (DC/AC) as the micro grid distributes in alternating single-phase current. Power relations constrain which turbines, controller and inverters to use.
- The micro grid design should take into account the voltage drop limit.
- At the consumption points that are fed by a micro grid, a meter is needed to limit the energy consumption of each user. Thus, the energy stored in the batteries is shared fairly between all the consumers.

The problem to address is the combinatorial problem of the location of each type of wind turbine and the design of the possible micro grids. The developed model also provides the location and sizing of the other equipment involved in the projects (batteries, inverters, controllers and meters). The optimization objective is to minimize the initial investment costs and meet demand and the technical constraints. We propose a model and mixed integer linear programming to solve the problem.

The model was initially validated by applying it to the real case study of El Alumbre. As available generation equipment we considered the turbines used in El Alumbre project plus two more powerful models, to be used feeding micro grids. In terms of demand, we generated different scenarios. All the solutions combined the use of individual wind turbines and micro grids, where the consumption points are closer to each other. In the high demand scenarios, the number of more powerful wind turbines and the number of micro grids was higher. All the solutions required lower initial investment costs than the use of individual systems. The range of obtained cost reductions was from 15% to 25%.

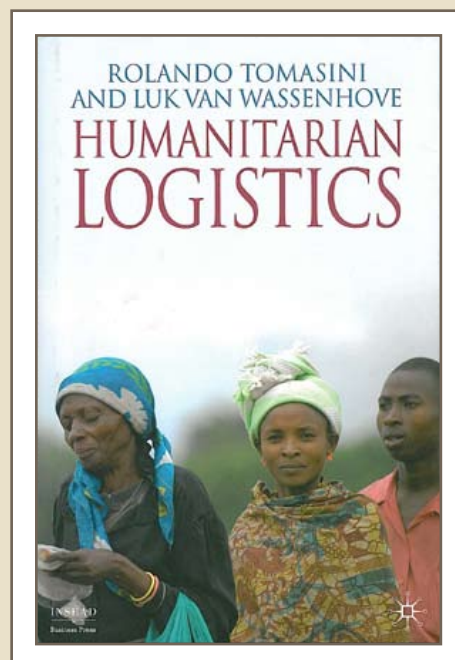
Improving electricity planning

The design of the electrification project is the last step in rural electrification planning, which involves identifying which communities to electrify, proposing the technology to use in each community, establishing priorities between the projects and communities, and designing the project in detail. A criteria-based decision must be taken at each step. Most of these are multicriteria decisions, in which technical and socioeconomics conditions must be considered.

NGOs, companies and governments are increasingly involved in developing policies to improve energy services and to spread renewable energy technologies. >>

BOOK REVIEW

The number of natural disasters and those man-made are plentiful and seem to be increasing annually. Given such a disaster, one of the first actions is to assist those affected. This is where humanitarian logistics comes into play. Medical supplies, food, clothing, etc. are some of the needs of those affected that have to be satisfied.



Humanitarian organisations have played, and are still playing, a vital role in supporting those who are suffering. These organisations have realised the need for more efficient and effective solutions to the logistics problems. Simultaneously, professionals such as Luk van Wassenhove got involved in relief operations and started focusing on providing better solutions. Working in an environment where disasters are on the rise, more complex, and where donor support is increasingly unpredictable, it became clear that anyone operating in this environment needs to understand the humanitarian space and the link to supply chain management. That is where the book, *Humanitarian Logistics*, originated from. The ultimate aim of the book is to sensitise those involved about the various and diverse issues experienced in the humanitarian community.

Humanitarian logistics is defined as “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 alleviating the suffering of vulnerable people. The function encompasses a range of activities, including preparedness, planning, procurement, transport, warehousing, tracking and tracing, customs and clearance” (Thomas, 2004). Noticeably there is no reference to profit, in this regard, as humanitarian organisations seek a balance between speed and costs in their supply chains.

Chapter 1 of *Humanitarian Logistics* focuses on logistics in humanitarian aid. Similarities are shown between commercial supply chains and those used for humanitarian relief. In a humanitarian supply chain, there is the flow of materials (or products), information and financial information, the same as in normal supply chains. However, two additional flows are present in humanitarian supply chains, namely people and knowledge and skills. The latter is very important in the humanitarian sector since each time a supply chain is re-established for a new disaster, the required skills need to be reconfigured, indicating the uniqueness of every supply chain. Humanitarian supply chains are designed similar to commercial supply chains and they also have to be agile, adaptable and aligned. There are differences, however, in that the objectives of a humanitarian supply chain are ambiguous, resources are limited, there is high uncertainty, urgency is acute while the environment is typically politicised. Speed in the supply chain is overriding at the start, after a disaster, to ensure as many lives as possible are saved. Complexity and dispersion are two fundamental characteristics of humanitarian supply chains. Relief operations can take place anywhere, any day, affect any numbers of people while it is typically not clear what should be contributed and what the state of the local infrastructure is. Another huge risk in humanitarian supply chains is the inherent coordination risks of matching supply and demand.

Humanitarianism is the topic of Chapter 2 and the authors show clearly that the three widely accepted principles of humanity, neutrality and impartiality must be present to constitute a humanitarian operation. These three principles define the humanitarian space and humanitarians live and operate within this space. Maintaining this space is very difficult; there are a number of key challenges that organisations face, namely ambiguous goals, impact, levels of influence, political humanitarian relations, funding, willingness and consent. Humanitarian operations are judged by their impact and humanitarian workers need to operationalise their mandate without compromising their principles or producing negative impacts.

Chapter 3 is devoted to preparedness, one of the four steps in disaster management. The other three are mitigation, response and rehabilitation. Preparedness can be defined as putting mechanisms in place to respond immediately to disasters to ensure that the right goods, at the right time, get to the right place and are distributed to the right people. >>



However, the difficulties of project design and the complexity of multicriteria decision-making may lead to solutions that are not well evaluated, causing failure and environmental or social impacts. Operations research can significantly help to reduce these problems and to improve the efficiency of projects by developing design models and decision support tools to aid the projects and the planners. It can significantly improve access to energy and electricity in rural communities, and promote human development.

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In putting preparedness plans in place, the five essential flows mentioned previously, namely materials, information, financials, people and knowledge flow, become critical. Up to fairly recently, one of the big stumbling blocks to better preparedness in the humanitarian sector has been the failure to recognise logistics as an essential element of the relief operation. Humanitarian organisations nowadays spend a lot of time and effort on developing plans, processes and protocols that need to be followed, thereby ensuring preparedness and fast response time.

Coordination is another very essential function in any humanitarian operation. In Chapter 4, this is discussed and, as in all the chapters, "stories" illustrate and explain the need of the function. Coordination between humanitarian organisations is needed but it should not add another level of bureaucracy – instead, it needs to add value. There are three levels of coordination, namely at international, national and the field levels. What is required and what happens at these different levels are outlined in detail. Every disaster or crisis has a life cycle with three main stages, namely a ramp-up stage, a sustained stage and finally, a ramp-down stage. At each stage, a different kind of coordination is required. Several factors affect proper coordination in emergencies. These are diversity of structures, funding, costs (coordination is expensive), branding (it is problematic if one agency's brand is linked to another's brand) and finally leadership. Successful emergency coordination is a mix of different styles for the different stages of the disaster life cycle, and needs to happen at different levels.

The next two chapters address two of the most crucial issues, namely information management and knowledge management. Information is the foundation upon which the humanitarian supply chain is designed, formed and managed. At the onset of a disaster, information flows to indicate the demand or requirements and soon after that, information flows back to indicate what is being supplied. Overriding in this process is the need for visibility, transparency and accountability around the information provided. It is also very important to understand the process of information flow. Firstly the data need to be gathered, and then need to be processed and disseminated. The next stage in this process is the audience – those to whom the information must flow; the information should be accessible, accurate and timely. One of the main challenges with any relief operation is to capture and channel the information appropriately.

Knowledge management is in essence the need and ability to learn from the past and tap into the "organisational memory" of people who were involved in past relief operations. By capturing such lessons learnt, one can ultimately add further value. With each disaster there is new learning and, with a proper knowledge management system in place, this learning can be retained for future emergency teams. Knowledge is created by capturing raw, unprocessed material such as facts, adding value to obtain information. Through interpreting and a decision-making process, knowledge is created. This information and knowledge need to be communicated and shared equally between partners, giving real collaboration. The authors show that knowledge is created and needed at different levels. Knowledge resides in the people, in processes, i.e. different levels of an organisation, but also among different organisations and lastly, knowledge resides in the context, providing the bigger picture. Given the fact that there is a wide spectrum of organisations involved in humanitarian aid, there are difficulties in sharing knowledge. A few of these are presented such as that knowledge is power, exchanging knowledge can be threatening, etc. Knowledge management is key in an environment where there is high staff turnover and where multiple crises happen simultaneously.

The final chapter of the book deals with all the aspects necessary for building a successful partnership between humanitarian organisations and the private sector. A comprehensive view is given of how to establish partnerships, the challenges in setting them up, the various forms of partnership, the process of transferring best practice, how to select partners and also how to make it work. Partnerships are vital if aid organisations want to succeed, since they don't have an option but to cooperate and collaborate.

Humanitarian Logistics is the first book on the topic and as such, is a welcome addition to the growing literature on the topic. It is not so much about logistics or supply chain management that is required for effective and efficient humanitarian logistics, but rather an essential outline and view on the humanitarian space, the way it currently operates, the many challenges that need to be addressed, etc. The book illustrates the wealth of knowledge that the authors have about humanitarian aid. They do succeed in sensitising those interested in working in this complex environment about the main aspects to take note of and the many pitfalls that exist.

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Humanitarian Logistics by Rolando Tomasini and Luk van Wassenhove, 2009, Palgrave Macmillan, England, pp. 178. ISBN-13: 978-0-230-20575-8. US \$ 29.95.





▲ **Andrés Weintraub, IFORS President (1998 - 2000)**

INTRODUCTION

Why do we look at 40 years? Basically the start of the use of OR in forestry can be dated to the mid sixties. This also corresponds to almost the time when I started getting involved with the area. In the initial stages, the main work in operational research in forestry was done by the US Forest Service which was the precursor in using linear programming in forest planning. The first system widely used was Timber RAM developed by Daniel Navon of the Pacific South West station in Berkeley, whom I worked with. He developed the first system by the US Forest Service which was used for long range planning.

The main decisions involved were which areas or which cutting units to harvest at given moments, when to do partial cutting, when to do total harvesting. Very long horizons were considered, usually of the order of 200 years which accounted for about two and a half rotations, given that trees in the US native forests mature at about 70 - 80 years.

Since then the use of OR in forestry has made very significant advances, both in methodologies as well as in use. Support tools for operational and tactical decisions were later developed, where temporal and in particular detailed spatial definitions become important. The use of OR in private firms became very significant. New methodologies were developed as they became necessary to solve increasingly large scale complex problems, such as Mixed Integer Programming and heuristics. A main theme emerged with force in the 70's and 80's related to environmental issues, which enriched the OR agenda in forestry. Vastly improved technologies in hardware and software allowed to tackle increasingly complex problems.

In the next sections we try to tell the story of the developments in this area, in terms of methodologies, applications, and some of the actors involved.

THE EARLY HISTORY

The story of why LP was used is interesting. In the sixties there was a high pressure from

FORTY YEARS of OR in Forestry

private enterprises to harvest in public lands. The US Forest Service owns a huge amount of timber land and it usually called for bids from companies, who then got the right to harvest those areas. In order to reduce the pressure from firms to harvest too much timber, Congress passed a law stating that long range plans should be done in such a way that in any given period – periods were 10 years long – there would be non declining yields. This means that plans should be done in such a way that guaranteed that in any future period, there would not be a decline in timber production from the previous period. In that way, the forest service could maintain the position that there could be no over harvesting in the present because then they could not guarantee that timber would not fall in production in future periods.

The tool used at that time was simulation. Planners used simulation models to test promising harvesting plans through the horizon: “OK, this decade we will harvest these areas and in future decades these other areas” and they would make a plan in such a way. When they tried to test these decisions through simulation, given now the constraint of non-declining yields, this was an enormous difficulty in finding feasible solutions. What had happened was that due to these constraints, the feasible regions became very small and the handmade proposed solutions could not determine feasible ones. Given the well known capacity of LP to find feasible solutions, it led to the introduction of linear programming.

That was not the end of it. LP started being used by the Forest Service at large and there was even a law of Congress stating that all regions had to use Timber RAM to plan long range for each decade.

And then came what can be seen as the first environmental concern. That first model, Timber RAM emphasized timber production and just considered environmental concerns in the sense that plans could leave out some areas from harvesting to preserve the native forest. A very strong environmental group, the Sierra Club, then filed a lawsuit against the US Forest Service for using linear programming. That's remarkable! It was not against the decisions taken. It was against the use of linear programming. I was working at the US Forest Service on a grant of the University of California Berkeley Operations Research Center; and remember my boss, Daniel Navon, spending hours and hours, even days, with the lawyers. This was finally settled.

Since then – we're talking here about something that happened almost 40 years ago – there have been many successful applications and theoretical developments and this is what I want to describe, centered through more on the work I have been involved in.

LATER DEVELOPMENTS

What are the problems? It is basically how to plan and manage forests, long term strategic decisions, medium term tactical planning – which usually has as a horizon the harvesting of the trees that are presently growing– and short term operational harvesting which usually has a horizon from few days to few months. There are environmental issues, which have been vital starting in the seventies and eighties and since then have become more and more important, first for native forests and later for plantations.

In North America, except mostly for the South East, and many European countries most of the timber correspond to native forest, which are regrown; In other countries, like Chile, Brazil, New Zealand, and South Africa, plantations of usually exogenous species like pine and eucalyptus, are the basis of the timber business. These latter plantations are usually privately owned. Another problem that is important is the integration of the forest to a supply chain, integrating forests, mills, and plants.

They are methodological challenges. Many of the problems that we have been solving in the last decades lead to difficult Mixed Integer Programming problems to solve. There is a concern about multi objectives and uncertainty that we will discuss; there are equilibrium problems when we are looking at the economies, national and international; there is hierarchical planning on how to link strategic, tactical and operational planning.

One important question is to look at the impact of operations research in forest planning and management. What is actually really been used, in practice by governments and in firms; how to distinguish between real application and prototypes or theoretical models; what are still open problems that have not been solved.

THE DRIVERS OF CHANGE

What has made the introduction of OR in development important in these decades? One is the political scene. For example, the US law of Congress, which led to the introduction of linear programming. And the most important thing – especially the last two or three decades – is environmental concerns. >>



This has changed the way forests are handled in many countries.

In industry, globalization has led to a tremendous need to improve efficiency, as industries from different countries compete for global markets. Technologies have been important; the impressive developments of computers, software, GIS, GPS, have led to the possibility of solving much larger and more complex problems than those that were possible to solve 30 years ago. There is also communication and data handling developments that were not available then.

And finally there is institutional policy. The case of researchers and professionals who have become interested in using more OR tools. A good summary of what has been done in these decades is in the Handbook of Operational Research in Natural Resources, published by Springer in 2007 with Weintraub, Romero, Bjørndal and Epstein as editors.

STRATEGIC MODELS

As I mentioned before, the US Forest Service was the leader in designing the initial strategic planning models. Timber RAM was replaced by FORPLAN, which added environmental planning in a more explicit way. And finally, in 1995 SPECTRUM which looked at the forest as an ecosystem management problem.

Interestingly and very disappointing, being the pioneer in the use of operational research, I would say that in the last decade we have seen a decline in the use of operational research in the US Forest Service, as we see an increased use of OR in other institutions, especially by private firms.

When we look at private plantations, we see several systems to support strategic decisions in use. FOLPI by Garcia in New Zealand [6]; Morales, Epstein and Weintraub in Chile and Brazil [16]; And models in Sweden, and Finland. These are heavily used systems that are relatively easy to solve LP models.

If we look at the ideas behind the strategic forest management Eldon Gunn [8] postulates what are the typical goals: conservation of biological diversity, maintenance of productive capacity of forest ecosystems, maintenance and enhancement of long term multiple socioeconomic goods, forest conservation, and sustainable management. This can be seen as long range visions, constraints and goals that are considered at strategic level.

TACTICAL MODELS

These models consider a shorter horizon, which do not include replanting. They look only to the point where trees that are currently growing are going to be harvested. So in native forest with maturing or rotation of about 80 years, typical tactical models go to 30 or 40 years, in plantations which usually take 20 to 25 years to grow the horizons are 5 to 10 years.

What are given in these models in detail are spatial aspects. In this sense, road building is important. In native forest road building means usually 30% to 40% of operating costs. In plantations, which are usually near public roads, it may be 10%. In the 80's, road building was explicitly introduced into models. Jones et al [11] showed that by explicitly introducing road

building into the models there were gains of up to by 35%, over dealing with road building and forest harvesting in a separate way, as had been done before.

Dealing with road building was difficult to solve given the technology of the time. A heuristic solution based on LP rounding of solutions, proposed by Weintraub and Kirby [17], was used by several programs of the US Forest Service for the planning cycle of a decade. We developed a system for a 5 year plan used by Millalemu, a Chilean firm. Strengthening and Lagrangean relaxation allowed solving the most difficult problems [1].

There's an environmental tactical problem. This has not really been well defined. How do you define all environmental issues in an explicit way? There are important differences here between how foresters look at the problem and how people from biology look at it. A main issue has been the maximum opening size: what is the maximum size that should be allowed for a continuous harvest area. This has led to an important condition that is currently used as a proxy to environmental protection in most cases in North America and Europe.

This condition is called adjacency, which means that two neighboring cutting units typically of about 40 hectares cannot be harvested simultaneously. If you harvest one, all the neighbors cannot be harvested until the unit just harvested grows to a certain height, which is typically one or two periods.

Adjacency leads to highly complex combinatorial problems which have led to algorithmic developments in the last 20 years. The original problem considered was the unit resource management, URM, where units are defined by foresters using GIS as cutting units up to the size permitted by regulations. Since the basic cell given by the GIS is much smaller, of about one to five hectares, foresters would build these cutting units based on their experience. Those problems were solved in the 90's mainly using heuristics and metaheuristics and they were successfully used in planning, specially in the US [15]. There were also proposals which could solve the problem in exact formulations, using column generation, cliques for strengthening the LP formulation and Dynamic Programming.

In the 80's, Hokans [10] was the first to propose to include the forming of the blocks from basic cells into the same problem. At that stage and even now, technology wasn't developed enough to solve it in an exact way these more complex combinatorial problems. So heuristics and later metaheuristics were used. In the 90's Murray defined the distinction between the URM and what he called ARM, Area Resource Management, in which the forming of the blocks was included into the problem. Heuristics and metaheuristics have been proposed for this problem [15].

An important area of research that started about eight years ago is solving the area resource management in exact formulations. Important work here has been carried out by Mc. Dill Toth, Goycoolea, Weintraub, Vielma, Murray, Constantino, Martins, Falcão, Borges [7].

Other challenges in terms of spatial environmental problems have involved the treatment of old

growth patches needed to preserve wildlife, as well as corridors to link these patches. Metaheuristics have been proposed for these problems. Other environmental issues that have to be dealt with preservation of wildlife; how wildlife populations evolve spatially. This has been dealt with birth, death, dispersion of animals [9].

OPERATIONAL MODELS

A very successful use of OR has been at the operational level. The decisions considered are harvesting and bucking of logs; location and use of harvesting machinery and building secondary roads; transportation to primary destination which are plants and sawmills; handling of logs at primary destination; and then downstream operations to secondary destinations into the final markets [4][5].

One application of these systems started in the 90's in Chile where a system, called OPTICORT, was used by the Chilean forest firms. It is basically an LP model to assign short term harvesting to meet known demand for specific logs with column generation to produce bucking patterns, which are fed to the master program. This was used quite successfully, and costs were reduced by about 10%. The yields of timber were improved as standing trees and the specified demand for products could be matched much more efficiently as is typical with an LP. For example, with decisions made manually, there was a remaining stock of logs of about 15% which were of higher value, but since there was no demand for those particular logs they had to be sent to the pulp mill, which usually pays a much lower price for those better quality logs. This was reduced to 2%.

" There's an environmental tactical problem. This has not really been well defined. How do you define all environmental issues in an explicit way? "

The machine location problem is a very interesting one. Suppose you have an area of five hundred hectares that needs to be logged during the next six months or so. In the hilly parts cable logging is used, where towers with cables bring the timber up and they are stored. A road is built to where the tower is located to take the logs out to the primary destinations. In flat areas, skidders are used which can handle very well the flat areas but are slow, so you also need to build roads there because it is not economically convenient to operate skidders more than 300 meters away from roads.

Around 1990, two systems, PLANS in the US first and then PLANZ in New Zealand, were built using GIS. Once the planners decided where to locate the towers, the system – using GIS – would simulate the location of all the needed roads. Logger PC, Jammer & Sessions in 1992, developed the tool to design the cable logging in terms of how the feasibility analysis for the use of the log cable in terms of tensions and support of the cables.

In the 90's, PLANEX began to be used in the Chilean firms, which included into the >>



model the location of the skidders and towers. This was based on a GIS, a very friendly graphical interface, so users could easily make variations using the models and heuristics to optimize solutions. This led to important savings both in terms of costs and also in terms of environmental health, because using these tools allowed building fewer roads which is clearly better for preserving the quality of soil.

The location of harvesting machineries and building of secondary roads is a very difficult problem. It involves the integration of a plant location problem, where the tower locations of machinery are considered as a plant, and the cells where timber are harvested as customers which need to be reached. And the road building and transportation is a network flow problem with road building. Both are difficult NP-hard problems and dealing with them in an integrated form is more difficult. Solving an exact formulation is still an open problem, so heuristics are used.

Log Merchandising in Mechanical Harvesting, shows that if log cutting takes place at the terminals of the plant with mechanized, sophisticated machines, there is an important gain that can be made, by cutting logs in specific dimensions. It can be done either in the form of buck to value, where value is assigned to specific pieces, or buck to demand, where there are specific pieces that are needed. Basically, the techniques used here are the dynamic programming or network programming. These approaches have been implemented into mechanical harvester processors, and studies indicate value gains by 4% to 10%, [13].

Lemberski and Chi won the INFORMS Edelman Prize Competition in 1985 [12], with the VISION system. This is a system to train loggers in the field on how to buck trees to obtain maximum value. It increased Weyerhaeuser's profits by tens of millions dollars a year.

A third problem at the operational level is transportation which is very important. Transportation can take 30% to 40% of operational costs, especially in plantations. Many works have addressed transportation, planning and storing, including crew scheduling [5].

A very successful system was developed in Chile, ASICAM, by Epstein, Weintraub and others. It has been used by all Chilean firms since 1990, and also in Brazil, Argentina, Uruguay, Venezuela and South Africa, where Mondi won the South African Logistics Prize using the system in 1996. It's based on a simulation system, with a heuristic algorithm: It reduced transportation costs between 10% and 20%. Solving the exact formulation of this problem turns out to be very difficult and it's still an open problem [5].

Several other systems have been developed, mainly in the Scandinavian countries. A real time truck dispatching was developed in New Zealand by Rönnqvist and Ryan, based generating trips dynamically and was used successfully for several years [5].

It is well known that the supply chain of other industries – especially in manufacturing – is very well established in terms of the use of sophisticated tools. This is not the case in

forestry, where even in firms which own all the links of the supply chain: the forests, the plants, the primary plant and the secondary plant markets don't coordinate well. Recent advances have been made, such as D'Amours et al 2009 [2].

Other Issues

An important problem is fire management. D. Martell is probably the leader in developing fire models at different levels. OR has been used in initial attack deployment, including how to dispatch the fire teams and helicopters, how to deal with escaped fires [14].

Uncertainty is present in most cases. It is usually present in timber growth, due to catastrophes like pests and fire, and mainly in markets and prices. There have been attempts develop methods for solving these problems. Typical approaches have been adaptive optimization stochastic dynamic programming, and chance constrained programming.

The same can be said about multi-criteria. It is obvious that when managing forests there are multiple objectives: there are objectives related to performances of timber harvesting, biodiversity, sustainability, and recreation. And there have been proposals in terms of how to handle these problems, mostly as developments. Techniques used include goal programming, compromise programming, multi objective programming, and multi criteria methods like ELECTRE and AHP [3].

CONCLUSIONS

What we have seen so far is that operational research has been an important tool used in forestry. It has been successfully used at all levels: strategic, tactical, and operational. It has been used for native forests, and lately by private firms competing in world markets. It has been a success story. Our group, working with Chilean forest firms won the INFORMS Edelman Prize Competition in 1998.

There are important groups working now around the world. For example in the US, the US Forest Service at state level in Oregon and Pennsylvania. In Canada, FORAC – led by Sophie D'Amours – has done important work with Canadian firms. Mikael Rönnqvist in Sweden and Norway is developing important work in planning and transportation. Also leading work is being carried out by among others like Mark McDill in Pennsylvania, Rick Church with the US Forest Service; Constantino and Borges in Portugal and our group, led by Rafael Epstein, in Chile.

Overall I think we can see a bright future for OR in forestry.

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**Makerere University Business School, Kampala, UGANDA.
October 14 and 15, 2010.**

The theme for the conference is 'Innovation in OR and Economic Transformation.' The organizers hope the exciting opportunity to interact with researchers from around the world and enjoy Lake Victoria, the Kasubi Tombs, the Uganda Museum, Bujagali falls, and several nearby game reserves and eco-tourism sites will entice you to attend this conference. For more information contact Conference Chair Musa Moya of the Makerere University Business School at mmoya@mubs.ac.ug or +256-772-564-130.

2nd International Conference on Engineering Optimization (EngOpt2010)

Lisbon, PORTUGAL. September 6-9, 2010.

EngOpt is a forum for Engineers, Mathematicians and Computer Scientists to share research and innovations, promoting interdisciplinary activities in all fields of Engineering Optimization

Objectives

The main objective of the EngOpt conference series (<<http://www.engopt.org/>> www.engopt.org) is to bring together engineers, applied mathematicians and computer scientists working on research, development and practical application of optimization methods applied to all engineering disciplines or developing essential techniques in this field.

Prospective authors are invited to submit abstracts on optimization and its application in all areas of engineering and industry.

Main Topics

Engineering Design Optimization, MDO - Multidisciplinary Design Optimization, Inverse problems, Engineering simulation Involving Optimization Techniques, Basic Numerical Techniques, Interdisciplinarity in Engineering Optimization, Efficient Analysis and Reanalysis Techniques, Practical Applications.

Important dates

Deadline for abstract submission:	March 5, 2010
Notification of Acceptance:	April 2, 2010
Full Paper Submission:	June 4, 2010

Visit the conference website at
<<http://lemac1.dem.ist.utl.pt/engopt2010/>> www.engopt2010.org
for up-to-date information about the congress.

EngOpt2010 Secretariat
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Web: <<http://lemac1.dem.ist.utl.pt/engopt2010/>>
<http://www.engopt2010.org>

VI Moscow International Conference on Operations Research (ORM2010)

MOSCOW, October 20-25, 2010.

Dear colleagues, we invite you to attend the VI Moscow International Conference on Operations Research. The conference will bring together scientists from all over the world to discuss theoretical aspects and various applications of operations research. Dorodnicyn Computing Center of RAS (CC of RAS), Lomonosov Moscow State University and Russian Scientific Operation Research Society will organize the VIth Conference in October 2010 in Moscow. Working languages of the conference –English and Russian.

Traditional topics of the conference include:

1. New models and methods.
2. Optimization methods.
3. Multiple objective decision making.
4. OR in economics.
5. OR in military science.
6. OR in finance and insurance.
7. OR in medicine, biology and ecology.
8. Computer-aided design.
9. Game-theoretic models.

We invite you to submit your proposals on organization of special sections and round tables through December 1, 2009.

Program Committee

Chair: A. A. Petrov (CC of RAS), F.T. Aleskerov (HSE), Yu.G. Evtushenko (CC of RAS), M. Jacimovic (University of Montenegro), Yu. Nesterov (CORE, Universite Catholique de Louvain) Yu.N. Pavlovsky (CC of RAS), I.G. Pospelov (CC of RAS), K.V. Rudakov (CC of RAS), G.I. Savin (Join Supercomputer Center), A. Shapiro (GaTech), Yu. I. Zhuravlev (CC of RAS).

Organizing Committee

Conference Chair: P.S. Krasnoschekov (CC of RAS), Yu.A. Flerov (co-chair, CC of RAS), A.A. Vasin (co-chair, MSU), A.A. Belolipetckiy (CC of RAS), N.M. Novikova (CC of RAS), A.V. Lotov (CC of RAS), Yu.E. Malashenko (CC of RAS), D.V. Denisov (MSU), A.F. Izmailov (MSU), E.Z. Mokhonko (CC of RAS), A.A. Shaninin (MFTI), V.V. Morozov (MSU), F.I. Ereshko (CC of RAS).

The secretary of the Conference Irina I. Pospelova, deputy secretary – Marina Dolmatova.

Information on important dates, registration, submission of abstracts

Abstracts should be sent to Organizing Committee via email. Submission deadline is April 1, 2010. You will receive information about acceptance before June 1, 2010. Abstracts should be presented as a MS Word file, size – 2 pages, according to the attached template. Abstracts should be sent as a file attached to the letter to the following email address: io@cs.msu.su. Letter should have "ORM2010 abstract" in subject field and contain the name of the paper and authors in it. For further information, please, visit our web-page <http://io.cs.msu.su/>.

No obligatory registration fees.

Conference dinner and cultural program are up to the participants and can be paid at the registration. The organizing committee provides visa support (if necessary) for all participants of the conference. Typically participants care about their accommodation themselves. You can find suitable hotel using, for instance, booking.com web-page. The organizing committee can provide a very limited number of cheap apartments at the Moscow State University main building. Apply if necessary.



ALIO-INFORMS Joint International Meeting

Buenos Aires, ARGENTINA, June 6-9, 2010

<http://meetings.informs.org/BuenosAires2010/>

NEWS (see below)

- A very comprehensive program of talks and tutorials !!!!
- Publications
- Reduced registration fee for people that will need financial aid from Latin Americans and developing countries

DEADLINE for abstracts submission - February 1
(abstracts changes will be allowed till April 26)

Co-sponsored by:

- ALIO (Association of Latin-Iberoamerican Operational Research Societies)
- INFORMS (Institute for Operations Research and the Management Sciences)

There is still time to decide to attend ALIO-INFORMS Joint International Meeting in Buenos Aires, Argentina, in June 6-9, 2010.

Deadline for submissions is February 1, 2010, but papers will continue to be accepted after the deadline for as long as space is available.

Authors are invited to submit their abstracts at one of the many clusters being organized (see list at the web page) or simply as a contributed abstract. People willing to organize a complete session is also very welcome to do so.

PLENARIES AND KEYNOTES

- Garrett van Ryzin, Columbia University, USA, IFORS Distinguished Lecture
- David Simchi-Levi, Massachusetts Institute of Technology, USA
- Celso Carneiro Ribeiro, Universidade Federal Fluminense, Brazil
- Egon Balas, Carnegie Mellon, USA
- Paul Glasserman, Columbia University, USA
- Ralph Keeney, Duke University, USA
- Christopher S. Tang, UCLA Anderson School of Management, USA

TUTORIALS

- Peter Bell, University of Western Ontario, Canada "Revenue Management"
- Michele Breton, HEC, Canada "Dynamic Games in Finance"
- João Clímaco, University of Coimbra, Portugal "Multiobjective Path Problems: Methods, Software and Applications"
- Pierre l'Écuyer, Université de Montréal, Canada "Staffing and Scheduling Optimization in Call Centers"
- Simone Martins, Universidade Federal Fluminense, Brazil "Metaheuristics for Optimization Problems in Communication Networks"
- Anna Nagurny, University of Massachusetts Amherst, USA "Fragile Networks: Identifying Vulnerabilities and Synergies in an Uncertain Age"
- Panos Pardalos, University of Florida, USA "Cliques, Quasi-cliques and Clique Partitions in Graphs"
- Mikael Rönnqvist, Forestry Research Institute of Sweden, Sweden; "OR Challenges Arising from Solving Industrial Applications"
- Moshe Sniedovich, University of Melbourne, Australia "Black Swans, New Nostradamuses, Voodoo Decision Theories, and the Science of Decision-making in the Face of Severe Uncertainty"
- Maria Grazia Speranza, Università degli Studi di Brescia, Italy. "Vehicle Routing Problems with Split Deliveries"
- El-Ghazali Talbi, University of Lille-INRIA-CNRS, France, "Metaheuristics for Multi-objective Optimization"
- Michael Trick, Carnegie Mellon University, USA "Combinatorial Benders Approaches to Hard Problems"
- Sebastián Urrutia, Universidade Federal de Minas Gerais, Brazil "Minimizing Closed Curves with Constrained Curvature: The Dubins Traveling Salesman Problem"

- Luk Van Wassenhove, INSEAD, France "An Overview of Humanitarian (Operations) Research"
- Stavros Zenios, University of Cyprus, Cyprus Financial Risk Management

PUBLICATIONS

Several journals will be publishing special issues to include papers from the ALIO-INFORMS Joint International Meeting. ALIO-INFORMS authors will be invited to submit papers for these special issues.

FINANCIAL AID

Financial aid will be available to reduce the cost of conference registration for attendees from Latin American countries and developing countries in other parts of the world.

Last but not least you may have the opportunity of visiting Buenos Aires, an alive, dynamic, modern city and one of the biggest in the world. And maybe to travel to other regions in a vast country as is Argentina, that offers so many different attractive landscapes.

For information about the meeting, abstract submission, program, hotel reservations or tours pre and post conference, visit the conference web site at:

<http://meetings.informs.org/BuenosAires2010/>

ORPA 5 (Operational Research Practice in Africa Group) Conference

Cheikh Anta Diop University, Dakar, SENEGAL. March 18-20, 2010.

This conference might interest you and your colleagues - for more information you can visit the conference URL
(<http://www.orpagroup.net/ORPA2010/index.html>).

24th European Conference on Modelling and Simulation, ECMS 2010

University of Nottingham, Malaysia Campus, Kuala Lumpur, MALAYSIA. June 1-4.

Deadline for the full paper submission: February 10th, 2010.

Organised under the headline "SIMULATION MEETS GLOBAL CHALLENGES" the conference emphasises the fact that in today's global economy the regional concerns have been replaced by global concerns about the industry, economy, climate etc. The ECMS 2010 aims at creating a broad international forum for addressing these global challenges from the perspective of modelling and simulation. The conference, which for the past 23 years has been held in Europe, is making a bold change to this pattern with its 2010 venue in Kuala Lumpur, Malaysia.

More information about the conference can be found at the conference website:

<http://www.scs-europe.net/conf/ecms2010/index.html>

You may download the CfP flyer at:

<http://www.scs-europe.net/conf/ecms2010/CFP2010.pdf>

Many internationally recognized experts in simulation are involved in the organization of this event - come to Kuala Lumpur to meet them!

We are looking forward to welcoming you in Kuala Lumpur.

- Andrzej Bargiela - General Conference and Programme Chair
- Sayed Azam Ali - General Conference Co-Chair
- David Crowley - General Conference Programme Co-Chair
- Eugène Kerckhoffs - Honorary

