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From the Editor

Fulfilling Endings, Fresh Beginnings

Year-end is a special time when all are presented with the opportunity to examine what they have done and contemplate on resolutions for the New Year. It is particularly special for IFORS because this year marks the culmination of the three-year term of the AC.

It is but fitting then that in this issue, you will find **IFORS President Dominique de Werra's** assessment of the AC's three years in office. He touches on IFORS initiatives, among them Developing Country activities. Two of these, the IFORS Prize and the ICORD, are covered in our OR for Development Section. Fully supporting IFORS efforts toward a more visible discipline and organization, President Dominique has covered a lot of ground spreading the word about OR and IFORS. This issue covers two conferences, namely, the ALIO regional conference in Rio de Janeiro and the Quadrennial conference of the Operations Research Society of China (ORSC) where he represented IFORS. Three other conferences in the EURO region in Šiauliai, Kiev and St. Petersburg and are also featured here. Completing coverage of all the IFORS region happenings is an exciting news from INFORMS within the NORAM region.

You will remember that in the last issue, we started a new section that features successful applications of OR all over the world. This time, we feature an application from Down Under showing how OR has helped improve processes in iron ore mining. The tutorial featured here, part of the IFORS Tutorial Lecture during the APORS conference in Xi'an, China shows how optimal inventory decisions change when cash flow constraints are present. Meanwhile, our book featured in this issue is one that uses quantitative methods in predicting the next US president.

Speaking of presidents, it is with a warm welcome that we feature the incoming IFORS President for 2013-2015 **Nelson Maculan** and his team. Learn more about who will be taking over the reins of IFORS in this issue.

For IFORS News, 2012 has been a year of new beginnings. I am deeply indebted to our volunteers, **Arabinda Tripathy** as well as **Sue Merchant** and **John Ranyard** who had responded to my request to edit two new sections, *OR for Development* and *OR Impact,* respectively. **Hans Ittmann** and **Heiner Müller Merbach** had always been reliable contributors to the Book Review and Opinion portions. For the regional news, I would like to thank **Degang Liu** (APORS), **Annibal Parracho** (ALIO), and **Gerhard Wilhelm Weber** (EURO) who had been making sure that regional events are covered. **Karla Hoffman** had been very helpful in soliciting news and articles from NORAM. Huge thanks too to all who have submitted articles for the 2012 volume. All of your help had been instrumental in getting IFORS News closer to its goal of being a vehicle for communication of the international OR community. Hope to continue hearing from you in the coming year!

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

WHAT'S INSIDE >>

IFORS from 2010 to 2012

Dominique de Werra <dominique.dewerra@epfl.ch>

Three years ago my predecessor Elise del Rosario presented in these pages an impressive survey of the multiple activities of the Federation during her term of office. Everyone had an excellent opportunity to realize how many different actions an Administrative Committee (AC) could initiate and follow through during a rather short period of time.

Among the many events for the period 2007-2009, one of the most important was the celebration in 2008 of the 50th anniversary of IFORS.

Unfortunately no such opportunity to celebrate arose during the following term between 2010 and 2012: the Federation is now more than 50 years old, the number of member societies is also above 50 and will increase as does age.

Things have drastically changed during the last years, in particular for what concerns communication and information: under the enthusiastic guidance of Elise who took over the job of Newsletter Editor, our bulletin has become an even more attractive communication tool which allows all IFORS members to follow - almost online - the various activities, conferences, courses, awards, publications, news, discussions, etc which are of interest to the OR community all over the world.

This has an immediate consequence for the author of these lines: although generally things need to be repeated twice in order to get memorized, we will not give here an exhaustive list of the various activities of the present AC during the last three years. These can be found in various issues of the Newsletter. Nonetheless, Table 1 shows an overview.

Table 1: IFORS Administrative Committee 2010-2012

President – Dominique de Werra
Past President – Elise del Rosario
VP-at-Large – Hugo Scolnik Developing Countries
Treasurer – Peter Bell
ALIO VP – Nair Maria Maia de Abreu Education Scholarships and Education Initiatives within ALIO
EURO VP – Martine Labbé and Elena Fernandez Publications Scholarships and Education Initiatives within EURO
APORS VP – Xiang-Sun Zhang Scholarships and Education initiatives within APORS
NORAM VP – Karla Hoffman Meetings (Triennial and Special Conferences)
Newsletter Editor – **Hans Ittmann** (till June 2010) **Elise del Rosario** (from July 2010)
IFORS Secretary –Mary Thomas Magrogan

Apart from providing an enjoyable and instructive reading, the Newsletter, which we now enjoy, will have an impact that will undoubtedly extend beyond the usual OR Community.

In this way, our Newsletter is becoming one of our best tools for developing our visibility to the outside world. Many of the articles published in our bulletin have certainly been noticed and hopefully read by exterior readers curious to see what OR could do in emergency management or humanitarian logistics for instance and more generally in emerging economies or in crisis situations.

This struggle for increasing our visibility has to be a permanent activity: it is precisely where all our efforts should concentrate. OR deserves to exist and to develop because it can help in many areas; a huge number of these application fields have not emerged yet and it is also our main task not to miss them.

What we need is definitely an OR oriented towards outside. Such an obvious remark should at least help us to reassess our priorities: is it really dramatic if after almost 70 years of existence, OR is still looking for a proper definition and sometimes also for a clear denomination?

During these three years, our AC has been working on the visibility issue. The presence of IFORS has been ensured at all major OR conferences as reported in the Newsletter. A formal presentation of IFORS was regularly given to the various audiences, showing the many facets of the Federation as well as the many ways in which IFORS encourages and supports initiatives often proposed by its members. I express here our gratitude to our APORS Vice President, Xiang Sun Zhang, who represented IFORS efficiently many times in regional conferences in Asia.

Among the above initiatives we would simply like to recall the existence of scholarships to encourage the participation of young scholars to courses and/or institutes involving inter-regional collaboration.

We also have to mention the IFORS Prize for OR in Development, which is awarded at our Triennial Conferences. We take this opportunity to thank Professor Subhash Datta who chaired the Jury of the last Prize awarded during the Melbourne 2011 Triennial Conference. Thanks also to Hugo Scolnik, Vice President-at-Large, who chaired the Developing Countries Committee.

As far as visibility is concerned, our publications are an essential communication instrument and they need the full support of the Federation. As was reported in the Newsletter, the International Transactions in Operations Research (ITOR) has been accepted into the Social Sciences Citation Index (SSCI) and Science Citation Index Expanded (SCIE) and has received its first impact factor in 2011. We express our thanks to Celso Ribeiro, Editor-in-Chief of ITOR, and congratulate him for his efforts to permanently increase the quality of this high level scientific publication.

During our term, the former Editor-in-Chief of the International Abstracts in Operations Research (IAOR), David Smith, retired after having worked hard during close to twenty years to modernize this important tool for the users of OR. We had an opportunity to thank him for his efforts and his successes. At the same time, we had the pleasure of welcoming Preston White who has taken over the job with courage and energy. We are confident that he will continue to develop the IAOR in a form which will have to be adapted to an extremely dynamic context for the future users of OR.

Before leaving the topic of publications, we will also express the gratitude of IFORS towards Hugh Bradley who has chaired the Publications Committee after having served IFORS in many different positions during many years. We express our best wishes for his health and thank him for helping his successor, Graham Rand, take over the job not only as liaison between IFORS and the publishers but also as promoter and developer of our publication concept. We thank him for having accepted to serve IFORS again in a domain where challenges will be numerous.

Three years ago, the new AC announced that education in OR was among its first priorities. This is consistent with the visibility issue, which has been put forward with so much emphasis. We want to thank Nair Abreu, ALIO Vice President, who took care of the Education Committee during this term.

Education is by nature an activity that is oriented towards the outside world: it brings into the OR Community newcomers with original ideas and different views.

Although there is a huge number of academic institutions offering extensive curricula in OR, our Federation has a crucial role to play in this context. Its inter-regional (international) links and the extreme cultural variety of its members present an ideal setting for creating original models of courses or institutes for newcomers as well as for experienced teachers in OR.

IFORS has often taken advantage of this situation in recent years, as shown in the many reports of the courses and other events initiated and/or supported by the Federation.

We also remind the readers that most of the actions of IFORS in the programmes oriented towards Developing Countries are based on education.

Our Federation has been extremely visible in the community through the IFORS Distinguished Lectures (IDL) which are normally presented in plenary sessions of the major regional OR Conferences; we had 8 such Lectures between 2010 and 2012 ; 4 of them were given this last year (See table 2). Such events are deeply appreciated by the various audiences; they have given to the participants opportunities to see famous personalities like for instance John Nash (EURO conference, Lisbon, July 2010) or Ralf Gomory (Euro Conference, Vilnius, July 2012) and to realize that they are real people and not only names in textbooks!

Table 2: IFORS Distinguished Lecturers 2010-2012

July 2010	Garrett Van Ryzin	ALIO/INFORMS Buenos Aires
July 2010	John Nash	EURO XXIV Lisbon
December 2010	Jonathan Rosenhead	APORS Penang
November 2011	Yves Crama	INFORMS Charlotte
June 2012	Brenda Dietrich	INFORMS Beijing
July 2012	Ralf Gomory	EURO XXV Vilnius
September 2012	Silvano Martello	CLAIO/SBPO Rio de Janeiro
October 2012	Paolo Toth	INFORMS Phoenix

Table 3: IFORS Tutorial Lecturers 2010-2012

July 2012	Erhan Erkut	EURO XXV Vilnius
July 2012	Xiuli Chao	APORS Beijing
September 2012	Mauricio Resende	CLAIO/SBPO Rio de Janeiro

As a natural complement to the IDL, the present AC introduced a new instrument (again education oriented): the IFORS Tutorial Lectures (ITL). Organized in a way similar to the IDL, these Tutorials are aimed at exposing the audience to emerging OR fields or to new teaching concepts and are designed to be given by personalities having recognized pedagogical talents.

2012 was the first year with ITLs (see table 3): Erhan Erkut was the first IFORS Tutorial Lecturer (EURO Conference, Vilnius, July 2012), followed by Xiuli Chao (APORS, Beijing, July 2012) and Mauricio Resende (CLAIO/SBPO, Rio de Janeiro, September 2012).

All three tutorials have been much appreciated by their audiences and we can just hope that this tradition will continue in the future since this initiative seems to answer the needs of many practitioners and researchers to keep up with the continuing developments in OR.

Our deep thanks go to Karla Hoffman, NORAM Vice-President, chair of the Meetings Committee, who has coordinated the organisational work related to these IFORS Lectures. We shall not forget to underline that all IFORS activities have been possible thanks to the expertise of the IFORS Treasurer, Peter Bell, who has managed to keep our Federation in a sane financial situation in spite of the general turmoil of these last years. We are very grateful to Peter for having served IFORS for many years not only as a treasurer!

At the end (or almost) of this brief report, one cannot omit the major event of the 2010-2012 period which is the IFORS Triennial Conference in Melbourne (July, 2011) As expected, the Newsletter has dedicated several pages to report on the success of this meeting organized by Patrick Tobin (Organization Committee) and Jenny Leung (Programme Committee). They deserve once more our thanks and our admiration for the remarkable conference they offered to the OR Community. Looking at the future as we always should, the next Triennial Conference will be in Barcelona (July, 2014) and we can already thank Elena Fernandez, EURO Vice-President, who is chairing the Organization Committee in addition to her active participation in the present IFORS AC also as chairperson of the Publications Committee.

Our gratitude extends also to Martine Labbé, EURO Vice-President, who had to resign before the end of her term, since she got new editorial responsibilities within EURO.

Although the Spring 2013 Newsletter will give us another opportunity to summarize the activities of the AC in 2012, I would like to express my thanks to all members for their dedication to serving IFORS without counting their efforts. I include in these thanks Mary Magrogan, the IFORS secretary, who took care of all administrative questions and who is the memory which a new AC, in particular a new president, is missing. Her experience has been extremely useful to all AC members. The many successful realizations of these years are theirs, the omissions are mine.

It is now time to welcome Nelson Maculan, IFORS President 2013-2015, and to wish him and his AC to have as much pleasure serving IFORS as we had.

As a conclusion to this final report, I would like to quote a recent proverb dedicated to all present and future OR professionals, inspired during the IFORS President's dinner at the Melbourne aquarium, and a smart sculpture of a couple found in the streets of Vilnius::

IFORS President's Dinner at the Melbourne Aquarium

A couple found in Vilnius Streets

"Even if you had to live among sharks, OR should remain a love affair!"

Back to the first meeting venue

Rio de Janeiro hosts 16th ALIO Conference

Annibal Parracho <annibal.parracho@gmail.com>

The Latin American OR community converged in Rio de Janeiro from September 24 to 28 for the XVI Latin Ibero American Conference on Operations Research (CLAIO) and the 44th Brazilian Symposium on Operational Research (SBPO). The congress was also a celebration of the 70th birthdays of three OR stalwarts in ALIO, namely: Hugo Scolnik (Argentina), Nelson Maculan (Brazil) and Andres Weintraub (Chile).

Conference in celebration of their 70th: Maculan, Weintraub and Scolnik.

IFORS President Dominique de Werra was on hand to introduce IFORS and the IFORS lecturers, IFORS Distinguished Lecturer Silvano Martello (U. Bologna) and IFORS Tutorial Lecturer Mauricio Resende (AT&T). Martello spoke on "Two Dimensional Packing Problems in Telecommunications" and the tutorial presented by Resende was on "Biased Random Key Genetic Algorithms".

Close to 800 communications were submitted, from which 400 full papers and 100 posters were accepted and presented at the Symposium. More than 500 participants, with graduate students accounting for a majority, came from within and outside the Latin American region.

M. Gonzales, Nair Abreu, and Horacio Hideki chair the plenary session.

To celebrate the theme of the joint meeting "Operational Research in Major Sport events", a competition was held where authors of papers related to the theme were selected to develop projects. At the Gala Dinner that closed the meeting on September 29, a prize was awarded to the best paper submitted, "A Genetic Algorithm to the Strategic Pricing Problem in Competitive Electricity Markets" by Marcia Fampa and Wagner Pimentel, of the Federal University of Rio de Janeiro. The winner of the competition among undergraduate students for the best Scientific Initiation Research Report was Pedro Belin Castellucci of the University of São Paulo (Alysson Costa, adviser) for his work on "Simulation Models for Production Streams Operated by Disabled Workers".

IFORS President De Werra hands over plaque to IDL Martello.

During the business meeting, Horacio Hideki Yanasse (Space Research Brazilian Institute) was re-elected to the presidency of SOBRAPO and Luciana Buriol (Federal University of Rio Grande do Sul) was elected president of ALIO.

The authors of the papers presented were invited to submit articles in English to special editions of the SOBRAPO journal Pesquisa Operacional, and to the International Transactions on Operational Research (ITOR), the official publication of IFORS whose editor, Celso Ribeiro, is from Brazil.

Everyone left the conference looking forward to seeing friends and colleagues again in conferences scheduled for the next three years: the next SBPOs to be held September 2013 in Natal, north of the northeastern region of Brazil; in 2014 at the first colonial capital of Brazil, Salvador in the state of Bahia; and the next CLAIO 2014 in Mexico.

A huge turnout for the ALIO regional conference.

IFORS President Graces China National Meeting

Degang Liu <dliu@amt.ac.cn>

The 9th quadrennial ORSC National Congress (http/:orsc2012.csp.escience.cn) was a major ORSC event that gathered more than 400 participants from all over the country. The conference was held in the Hanqing Conference Center of the Chinese Northeastern University (NEU) in Shenyang, the capital of Liaoning Province. The conference center was named after the University founder, General Chang Shueh-Liang, a famous Chinese military leader of the 1930s.

The congress program included plenary and parallel sessions, competitions, council elections, and journal editorial meetings. The Opening Session at the Hanqing Conference Center featured the NEU president Lieyun Ding, who thanked the organizers for choosing his university as the conference site, and for the encouragement that this conference brings to many national experts of Operations Research. At the opening session, IFORS VP Xiang-Sun Zhang was bestowed the top ORSC distinction, the ORSC Science & Technology Award in recognition of his valuable long-term contribution to the profession and to the Chinese operations research community.

IFORS President Dominique de Werra gave the first plenary session. He gave a brief introduction to the Federation and IFORS initiatives at the beginning, followed by his presentation on Optimization Problems Related to Blockers and Transversals in Graphs. He concluded with gratitude for the invitation and hospitality of the ORSC, and expressed his best wishes and hopes towards the continuing contribution of ORSC in promoting OR throughout the world. This was the second time that the IFORS President was invited to the ORSC national conference. Four years ago, Elise del Rosario presented at the ORSC2008 in Nanjing.

The day before the meeting, Dominique visited the Chinese Academy of Sciences in Beijing, where he lunched with the ORSC president Yaxiang Yuan, IFORS VP Xiang-Sun Zhang and the visiting Professor and IFORS President-Elect Nelson Maculan. In the afternoon, both IFORS Presidents were invited to give their talks at the Chinese Academy of Sciences' Institute of Applied Mathematics.

In the same session, the ORSC award winner Prof. Xiang-Sun Zhang presented his most recent research on Optimization Problems in Complex Networks. His talk summarized some critical optimization models and solution techniques emerging from complex network research relating to systems biology and touched on research findings by his research group (Zhangroup.org).

In the following plenary sessions, six invited speakers delivered plenary talks focused on research progress in their respective relevant areas: Urban Traffic Congestion and Mitigation Strategies (Ziyou Gao, Beijing Jiaotong University), Energy and Climate Complex System Modeling and Policy Studies (Yiming Wei, Beijing Institute of Technology), Valuation of Games (Chengzhong Qin, Shandong University and University of California at Santa Barbara), Some Optimization Problems in Coal related Industries (Yuhong Dai, Chinese Academy of Sciences), Some Problems in Game Movement (Yinfeng, Xu, Xi'an Jiaotong University), and Combinatorial Optimization from Algorithms to Mechanisms (Guochuan Zhang, Zhejiang University).

IFORS President deWerra presents Certificate of Appreciation to ORSC President Yuan Ya-Xiang.

After the first day sessions, ORSC elected its new council. The new council is composed of 127 members from provincial OR societies and special interest committees. The council also elected a new set of ORSC officers, with Professor Xiaodong Hu taking over the Presidency for 2013-2016. A council business meeting was then called the next day. The new leadership set its main agenda as that of enhancing links with the society's industrial members through collaborative projects and consulting services, while improving the quality of its journals.

Following an established tradition, the Young OR Award candidate session was arranged on the second day. Five young professors shortlisted from several candidates presented their research achievements. The award went to Zaiwen Wen (Shanghai Jiaotong University, first prize), Lingchen Kong (Beijing Jiaotong University, runner-up) and Jia Shu (Southeastern University, runner-up), and Zhao Zhang (Xinjiang University, nominee) and Xiaojin Zheng (Tongji University, third place).

Meanwhile, the OR Application Prize went to Lixin Tang at al of the Logistics Institute of the Northeastern University on the paper "OR in Steel Works and Logistics Scheduling". Second prize was awarded to Yifan Xu, at al of the Fudan University on their paper "Airline Company Revenue Management" and to Liwei Zhong, at al of the No.1 hospital affiliated to Shanghai Jiaotong University on the paper "Operating Room Scheduling".

During the conference, editorial meetings were held for the Chinese language journals, the Transaction of OR and the Operations Management and Management Science and its newly launched English journal-Journal of the Operations Research Society of China. This new journal will be jointly published by ORSC and Springer. The first issue will appear in the beginning of 2013. ORSC had issued calls for papers from authors worldwide.

Shenyang, as the largest city in China's Dongbei (Northeast) region, was the home and political center of Manchu ethnic minority before they overthrew the Ming emperor and established Qing Dynasty in Beijing in the 1600s. The old Qing palace and Qing tombs are among the most famous tourist spots in China. Participants' trip to the Qianshan Mountain100km south of Shenyang was made more exciting by an unexpected snowfall, which made the mountains a sight to behold, especially for those who came from southern tropical provinces.

Workshop Celebrates 12 years of Continuous Optimization

Leonidas Sakalauskas <sakal@ktl.mii.lt>

Šiauliai, Lithuania played host to 50 participants from 20 countries during the 10th EURO Working Group on Continuous Optimization (EUROPT) Workshop on Advances in Continuous Optimization held from 5-7 July at the University of Shiauliai. The Workshop was a satellite meeting of the 25th European Conference (EURO 2012).

A welcome reception on July 4 was followed by two working days, which featured plenary sessions given by: Panos Pardalos (USA) on "Global Optimality Conditions in Non-Convex Optimization"; Joaquim Júdice (Portugal) on "Linear Programming with Linear Complementarity Constraints"; Adilson Elias Xavier (Brazil) on "The Smoothing Method: a Novel Approach for Solving Clustering Problems"; and Boris Polyak (Russian Federation) on " L1 Problems in Control". Papers were presented under the following streams: convex optimization and generalized convexity; local nonlinear optimization; global nonlinear optimization; optimal control - theory and applications; multiobjective optimization; conic optimization and semidefinite programming; semiinfinite optimization; robust optimization; stochastic optimization; large-scale methods in global search; optimization in data mining; data visualization for optimal decisions; applications of continuous optimization to combinatorial problems; optimization in industry, business and finance; supply chain management; analysis and engineering of algorithms; and software development.

Participants pose with chess pieces at the Library Hall.

At the concluding dinner-banquet, the EUROPT Fellow 2012 was awarded to Joaquim Júdice of Portugal. Capping the event was Gerhard-Wilhelm Weber's overview of the 12 year-work of the EUROPT. He went through the workshop highlights of the ones held in Budapest (2000), Rotterdam (2001), Istanbul (2003), Rhodes (2004), Reykjavik (2006), Prague (2007), Remagen (2009), Aveiro (2010) and Ballarat (2011).

The 10th EUROPT Workshop was organised by the Šiauliai University Faculty of Mathematics and Informatics, Vilnius University Institute of Mathematics and Informatics, European Association of Operational Research Societies (EURO) and the Lithuanian Operational Research Society (LitORS).

"Gamers" Descend on St. Petersburg

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

The Sixth International Conference on Game Theory and Management held June 27-29 at Graduate School of Management in St. Petersburg, Russia attracted over 100 researchers interested in game-theoretic and management models and applications. Participants had an opportunity to attend the presentations on a wide range of game-theoretic models. Among others, the topics included: Game theory and management applications; Cooperative games and applications; Dynamic games and applications; Evolutionary games and applications; Stochastic games and applications;and Game theory applications in fields of strategic management, industrial organization, marketing, operations and supply chain management, public management, financial management, human resources, energy and resource management and others.

Invited speakers were leading representatives and scholars from different fields of game theory: Josef Hofbauer (Vienna Graduate School of Economics, University Vienna, Austria): "Deterministic Evolutionary Game Dynamics"; Sylvain Sorin (University Pierre et Marie Curie – Paris, France): "Recent advances in zero-sum dynamic games"; Kalai (Kellogg School of Management, Northwestern University, USA): "Cooperation in Strategic Games Revisited"; Michele Breton (HEC Montreal, Canada): "Borrowing and lending: two sides of the financing game", and Aseev (Steklov Mathematical Institute RAS, Moscow, Russia): "The Pontryagin maximum principle for infinite-horizon problems and its applications in economics".

The final day ended up with a great Conference Banquet at the Palace of Grand Duke Vladimir. Built in the Florentine Palazzo style, the building now belongs to the House of Scientists. The place provided a scenic end to a fruitful gathering of game theory researchers and scientists.

The whole event was hosted jointly by Saint Petersburg University's Graduate School of Management with Faculty of Applied Mathematics and Control Processes and the ISDGRus, Russian Chapter of the International Society of Dynamic Games.

Summer School in Kyiv: Successfully Promoting OR on its second of seven years

Dmytro Fishman, Alexis Pasichny, Kate Pereverza, Bohdan Pukalskyy, Iryna Smolina
Student Science Association of National Technical University of Ukraine "KPI"

Gerhard-Wilhelm Weber
Institute of Applied Mathematics, METU, Ankara, Turkey

Participants and tutors of Summer School together at the entrance of the main building of the KPI

Summer School "Achievements and Applications of Contemporary Informatics Mathematics and Physics", an international project annually organized by young volunteers from the Student Science Association of National Technical University of Ukraine "KPI" Kiev brought together over 80 young researchers and students from 18 countries for 14 days to attend courses on Operational Research, Neuroscience, Advanced Energy and Mobile Software Development (http://summerschool.ssa.org.ua/). Held from August 3 to 6, the School featured 39 internationally recognized scientists and tutors in their fields, coming from both academia and industry.

The Summer School AACIMP provides a wonderful chance for young people to expand their horizon, find out more about the latest achievements in science, modern high technologies, and urgent questions of scientific and technical progress of society. The theme "New ideas start here" reflects the aim of the School to be an activity where one can find new contacts, ideas and collaboration toward establishing scientific/ educational partnerships.

Following the tradition of the previous year, an essential part of the programme was the stream on Operational Research. This year the main focus of the OR-stream was Data Mining. The basics of data mining were covered by the course "Introduction to Data Mining" conducted by Konstantin Tretyakov from Tartu University, Estonia.

This was followed by practical applications in the course "Humanitarian Operations Research : Decision Support for Crisis & Disaster Operations" delivered by Erik Kropat from Bundeswehr University (Munich, Germany). Students were introduced to the simulation of evacuation scenarios and were given a chance to create disaster protection systems as well as applied graph algorithms to test the proposed plans and schemas.

Gerhard-Wilhelm Weber from Middle East University (Ankara, Turkey) spoke on Financial Mathematics and its mutual influence on Environment, Education and Development. Weber's lectures helped the students to grasp complex mathematical ideas with a diverse set of applications in the fields of Portfolio Theory, Bioinformatics education, Energy and Environment.

From Tartu University, Anna Leontjeva prepared a workshop on Time Series Analysis which included a lot of practical assignments that were excellent examples of 'learning by doing'. The course "Introduction to Integer Programming" delivered by Oleg Prokopyev (Pittsburgh, USA) covered approaches used for formulating and solving linear as well as nonlinear integer optimisation problems. From the host university, Professor Alexander Makarenko discussed with the stream participants principles and models of consciousness including the new concept of Anticipating Neural Networks and their relation to understanding of consciousness. Other overview lectures delivered by invited lecturers are: Boris Goldengorin (Nizhny Novgorod, Russia) on Combinatorial Optimization and Valery Kozin (Zaporizhzhia National University, Ukraine) on Principles of Symmetry and Decision-Making. Michael Tso (Manchester, Great Britain) introduced the latest trends to OR from a practitioner and consultant perspective.

This year's programme also included a presentation by G. Weber of the international OR community, specifically, EURO and IFORS - history, organizational structure, current activities and possibilities for newcomers to OR.

Apart from Operational Research, the Summer School hosted streams on Neuroscience, Advanced Energy and Mobile Software Development. The multidisciplinary nature of OR is supported by exposure to these other fields that the Summer School offered. The numerous social events provided a perfect opportunity for communication and collaboration among researchers in various fields.

Not only is the Summer School a meeting place for different disciplines but also for different cultures. The participants and tutors from Malaysia, Japan, USA, Brazil, Italy, Turkey, Pakistan, Russia and other countries got acquainted and established international networks based on shared interests.

The 2012 Summer School has started the tradition of introducing Operations Research among the topics it covers and the positive experience ensures that it will be a permanent fixture in the Summer Schools to come!

Section Editor: Arabinda Tripathy <tripathy44@rediffmail.com>

Participants Learn Problem Structuring in IFORS Workshop

Teresa Rodrigues* <teresacrodrigues@ist.utl.pt>

Since 1992, IFORS (International Federation of Operational Research Societies) has organized a series of International Conferences on OR for Development (ICORD). In addition, and in order to enhance continuity and interest in this field, IFORS has launched an additional program to conduct workshops in non-IFORS Conference years, to be held across IFORS' different regions, with the aim of promoting a deep discussion about the role of OR in developing countries.

The first workshop of this new programme was held in the beautiful island of Djerba, in Tunisia, from 12-13 October. Its white sandy beaches, blue sea, dramatic sunsets, and rural Mediterranean farms, made Djerba the perfect place to welcome the 30 participants from Brazil, Philippines, Portugal, UK, China, Libya and Tunisia.

The workshop was designed to introduce Problem Structuring Methods (PSMs), and give guidance on how they could be applied to problems within a development context. PSMs are a family of methods that aim to support a group of decision-making actors and stakeholders in addressing a problematic situation of shared concern within a complex and uncertain environment. Typically, the most challenging element is to address what the problem is and, consequently, define the critical issues and systemic relationships among them. Examples of PSMs discussed during the workshop were Soft System Methodology, Strategic Choice Approach, Robustness Analysis, SODA – Strategic Options Development and Analysis. The participants were guided through the methodologies by Mike Cushman and Jonathan Rosenhead of the London School of Economics, and Leroy White of the University of Bristol.

...the general response was that most had gained a deep knowledge about the theme and acquired a better understanding of how PSM can help deal with complex and difficult problems. The group felt that another key factor for the success of the workshop was the design, which specified a small group from all over the world with different and heterogeneous backgrounds.

The daily agenda consisted of experts' presentations followed by concrete and illustrative real world case studies, which encouraged discussion and knowledge sharing by the group. Participants were encouraged to work into the night with the cases that were to be discussed the following day. Additionally, participants were asked to contribute with examples of a development issue or problem relevant to their own country and situation, which were then discussed during the workshop with the tutors.

The coffee breaks were a perfect excuse to enjoy the sun of Djerba, and simultaneously, continue the scientific discussion between the participants and the tutors. The continuing interaction among the members of the workshop made the scientific program unique, interesting, and helpful for the on-going research of all the participants.

Groups share with each other what "development" means to them.

Organizers and tutors (front, right to left) del Rosario, White, Cushman, Rosenhead and Masmoudi join some participants who stayed till the very end. The author is at the center of the back row.

A memorable social program accompanied this extensive scientific program. In fact, the facilities of the resort where the workshop took place allowed the participants to socialize while enjoying a game of tennis, a swim in the pool or even a drink at the bar.

Participants from Libya, UK, Portugal and Brazil team up for one of the many group discussions.

By the end of the Workshop, all participants unanimously expressed that the tutors were very qualified and that their collective experience was key to the success of the Workshop and that two days were not enough to learn everything and tackle all the issues raised. All told, the general response was that most had gained a deep knowledge about the theme and acquired a better understanding of how PSM can help deal with complex and difficult problems. The group felt that another key factor for the success of the workshop was the design, which specified a small group from all over the world with different and heterogeneous backgrounds.

Apart from the tutors, participants were thankful to the local organizing committee headed by Youssef Masmoudi, the sponsor Logiq as well as the coordinator representing IFORS, Elise del Rosario. The Workshop was also funded by the EURO Working Group on OR for Development.

In the end all the participants agreed to maintain contact, and hopefully, to meet in the next IFORS workshop, in Rome (27-28 June 2013).

**The author was one of the participants sponsored by IFORS to the ICORD Workshop.*

JOINT ICORD/EWG-ORD WORKSHOP

"OPERATIONS RESEARCH: ADDRESSING ISSUES OF DEVELOPMENT"

June 27-28, 2013 Rome, Italy

in conjunction with EURO XXVI - EURO-INFORMS, June 30- July 4, 2013

Call for Participants

Background

The International Conference on OR for Development (ICORD) had been sponsored by IFORS (http://ifors.org/web/icord-history) every 3 years. A recent initiative called for yearly meetings, resulting in two workshops preceding the ICORD itself, which is scheduled for 2014 alongside the IFORS Triennial Conference. This workshop is one of the two preceding the 2014 ICORD. The 2012 workshop was held in Tunisia – with the cooperation of the EWG-ORD (http://ifors.org/web/icord-workshop/). This 2013 workshop is a joint activity with the EWG-ORD satellite event.

The EURO Working Group on Operational Research for Development (EWG-ORD); http://web.ing.puc.cl/~fcrespo/eurofdv/), is a working group of EURO (http://www.euro-online.org/) which aims to promote and facilitate communication links among European and other researchers working in areas of operational research for development. EWG-ORD actively organized / co-organized workshops or streams on operational research for development for EURO 2006, EURO 2007, EURO 2008, IFORS 2008, EURO 2009, EURO 2010, IFORS 2011 and EURO 2012. These workshops have been successful in promoting the role of operational research and related techniques towards improving living conditions in developing and developed countries.

Call for Participants

Operations Researchers who have done work in the area of OR for Development are invited to participate in this joint workshop. To qualify, participants are required to submit a full paper (of at least 1500 words) on their work which has used Operations Research to help the decision-making process in the areas of education, health, water and other basic services, technology, resource use (physical or financial), infrastructure, agricultural/industrialization or environmental sustainability, that help optimize development in view of constraints and limited resources. A stress on developmental issues will be an important factor; papers of a purely technical nature, or those that have no relevance in the developmental context, will not be considered. All work presented are eligible for submission to the IFORS Prize Competition. file://localhost/(http/::ifors.org:web:ifors-prize-for-or-in-development-2014:)

Workshop Format

The Workshop will feature presentations by the participants of their papers. At least one reactor will be assigned for each paper. All participants will be given all the papers of accepted participants in advance, which will give them time to study the other papers. Ample time will be given for a discussion of each of the papers presented. There will also be a plenary session for invited speaker/s. Details and updates will be available at http://ifors.org/web/joint-icordewg-ord-workshop/.

Important Dates

Full Paper Submission	December 15, 2012
Notification of Acceptance	January 15, 2013
Workshop Registration Fee	USD 200

Support for Participants

A limited number of slots for accommodation and registration support will be available, and will depend on the quality of material submitted.

For any inquiries, please contact:

Elise del Rosario	elise@jgdelrosario.com
Honora Smith	honora.smith@soton.ac.uk
Gerhard-Wilhelm Weber	gweber@metu.edu.tr

**Program Committee members and exact venue will appear in the second announcement.*

INTERNATIONAL FEDERATION OF OPERATIONAL RESEARCH SOCIETIES

Invitation and Call for Papers

IFORS Prize for OR in Development

IFORS is pleased to announce that the Prize will be awarded during the 20th Triennial conference on "The Art of Modeling" to be held in Barcelona, Spain from 13-18 July 2014.

- Awarded at the close of the IFORS Triennial Conference and carries with it a grand prize of US$ 4,000.00 and a runner-up prize of US$ 2,000.00

- The finalist papers are automatically considered for publication in the IFORS Publication, International Transactions in Operational Research (ITOR). Publication is contingent upon the usual refereeing process. Authors of these papers agree that the first right to publish their papers lies with ITOR; as such, they will not publish the same until and unless they receive permission to do so by the ITOR editor.

Important details about the competition follow:

Topic of paper

- The paper describes a practical OR application in a developing country, conducted to assist a specific organization in its decision-making process with regard to education, health, and other basic services, water, technology, resource use (physical or financial), infrastructure, agricultural/industrialization, environmental sustainability with original features in methodology or implementation for development in developing countries. The idea is to optimize the development with the constraints and limited resources.

- The paper includes some description of the application's social context and its impact on the decision making process or on the organization for which it was conducted. Where appropriate, the relevance of the country's state of development to the study is addressed. A stress on developmental issues will be an important factor in the judging. Papers of a purely technical nature, or those, which have no relevance in the developmental context, will not be considered.

Judging Criteria

- Qualifying papers will be evaluated on the following criteria: problem definition, creativity and appropriateness of approach, MS/OR content, stress on developmental issues, innovative methodology, impact of the study, paper organization and structure, participation of local researchers and quality of written and (if selected as finalist) oral presentation.

Other Information

- Principal authors and presenters of any nationality are welcome. If selected to be among the finalists, the entry must be presented by one of the principal authors during the IFORS Triennial Conference to be held in Barcelona, Spain from 13-18 July 2014.

- Finalists' registration fees will be sponsored by IFORS. For finalists who are nationals of developing countries, a grant for living expenses may be requested but cannot be guaranteed.

- All contributions must be submitted using the submission site http://mc.manuscriptcentral.com/itor, indicating in their cover letters that they are intended for this competition.

Other inquiries should be sent directly to the Prize Chair:
Prof. Andres Weintraub
Professor Department of Industrial Engineering
University of Chile
P.O. Box 2777
Santiago, Chile
E-mail:aweintra@dii.uchile.cl

Last date of submission of the full paper: November 30, 2013
Finalists will be notified by: February 28, 2014
Date of oral presentation: July 14, 2014

INFORMS to Offer Analytics Professional Certification

Andy Boyd <e.a.boyd@earthlink.net>
Vice President, Marketing, Communication, & Outreach, INFORMS

The shortage of data analytics professionals forecast for the next few years is a well known precept espoused by many seers and soothsayers watching industry.

Back in January, 2012, INFORMS' Board of Directors led by Vice President, Practice Activities Jack Levis discussed what could be done to help industry ensure people with the requisite skills and capabilities are being hired. With the help of consulting firm Capgemini, the board arrived at the realization that INFORMS could offer a certification program in analytics. Based on ongoing certification programs in other fields such as project management and business analysis, the board felt confident INFORMS could deliver a rigorous program that could be the industry's gold seal of approval for analytics professionals.

The new program would not be just for the benefit of employers in industry, but will deliver solid benefits to the individual candidates taking the certification exam. Certification should advance the career potential of individuals by setting them apart from the crowd, driving personal satisfaction, and improving overall job performance by stressing continuing professional development.

INFORMS, will hold the first exams for its new Certified Analytics Professional (CAP) certification next April 7 at the 2013 INFORMS Conference on Business Analytics & Operations Research in San Antonio, Texas. A second test will be conducted next October 5 at the 2013 INFORMS Annual Meeting in Minneapolis, Minnesota. More sites are to be determined and will depend on market acceptance. The exam may not be taken remotely yet but must be taken in person in a proctored environment.

INFORMS hopes to offer CAP outside of the U.S. eventually and will be looking for potential partners to help achieve this.

To attain the CAP certification credential, candidates will be required to pass a 100-question, multiple choice examination in three hours as well as provide evidence of attainment of "soft skills" that includes items such as effective partnering with business clients, framing problems with stakeholders, working in project teams, and communicating results to decision makers.

Not everyone qualifies to take the CAP exam. To be eligible, candidates must have:

- A BA/BS or MA/MS degree in an educational area related to analytics
- For BA/BS holders, at least five years of analytics work-related experience
- For MA/MS holders, at least three years of analytics work-related experience
- At least seven years of analytics work-related experience for BA/BS (or higher) holder in an unrelated area

INFORMS' CAP certification exam costs $495 for members and $695 for non-members. Bundled rates with INFORMS meetings and team rates are also available. Contact INFORMS for more information.

The exam is based on a rigorously developed Job Task Analysis, which judges the tasks that a typical analytics professional performs on the job and the knowledge needed to perform those tasks. The broad domains of practice that will be tested and their weight toward the final score are:

- Business problem (question) framing – 15%
- Analytics problem framing – 17%
- Data – 22%
- Methodology (approach) selection – 15%
- Model building (16%)
- Deployment (9%)
- Life cycle management (6%)

Certification should advance the career potential of individuals by setting them apart from the crowd, driving personal satisfaction, and improving overall job performance by stressing continuing professional development.

The completed Job Task Analysis was subjected to external review and accepted as representative. More than 200 analytics professionals from the U.S., Europe and Asia/Pacific offered input into the structure of the test's sections. Once the framework was established about 50 members volunteered to write test questions.

The JTA and resulting exam is the result of collaboration between advanced analytics educators and practitioners. About three-quarters of INFORMS' 10,000 members are in the academic world, with the rest working in business or government.

For more information on INFORMS CAP certification, see the just-released Candidate Handbook and Frequently Asked Questions.

OR Society in Focus

SOBRAPO: A Partner in the Development of OR in Brazil

Annibal Parracho <annibal.parracho@gmail.com>

Operations Research in Brazil has a rich, long history with the Brazilian Society of Operations Research (SOBRAPO) playing a significant part in it. Now on its 44th year, SOBRAPO paved the way to the staging of the first Brazilian Symposium on Operational Research (SBPO) in São José dos Campos, São Paulo, in May 1968. At that time, the study and use of Operations Research techniques were already widespread throughout the country.

This is no surprise because thirteen years earlier, in 1955, Rui Leme had already published, in the Revista de Engenharia, an article entitled "Industrial Applications of Operations Research". By 1958, the textbook 8th volume of Notes in Mathematics of the Institute of Pure and Applied Mathematics (IMPA) had been authored by Mario Henrique Simonsen.

The first undergraduate course in Production Engineering in Brazil was offered in 1957 at the Polytechnic School of the University of São Paulo (EPUSP), São Paulo and, in 1959 at the Technological Institute of Aeronautics (ITA), São José dos Campos. In Rio de Janeiro, Operational Research first appeared as a graduate course at the Pontifical Catholic University (PUC-Rio) in 1966. At that time, researchers like Jack Schechtman and Sandro Berenguer at IMPA, Demetrio Ribeiro and Guilherme de La Peña at COPPE/UFRJ and Rio Nogueira and Jose de Jesus da Serra Costa in the Mathematics Institute of the Federal University of Rio de Janeiro were teaching Operational Research within other courses.

At this point, big Brazilian companies were also undertaking research on and applications of Operations Research. Especially remarkable were groups within Petrobras, Eletrobras, the tobacco company Souza Cruz and Vale, the former Companhia Vale do Rio Doce – which have remained active till the present. With the closure of such companies as the telecommunications TELERJ and the National Housing Bank (BNH), operations researchers moved to the University and other enterprises.

SOBRAPO

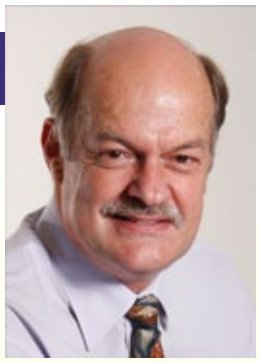
Initial work on the constitution of SOBRAPO started during the second Symposium in 1969 in São José dos Campos, where the Society held its office until 1973, after which it moved to Rio de Janeiro where it has stayed since.

In 2012, the 44th SBPO was held in Rio de Janeiro alongside the 16th Latin American Congress. It is worthwhile noting that in 1982, this same place hosted the first Latin American Congress held in conjunction with the 15th SBPO. The Latin American and Ibero Association of Operational Research (ALIO) was created at that first congress which elected Roberto Galvão as its first president. Other Brazilians to chair ALIO later were Nelson Maculan, Celso Carneiro Ribeiro and Horacio Hideki Yanasse.

SOBRAPO has had an average membership of 400 active individual members and dozens of institutional partner companies. Fields of study have spread from the traditional core of Mathematical Programming and Optimization to many new topics of interest. Segments dealing with the application of Simulation techniques, Graphs and Probabilistic Methods play an important role in the current Operational Research activities in Brazil, with several consulting enterprises constituted to provide advice on the subject in the last few years.

Indeed, a rich history continues to light the way to a bright future for research in and practice of Operations Research in Brazil.

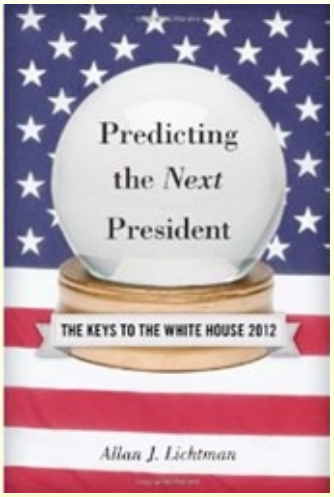
Book Review
Required Reading for US Presidential Aspirants?



Hans Ittmann <hittmann01@gmail.com>

Predicting the Next President: The Keys to the White House by Allan J Lichtman, 2012. Rowman & Littlefield Publishers, INC, New York, USA. pp 226, ISBN-10: 144221211X, $16.75 and Kindle edition $10.59.

The presidential election in the USA has traditionally attracted worldwide attention and spawned numerous predictions of the outcome. Amid the competition for viewership, TV channels bombard the world with discussions, speculations and predictions. Even the OR community has offered its own. Before the last two elections in 2008 and in 2011, OR/MS Today (the INFORMS magazine) ran two stories, one in October 2008 and the other in June 2011, on "predicting the outcome of the upcoming presidential election". In both cases, outcomes were as predicted!



The OR/MS Today article mentioned that the method used for the prediction is "based on a solid statistical model…." while the "keys" are based on a statistical pattern recognition algorithm which closely resembles "kernel discriminant function analysis". In collaboration with Vladimir Keilis-Borok, a world-renowned authority on the mathematics of prediction models, Lichtman developed the "prediction model" in 1981. Being interested in election forecasting and keen on understanding the methodology, I set out to read the latest edition (January 2012) of the book "Predicting the Next President: The Keys to the White House" by Allan J. Lichtman.

Lichtman is a Professor in History at the American University in Washington, D.C. and he has developed a "prediction model" that is based on 13 keys, or questions, each with a "true" or "false" answer. A "true" answer favors the incumbent party and if five or fewer answers are "false" the incumbent party retains the presidency. However if six or more answers are "false" the challenger wins. Impressively, Lichtman's model has correctly predicted the popular vote outcomes of all the elections since 1984, including the victory of George W H Bush in 1988 when the polls showed he was 20 points behind, as well as Al Gore's "victory" in 2000 when he prevailed in the popular vote against George W Bush but lost on the electoral vote. In addition, the model also "works" for all elections going as far back as 1860 through to 1980.

The book introduction explains the logic of the keys and how presidential elections work. Contrary to the horse-race approach to politics taken by the media, pollsters, campaign consultants and many politicians where everything such as personality, image, advertising, ideology, eloquence, agility, fund-raising, etc. are things that really matter, Lichtman is emphatic about presidential elections being "primarily referenda on the performance of the incumbent administration during the previous four years".

It was based on this view that the Keys to the White House, a diagnostic prediction model, was developed through the application of mathematical procedures to study past elections. The approach embodies a broad-based "performance" theory of presidential elections that leads to "a prediction system that identifies thirteen historical conditions, or keys, that gauge the political strength and performance of the executive party as a presidential term progresses".

The thirteen keys are the following (an abbreviated version of each key is given here):

Key 1: Incumbent-party mandate	Key 8: Social unrest
Key 2: Nomination-contest	Key 9: Scandal
Key 3: Incumbency	Key 10: Foreign or military failure
Key 4: Third party	Key 11: Foreign or military success
Key 5: Short-term economy	Key 12: Incumbent charisma
Key 6: Long-term economy	Key 13: Challenger charisma
Key 7:Policy change	

The first four are political keys; keys 5 to 11 are performance keys while 12 and 13 are charisma keys. The keys express a condition that represents the success of the incumbency party and all of the keys together accurately predict the outcome of an election. There is no explanation of the quantitative basis of the method to determine what the keys should be and what they should represent. There is also mention of a model used to determine how the economy would look like but no details are given.

To get a prediction, the answer to each key should be evaluated. Not surprisingly, one of the major criticisms is the subjective nature of determining the answer to each of the keys. Three arguments against this criticism are presented: (i) decisions on keys must be made consistently across elections and according to the exact definition of the key; (ii) once a decision is made for all thirteen keys, the approach gives a definite prediction that serves to test the judgments made; and (iii) the keys have a successful track record. Although the latter is true, I find the arguments presented very dubious.

The author must be credited, and rightly so, with correctly calling the outcome of the last eight presidential elections in the USA.

An entire chapter is devoted to illustrate how each key is determined and used. This is done through the use of examples from previous elections. What then follows, in chronological order, is a detailed analysis and description of the successful application of the prediction model and keys to every election since 1860. For anyone interested in US politics and specifically the history of presidential elections, this makes for very interesting reading. Lastly, in the final chapter, the author offers some advice to potential presidential candidates on how they should run their election campaigns.

This is an infectiously interesting book on an approach to election forecasting. What is lacking is an in-depth discussion of how the various keys are determined and how quantitative methods are applied, or used, to assist the process. The author must be credited, and rightly so, with correctly calling the outcome of the last eight presidential elections in the USA. This in itself is astonishing although one is left with a lingering doubt: is this approach really scientifically sound, or is its success just a testament to Lichtman's innate ability to correctly determine answers to each of the keys?

OR IMPACT

Articles demonstrating direct benefits from implementing OR studies

Section Editors: Sue Merchant <suemerchant@hotmail.com>, **John Ranyard** <jranyard@cix.co.uk>

CSIRO Improves Rail Planning of Australian Iron Ore Exports

Rodolfo García-Flores <Rodolfo.Garcia-Flores@csiro.au> and **Gaurav Singh** <Gaurav.Singh@csiro.au>

CSIRO Mathematics, Informatics and Statistics (CMIS)

The authors are OR research scientists at CSIRO (the Commonwealth Scientific and Industrial Research Organisation) and work on a variety of practical and research projects for a range of industries in Australia.

Introduction

Scientific innovation is an important driver of Australia's economic growth. The mission of CSIRO is to innovate by producing research and development that is relevant to the Australian economy. CSIRO is actively developing novel solutions to improve the efficiency of the mining industry's processes and operations, and iron mining is a clear example. Australia is the largest iron ore exporter in the world: in 2009, iron ore exports accounted for more than 30 billion dollars in value.

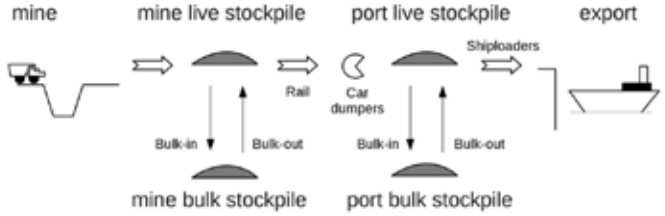
The Integrated Planning Delivery team of Rio Tinto (RT) and the Operations Research group of CSIRO Mathematics, Informatics and Statistics (CMIS) developed a planning tool to maximise throughput of the export operations, while satisfying all grade requirements and operational capacity constraints of RT's rail network. This network operates in the Pilbara region of Western Australia (WA), where 97% of the iron ore mined in the country is produced. Consisting of approximately 1500 km of track, the network connects 14 mines to three shipping terminals north of WA, making it the largest privately owned rail network in Australia.

The optimisation tool developed by CMIS solves a mixed-integer linear program that assumes that RT's medium term production plan is the backbone for determining medium-term rail operations. In 15 minutes of execution time, the tool produces rail schedules with at least as high a throughput of iron ore as those constructed by more than five hours of manual planning.

The Problem

The aim of the project was to devise an optimal plan in the form of allocation of trains to mines, so as to maximise throughput while satisfying all grade requirements and operational capacity constraints. The planning horizon is subdivided in periods of days (typically one week), but the number of days in any two periods is not necessarily the same.

The mines can send up to 30 trains of iron ore per day. In the mines, material is dumped in live stockpiles, which are part of the production line, and bulk stockpiles, which are used for buffering and storage. In both mines and ports, bulk-in operations move iron ore from live to bulk stockpiles, and bulk-out move the material in the opposite direction. The ore in the mines' live stockpiles is transported by rail to the ports, where it is dumped onto the ports' live stockpiles by car dumpers. Shiploaders put the ore into the ships for export.



Capacity constraints form the core of the problem. Stockpile capacities are defined by the minimum and maximum limits, and the inventory on each stockpile is tracked in the problem's mass balance constraints. The model also considers the limitations of the equipment concerning the amount of material that can be displaced. Similarly, there are limitations on the time available for train operation and the capacity of the trains to transport mineral. The model includes constraints that ensure that the total number of fleet hours should not exceed the available time for operation, and that the train capacities are not exceeded. Ensuring that the model respected the desired composition of the final blends and that RT was able to fulfil its legal obligations with joint venture companies posed very interesting challenges, as discussed next.

The Challenges

Grade requirements and contractual obligations introduced additional complications to the calculation of the rail schedule that required insight and creativity. This problem led to the development of an original scheduling formulation that incorporates blending and delivery quotas, which are required by legal contracts with RT's joint venture partners.

The first challenge was ensuring that the quality of the shipped product was preserved. In the model, target compositions are expressed as fractions whose denominator is the amount of mass in the stockpiles. This means that grade requirements introduced non-linearities into the model, which we attacked by iteratively solving the optimisation problem and feeding the stockpile composition values back into the next optimisation iteration. This technique is known as Successive Linear Programming (Méndez et al., 2006) and has been widely used in the petrochemical industry, although it has only recently been introduced to open-pit mining problems.

The second challenge is ensuring that the company fulfils its contractual obligations. These obligations prescribe that some of the mines have to comply with annual as well as per-period delivery quotas, which are re-set at the beginning of each financial year. These were modelled as soft constraints.

Additionally, the operative policies of the company stipulate that some dumping equipment in the ports must be given preference to unload material originating from certain mines or groups of mines. Requirements like this were not uncommon during development and also had to be incorporated into the model.

The Tool

We delivered an Excel-based application supported by Visual Basic as a front-end, with a C++ back-end that has the capability of interfacing to either the Gurobi or CPLEX solvers. We originally built the solution with CPLEX as the only solver, but we added Gurobi because we realised from our experiments that Gurobi produced tighter bounds early on in the calculation. The interface gives structure to the problem and encourages the planners to formalise rules of thumb and operational policies that had not been previously recorded. It has also encouraged staff to maintain clean and updated resource data.

We added relevant features to the software guided by the planners' constant feedback. For example, we implemented "incentives" to the spreadsheet to help the planners test "what-if" scenarios. These incentives are additional terms in the objective function that guide the model towards a solution which recommends the transfer of as much iron ore as possible from the mines to the ports, regardless of whether or not it can be shipped. Without incentives, the tool prescribes the use of just enough train capacity to transfer the material that can be shipped. In a few words, the aim of the incentives is to use train capacity to its maximum.

In addition to the optimal solution method, we implemented two sliding-time-window heuristics to provide RT with good quality solutions with short computation time. These heuristics reduce the computer's memory requirements, run at a comparable speed or faster than the optimal method, and match the planners' intuition in that periods far in the past should have little or no influence on present or future periods.

The Outcomes

A comparison between our tool and the previous manual approach demonstrated that, over an 18 month planning horizon, the optimiser scheduled over 500 kilotonnes of iron ore more than the plan obtained manually. Moreover, the scheduling tool has been consistently producing plans with higher iron ore throughput than the manual approach, to the extent that the company's planners now rely solely on the software developed by CSIRO.

The computational experiments let us claim with certainty that all operational, grade and contractual constraints are met. The results also show that not all incentives are equally useful to increase the use of the available train capacity, but their inclusion in the Excel interface gives the planners freedom to adjust their value to explore the solution space. This enables the planners to effectively test "what-if" scenarios in a short time, a capability that the manual approach could not provide.

The tool writes comprehensive output reports which have been useful in shaping operations by helping planners understand uncertainties and identify bottlenecks, and has released valuable staff time to be used in other business priorities.

In summary, CSIRO produced in collaboration with RT a cutting-edge decision making tool that does more than assist in rail network planning. By design, the tool enables the translation of tactical plans at RT into shorter term, operational plans by optimising the use of trains, car dumpers and stockpiles. RT planners have the option to enable and adjust incentives to maximise train use. By granting the user control over the incentives, the planner can experiment with alternative scenarios, which in many cases produce schedules with higher iron ore throughput than running the optimiser with no incentives at all. Most importantly, CSIRO is creating, in collaboration with experts in the mining industry, value for the Australian economy through innovation.

More details about this project, together with a letter of endorsement by the client, can be seen in a forthcoming paper in Interfaces.

(Reference: CA Méndez, IE Grossmann, I Harjunkoski, P Kaboré (2006) A simultaneous optimization approach for off-line blending and scheduling of refinery operations. Computers and Chemical Engineering 30(4), 614-634).

Dynamic Inventory Control with Cash Flow Constraints

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The majority of the literature on inventory theory ignores the cash flow and assumes that the firm always has enough capital to implement any operational decisions (see, e.g., Zipkin, 2000). Such ignorance may be justified by the seminal paper of Modigliani and Miller (1958), which shows that a firm's operational and financial decisions can be made separately in a perfect capital market. However, in practice, most of the firms (especially the start-up, small- and medium- sized ones) do not operate in perfect capital markets and their operational decisions are affected by their internal capital and ability to obtain external capital such as bank loans, equity and venture capital investment. Indeed, according to a report from the Federal Reserve Bank of New York, for firms with limited access to capital markets, internal funds are a significant predicator of inventory investment (Zakraj˘sek 1997).

One of the most classic models in inventory control is the periodic-review systems with no setup cost (Arrow et al. 1958). When cash flow is not a constraint, a celebrated result is that the optimal inventory control policy for each period is the so-called base-stock policy. How does the inventory replenishment policy change when cash flow, considered as the blood line of a company's operation, is introduced? An interesting question that arises is: how does the optimal inventory decision change when cash flow constraints are present. Is base-stock type of policy still optimal in that case?

To address this question we consider the classical dynamic inventory control problem where the firm periodically replenishes its stock from a supplier and sells it to the market. Excess demand in each period is lost when insufficient inventory is in stock. The demands for different periods are independent and identically distributed random variables. The replenishment decisions of the retailer are constrained by cash flow. We consider two models. In the first one, the firm has no borrowing capability and has to rely on its own capital for its operation, resulting in a self-financing 1model (Chao, et al. 2008); while in the second, when the firm is short of cash, it can borrow from a lender at certain interest rate, giving rise to a short-term financing model (Gong, et al. 2012). In either case, the objective is to maximize the firm's expected terminal wealth at the end of the planning horizon.

Most of the existing research in the interface between inventory and finance are based on single- period models. In such models, decision makers have only one chance to make operational/financial decisions under financial constraints. One stream of these models focuses on a single firm's optimal operational and financial decisions. Xu and Birge (2004) consider a model for a capital-constrained firm to make production and financial decisions simultaneously in the presence of demand uncertainty and market imperfections. Xu and Birge (2008) build on a newsvendor model to make optimal production decisions in the presence of financial constraints and managerial incentives. Babich et al. (2010) study joint inventory and financial decisions of a capital-constrained firm facing either an uncertain demand or an uncertain supply. The other stream of one-period models focuses on the effects of financial constraints and financing sources in a supply chain context. Buzacott and Zhang (2004) incorporate financial capacity into production decisions using asset-based financing on the available working capital in a stackelberg game. Dada and Hu (2008) study a capital-constrained newsvendor's optimal borrowing amount when a bank determines the interest rate to maximize its own profits. Recently, Kouvelis and Zhao (2009) study the impact of trade credit contracts under a supply chain where both the supplier and the retailer are capital-constrained; and Yang and Birge (2010) analyze the effects of trade credit in supply chains with demand uncertainty and costs of financial distress. In contrast to single-period models, there are only a few papers on dynamic inventory models with financial constraints, including Li et al. (1997), Hu and Sobel (2007) and Hu et al. (2010), Archibald et al. (2002), Xu and Birge (2006) and Chao et al. (2008). More specifically, Li et al. (1997), as well as Hu and Sobel (2007) and Hu et al. (2010), focus on expected total discounted dividends over the planning horizon. Archibald et al. (2002) aim at maximizing a startup firm's probability of long-term survival. Xu and Birge (2006) propose an integer stochastic programming with nonlinear constraints which is analytically intractable.

In some sense, financial constraint in inventory management can be considered as a supply capacity constraint on ordering quantity, and borrowing from the lender can be considered as higher purchasing cost when ordering quantity exceeds the capacity level. Production-inventory problems with supply capacity constraints have received a great amount of attention since the work of Federgruen and Zipkin (1986) (see, e.g., Ciarallo et al., 1994; Wang and Gerchak, 1996). When the ordering decisions are constrained by capacity, a main result in these papers is that the optimal control strategy is a modified base-stock policy. That is, there exists an optimal base-stock level, which is greater than or equal to that of the uncapacitated model, and the optimal policy always tries to bring the inventory level to the base-stock level if possible; if this cannot be achieved due to the capacity constraint, then order as much as possible.

There is an important difference between the models involving cash flow constraints and those with supply capacity constraints. Indeed, in inventory control problems with supply capacity constraints, the constraints are given externally; while in inventory models with financial constraints, the financial constraints are the result of the firm's past decisions. Therefore, the financial con- straints are in fact part of the firm's decisions. Consequently, when making inventory decisions, the firm needs to take into account their impact on future financial cash flows. On a more technical level, inventory management models with capacity constraint allow the state of the system to be one- dimensional (i.e., the inventory level). Inventory control models with cash flow constraint, however, are characterized by a two-dimensional state, which makes the analysis much more involved.

To proceed, let us consider a capital-constrained firm that sells a product over a planning horizon of N periods, indexed by $n = 1, \ldots, N$. At the beginning of the planning horizon (i.e., period one), the firm has an initial capital w_1 and inventory stocking level x_1, with $w_1 > 0$ and $x_1 \geq 0$. In each period n, the firm can replenish its inventory from a supplier with a unit cost c. The delivery lead time is zero, implying that an order placed at the beginning of a period is delivered in the same period. The product has a fixed selling price p and a random demand D_n in period n. We assume $D_1,\ldots,D_N$ are independent and identically distributed non negative random variables, with $f(\cdot)$ and $F(\cdot)$ being their density and distribution functions, respectively. We also assume that any unsold product in a period is carried to the next period, any excess demand in a period is lost, and any unsold inventory at the end of the planning horizon is salvaged at a value γ per unit with $\gamma \leq c$.

We consider two scenarios. The first one is a self-financing model, in which the firm has no option to borrow, and has to rely on its own capital for all operations. In the second, the short-term finance model, besides using its own capital, the firm can borrow short-term loans to finance its inventory in each period. The potential sources for such loans include the firm's shareholders, its supplier, third-party companies, or the banks. Note that if the short-term loans are from the firm's shareholders, then they can be regarded as (short-term) capital subscriptions; while if the loans are from the firm's supplier, then they can be regarded as trade credits.

Let $\rho(z)$ denote the total loan interest in one period if the loan size is z. Then, $\rho'(z)$ can be regarded as the marginal interest rate when the loan size is z, with $\rho'(0)$ being the minimum interest rate. Since the interest rate is positive and it is usually increasing in the loan size, we assume that $\rho(z)$ is increasing and convex in z with $\rho(0) = 0$ and $\rho'(0) > 0$. In addition, the firm can deposit its extra capital into a savings account with a fixed interest rate d per period. It is reasonable to assume $0 \le d < \rho'0)$, since in practice the loan rate is always higher than the deposit rate. This assumption also ensures that the firm will never borrow a loan while deposit capital in the same period. We further assume $\rho'0) < (p - c)/c$, since otherwise the firm will never borrow and the problem then reduces to the model with a self- financing firm. Note that the loan interest function ρ(z) described above includes all commonly used lending contracts as special cases. Two examples are 1) a contract with borrowing cap K, $\rho(z) = \rho(K) + (p - c)(z - K)^+/c$, in this case the firm will never borrow more than K; and 2) a contract with the loan rate is $b1$ up to a borrowing limit K and a jumbo rate b_2 beyond K, i.e., $\rho(z)=b_1z+(b_2-b_1)(z-K)^+$.

The sequence of events in each period n is as follows: First, the firm reviews its inventory level x_n and capital level w_n. Second, the firm decides on the order quantity for this period, denoted as q_n, pays the ordering cost cq_n by its own capital and/or short-term loans, and deposits the extra capital (if any) to the savings account. Clearly, for the self-financing model it must hold that $cq_n \le w_n$ for all n. Third, the order arrives and the inventory level is increased to yn, with $y_n = x_n + q_n$. Fourth, the random demand D_n is realized and the sales revenue $p \min\{y_n, D_n\}$ is collected. At the end of the period, the firm receives its deposited capital and interest from the savings account (if any), or pays the principal and interest of the short-term loan (if any). In case the firm does not have enough capital to pay the entire principal or interest of the loan, we assume that the firm pays all its capital and the remaining debt is carried to the next period as the firm's negative capital. Note that in this model, the inventory holding cost is implicitly included as the opportunity cost of capital and the shortage cost is implicitly included as the lost revenue.

Let (x_n, w_n) denote the state of the system in period n. Then, with the preceding description and assumptions of the model, the state transitions between period n and period $n + 1$ can be given as follows:

$$x_{n+1} = (x_n + q_n - D_n)^+;$$

$$w_{n+1} = p\min\{x_n + q_n, D_n\} + (1 + d)(w_n - cq_n)^+ - (cq_n - w_n)^+ - \rho((cq_n - w_n)^+).$$

Note that in the case of self-finance, it follows from $cq_n \le w_n$, $(cq_n - w_n)^+ = 0$ and $\rho(0) = 0$ that the expression above is significantly simplified. The transition of the inventory level follows directly from the lost-sales assumption; while the transition of the capital level consists of four terms. The first term on the right hand side of the second equation is the sales revenue in period n, the second one is the capital received from the savings account, and the last two terms are the payments for the principal and interest of the short-term loan, respectively. Note that under our assumptions, the firm deposits if and only if $w_n \ge cq_n$ and the deposit amount is $(w_n - cq_n)^+$; while it borrows if and only if $w_n < cq_n$ and the loan size is $(cq_n - w_n)^+$.

Having described the state, actions, and state transitions, we now turn to the objective of the firm. Following the many studies in mathematical finance (e.g., Karatzas, 1996; Pliska, 1997), we assume that the firm's objective is to maximize its expected terminal wealth (capital) at the end of 4 the planning horizon. That is, the firm's decision problem is: for given $w_1 > 0$ and $x_1 \ge 0$,

$$\max_{y_1,\ldots,y_N} E[w_{N+1} + \gamma x_{N+1}],$$

subject to $y_n = x_n + q_n \ge x_n$, for $n=1,\ldots,N$ and the finance constraints.

Our main findings are the following. For the case of self-financing, our analysis yields exceedingly simple structure for the optimal inventory control policy in each period, and we also develop efficient algorithm to compute the optimal control parameters. We show that even though the optimal target inventory level depends on the equity level in a complicated manner, the optimal realized inventory level has a very simple structure: Replenish the inventory level to a critical number when there is sufficient on-hand capital, and use up all the capital otherwise (Chao, et al. 2008). We also obtain the comparative statics results, i.e., relationship between the optimal control policy and purchasing price, interest rate, savage value, and selling price; and present conditions under which the optimal control policies are identical across periods. For the case with short-term finance, we again show that the optimal inventory control policy for each period is a function of the firm's equity level, but in a more subtle way. More precisely, the structure of the optimal policy is characterized by four intervals of the equity level. In two of these intervals, the optimal replenishment level is a base-stock type, borrowing money if necessary; in the third interval, the firm simply uses up all its cash and does not resort to the lender, while in the last interval, the optimal replenishment is complicated and is not even monotone in the equity level (Gong, et al. 2012). These results shed light on the firm's dynamic inventory decision, one of the most classic models in the operations research literature, when cash flow, a true constraint to almost all firms in the real world, is introduced to its operations.

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Congratulations to the Incoming IFORS President

Nelson Maculan receiving the insignia of Chevalier of the National Order of Merit from Consul General Jean-Claude Moyret.

IFORS incoming President Nelson Maculan received from the Consul Général of France in Rio the insignia of Chevalier de l'Ordre National du Mérite last November 26, 2012.

A Brazilian who recently became a French citizen after being married for 40 years to French spouse Anne-Marie, Maculan has dedicated most of his professional activities to the development of education and research both in France and in Brazil. In the process, he has been instrumental in enhancing academic and scientific cooperation between the two countries.

The OR community offers its congratulations and wishes him continued success in international affairs, especially with his upcoming presidency of the IFORS!

Welcome to IFORS AC 2013 – 2015

IFORS welcomes the new members of the Administrative Committee for the period 2013-2015.

They are joined by past AC members President Dominique de Werra who serves as Immediate Past President, Peter Bell as Treasurer, and Mary Magrogan as Secretary.

IFORS President Nelson Maculan

Nelson Maculan is professor in the Department of Systems Engineering and Computer Science of the Graduate School and Research in Engineering (COPPE), Federal University of Rio de Janeiro (UFRJ), Brazil. He has supervised over 60 PhD theses and 150 MSc dissertations. A former president of the Federal University of Rio de Janeiro, he served as National Secretary for Higher Education and as State Secretary for Education in Rio de Janeiro.

He was the recipient of several honorary degrees, which includes: Chevalier dans l'Ordre National du Mérite, France; Grand-Croix National Order of Scientific Merit, Brazil; and Docteur Honoris Causa de l'Université Paris 13, France. He is a member of the Brazilian Academy of Sciences, the National Academy of Engineering (Brazil), the European Academy of Arts, Sciences and Humanities (France), and the TWAS – the Academy of Sciences for the Developing World.

He has published and edited several books, edited and published articles in journals, was IFORS VP from 1983 to 1986, and twice served as ALIO President.

IFORS Vice President Sue Merchant

Sue Merchant started her OR career in 1970 in the Ministry of Defence in London before moving to the Metropolitan Police where she stayed for 28 years. Projects for the Met included planning for the conversion of some 4.5m criminal records to microfiche; devising the Force's first Information Strategy; and undertaking numerous analytical studies from evaluating police schemes to using MCDA for equipment selection. She was appointed Director of Consultancy and Information Services in 1990.

In 2003 she became an independent OR consultant, carrying out studies from devising risk management plans to performing efficiency studies. Currently, she supervises MSc students at LSE and Warwick Universities in their summer industrial projects, and is a trustee of the Tavistock Institute.

A President of the UK ORS from 2008-2009, she is keen to assist IFORS in its role of promoting the spread of good OR practice and thinking across the world.

IFORS VP for the Latin American Ibero Association on Operations Research Lorena Pradenas

Lorena Pradenas teaches Industrial Engineering in the graduate and undergraduate levels of the Concepción University in Chile. She obtained her Dr. Sc. in Systems and Computing Engineering from the COPPE/UFRJ-Brazil and her Master's degree in Industrial Engineering from PUC/RJ-Brazil. She obtained her Chemical Engineering degree from the Concepción University of Chile.

She held the position of President of the ALIO and ICHIO, as well as the Academic and Professional Women Association of the Concepción University. She is currently Director of the master's program in Industrial Engineering and has guided over 30 Master's Thesis in Industrial Engineering.

Having served as director of an ALFA project, she has likewise been co-director of educational projects and mobility between the U.S. and Chile. She has published several articles in international conferences and journals and has held the position of Executive Director for various national and international conferences. She was manager of industrial projects developed with Chilean mining companies

IFORS VP for The Association of Asian-Pacific Operational Research Societies Yuan Ya-xiang

A professor at Academy of Mathematics and Systems Science of Chinese Academy of Sciences, Ya-xiang Yuan obtained his Bachelor's degree from Xiangtan University in 1981 and Ph.D. in 1986 from the University of Cambridge. He was the director of Institute of Computational Mathematics and Scientific/Engineering Computing of CAS prior to this, was director of State Key Laboratory of Scientifc and Engineering Computing). In his field of operational research and numerical analysis, he has published four books and over 100 research papers. He is a Member of CAS and a fellow of both SIAM and AMS.

He is the editor-in-chief of Journal of the Operations Society of China, and serves in the editorial boards of many international journals. He has won numerous awards, including Feng Kang Scientific Computing Award, China's National Young Scientist Award, China's National Science and Technology Award, and Shiing S. Chern Mathematics Award.

He is the president of OR Society of China (2004-2012) and the president of APORS (2010-2012).

IFORS VP The Association of European Operational Research Societies Elena Fernandez

Elena Fernández is a Professor in the Department of Statistics and Operations Research at Universitat Politècnica de Catalunya - Barcelona Tech. Her research interests include discrete optimization and, in particular, discrete location, vehicle routing and network design problems. She is author or coauthor of over 50 papers published in international journals and has supervised a number of PhD students.

A member of the Editorial Board of Computers and Operations Research and TOP, the OR journal of the Spanish Statistics and OR Society (SEIO), she is also a member of the Advisory Board of the EURO Journal on computation Optimization.

From 2007 to 2010, she served as the Operations Research VP for SEIO. She took over the unexpired term of the EURO VP for IFORS Martine Labbe in 2011. She has been very busy with preparations for IFORS 2014 Conference in Barcelona for which she has been appointed General Chair.

IFORS VP for The Association of North American Operations Research Societies Michael Gendreau

Michel Gendreau is Professor of Operations Research at the Department of Applied Mathematics and Industrial Engineering of École Polytechnique de Montréal (Canada), where he holds the *NSERC/Hydro-Québec Chair on the Stochastic Optimization of Electricity Generation*. A former Vice-President of IFORS from 2001 to 2003, he was President of the *Canadian Operational Research Society* as well as Vice-President, International Activities of *INFORMS*.

With the application of operations research methods to energy, transportation and telecommunication planning as his area, Gendreau has published more than 225 papers on these topics in peer-reviewed journals and conference proceedings. He is also the co-editor of six books dealing with metaheuristics, transportation planning and scheduling,

He is the Editor in chief of *Transportation Science* and member of several other editorial boards. In 2001, he received the Merit Award of CORS in recognition of his contributions to the development of O.R. in Canada and in 2010 was elected Fellow of INFORMS.