What's Inside:

Hola Barcelona!

The Art of Modeling could not have found a better backdrop for expression than this city overflowing with passion for festivals, cuisine, art, culture, architecture – Barcelona!

This dynamic and inviting city will play host to thousands of Operational Researchers from around the globe as they participate in a long-awaited triennial event, the IFORS 2014 Conference from July 13 to18 .

The venue for the conference is the Centre de Convencions Internacional de Barcelona (CCIB) http://www.ccib.es/home. Located at the newest section of Barcelona's seafront, it is one of the largest and more modern convention centers in Europe. Numerous choices of hotels for all budgets dot the ten- minute walking distance radius from the CCIB. It can be easily reached by bus, metro or tram from the city center.

Among the luminaries invited to give plenary sesisons are Jaume Barceló (Universitat Politècnica de Catalunya, Spain), Robert Blackburn (BASF, Germany), Margaret Brandeau (Stanford University, USA), and Kate Smith-Miles (Monash University, Australia). The abstracts of their presentations together with their bios are available at http://www.ifors2014.org/program/confirmed-plenary-speakers.

Over 2000 abstracts grouped into more than 170 streams are being organized by the Program Committee. Several competitions will be held in some of these streams. The IFORS Prize for OR in Development will be awarded at the close of the conference. The winners of two other prizes, traditionally awarded at EURO Conferences, will also be announced at IFORS 2014, given that no EURO Conference is organized in the years when IFORS conferences take place. One such prize is the Award for the Best EJOR Paper 2014. The other is the ROADEF/EURO challenge.

The social program kicks off the conference on Sunday July 13 with a welcome reception taking place at the Museu Nacional d'Art de Catalunya. It is located in the hillside of Montjuïc, facing the magic fountain, offering a spectacular display of color, light, motion, music and water acrobatics.

A number of choices are offered for the Wednesday full day excursion. They include a Barcelona City Tour, a visit to Codorniu Cava Cellars and Sitges, the Dali Museum in Figueres (Girona) and the beautiful village of Tossa de Mar in the Costa Brava. More details can be found at http://www.ifors2014.org/program/tours-excursions.

Be a part of the OR. Be a part of Barcelona. Be a part of IFORS 2014. Find out more at www.IFORS2014.com.

IFORS is 55!

Reaching 55 years is a milestone. Celebrating it in Barcelona – where commerce, education, entertainment, media, fashion, science, and the arts conspire to make it a major world center – makes the event doubly momentous.

The Federation holds it 20th Triennial Conference in sunny Spain where we expect more than two thousand delegates. As you read about preparations reported by IFORS Conference Chair Elena Fernandez, the success of this Triennial Conference is indeed certain.
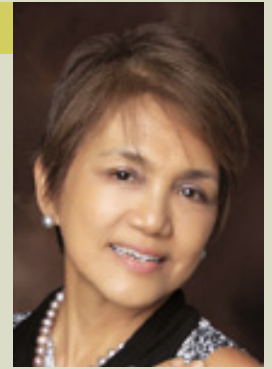
As you would know by now, this conference is preceded by the International Conference on OR for Development (ICORD), another major IFORS event that takes place in Lleida. Papers that had been accepted are included in the ICORD piece inside. The OR for Development section also includes the competition finalists of the IFORS Prize for OR in Development. Varied as they may be, the eight finalists' works cover a lot of areas demonstrating how OR has impacted development and developing countries.

News and conferences from all the regions (Asia, Latin America, North America, Europe and Africa) focus on the different aspects of our discipline –from the points of view of students, practitioners and academics. IFORS Past President Dominique de Werra teaches us how OR concepts become important tools in sports scheduling in the Tutorial section. OR Impact, on the other hand, shows how the use of OR has translated into millions of dollars in savings in the mining sector.

Geographically, OR is alive and well in the 51 member countries of IFORS. The Member Society in Focus section gives us an idea of how the Polish organization is structured. Technically, getting hold of an encyclopedia devoted to OR can give an appreciation of the breadth and depth of our discipline – this issue's Book Review highly-recommends one such encyclopedia.

How did the past year go? The 2013 report of the 20th President of IFORS, Nelson Maculan with details given by the Administrative Committee gives a snapshot of how the organization has evolved and strengthened over the 55 years of its existence. An active global community under strong leadership indeed bodes well for OR and IFORS -   a toast to its next 55 years! 🌐

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

Conferences

ICOTA9 in Taipei Impresses Young Dalian Researcher

Zhichuan Zhu <zhuzcnh@126.com>, **Gerhard-WilhelmWeber** <gweber@metu.edu.tr>

🔺 Participants gather for a picture by which to remember ICOTA9

Optimizers coming from different regions of the globe - Australia, Canada, China, France, Germany, Hong Kong, Japan, Korea, Macau, Malaysia, Mongolia, Norway, Poland, Saudi Arabia, South Africa, Singapore, South Australia, Taiwan, Thailand, Turkey, United Kingdom, USA, Vietnam, congregated in Taipei from December 12 to 16 for the 9th International Conference on Optimization: Techniques and Applications (ICOTA 9,http://icota9.conf.tw).

More than 200 papers and posters were presented on various theoretical and application aspects in the area of nonlinear optimization; Hankel tensors; semi-infinite optimization; bilevel programming; conic optimization; industrial management; linear programming; equilibrium problem; vehicle system; economics; nonsmooth optimization; management science; multi-objective optimization; new methods and algorithms; optimal control; and supply chain management.

ICOTA 9 featured 2 keynote speeches, 10 plenary speeches, 2 semi-plenary speeches and12 streams. Keynote speeches were given by George L. Nemhauser (Institute Professor, Georgia Tech ISyE, Atlanta) on *Mixed-Integer Programming: Approaches to Improving Solution Performance* and by Jong-Shi Pang (Daniel J Epstein Dept. of Industrial and Systems Engineering, USC Viterbi School of Engineering) on *Nonconvex Nash Games.*

The plenary speeches included IFORS VP for APORS Ya-Xiang Yuan's *Subspace Techniques for Nonlinear Optimization*, Liqun Qi's *Hankel Tensors: Associated Hankel Matrices and Vandermonde Decomposition*, Po-Lung Yu's *Optimization in Changeable Spaces*, Masao Fukushima's *Equilibrium Problems with Equilibrium Constraints and Multi-Leader-Follower Game*, Toh Kim Chuan's *Algorithms for Large Scale Matrix Optimization*, Jie Sun's *Two-Stage Stochastic Optimization with Risk Measure and Risk Aversity*, Juan-Enrique Martinez-Legaz' *On the Voronoi Mapping*, Kok Lay Teo's *Optimal Control Problems with Stopping Constraints*, Xiaoqiang Cai's *Fourth-Party Logistics, Internet of Things and Cooperative Games*, and Xiang-Sun Zhang's *OR Methodology in Community Structure Analysis of Complex Networks*. Marco Antonio Lopez Cerda's *The Calmness Property in Linear Semi-infinite Optimization* and Jane Ye's *Solving Bilevel Programs with a Nonconvex Lower Level Program* were the featured semi-plenary sessions.

The **Organizing Committee** chaired by *Yi-Kuei Lin* ensured that *ICOTA 9* delivered the perfect setting for academic learning and social interaction among the participants. The conference was held at the International Building of National Taiwan University of Science and Technology, and was sponsored by the National Taiwan University of Science and Technology, Academia Sinica, Chinese Institute of Industrial Engineers, National Cheng Kung University, National Tsing Hua University and Operations Research Society of Taiwan. The city landmark Taipei 101 formerly Taipei World Financial Center and presently the second tallest building in the world was the venue of the Conference Banquet. (Taipei, officially known as Taipei City, is situated at the northern tip of Taiwan, lying in the Taipei Basin, an ancient lakebed bounded by the two

relatively narrow valleys of the Keelung and Xindian rivers, which join to form the Tamsui River along the city's western border.)

ICOTA was first held in 1987 and has become a traditional international well-recognized OR event. The conference had taken place every three years from 1992, and since then, has been held nine times. The conference series aims to provide a forum for scientists, researchers, software developers, and practitioners to exchange ideas and approaches, to present research findings and state-of-the-art solutions, to share experiences on potentials and limits, and to open new avenues of research and development. The ICOTA conference series is closely related with the Pacific Optimization Research Activity Group (POP), a partner of the EURO Working Group of Continuous Optimization (EUROPT) for the last10 years and avid supporter of EURO conferences.

ICOTA 9 was especially inspiring for the young researchers who had the opportunity to present and discuss novel methods and research findings with international experts. In particular, the article co-author, Zhichuan from the Dalian University of Technology delivered his first presentation on *A Modified Homotopy Method For Solving The Principal-Agent Bilevel Programming Problem* very much impressing co-author Weber for depth and breadth of the analysis. He and his colleagues came to Taiwan from Dalian in China. (Dalian is a major city and seaport in the South of Liaoning province; it is the southernmost city of Northeast China and China's northernmost warm water port, at the tip of the Liaodong peninsula. Today a financial, shipping and logistics center for Northeast Asia, Dalian has a significant history of being used by foreign powers for its ports.) 🌐

> ICOTA 9 was especially inspiring for the young researchers who had the opportunity to present and discuss novel methods and research findings with international experts.

ORSN: Young Society Holds 4th International Conference

Sunity Shrestha Hada <sunity.shresthahada7@gmail.com>

An international conference and a pre-conference workshop marked the February 1 annual day of the Operational Research Society of Nepal (ORSN). The 4th international conference of ORSN February 1 and 2 was held at Chitwan on February 1 and 2 this year.

Participants numbered 105, featuring 61 technical papers on various themes such as optimization, socio-economic, finance, marketing, human resource management. Keynote speeches were given by James Cochran of the Louisiana Tech University on *An Alternative Test for the Relative Age Effect and an Examination of the RAE in High School Swimming*, Kenneth Chelst of Wayne State University on *Beyond Optimality: Value Added Decision Managing,* Nan Zhu from China on *The Problem Of Regional Cash Armoured Transport And Storage In The Chinese Banking Industry*. Speakers from Nepal included Pushkar Man Bjracharya, former member of National Planning Commission of Nepal who spoke on *Graduation from LDCs: Strategies and Approaches for Nepal,* and Devendra Bahadur Chhetry former Head of Department of Central Department of Statistics, TU/Nepal who delivered a talk on *Revisiting Averages*.

The conference venue was Chitwan, a famous tourist destination for jungle safari and elephant riding and lying between Pokhara,

🔺 Jim Cochran giving the Plenary at the ORSN Conference

Lumbini and the capital city Kathmandu.

Prior to the conference, a workshop on "Decision Analysis based on Advanced Mathematics" was held January 29, 2014 at the Kathmandu University School of Education (KUSOED). Conference speakers James Cochran and Kenneth Chelst led the workshop participated in by 42 mathematics teachers.

New Beginnings in Historic Erzurum

Gerhard-Wilhelm Weber <gweber@metu.edu.tr>

It was hard to resist an invitation from Muhammed Yasin Çodur, head of the Department of Civil Engineering of Erzurum Technical University (http://www.erzurum.edu.tr/) who was responsible for boosting the Turkish presence at the EURO 2012 in Vilnius and EURO-INFORMS 2013 in Rome. I thus paid Erzurum Technical University (ETU) a visit on November 18.

At three years of existence, the university certainly needed inputs for its development as an institution of education and science. ETU is an academic project in Erzurum, complementing the older and established Atatürk University, which was named after the founder of Turkish Republic. The students who come from all over Turkey and its neighbouring countries were certainly interested in learning and in exchange. I took the chance to talk to lecturers and higher education students while gathering technical information about the development strategy and administration of the young university.

In the afternoon, after introducing myself to the audience as a friend and hemşehri (coming from the same city), I proceeded to deliver a lecture on *Stochastic Dynamics and Its Optimization, in Economics and Finance, Science and Engineering*. Though dealing with what some students would consider as complicated topics of Stock Price Dynamics, Lévy Processes, Bubbles, Jumps and Insiders, Stochastic Control of Stochastic Hybrid Systems I, Merton's Optimal Consumption – Investment Problem, Hamilton-Jacobi-Bellman Equation, Optimization and Numerics, Stochastic Hybrid Systems II, the audience, based on feedback, found the presentation enjoyable and beneficial. I then invited everyone to two highlights of international OR of the forthcoming years, namely, IFORS 2014 in Barcelona, Spain (http://ifors2014.org/) and EURO 2015 in Glasgow, United Kingdom.

After receiving my plaque for the lecture from the Rector of Erzurum Technical University Muammer Yaylalı,

a cocktail followed. It was an enjoyable gathering, making me realize that these opportunities to reach out to the youth and schools that are just starting out should not be missed, as one may have an advise to give or an idea to express that might have some impact on the development of a course, or the life of a young student. Among the interesting ideas that was floated around was for Erzurum to

Weber with Erzurum Technical University's Muhammed Yasin Çodur

offer hosting the EURO Winter Institute. Why not? After all, Erzurum has some of the finest winter sports facilities in all of Turkey, having hosted the 2011 Winter Universiade. Famous for such sites as the Castle of Erzurum and Double Minaret Madrasah, Erzurum hosts fingerprints of numerous civilisations ranging from Roman to the Ottoman Empire. An Institute in Erzurum will be a great opportunity to the locals as it is for the Institute itself.

> I am still in touch with the students, via social media through which I constantly alert them on conference announcements and other interesting information from the OR world.

Oh, yes, I am still in touch with the students, via social media through which I constantly alert them on conference announcements and other interesting information from the OR world. In this age, social media is one effective way to capture the interest of the young minds of the OR community. 🌍

News from Around the World

Continuously Growing Analytics

From IFORS Correspondent **Grace Lin** <gracelin.ny@gmail.com>

In full support of IFORS, INFORMS is encouraging communities and special interest groups in more than a dozen specialties – including aviation, the environment, and the military, as well as optimization, data mining and applied probability – to submit papers and abstracts to the IFORS 2014 in Barcelona.

This active pace also continues as INFORMS seeks to become known as the leading professional society for those interested in all aspects of analytics. For more than two years, INFORMS has been growing top analytics programs:

• Meetings: INFORMS successfully rebranded its spring O.R. practice conference as an analytics conference, emphasizing ways of attracting not only O.R. analysts and analytics experts but also their executives (the INFORMS Conference on Business Analytics & Operations Research begins on March 30, 2014 in Boston, MA). This year, INFORMS is introducing a new Conference on the Business of

Big Data, starting June 22 in San Jose, CA, which will help business people make the leap from data discovery to return on investment.
• Certification: Last spring INFORMS launched its Certified Analytics Professional (CAP ®) program, which rigorously allows applicants to obtain professional credentials and reassures employers who seek certification from their new hires. More than 500 people are in the process of seeking certification, over 100 people have taken the exam, and approximately 75% of those who took the exam passed and earned the coveted status as CAP certified.
• Continuing Education: Last September INFORMS introduced courses in essential practices for analytics professionals, as well as data explorations & visualization. In a few short months last year 55 people attended the courses; many more will attend this year. In the fall, INFORMS will introduce additional courses as it expands the training it offers to analytics professionals who want to keep their skills strong.

• Career Center: Last August INFORMS partnered with the firm Job Target to expand job services for employers and INFORMS members seeking a position. INFORMS more than doubled its job views, to 103,000, in 2013. The number of résumés posted by job seekers also doubled, to more than 2,200.

At its analytics conference this March, INFORMS will beta test its new analytics maturity model. INFORMS is bringing its reputation as a trusted nonprofit, professional society to a new offering. Leaders at many organizations are interested in making better use of analytics but are not sure about the current strength of their organization's analytics use. The INFORMS Analytics

> …operations research and analytics are becoming a dynamic duo.

Maturity Model will allow organizations to complete an online assessment of their maturity along three themes: their organizational maturity, their analytics capability, and their infrastructure/use of data. After providing a score of low, medium, or high maturity, INFORMS will guide organizations toward services and resources that will help them rise to their desired level of analytics maturity.

INFORMS remains committed to being an operations research society, and its leaders take pride at news like US News & World Report's ranking of "operations research analyst" as the #2 in its ranking of top business professions. For INFORMS, operations research and analytics are becoming a dynamic duo. 🌐

Operations Research Practice in Nigeria

Ismaila Salawu <or.mautechng@gmail.com>

Twenty years after Operations Research was introduced in Nigeria, most executives in public and private industries are still unaware of the profession and much less use it. Undergraduates and graduates of OR, especially those doing their internship, are frequently asked, "What is Operations Research?" This suggests that there is a lot of scope for improving effectiveness and efficiency in the country.

OR as a field of Study

The University of Benin, Nigeria established the first postgraduate programme in Industrial Mathematics which directly included OR as a field of study in 1980. OR development had its quantum leap in 1986 when Eyitayo Lambo, professor and then the former minister for health in Nigeria started the PhD programme in OR at the University of Ilorin. The earliest contributors to the development of OR as a discipline in Nigeria include Professors B.Onimode, Joseph Funsho Akingbade, A.A. Agbadudu, Eyotayo Lambo, Soyibo and Adamu Idama (who introduced the discipline as an undergraduate programme at Mautech).Today Mautech is the only University in Nigeria that offers pure Operations Research at undergraduate and postgraduate levels.

Modibbo Adama University of Technology Yola (MAUTECH Yola), formerly Federal University of Technology Yola was among an additional seven universities established in 1980 by the Federal government of Nigeria in response to perceived need for skilled manpower. On September 1, 1998 the department of Statistics and Operations Research was established in the School of Pure and Applied Sciences. Since then, in addition to the undergraduate programmes, the department now

▲   NSORS take it upon themselves to create an awareness for OR

runs courses leading to the award of M.Tech and PhD in Operations Research. The durations of these are 5 years for undergraduate degrees, a minimum of 18 months for Masters and minimum of 36 months for PhD.

Professionals Form An Association

Nigeria's foray at establishing an enduring OR professional body was made by Professor Joseph Funsho Akingbade in 1980 when an Operational Research club was formed at the University of Lagos. In late 2004, the Institute for Operations Research of Nigeria (INFORN) was established under the leadership of Abdulfatai Oyeyemi Lawal. It was

recognised under the laws of the Federal Republic of Nigeria on 4th July 2006.

The Institute provides a venue for professionals in Operations Research in Nigeria to interact, develop the profession, and advance its practice, method and application for improved systems performance in Nigeria. It also offers courses leading to the award of Certificate and Diploma in Operations Research.

Students of OR follow Suit

The Statistics and Operations Research department at MAUTECH is also home to a National Society of Operations Research Students (NSORS), of which the author is current President.

The association comprises all undergraduate and post graduate students studying Operations Research in the University. Like the INFORN, it aims to develop OR among the students of Nigeria. Students see the following challenges ahead as they join the work force:

• The name of Operations Research is misleading and people tend to think of the discipline as academic research.
• People in industry and government neither know what it is nor its potential.
• Lack of competence to implement projects.

The students have embarked on activities to create awareness by educating Nigeria employers on what OR is and how they could benefit from the discipline as well as providing its members with skills through workshops and seminars. NSORS also tries to obtain donations of books/journals for its students (Interested readers may contact the author directly.)

Conclusion

Thus, even with OR being taken up in school, it is not being implemented in practice. However, it can be said that the professional and student associations are working hard to change the way things are in Nigeria. 🌐

ELAVIO Scores Another Success

Oscar C. Vásquez* <oscar.vasquez@lip6.fr>

ALIO (Asociación Latino-iberoamericana de Investigación Operativa) has been organizing the ALIO Summer School for Young Scholars (ELAVIO) for two decades. In the past as now, it has continued to provide young Operations Researchers the opportunity to be updated and network with others. For 2014, ELAVIO took place in Paraiba, Brazil from February 17 to 21 at the Hotel Fazienda Triunfo (http://www.hoteltriunfo.com.br/) at Areia, a town located 127 km from Joao Pessoa, capital of Paraiba. It was a well-chosen venue for young doctoral and master students mainly from Latin America to discuss their research and take part in networking activities.

The scientific program was divided into 5 tutorials, 2 plenary talks and parallel technical sessions. The tutorials were led by OR specialists such as Philippe Michelon (Université d'Avignon et des Pays de Vaucluse) who presented constraint programming as an alternative tool for solving combinatorial optimization problems and Flavia Bonomo (Uniersidad de Buenos Aires) who talked about several structural properties of well known graph classes and their use in solving strategies for optimization problems, among others. In the plenary talks, Luiz Satoru Ochi (Universidade Federal Fluminense) discussed the efficient methods for solving vehicle routing problems, while Rosiane de Freitas (Universidade Federal do Amazonas) spoke on complex scheduling problems and some applications. In the parallel sessions, students had the chance to present their own research works and to discuss it with the audience.

An important part of every ELAVIO is the social event that enables participants to interact in an informal setting. Activities included a trip to the Arena town, which included a tasting of the traditional drink "cachaza" as well as a social dinner, where professional and personal connections were established amid the "very cool" live music.

> In the past as now, it has continued to provide young Operations Researchers the opportunity to be updated and network with others.

Apart from ALIO and IFORS, other sponsors for the event were CNPQ (Brazil), CAPES (Brazil) and FAPESQ (Fundação de Apoio à Pesquisa do Estado da Paraíba). The School was organized by Centro de Informatics, University Federal da Paraíba.

I would to thank Lucidio dos Anjos Formiga Cabral (chair-Universidade Federal da Paraiba), all ELAVIO team for the hospitality and IFORS for making it possible for me to attend this very productive OR school. It was indeed a great opportunity for developing contact, exchanging ideas and meeting with potential research collaborators!

Oscar Vazquez is a PhD student in Computer Science at the Université Pierre et Marie Curie France and completed his undergraduate studies in Chile. His work on "For The Airplane Refueling Problem Local Precedence Implies Global Precedence" won for him the chance to join ELAVIO with IFORS providing the airfare, and ELAVIO his living expenses. The screening committee was headed by IFORS VP for ALIO, Lorena Pradenas.

OR *for Development Section*

IFORS Continues Tradition of Recognizing OR Work for Development

During the IFORS XI Conference held in Buenos Aires, the Third World Prize was set up in order to encourage and reward the best applications of OR in a developing country. The prize winning paper was "The National Assessment of Education in Chile" by Nicolas Majluf. At the IFORS XII in Athens, the prize was not awarded. During the succeeding competition in Lisbon, the Prize has been renamed IFORS Prize for OR in Development. Since then, prize money has increased and more rigid criteria had continuously been introduced. The current Prize criteria is shown in the Table on the right. Past winners list can be found at http://ifors.org/web/ifors-prize-for-or-in-development/.

The eight finalists who got the highest scores in the elimination round are given in the following pages. Meanwhile, Andres Weintraub who chairs the 2014 competition announced the complete list of the panel of judges.

The 2014 IFORS Prize stream has been scheduled on the first day of the conference.

Criteria	Weights	
	Elimination	Final
Definition of Problem	5%	5%
Creativity / Appropriateness of Approach	10%	5%
MS/OR Content	10%	10%
Paper Organisation and Structure	10%	5%
Participation of Local Researchers	20%	20%
Technical Aspect Total	**55%**	**45%**
Impact of the Study (actual and potential)	25%	20%
Stress on Developmental Issues	20%	15%
Application Area Total	**45%**	**35%**
Clarity and organisation		10%
Handling of Questions		5%
Assessment of Study Impact		5%
Presentation Aspect Total		**20%**
TOTAL WEIGHT	**100%**	**100%**

Emergency Engineering Rescue Scheduling and its Application in Disaster Relief Operations in China

Zheng Yu-Jun, Ling Hai-Feng, Xu Xin-Li, and Chen Sheng-Yong
College of Computer Science & Technology, Zhejiang University of Technology, Hangzhou 310023, China
College of Field Engineering, PLA University of Science & Technology, Nanjing 210007, China

Abstract
Disaster relief operations typically involve a large number of engineering rescue tasks, the completion of which is vital to the success of the operations. The paper establishes a model of emergency engineering rescue scheduling, which involves multiple rescue teams and tasks, different and perhaps fuzzy processing times, as well as different importance weights of the tasks. We then propose a solution method based on biogeography-based optimization (BBO), develop effective migration and mutation operators, and employ a multi objective optimization approach to provide a set of candidate solutions for decision support. Computational experiments demonstrate that our approach can provide competitive performance in test problems. The proposed model and method have been successfully applied to the very recent 2013 Dixi Earthquake in China.

Keywords: Emergency engineering rescue scheduling, multi-expert decision, multiobjective optimization (MOO), biogeography-based optimization (BBO)
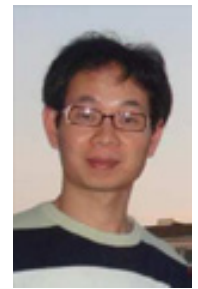
Zheng Yu-Jun

Ling Hai-Feng

Xu Xin-Li

Chen Sheng-Yong

A Multi-Period Fleet Allocation Model for the Santiago Fire Department

Juan Pérez and Sebastián Maldonado
1Universidad de los Andes, Mons. Álvaro del Portillo 12455, Las Condes, Santiago, Chile.

Abstract
The city of Santiago de Chile has experienced significant but uneven growth in the last few decades, while the location of fire stations and their resources have experienced little change. Additionally, the lack of a centralized and coordinated assignment of resources has caused a significant increment in the average response times in some zones, leading to inefficient and inequitable service. In this study we propose a multi-period fleet assignment model for the Santiago Fire Department. In order to include the seasonal effects observed in the data, a time-series analysis is also presented for forecasting the occurrence of future events, and used as input for the mathematical programming problem. According to our results, an improvement of 10% can be achieved in terms of response time compared to the current scenario by reallocating the existing resources in an optimal way, without the need of adding more fire engines.

Keywords: Fleet allocation, Mixed integer programming, Emergency response.

Juan Pérez
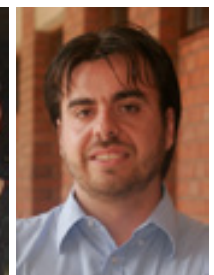
Sebastián Maldonado

Public Transit Planning and Scheduling Based on AVL Data in China

Yindong Shen
School of Automation, Huazhong University of Science and Technology, Wuhan 430074, China

Abstract
The public transit operation planning process commonly includes the following activities: network route design, service planning (frequency setting and timetabling) and scheduling (vehicle scheduling, crew scheduling and rostering). However, the network route design is generally the only one widely recognized, whilst the service planning and scheduling are often ignored in China. This leads to the lack of elaborate timetables and schedules, hence, transit operation is often in disorder with high operating cost. To raise the service level and the utilization of resources, this paper presents an applied study for three cities in China, focusing on the enhancement of the cognition and means of public transit planning and scheduling. A comprehensive framework of public transit planning is first proposed, which is composed of Chinese traditional three items (i.e. network route design, land use for depots and equipment with vehicles) and the following newly added items: intelligent public transit system (IPTS) planning, service planning and scheduling. This is pioneering work in China, during which an IPTS is planed and a random model and solution methods for vehicle scheduling based on AVL data are developed. Experiments under the actual projects show that vehicle schedules with high on-time probability and low cost were compiled, while the essential input parameters such as headways and trip times were set automatically. It is anticipated that the research fruits and practical experiences obtained would be of great benefit in increasing service and management level and resource use in the public transport sector in China and other developing countries.

Keywords: Public Transit Planning; Vehicle Scheduling; Timetabling, AVL Data, Public Transport

Optimizing Ambulance Moveable Station Location and Vehicle Repositioning to Reduce Response Times for the City of São Paulo

Luiz Augusto Canito Gallego de Andrade
Graduate Program in Logistics Systems Engineering, University of Sao Paulo
Claudio Barbieri da Cunha
Department of Transportation Engineering, University of Sao Paulo

Abstract
In this paper, we address the problem of determining the optimal number and the location of ambulance stations, as well as the vehicle allocation and repositioning for the Mobile Emergency Care Service of Sao Paulo (SAMU-SP), in Brazil. This problem arises in the context of seeking to reduce expected ambulance response times, that was within 27 minutes in Sao Paulo for 98% of the requests. In order to bring total response times down closer to internationally acceptable standards, SAMU-SP devised the concept of moveable ambulance stations that can be installed in available public spaces such as squares and parks and also can be periodically relocated to ensure a good coverage at all times. This new concept, however, was not an easy sell. It was necessary to clearly demonstrate the benefits that such stations, properly located, could provide in the context of limited budgetary resources when compared to the traditional facilities in regular buildings. In this context, we propose an optimization-based decision support system to guide SAMU-SP in its strategic decisions involving their service network, as well in the allocation and repositioning of ambulances to each stand-by points in order to cope with varying demand on different time periods. The model was applied to analyze different scenarios, including one that was implemented in the short term and yielded an improvement in the expected coverage of over 40%.

Keywords: emergency medical services; ambulance stations; location; relocation

Luiz Augusto Canito Gallego de Andrade

Claudio Barbieri da Cunha

Modelling and Solutions of Slab Allocation and Reallocation Problems in Chinese Steel Industry

Lixin Tang*, Gongshu Wang, Ying Meng, Jiyin Liu and Yuan Yuan
The Logistics Institute, Northeastern University, Shenyang, China, 110819

Abstract
Over the last thirty years, China's steel industry, along with China's economy, has developed rapidly. However, in terms of operations management, most steel companies in China are still well behind those in developed countries and need significant improvements. This work improves resource utilization and customer satisfaction for Baosteel, China's leading steel company by addressing two important operations decision problems on allocating and reallocating slabs to customer orders. The problems were formulated as an integer linear programming model and a mixed-integer second-order cone programming model, respectively. Column generation and Lagrangian relaxation techniques were used to solve the models. For large-scale instances of the slab allocation and reallocation problems, hybrid metaheuristic algorithms were proposed to obtain near-optimal solutions within a short computation time. The models and solution methods were successfully embedded into a computerized decision support system (DSS). The implementation of the DSS has brought a total direct economic benefit of $43.16 million USD to Baosteel and reduced carbon dioxide (CO_2) emissions by 238,883 tons annually.

Keywords: Steel industry; slab allocation/reallocation; integer programming; second-order cone programming; column generation; Lagrangian relaxation; metaheuristics

Water Allocation Modelling and Policy Simulation for the Min River Basin of China under Changing Climatic Conditions

Jiuping Xu*, Zhineng Hu, Hong Yan, Liming Yao, Ziqiang Zeng, Mengxiang Zhang
State Key Laboratory of Hydraulics and Mountain River Engineering, Sichuan University, Chengdu, 610065, P.R. CHINA
Low Carbon Technology and Economic Research Center, Sichuan University, Chengdu, 610065, P. R. CHINA
Department of Management, The Hong Kong Polytechnic University, Hong Kong, CHINA

Abstract
Unsustainable water resource allocation has been a problem for the Min River Basin, a tributary of the upper Yangtze River in China. At Sancha Lake, the local authority sought to ensure equitable and efficient water use for its subareas. An interactive-dynamic-programming-based genetic algorithm (IDP-GA) is designed to simulate the policies needed for the optimum allocation of water resources under various climatic scenarios. Specifically, a complete operationalized mechanism for the Sancha Lake area is presented to demonstrate the practicality and efficiency of the model, specifically, that: (1) the bi-level equilibrium model integrating the Stackelberg-Nash equilibrium and the Cournot-Nash equilibrium, is an efficient tool for optimizing water resource allocation strategies; (2) the policy simulation system with an IDP-GA, an extension of principle of computable general equilibrium CGE, inputs scenario data and outputs an early-warning mechanism to inform policy making; and (3) an emergency response cooperative mechanism based on allocation modes dominated by an authority is a relatively equitable and efficient method for developing countries.

Keywords: water allocation modelling; changing climatic conditions; bi-level equilibrium model; policy simulation; emergency response cooperative mechanism.

Jiuping Xu   Zhineng Hu

Hong Yan   Liming Yao

Ziqiang Zeng   Mengxiang Zhang

THE FINALISTS

Measuring the Effectiveness of Development Programmes for Vulnerable Indigenous People in India

B. K. Mangaraj, Production, Operations and Décision Sciences Area
XLRI-Xavier School of Management, Jamshedpur, Jharkhand-831001, INDIA
Upali Aparajita, Department of Anthropology, Utkal University,
Bhubaneswar, Odisha-751004, INDIA

Abstract

This paper tries to measure as well as benchmark the effectiveness of development programmes meant for the vulnerable indigenous people of India. These people who live in different parts of the country are named as particularly vulnerable tribal groups (PTGs) by the Ministry of Tribal Affairs, Government of India. In this work, development effectiveness has been explained in a multi-dimensional framework and multi-criteria decision-making methodologies have been employed to measure it. The identification of the multiple criteria of the complex effectiveness construct has been done with the help of an ethnographic survey followed by a confirmatory analysis. The concept of relative effectiveness has been introduced to benchmark the effectiveness from that of the relatively ineffective ones. A twophase fuzzy goal programming methodology has been adopted to determine an effective portfolio for the purpose. Two case studies were also presented to demonstrate the measure of development effectiveness of the government sponsored development programme for the PTGs who are in the weakest section of the Indian society.

Keywords: development effectiveness; endogenous development; particularly vulnerable tribal group; factor analysis; analytical hierarchical process; fuzzy goal programming.

B. K. Mangaraj

Upali Aparajita

Disaster Risk-Sensitive Shelter Plans from Community-Based Risk Analysis for Legazpi City, Philippines

Leorey Marquez, CSIRO Computational Informatics (CCI)
Gate 5, Normanby Road, Clayton, Australia 3168
Sarah Redoblado, Maria Cheryl Prudente, Nicasio De Rosas, Myrna Llanes, Bernard Apuli
Alternative Planning Initiatives, Inc. (ALTERPLAN)
Unit 3A, Casa San Jose, 30 Road 8, Project 6, Quezon City, Philippines
Ernesto Serote, UP School of Urban and Regional Planning
E. Jacinto St, Diliman, Quezon City, Philippines
Jenifer Belarmino, Evelyn Sierra, Department of Social Welfare and Development (DSWD)
Batasan Complex, Constitution Hills, Quezon City, Philippines

Abstract

Disasters disproportionally affect the poor, vulnerable, and marginalized. Improving social protection and community-driven development (CDD) interventions and linking these mechanisms to disaster risk management (DRM) increases the effectiveness of DRM programs in contributing to poverty alleviation and sustainable development, while significantly reducing disaster response costs. These interventions are especially relevant to the Philippines which has the third highest disaster risk worldwide, and with climate change, high population density and poverty conditions, the impacts of disasters are expected to increase. This paper describes the implementation and impact of a CDD project aimed at creating Disaster Risk-Sensitive Shelter Plans (DR-SSP) for nine barangays in the city of Legazpi. The results show the importance of building capacity in civil society organizations and local government, and the effectiveness of the participatory approach in data collection, risk assessment, and disaster planning.

Keywords

disaster risk management, shelter plans, participatory planning, risk analysis, civil society organization

THE JUDGES

IFORS Prize Chair

Andres Weintraub is a professor at the University of Chile. He has published over 70 papers in such journals as Operations Research, Management Science, Forest Science, and The European Journal of Operations Research. He has also edited several books and journal issues on topics related to the use of Operations Research in natural resources and carried out projects with industry and governmental organizations. His work with Chilean forest firms won the prestigious Edelman Prize. He was a founder and former President of ALIO, the Latin American Association of OR, and President of IFORS from 1998 to 2000.

Members

Subhash Datta is currently the Director of the Centre for Inclusive Growth and Sustainable Development (CIGSD) at Gurgaon, India. He was awarded the 'Goodeve Gold Medal' for the most outstanding paper on STRATEGY FOR DEVELOPMENT OF BACKWARD AREAS in the Journal of the Operational Research Society in 1990. Apart from this, he has published 9 books and more than 60 articles in refereed international and national journals. He has served as judge in the panel for the IFORS paper competitions held in 2008 and 2011.

Guillermo Duran is a professor at the University of Buenos Aires (UBA, Argentina) and the University of Chile (Chile). He is also the director of UBA's Calculus Institute. His areas of specialization include operations research, combinatorial optimization and graph theory, and he has published numerous articles in these fields in major international journals. Professor Duran is also active as a consultant in operations research and has directed many OR projects over the last ten years for the Argentinean government as well as private industry in both Argentina and Chile.

Ke Liu is a professor at the Institute of Applied Mathematics, the Academy of Mathematics and System Sciences, the Chinese Academy of Sciences and he also serves as Secretary General of Operations Research Society of China. His research interests are Markov Decision Processes, Stochastic Optimization, Reliability Theory, and Supply Chain Management. He obtained his B.S. in Applied Mathematics and Operations Research and Ph.D. in Applied Mathematics from the University of Science and Technology of China and the University of South Australia, respectively.
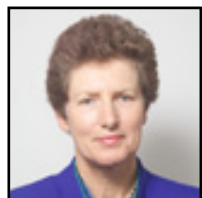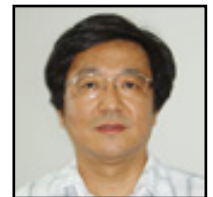
Sue Merchant is currently vice President of IFORS with particular responsibility for matters pertaining to developing countries. She was President of the UK OR Society from 2008-2009 and has been a judge for several editions of the society's President's Medal competition for best practice paper. The majority of Sue's OR career was spent in the Metropolitan Police in London but since 2003 she has been an independent consultant carrying out projects for a wide range of clients from Crimestoppers to the Association of Train Operating Companies.

Tatsuo Oyama has been teaching at the National Graduate Institute for Policy Studies (GRIPS) since 1997, was appointed Dean in 2000 then Vice President in 2003. He was also a Professor at Saitama University in Japan. He served as IFORS Vice President representing APORS from 2007 to 2009. His major research interests include applying operations research theory to public sector decision-making, quantitative policy analysis and evaluation. He has published papers and books in such areas as discrete optimization, mathematical programming model analyses, as well as problems in energy, environment, public facility location and apportionment.

Mikael Rönnqvist is a professor in industrial engineering at Université Laval (Québec). He currently holds a Canada Research Chair (tier 1) in Operations Research in Natural Resources. He is a member of the FORAC, VCO and CIRRELT research organisations/networks. His interests are in the areas of industrial and practical use of Operations Research, particularly in the forest industry. He has been involved in the development of many industrial decision support systems based on optimization. He held academic positions in Sweden, New Zealand, Norway and Canada and completed his Ph.D. in optimization at Linköping University.

Elise del Rosario does OR consulting work for the government and the private sector in the Philippines after her retirement as Vice President and Manager of the Operations Research Department of a Philippine-based multinational. She is also the CFO of the del Rosario family foundation, which aims to uplift public school education in the Philippines. She served as IFORS President (2007-2009) and was head of the Developing Countries Committee. She has served as judge for the IFORS paper competitions held in 1996, 1999, 2002 and 2011.

Jan van Vuuren is professor of operations research within the Department of Industrial Engineering at Stellenbosch University in South Africa. He is an associate editor of the journals INFORMS Transactions on Education and ORiON, as well as past-president of the Operations Research Society of South Africa. His research interests include graph and network theory, combinatorial optimisation and the design of decision support systems. He also served as a judge in the IFORS OR for Development Competition held in Melbourne, Australia in 2011.

Leroy White is a professor at the University of Bristol's Management Department. His main research interests are MS/OR, problem structuring methods, social network analysis, strategic partnerships, large group decision-making, public and community involvement, public sector working and public sector management. He has worked with a range of clients including the Department of Health, local health authorities, health trusts, and the voluntary sector in both the UK and abroad. He has published a number of papers on the process of operational research, partnerships, systems thinking, large group processes and a book on 'Partnerships and Participation'.

IFORS   EURO WG-ORD

International Conference on OR for Development, ICORD 2014
"The Art of Modeling, the Challenges of Implementation"

July 10-11, 2014
University of Lleida, Catalonia, Spain
(Immediately preceding IFORS 2014 July 13-18)

Organizers Bare Accepted List of Paper Presenters at ICORD 2014

In December 1992, participants of the first International Conference on OR for Development (ICORD) held in Ahmedabad, India, made recommendations on how OR could best be advanced in developing countries. Since then, IFORS through its Developing Countries Committee has sponsored ICORD (http://ifors.org/web/icord-history) every 3 years. Successor ICORDs were held in Rio de Janeiro (1996), Manila (1997), Berg-en-dal (2001), Jamshedpur (2005) and Fortaleza (2008). In recent years, workshops had also been held in the intervening years: the last two were held in Djerba (2012), and Rome (2013) in collaboration with the Euro Working Group on OR for Development.

The 2014 Lleida ICORD aims to carry on the tradition of improving the links among researchers with the view to improving each other's effectiveness at bringing about meaningful changes towards development. The conference is designed to cater to a small number of participants who will each present their paper to others in their group and will benefit from a critique of their work by the other participants and invited experts. There will also be plenary session for an invited speaker to conduct a workshop on techniques especially relevant to developing countries.

The organizers composed of Program Chair Youssef Masmoudi, (youssef.masmoudi@gmail) and Lluís Miquel Pla Aragonés (lmpla@matematica.udl.cat) are happy to announce that the papers of the following authors had been accepted for presentation and discussion at the ICORD: Sadia Samar Ali (India), Vladimír Hain (Slovakia), Bruno Domenech (Spain), Laia Ferrer-Martí (Spain), Saeedeh Anvari (Turkey), Subhash Datta (India), Faisal Wahid (New Zealand), Tomas Hanacek (Slovakia), Mel Devine (Ireland), David Fernando Muñoz (Mexico), Carlos A. Romero (Argentina), Lorena Pradenas (Chile), Pornpimol

Chaiwuttisak (Thailand), Gordon H Dash Jr. (USA), Joseph R. Kakeneno (Tanzania), Leorey Marquez (Australia), Pelin Alcan (Turkey), Yindong Shen (China) and Lieschen Venter (South Africa) and Yujun Zheng (China).

The event co-sponsor, EURO Working Group on Operational Research for Development (EWG ORD) (http://www.euro-online.org/web/ewg/29/or-for-development-ewg-ord) 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 in all of: EURO 2006, EURO 2007, IFORS 2008, EURO 2009, EURO 2010, IFORS 2011 and EURO 2012.Its participation in ICORD activities significantly contributes to its goal of highlighting the importance of operational research to improving living conditions in developing and developed countries.

The 2014 ICORD Workshop on MCDM Methods as Applied to Problems of Development will be conducted by Gilberto Montibeller of the Department of Management, London School of Economics. Distinguished Professor of Industrial and Systems Engineering at the University of Florida Panos Pardalos will deliver the plenary on "Optimization and Economic Modeling of Energy Systems Centering CO2 Issues"

The conference welcomes those who are interested to attend to listen to presentations, give feedback and take part in the Workshop. **Subsidized Conference Registration** Fee inclusive of materials, snacks & lunch is US $200 (US $ 300 if paid on or after May 1). Registration details can be found at http://ifors.org/web/icord-2014/.

Tutorial

The Basic Combinatorics of Tournament Scheduling

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

1. Introduction
Scheduling Sports events has become an extremely difficult problem due to many constraints, particularly technical and commercial ones. This tutorial shows how basic concepts of combinatorics and graph theory can help in formulating and solving some problems faced by professional tournament organizers.

One of the most common requirements involves finding a good solution to a round robin tournament involving an even number $2n$ of teams (some simple modifications can be made to handle the case of a league with an odd number of teams). Each one of the $2n$ teams has to play one game against every other team, making a total of $(2n-1)n$ games to be scheduled.

Combinatorics of tournament scheduling

Tournament with 2n teams

Complete graph K$_{2n}$

team → game

IDEAL MODEL!!

Fig. 1

Every game involves two teams, say i and j. It is therefore natural to associate each team to a vertex of a graph G and every game involving i and j to an edge $[i,j]$ of this graph. Figure 1 shows the so called complete graph corresponding to a league of $2n=4$ teams.

Fig. 2

Every game involves exactly two teams (see Fig.2). Note that three (or more) teams in each game would necessitate the use of "hypergraphs" which would involve more intricate constructions.

The first goal is to find an assignment of each game to some day (or period) such that each team plays at most one game in each day and the total number of days is as small as possible. Since each team has $2n-1$ games to play, at least $2n-1$ days are needed for a schedule. For convenience, identify the days with colors; finding a schedule is then an edge coloring problem in the graph defined above: divide the

Edge coloring

• **Given graph G = (V,E)**   **k positive integer**

• **Edge k-coloring :**   **F$_1$, F$_2$, …, F$_k$**

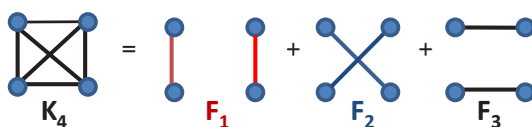partition of E into k matchings

K$_4$ = F$_1$ + F$_2$ + F$_3$

Fig. 3

games into subsets Fd corresponding to all games assigned to a specific day d. Fig.3 illustrates for a league of 4 teams represented by a complete graph K_4 the schedule F_1, F_2, F_3 of all the games in an interval of three days (Here $2n-1=3$). The set F_d of games assigned to some day d is called a matching. It can be seen that there is a simple construction which gives a schedule in $2n-1$ days (one can obviously not go below this) for a league of $2n$ teams.

At this stage, it is possible to exploit the natural properties of graphs (like orientation of edges) without having to handle hypergraphs for dealing with additional requirements.

days (slots)

teams	1	2	3
1	2	3	4
2	1	4	3
3	4	1	2
4	3	2	1

days (slots)

teams	1	2	3	
1	A	H	A	breaks!
2	H	H	A	
3	A	A	H	
4	H	A	H	

timetable

Home-Away pattern HAP

schedule
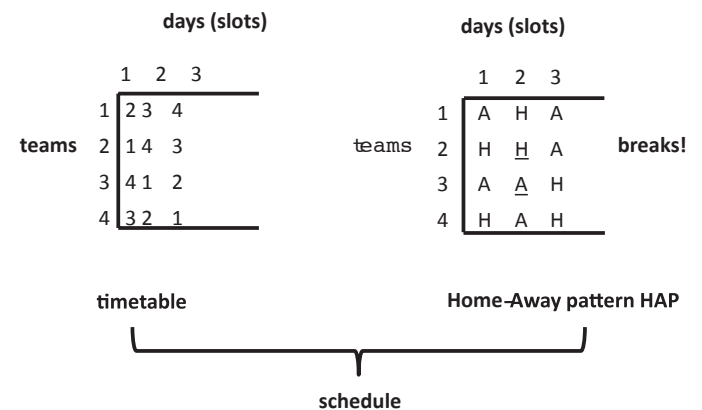
Fig. 4

2. The Home-Away constraints
In this case, each team has its own venue (a stadium) and each game i-j is played either at the venue of i or at the venue of j.

The first case is a home-game (denoted by H or by a +) for i and an away-game (denoted by A or-) for j. The second is the opposite case. Taking into account that the edges of a graph may be oriented, thus becoming (oriented) arcs, it is again natural to represent a game in which i will play against j in the venue of j by an oriented arc from i to j. Finding a schedule giving not only on which day a team meets another team but also in which of the two possible venues corresponds to finding an oriented edge coloring. An illustration for the league of 4 teams is given in Fig. 4: the timetable on the left indicates in row i and column d the team that team i meets on day d. The Home-Away Pattern (HAP) on the right indicates in row i and column d whether i plays on day d a home-game or an away-game.

Condensed representation

days (slots)

teams	1	2	3
1	2	3	4
2	1	4	3
3	4	1	2
4	3	2	1

days (slots)

teams	1	2	3	
1	A	H	A	breaks!
2	H	H	A	
3	A	A	H	
4	H	A	H	

H = +   **A = −**

teams

	1	2	3
1	-2	+3	-4
2	+1	+4	-3
3	-4	-1	+2
4	+3	-2	+1

Fig. 5

Difficulties arise regarding fairness in venue assignments. Ideally, one would like to have for each team a sequence of games which would be perfectly alternating between H and A (or + and -). This is not possible if the league has more than two teams, e.g., two teams having exactly the same sequence of H and A could n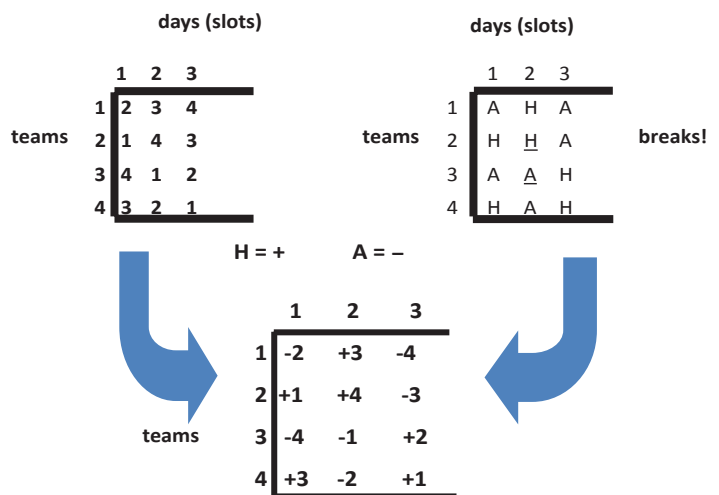ever play against each other. So we must have in any real schedule some breaks in the alternation of H and A of some teams: a break is defined as the occurrence of two consecutive H or two consecutive A for a team. In Fig 4, team 2 has a break on day 2 and so has team 3. In fact the timetable and the HAP in Fig. 4 can be represented in a more compact form (using + and – instead of H and A) as shown in Fig. 5. Since in a league there can be at most two teams with perfect alternation of H and A, 2n-2 teams will have sequences of games with at least one break each. So the total number of breaks in any schedule will be at least 2n-2. There is a simple construction [9] which gives for any league of 2n teams a schedule with 2n-2 breaks. It is illustrated in Fig. 6 for a league of 2n=6 teams; it is usually called the canonical schedule. It is an oriented edge coloring of the complete graph with 2n vertices.

The canonical schedule

To obtain the canonical schedule
* Place the teams on a circle with one team in the middle and rotate teams

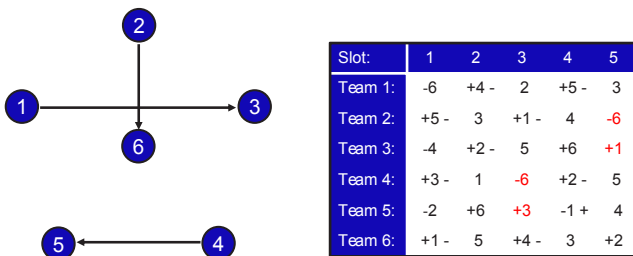| Slot:	1	2	3	4	5
Team 1:	-6	+4 -	2	+5 -	3
Team 2:	+5 -	3	+1 -	4	-6
Team 3:	-4	+2 -	5	+6	+1
Team 4:	+3 -	1	-6	+2 -	5
Team 5:	-2	+6	+3	-1 +	4
Team 6:	+1 -	5	+4 -	3	+2

Fig. 6

In a schedule for 2n teams with a minimum number of breaks (2n-2) the breaks occur in pairs on days $b_1,b_2,\ldots,b_{n-1}$. What are the possible values of the b_i?

Canonical schedules give $b_i=2i-1$ (i=2,…,n). But there are more schedules. It is an open question to characterize the values of b_i giving a schedule with 2n-2 breaks.

Enumerating the edge colorings of a complete graph K_{2n}, would be extremely time consuming since for instance K_{12} (a league of 12 teams) has 526 915 620 different edge colorings (with 2n-1 colors).

In practice we may meet the following problem : for some reason a few entries of a HAP have been fixed; this means that some teams must play H (or A) on some fixed days. Can a timetable and an extension of the partial HAP which will give a "feasible" schedule be found? To solve this problem we may have to use an integer programming model as given in Fig. 7 and Fig. 8.

Feasibility of HAPs

- **Given a HAP find an associated timetable**

- **HAP : 2n x (2n − 1) array H**

$$h_{id} = \begin{cases} \textbf{1 if Home game for team i on day d} \\ \\ \textbf{0 else} \end{cases}$$

$$\text{Define } x_{ijd} = \begin{cases} \textbf{1 if teams i \& j meet on day d} \\ \\ \textbf{0 else} \end{cases}$$
i<j

Fig. 7

Integer LP (Briskorn, 2008)

Max $$z = \sum_i \sum_j \sum_d x_{ijd}$$

s.t. $$\sum_d x_{ijd} \leq 1 \qquad \forall i,j$$

$$\sum_{j<i} x_{jid} + \sum_{j>i} x_{ijd} \leq 1 \qquad \forall i,d$$

$$x_{ijd} \in \{0,1\} \qquad \forall i,j,d$$

$$x_{ijd} \leq |h_{id} - h_{jd}| \qquad \forall i,j,d$$

Fig. 8

Its relaxation as a simple linear programming problem may provide necessary conditions for the existence of such a schedule (see [1, 5]).The objective function counts the number of games of the tournament which can be scheduled while respecting the requirements of the (partial) given HAP. If this number is smaller than (2n-1)n, then there is certainly no solution.

Another frequent problem consists in finding a HAP with a minimum number of breaks for a given timetable: all games have been assigned to some day, it remains to determine where each game between i and j is played (venue of i or of j). This problem is difficult (NP-hard in terms of complexity). It has been shown [6] that for a league of 2n teams the minimum number of breaks is at most n(n-1) if n is even or $(n-1)^2$ if n is odd.

However it is possible to find for a given timetable with 2n teams whether there exists a HAP with 2n-2 breaks or not; this can be done in a computation time which is a polynomial in n. We refer the reader to [5] for several other formulations of this type of problem.

Break Maximization!

Traveling tournament with 2n teams
All teams start at home and return home at the end
All distances between cities are equal (to 1)
Timetable *T* is given
Find a HAP minimizing total distance traveled (minimizing nb of trips!)

Fig. 9

3. More requirements
In most practical cases the teams travel and may play against several other teams before going back home. This is the so called traveling tournament problem. It is interesting then to minimize the total distance traveled by the 2n teams. With the assumptions of Fig. 9 one can easily see that the number of trips is 2n(2n-1)- B(T) (see Fig.10) where B(T) is the number of breaks for timetable T. So to minimize the number of trips we have to maximize B(T) (see[8]).

- Before day 1 n teams (starting with A) travel
- After day 2n-1 n teams (ending with A) travel
- After each day d $(1 \leq d \leq 2n \; 2)$ only teams with break on H do not travel
- Let B(*T*) = total nb of breaks in schedule *T*
- Nb of breaks on H : B(*T*)/2
- Nb of trips after days 1,2,…,2n-2 :

    2n(2n-2)- B(*T*)/2

Fig. 10

Balanced tournament design

- **2n teams (one game for each pair of teams)**
- **n stadiums**
- **Each team has 2n-1 games**
- **Each team plays one or two games in each stadium**

Fig. 11

Usually there are various types of balancing requirements which have to be taken into account for fairness reasons. It is in particular the case for the Balanced Tournament Design (see Fig.11) : there are n stadiums (not associated with any team); a timetable in which all teams play almost the same number of times in each stadium is desired. One starts from a canonical timetable (see Fig.12), one writes in bold the first and second game of day 1, the first and third of day 2, the first and fourth of day 3 until we reach day n-1 . Then starting from the last day we construct a symmetric pattern (with respect to the row of day n) of bold games.

- **Example 2n = 6 teams   n= 3 stadiums**

	stadiums 1	2	3
days 1	**61**	**25**	34
2	**62**	31	**45**
3	63	42	51
4	**64**	53	**12**
5	**65**	**14**	23

	stadiums 1	2	3
1	25	61	34
2	45	31	62
3	63	42	51
4	12	53	64
5	14	65	23

Simple construction valid for 2n = 0 or 2 (mod 3)

$\exists$ balanced schedule for any $n \neq 2$

Fig. 12

Exchanging the bold games in each row gives the required assignment of games to the n stadiums. In the case of 2n teams given in Fig.12 each team plays once or twice in each one of the three stadiums.

Balanced tournament design with referees

- **2n teams**
- ~~**2n-1 stadiums**~~   **find schedule in 2n-1 days**
- **2n-1 referees**
- ~~**each team plays once in each stadium**~~
- **each team sees every referee once**

Fig. 13

If instead of n stadiums we have s<n stadiums then there exists perfectly balanced schedules if 2n-1 or n are multiples of s. Another occurrence of balancing requirements arises when there are 2n-1 referees and it is desired to find a timetable for 2n teams such that each team plays its 2n-1 games with 2n-1 different referees (see Fig.13). The structure of a satisfactory timetable is similar to a Room Square of size 2n-1 (see Fig. 14). Fig15 shows such a timetable for 2n= 8 teams.

Room Square of size 2n-1 (odd!) on T = {1,2,...,2n}
- **Array (2n-1) x (2n-1)**
- **Every entry is empty or contains a pair of symbols of T**
- **Every symbol once in every row and once in every column**
- **Every (unordered) pair of symbols of T occurs in one entry**

Fig. 14

An example $2n-1 = 7$ $(2n = 8)$

referees

81	45	27		36		
	82	56	13		47	
		83	67	24		15
26			84	71	35	
	37			85	12	46
57		41			86	23
34	61		25			87

days (labels on left)

Room squares exist for any $2n-1 > 7$

Fig. 15

3-dimensional Room Square (« Room Cube »)

referees

81 $_1$	45 $_7$	27 $_6$		36 $_4$		
	82 $_2$	56 $_1$	13 $_7$		47 $_5$	
		83 $_3$	67 $_2$	24 $_1$		15 $_6$
26 $_7$			84 $_4$	71 $_3$	35 $_2$	
	37 $_1$			85 $_5$	12 $_4$	46 $_3$
57 $_4$		41 $_2$			86 $_6$	23 $_5$
34 $_6$	61 $_5$		25 $_3$			87 $_7$

days (labels on left)

j

i $x y_k$ Teams x and y meet on day i with referee j in stadium k (see Dinitz, Stinson, 1992)

Fig. 16

To get closer to real situations, consider 2n-1 stadiums in the model and require that in addition to all previous requirements related to referees, each team plays once in each stadium (see[2]). A timetable is then represented by a 3-dimensional Room Square (see Fig.16 for a league of 2n=8 teams).

4. Unavailability constraints

The unavailability of some of the components of a scheduling problem usually creates substantial difficulties. In tournament scheduling, it may happen that some games i-j cannot be scheduled in a specific set of days for various reasons; a stadium may not be available or one wishes to keep such a game for some later day in the season. Such a problem can be formulated as a list edge coloring problem in a graph defined as before. Now for each game i-j there is a subset L(i,j) of days in {1,…,2n-1} in which the game has to be scheduled. One wants then to construct an edge coloring of the complete graph K_{2n} such that each edge i-j gets a color in its set L(i,j) of possible colors. In fact the integer programming model given in Fig.7 and Fig.8 corresponds to a list edge coloring. The lists L(I,j) are defined as shown in Fig.17: game i-j can be scheduled on day d if teams i and j are neither both at home nor both away on day d. List coloring problems are generally difficult and the size of the leagues which can be handled by such models remains very limited.

5. Carry-over effects

In constructing schedules of a sports league, having several teams a,b,… which all play against two teams i, j consecutively in the same order is avoided. In other words if we consider for every team the collection of pairs (i,j) of consecutive opponents, we would like to have all these pairs different if possible. If it is not possible, then we would like to minimize the maximum number of occurrences of a pair (i,j) of consecutive opponents.

$$x_{ijd} \le \left| h_{id} - h_{jd} \right|$$

Edge ij can have color d   if on day d   i plays at home and j away
or i plays away and j at home

$$d \in L(ij)$$

$$L(ij) \;=\; \left\{ \begin{array}{l} d \;:\; \text{on day d   i plays at home and j away} \\[4pt] \text{or i plays away and j at home} \end{array} \right.$$

Fig. 17

Carry-over effects

Schedule for 2n=4 teams

		days				(i,i)	consecutive opponents of i		
	1	4	3	2	4	(1,1)	(4,3)	(3,2)	(2,4)
teams	2	3	4	1	3	(2,2)	(3,4)	(4,1)	(1,3)
	3	2	1	4	2	(3,3)	(2,1)	(1,4)	(4,2)
	4	1	2	3	1	(4,4)	(1,2)	(2,3)	(3,1)

Ideal case :   each pair (i,j)   occurs <u>once</u>

1	4	3	2
2	3	4	1
3	2	1	4
4	1	2	3

1	3	2	4
2	4	1	3
3	1	4	2
4	2	3	1

Orthogonal
Latin squares !

Fig. 18

For the timetable given in Fig.18 for a league of 2n=4 teams, the pairs of consecutive opponents are given. For example team 1 meets consecutively teams 4,3,2. For convenience we assume that the schedule is repeated as if it were a cyclic schedule, so day 1 is following day 3, Hence the pairs of consecutive opponents for team 1 are (4,3) (3,2) (2,4). If at the beginning of row i the pair (i,i) (which does not correspond to any pair of opponents) is introduced, an array of size (2nx2n) which contains $4n^2$ pairs of teams is obtained. If possible, all these pairs are preferably different. It is the case in Fig. 18. Decomposing the (2nx2n)-array of pairs into two (2nx2n)-arrays by taking the first element i (resp. the second element j) of each pair (i,j) gives two Latin squares (each row contains the symbols 1 to 2n and so does each column). Requiring that all pairs are different amounts to saying that the two Latin squares are orthogonal. Since orthogonal Latin squares of size 6 do not exist, one sees that for a league of 2n=6 teams, in any timetable there will be at least two teams a,b which both meet consecutively some teams i,j, i.e., the pair (I,j) will occur in the row of a team a and in the row of another team b. Some efforts have been devoted to construct schedules where pairs of consecutive opponents are as different as possible (see references in [4,7]), but it not obvious that taking this requirement into account has a crucial influence on the results of the games.

6. Conclusion

There are many more requirements which appear in most of the real cases. The literature of sports scheduling is already extremely voluminous. The diversity of sports tournaments with their specific requirements has, and will continue to produce a huge collection of contributions. This in turn will stimulate research in these fields. A nice state of the art until 2010 can be found in [4,7]. 🌐

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OR *IMPACT*

Articles demonstrating direct benefits from implementing OR studies

OR-Based Extraction Plan Pays Off *

Rafael Epstein
Department of Industrial Engineering, Universidad de Chile
Andrés Weintraub
Department of Industrial Engineering, Universidad de Chile.

Copper mining is the main export industry in Chile, producing 10% of the world's copper at two million tons annually. While international mining firms such as Billiton, Rio Tinto and Anglo American operate in Chile, the government-owned corporation CODELCO (National Copper Corporation of Chile) is the largest copper mining company not only in Chile, but in the world.

In the last decade, copper prices have risen enormously from about $1 per pound to more than $3. CODELCO produces one-third of the $45 billion in copper that Chile exports each year, and copper accounts for 55 percent of the nation's total exports. In 2011, CODELCO's net revenues totaled $3 billion.

Adapted from the original version published in ORMS Today vol 40 no.2, April 2013, page 44.

▲ FIG 1: Chile produces 10 percent of the world's copper, thanks in part to Chuquicamata, the world's largest open pit copper mine.

If not for the CODELCO profits, it is estimated that Chile would have to raise the national value added tax from 19 to 22 percent to maintain the current income of the government. Needless to say, it is important that the mines of CODELCO be run as efficiently as possible. CODELCO manages seven mines - some are open pit, others are underground. In open pit mines, material is extracted from the surface, opening a large hole that looks somewhat like a stadium. It is easier and cheaper to extract material from an open pit mine than from an underground mine. However, when an open pit mine becomes too deep and thus impractical to operate efficiently or when environmental constraints warrant, the only choice is to operate an underground mine, where the ore is extracted by penetrating into the mine. The percentage of copper, called the grade, is usually between 0.5 percent and 1.5 percent of the material extracted. This article concentrates on open pit mining.

An open pit mine is typically defined through blocks of 30x30x30 meters. For each block, the average grade, position and volume are known. Each block is classified either as "copper," with a percentage of copper worthwhile to process, or as "sterile," which contains a percentage below commercial value.

A preliminary definition of the areas to be mined is carried out through geological models, which consider the geometry of the pit and technical requirements, such as the maximum allowed slope of the pit that ensures that the walls of the pit do not collapse. To extract a block, all blocks situated above it must be extracted first. The extraction process includes defining major regions to extract, called expansions or phases. In turn, each expansion is subdivided into benches, which are like steps in a staircase. They must be extracted in a logical geometric order, from top to bottom. Figures 2 and 3 show an example of the open pit operation (Epstein et al., 2012).
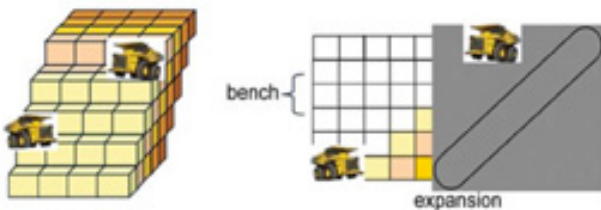

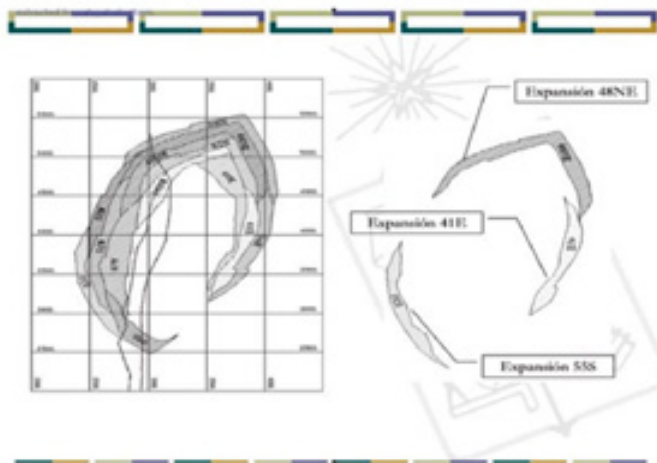Figure 2: Schematic example of benches and one expansion for an open pit.

Figure 3: Expansions of an open pit mine, viewed from above.

Copper blocks are sent to a metallurgical process for refining, while sterile blocks are sent to waste dumps. Some blocks with percentage

> If not for the CODELCO profits, it is estimated that Chile would have to raise the national value added tax from 19 to 22 percent to maintain the current income of the government. Needless to say, it is important that the mines of CODELCO be run as efficiently as possible.

of copper below present commercial value are sent to reserve areas in case higher copper prices or better technology will make them worth extracting.

Operations at open pit mines are similar in nature. As the open pit is excavated, roads are built in the benches, which are connected to downstream processes and lead to dumps, to allow for removal of material. Rock is loosened up using explosives; cranes then load large trucks (up to 300 tons), which carry the material to designated destinations.

Computer-based systems have been long been used for planning the long-term extraction of open pit mines. A seminal work by Learch and Grossman (L&G) in 1965 produced a good, tractable method to determine the shape of an approximately optimal pit. Several commercial codes have been widely used based on the L&G method. Many articles have shown how the L&G method can be improved. Methods to determine a cut-off grade, i.e., the minimum grade at which it is worthwhile to extract a block, have likewise been developed (Newman et al., 2010). While these methods have proven highly useful, some limitations such as scheduling through time have not been considered.

In an optimal extraction, there is no fixed cut-off grade; the profitability of extracting a block depends on how other blocks are handled. Institutional constraints such as the need to satisfy contracts should be considered.

Mixed Integer Programming approaches have the clear advantage of overcoming the above limitations, as they can deal with time sequencing, constraints and the relation between blocks. The problem is still complex, as hundreds of thousands of 0-1 variables representing block extraction can exist. Several algorithmic approaches have been proposed, such as Branch and Cut, heuristics and aggregation of variables (Newman, et al., 2010, which reports applying MIP techniques to real mines).

The open pit methods used, dealing directly with benches instead of detailed blocks, allowed for some aggregation. The corresponding decision variable is 0-1 to represent if a bench is extracted, and a continuous variable to represent the tonnage extracted in each period from a bench. The constraints include how benches can be extracted to satisfy logical and geo-mechanical constraints, as well as the maximum rate of extraction. The model looks for an optimal net return. The original open pit MIP formulation required long solution times. The relaxed LP model has a solution significantly better than the integer one. To strengthen the formulation, reduce the branching in the tree and bring the LP formulation closer to the integer one, flows are decomposed into individual ones, leading to a multi-commodity formulation. This led to a much larger model, with typically 245,000 constraints and 900,000 variables (of which 160,000 were 0-1) but which requires significantly fewer branchings. It was solved with a commercial code.

The model was used at CODELCO North Division, integrating the extraction process of two mines, Chuquicamata and RT, and their respective down-stream processes. After the model was implemented, results of the following four solution (Epstein, et al., 2012) approaches were compared:

1. The legacy-based model (used by the planners before the introduction of the new model), where each mine and its respective downstream process is run independently;
2. Using the model, but keeping each mine independent;
3. The legacy-based approach, but integrating the mines; and
4. The new model approach with the mines integrated

The evaluation showed that the best approach was using the model and allowing the mines to integrate their downstream process (4). >>

>> It was 8% better than the original approach used by the planners (1); 3% better than using the model without integration (2); and 5% better than integrating the mines using the legacy approach (3).

The proposed approach required less investment in machinery and produced greater volume of copper. In addition, the model pointed to a change in strategy by sending sulfide copper from one mine to a plant near another mine since lower processing costs were offsetting the higher transportation costs.

At another mine, Andina, 80 kilometers north of Santiago, the model has been used since 2006 to plan a mixed operation of an open pit and an underground mine. Compared to the use of the legacy model, the new model has improved net income by $180 million since implementation.

> Compared to the use of the legacy model, the new model has improved net income by $180 million since implementation.

The system is presently used routinely for planning purposes - to determine the effect of data changes on copper prices, production costs, copper grade and interruptions due to machine failure or strikes - as well as for evaluating what-if scenarios. 🌐

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Book Review

Lasting Legacy of A Legend

Hans W Ittmann <hittmann01@gmail.com >

The preface states that this work aims to "provide decision makers and problem solvers in business, industry, government and academia a comprehensive overview of the wide range of ideas, methodologies and synergistic forces that combine to form the pre-eminent decision-aiding fields of operations research and management science (OR/MS)". After going through the two volumes, the reviewer concludes that this encyclopedia is an exemplary example of a publication that provides all-encompassing information on one specific subject area. Particularly, the editors succeeded in the monumental task of "surveying and dividing OR/MS into specific topics and then collating these to capture the foundations, applications and the emerging elements of this ever-changing field".

arriving at this final answer: "the science of operational processes, decision making and management", with a note that "the definition of OR/MS is really given by the coverage of the material in the encyclopedia."

As one would expect from an encyclopedia, all topics are presented in alphabetical order. Over 200 major expository entries contain detailed history, descriptions and discussions as well as definitions and abbreviations where appropriate. Below are samples of how two topics are presented:
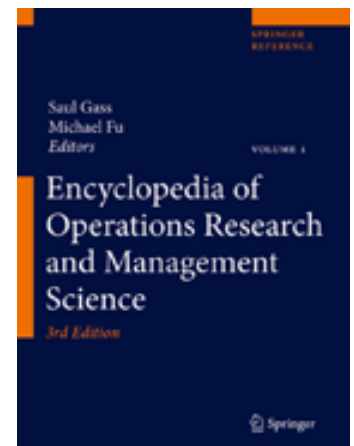
Disaster Management: Planning and Logistics

An introduction is provided, followed by a definition of a disaster and the role of disaster management. Disaster management and the planning process is then described followed by a section on disaster management and logistics and one on OR and disaster management. An overview is provided of logistics models in this area. After the concluding remarks is a section called "see," which lists all relevant linkages to this topic and a reference list of papers and books published on the topic.

Airline Industry and OR

Introduction is followed by a discussion of flight scheduling planning, fleet assignment, yield management, crew scheduling, aircraft maintenance routing and schedule recovery. A "see" section and list of references follow.

The third edition includes new long entries on topics such as Agent-Based Simulation, Community OR, Disaster Management, Revenue Management, Service Science, Global Optimization, Health Care Strategic Decision Making and Critical Systems Thinking.

> What is OR and Management Science? . . . the science of operational processes, decision making and management . . . given by the coverage of the material in the encyclopedia.

Encyclopedia of Operations Research and Management Science, Third Edition, edited by Saul I. Gass and Michael C. Fu. Published in 2013 by Springer Science & Business Media, New York, USA. ISBN 978-1-4419-1137-7 and ISBN 978-1-4419-1153-7 (eBook), Price 499 EUROs, 1647 pages, 231 figures and 59 tables in 2 Volumes.

Earlier two editions of 1996 and 2001 precede this 2013 edition. The second edition includes updates on existing material and some new material, where the relationship between OR/MS and information technology was highlighted and expanded. New entries, numbering 28, include AHP, Data Mining, Electronic Commerce, Theory of Constraints. The current 2013 edition features updates and rewrites plus an additional 48 new entries either describing a new topic or detailing a previous short entry. (A short entry may be as short as a term definition while a long entry goes into a more detailed, even comprehensive treatment of subject matter.) An impressive number of distinguished international academics and practitioners who contributed their piece on their areas of expertise are listed on some 12 pages of the work. In addition, an advisory panel of eleven noted members of the international OR/MS community helped the two editors.

As in the previous editions, the question "What is OR and Management Science?" is tackled by giving definitions for both,

There are many entries in the encyclopedia that are definitely not that familiar to the ordinary OR person.

Nonetheless, explanations of concepts, including techniques and algorithms, are easy to follow, thus giving a good insight into the topic. This makes the book a very useful reference guide. Apart from this, the encyclopedia covers the OR/MS field comprehensively and effectively caters to a diverse and wide audience: from those concerned with OR/MS techniques for decision-making in the workplace to students who wish to know more about their OR/MS classroom lessons.

In spite of the hefty price tag, the encyclopedia is still a must for any university or big library. This third edition of the encyclopedia is of great value and benefit to the profession. The editors and contributors deserve congratulations for succeeding in the ambitious task of coming up with a comprehensive up-to-date resource on OR/MS

Michael Fu dedicates the edition to his co-editor thus: "To the memory of my very dear colleague Saul Irving Gass, an OR pioneer, practitioner, and statesman, and a true scholar and friend. Saul passed away on March 17, 2013, as this edition of the Encyclopedia was going to press". This is certainly an appropriate tribute to an OR legend – this Encyclopedia will remain one of his many legacies! 🌐

OR Society in Focus

Polish Representation in IFORS : A Fruit of Collaborative Effort

Contributed by IFORS Correspondent, **Jan W. Owsiński** <Jan.Owsinski@ibspan.waw.pl>

Poland is represented in the national OR community by the Association of the Polish Operational Research Societies (ASPORS). Almost 30 years old, it unites two Polish learned societies, the Polish Cybernetics Society (PCS) founded in 1962, and the, Polish Operational and Systems Research Society (POSRS) established in the mid 80s. While the two societies have achieved a high degree of synergy in their co-existence and collaboration, officers from POSRS currently perform most of the duties related to external representation, including membership in IFORS and within the local community.

Historically, PCS originated from the classical universities (e.g. faculties of economics at the University of Warsaw and Jagiellonian University in Cracow) while POSRS had since been closely associated with technical and technological universities and institutes (universities of technology, research institutes from the broad domain of technical sciences, as well as military and marine schools and institutes). Both have seen an evolution of membership (now at around 150) and currently there is high degree of balance in terms of disciplines and institutions represented, including business and administration.

Some familiar names of leading officers of the Association include like Janusz Kacprzyk, President, Member of the Polish Academy of Sciences (employed at the Systems Research Institute in Warsaw, which is the key collaborating institution of ASPORS/POSRS), Jan Węglarz, foreign representative of the Association who, with Roman Słowiński, Vice-President are members of the Polish Academy of Sciences and work at the University of Technology in Poznań.

The flagship events of the POSRS and the Association are the bi-annual BOS conferences (from the Polish acronym for Operations

🔺 Mario Fedrizzi lectures at Palais Staszic in Warsaw, site of the previous and upcoming BOS conference.

and Systems Research), which started in the middle of the 1980s. The next and 13th in the series shall take place on September 24th-26th, 2014 at Palais Staszic, a historical building in the very heart of Warsaw   www.ptbois.org.pl/bos2014/ . The BOS conferences are getting increasingly international themselves, and the one in 2014 shall be collocated with IEEE Intelligent Systems, and shall also be closely associated with two other events – an international workshop on uncertainty analysing and modelling regarding GHG emission assessment, and the International Conference on Soft Methods in Probability and Statistics.

The BOS conferences feature groups affiliated with POSRS or closely collaborating with the Society. Thus, BOS 2014 includes a workshop of MODEST (MODelling of Economies and Societies in Transition), a EURO EWG, working within the Society, and, as always, there will be a session of the Polish chapter of INFORMS. 🌐

Welcome IFORS VP for EURO

Jacek Blazewicz is Professor and a vice-director (since 1987) of the Institute of Computing Science of Poznan University of Technology. He has been the editor of the series International Handbooks on Information Systems since 1997, member of the editorial boards of 10 international journals including Parallel Computing, Journal of Heuristics, Journal of Scheduling. He co-chaired 35 international conferences apart from having published over 350 papers and books in the area of computer science and bio-informatics.

His many awards include the EURO Gold Medal (1991), the Doctorate Honoris Causa of the University of Siegen (2006) and the Copernicus Prize (2012). 🌐

President's Report

Nelson Maculan <maculan@cos.ufrj.br>

A year has passed since your Administrative Committee has accepted the great responsibility of leading IFORS. Then as now, I am fortunate to be working with and counting on the invaluable advice and support of the team composed of:

Dominique de Werra — Immediate Past President
Sue Merchant — Vice President, Chair of the Developing Countries Committee
Peter Bell — Treasurer
Lorena Pradena — VP representing ALIO
Ya Xiang Yuan — VP representing APORS
Elena Fernandez — VP representing EURO
Michel Gendreau — VP representing NORAM
Graham Rand — Publications Chair
Elise del Rosario — Website and IFORS News
Mary Magrogan — Secretary

We started the three-year term focused on an agenda to encourage the establishment of new OR national societies and in so doing disseminate the development of OR in regions still unaware of what OR, or for that matter, IFORS is all about. Of course, it goes without saying that existing national societies will continue to be served and when needed, given the support for their continued viability and progress.

The **Regional VPs** have tended to the national societies under their wings as could be seen from the succeeding regional reports.

▲ IFORS Presidents Maculan and De Werra visit Beijing

The numerous OR activities in the IFORS world sends the message that indeed, OR is thriving! Accounting for the majority of IFORS individual members, NORAM in 2013 has organized conferences in various areas of OR, promoted successes in the field through the sponsorship of awards and the publication of journals, books, magazines, on-line information, videos, and other media. APORS VP Ya-Xiang Yuan has seen to it that the **IFORS Distinguished Lecturer** and **IFORS Tutorial Lectures** are presented in the regional conferences.

▲ IFORS President receives Mercosur Konex Award for Science and Technology

Members of the AC have not stopped looking for opportunities to encourage the formation of OR national societies and their eventual application for IFORS membership. The efforts of Lorena Pradenas have led to the application for re-activation of the Mexican national society; so with the Tunisian society which had been guided along by Elise del Rosario. Sue Merchant, with her role as the Developing Countries Chair, has encouraged the Nigerian OR people to band together and apply for IFORS membership. Her committee has also been supporting the potential formation of national societies in Indonesia and Sri Lanka.

Apart from encouraging developing countries, especially in Africa, to form their OR societies, the **Developing Countries Committee** under Sue Merchant has actively pursued traditional projects such as the International Conference on OR for development (ICORD), the IFORS Prize for OR in Development, and sponsorships of various speakers to the developing world.
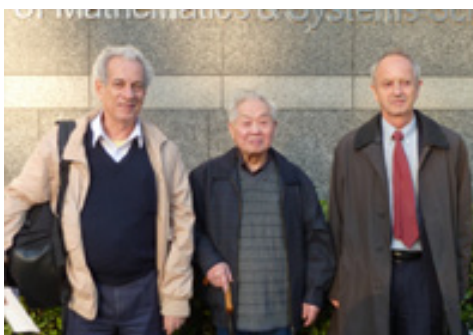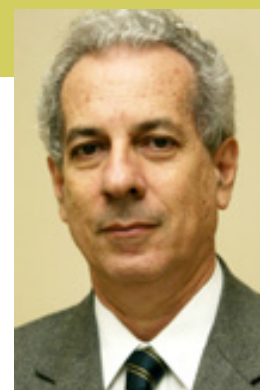
Highlighting the term of your AC is the Triennial meeting, which happens in 2014. This has kept the **Conferences** Committee very busy. Concurrently the Organizing Committee Chair, Elena Fernandez has worked closely with the Program Committee Chair, Stefan Nickel to bring a successful IFORS Triennial Conference in Barcelona.

Apart from Conferences, **Publications** has been the source of revenues, which in turn, enables IFORS to pursue its objectives. We stated at the beginning of this term that we aim to nurture the quality of the International Transactions in Operational Research (ITOR), as well as continue to support the publication of the International Abstracts in Operations Research (IAOR). Graham Rand has seen not only to the strategic but also day-to-day administrative concerns of the publications. Editors Celso Ribeiro (ITOR) and Preston White (IAOR) continue to ensure that these IFORS publications remain valuable to the international OR community even as they contribute to the financial viability of the organization. Our grateful appreciation to our two editors!

Your President was on hand to guide and give inputs during the meetings of the following national OR societies: Argentina (Buenos Aires, November 2013), China (Beijing, May 2013), Italy (Rome, June 2013), France (Paris, April and August 2013), USA (Minneapolis, October 2013), Greece (Athens, September 2013), Brazil (Natal, September 2013). I had the opportunity in September to give congratulations on the occasion of the Greek national society's 50th year. In November, I was fortunate to be able to share with the world what we do in our profession as I received the Konex award in Argentina for my contribution in the areas of mathematical programming, operations research, combinatorial optimization and global optimization. These events were shared in the IFORS major vehicles for communication, the **IFORS website** and the quarterly **IFORS News** headed by Elise del Rosario. These tools continued to provide the communication links to the IFORS membership in particular and to the international OR public in general.

▲ N. Maculan delivers speech for the HELORS 50th Anniversary.

Treasurer Peter Bell has taken good care of the IFORS coffers as he kept a watchful eye on the revenues and expenses. The good position that IFORS finds itself in today is the collective work of its past officers. Dominique de Werra **IFORS Immediate Past President**, has seen to the continuity of programs and provided the background of the past decisions made. Activities for the year received the full administrative support of **IFORS Secretary** Mary Magrogan and Beth West.

As President, I am grateful to the IFORS team that has worked together to accomplish so much in its first year. On behalf of this IFORS AC, I wish to thank you all for the support you had shown to the organization and its activities. 🌍

Report of the Vice President-at-Large

Sue Merchant <suemerchant@hotmail.com>

Activities started early in the year with the formation of a Developing Countries Committee (DCC) with the following members: Elise del Rosario (Philippines), Adam Ourorou (France/Benin), Yindong Shen (China) and Theo Stewart (South Africa), excellently supported by IFORS Secretary Mary Magrogan and Beth West. In addition, the Chair started to set up a wider consultative group so that contacts in different nations can be asked for views on DCC matters, act as useful local contact points and provide information about local needs and possible speakers. One of the committee's first tasks was to formulate a new set of objectives (based on the Ahmedebad declaration and other IFORS documents) approved by the Administrative Committee and published in IFORS News http://ifors.org/web/june-2013-newsletter/).

The DCC assisted with or organised the following events:

• ICORD 2013 (Rome) – this was a most successful joint event organised for us by EWG (ORD). 17 papers from delegates from a wide range of countries were accepted and discussed. Each paper was assigned two 'reactors' (who commented in detail on the papers presented) and the conference included a PSM workshop run by Jonathan Rosenhead and Leroy White. The committee's thanks are due to all those involved especially Elise del Rosario and her programme committee.
• The IFORS Prize competition, under the able chairmanship of Andres Weintraub received 25 entries from which the panel will select 8 finalists who will present at IFORS2014 in Barcelona. The committee discussed ways of confirming that finalist projects had actually been implemented in the organisations for which they were carried out.
• The Chair encouraged two individuals in Nigeria to make contact and offer mutual support in OR matters. One joined the ORSSA (thanks to the support of Theo Stewart) and another found contacts in the Nigerian OR Society (INFORN) whom we then encouraged to apply to join IFORS membership.
• The committee gave support to speakers for two different African conferences – to Jim Cochran for the Buea conference in Cameroon and to Hans Ittman who was asked by the DCC to speak at an ORPA conference on urban transportation in Dakar, Senegal. Elise del Rosario was also given some support to deliver a talk to the 2nd International Conference on OR in Medan, Indonesia, to encourage them to form a society and join IFORS;

• Gerhard Wilhelm Weber, with the most helpful support of Ruel Tan, IFORS' web editor, put much effort into improving the DCC Resources website – he encouraged the submission of many new papers with the help of several students, and oversaw the redesign of the site including a rating system; Wiley kindly agreed to give free access to one of its published papers by Professor Shen for a year;
• Discussions are nearly concluded with publishers Palgrave McMillan who have kindly agreed to give free access to their International Abstracts in OR to a number of developing countries via the Developing Countries website.
In the planning stage are:
• ICORD 2014 (Lleida, near Barcelona) - underway with particular thanks to EWG (ORD) for taking a lead in organising the event once again. Conference chairs are LLuis Miquel Pla Aragones (who is based in Lleida) and Youssef Masmoudi, and the programme committee comprises: Elise del Rosario, Honora Smith and Gerhard-Wilhelm Weber;
• The committee discussed at length the location for ICORD 2015. Among the venues considered which included China and Indonesia, a recent decision was made to select Sri Lanka. Thanks are due Arabinda Tripathy for securing an arrangement with potential sponsors. It is hoped that the selection of Sri Lanka will help to encourage the formation of a national OR Society and give the opportunity for the newly created Nepalese society as well as other South Asian members to attend a conference not too far away;
• The DCC is considering providing limited support for a speaker at an ORPA conference in Algeria in 2015 to spur the community to form a national OR Society.
• Consideration will be given to: further improvements to the DC Resources website; arranging a Teachers' workshop; selecting a venue for ICORD in 2016; and to other ways of supporting African OR.

Thanks are due to members of the DCC for their support in the above activities and I look forward to working with them again in 2014. 🌐

Report of the Treasurer

Peter Bell <pbell@ivey.uwo.ca>

IFORS financial position continues to be strong in the face of the budgeted operating deficit for 2013. What follows is a summary of the unaudited results for 2013, with all numbers in US$.
Strong revenues from IAOR and ITOR publications with cash receipts totaling almost $140,000 was above the budgeted amount of $127,000, with variations explained by the exchange rate variations when converting the payments in £ to US$.

Dues collections at $21,655 were also above the budgeted $20,000 as a result of continued diligent efforts by Mary Magrogan. With the decreased interest rates brought about by the economic downturn, IFORS' interest income from its reserves fell from $27,280 in 2008 to $2,443 in 2012 even with an increase in the amount of reserves. Final interest receipts for 2013 are not expected to be far from the 2012 levels. The net effect was that IFORS revenues from ongoing activities at about $163,000 were almost identical to 2012, above the budgeted amount of $148,200.

Spending for the year ($203,000 if the advances to the Barcelona conference of $13,879 is removed) is below the 2013 budget of $209,025. The Education and Developing Countries committees did not spend their full budgets while administrative committee and IAOR editorial expenses were above budget. Administrative expense - $16,376 actuals vs. budgeted $12,000 was a result of additional travel while the variance in the IAOR Editorial expenses ($46,500 actuals vs $34,500 budget) came from a 2013 booking of a 2012 expense. Other than these, most line items were close to budget.

The budgeted 2013 deficit of $60,761 is close to the cash deficit of $53,089. The audited statements that will be available in April will be slightly different as a result of the way that the auditor handles accruals.

The 2014 budget approved by the IFORS AC in Rome shows an operating surplus of $70,475 although the financial result is heavily dependent on the success of and the resulting IFORS revenues from the Barcelona conference.

On balance, 2013 did not materially change the organization's financial strength. With a very conservative investment strategy, fluctuations in the reserves come mainly from exchange rate variations of IFORS assets kept in currencies other than US$. In the face of recent improvements in financial system stability, prospects for the future look sound.

In view of the Society's financial position and prospects, no change in member society dues is recommended at this time. 🌐

IFORS Financials (unaudited, in US Dollars)

	2013		2014
	Budget	Actual (Cash)	Budget
INCOME			
Member Society Dues	20,000	21,655	20,000
Royalities			
IAOR	76,764	79,013	74,00
ITOR	55,000	58,477	55,000
Interest	1,500	2,132	2,500
Other Income			
Triennial Conferences- Barcelona 14			144,000
Special Conferences		2,078	
TOTAL INCOME	***148,264***	***163,355***	***295,500***
EXPENSES			
Triennial Conferences			
Barcelona 14		13,879	20,000
Quebec City 17			2,000
Activities			
Administrative Committee	12,000	16,376	12,000
Publications Committee			
IAOR Editor	34,500	46,500	34,500
ITOR Editor	23,000	20,786	21,000
Other			
Scientific Activities & External Affairs			
IDL, ITL, Fellowships, & Grants	16,000	17,545	5,000
IFORS Website	6,500	4,065	8,500
IFORS Newsletter	8,000	7,789	9,000
Education Committee	7,500		7,500
Meetings Committee			
Program IFORS2014	2,500	205	5,000
ITOR Subscriptions	20,525	20,525	20,525
Developing Countries Committee	26,000	17,261	26,000
General Business Operations			
Office & Secretary	46,000	47,420	47,000
Auditor	3,000	2,795	3,000
Banking	1,000	1,259	1,500
Write-off of Bad Debt from Dues			
Contingency	2,500	37	2,500
Exchange difference			
TOTAL EXPENSES	***209,025***	***216,443***	***225,025***
OPERATING RESULT	***(60,761)***	***(53,089)***	***70,475***

Report of the VP Representing ALIO

Lorena Pradenas Rojas <lpradena@udec.cl>

Various events were organized in 2013 in the different countries comprising the ALIO.

The Latin Iberoamerican Schools of Operations Research had been one of the most successful ALIO (http://www-2.dc.uba.ar/alio/) events in the past 20 years. **ELAVIO2013** (http://elavio2013.blogs.upv.es/) was no exception. Held September 8 to 12 at the Universitat Politecnica de Valencia, Spain (http://www.upv.es/) the Elavio featured 12 tutorials involving 69 undergraduate and postgraduate students, 63 of whom were granted food and lodging by the organization. IFORS scholar selected for the Elavio was Rafael Lovato Durbano, a University of Sao Paulo PhD student.

The Brazilian Symposium on Operations Research, **2013 XLVSBPO** (http://www.sbpo2013.ect.ufrn.br/) was held in Natal from September 16 to 19 under the auspices of the SOBRAPO (http://www.sobrapo.org.br/) and the Federal University of Rio Grande do Norte (http://www.sistemas.ufrn.br/portal/PT/). The coordinators were Professor Luciano Ferreira and Mariana Rodrigues de Almeida (both UFRN-BR). The event consisted of 3 lectures, 3 tutorial courses and paper presentations, with the participation of nearly 500 undergraduate and postgraduate students, researchers and teachers, from Brazil and other countries.

More than 150 undergraduate and postgraduate students, teachers and researchers from 13 countries participated at the **XOPTIMA/VIREDM** (http://www.optima2013.cl/). Sponsored by the Chilean Congress of Operations Research (www.ichio.cl) together with the Sixth Version of the Multi-Criteria Network, the event was held at the University of Concepción (www.udec.cl) from October 27 to 30. The event consisted of 8 lectures and 3 tutorials and featured international exhibitors of OR The event was chaired by Professor Lorena Pradenas (DII-UDEC).

The Annual Argentinian Conference on Computer and Operations Research **42JAIIO** (http://www.sadio.org.ar/noticias-de-las-42-jaiio/ took place at the National University of Córdoba (http:// www.unc.edu.ar/) from September 16 to 20. Organized by SADIO (http://www.sadio.org.ar/), the conference was coordinated by Carlos Areces and Laura Alonso Alemany (both FaMAF, UNC). The event had 379 presentations and 800 participants.

Other notable events, held in 2013 in the region include:
The 16th Conference on Integer Programming and Combinatorial Optimization **IPCO XVI** (http://ipco2013.dim.uchile.cl/) March 18 to 20 in Valparaiso, Chile;
The VII Latin-American Algorithms, Graphs and Optimization Symposium **LAGOS 2013** (http://xamanek.izt.uam.mx/LAGOS2013/) April 22-26 in Playa del Carmen, Mexico;
The IV Congress of Computational and Industrial Applied Mathematics IV **MACI 2013** (http://asamaci.org.ar/eventos/iv-maci-2013-1-1) May 15-17 in in Buenos Aires, Argentina;

International Network Optimization Conference 2013INOCC 2013 (http://eventos.ull.es/inoc2013/) May 20-22 in Tenerife, Spain; The Eighth Triennial Symposium on Transportation Analysis, TRISTAN VIII (http://www.tristan.cl) June 9-14 in in San Pedro de Atacama, Chile. The Workshop on Distance Geometry and Applications DGA'2013 (http://www.icomp.ufam.edu.br/dga2013) June 24-27 in Manaus, Amazonas, Brazil. 🌎

Report of the VP Representing APORS

Yuan Ya-xiang <yyx@lsec.cc.ac.cn>

APORS sponsored the 11th International Symposium on Operations Research and Its Applications (ISORA2013) held from Aug 23 to 25, 2013 in Huangshan, China. Participated in by 60 delegates, the conference had 45 full papers with the proceedings published by IET. Professor Zhang Xiangsun, president the Asia-Pacific Operations Research Center and former IFORS VP for APORS welcomed all participants from China, Hungary, Japan, Belgium and Poland. OR role and methods in combating severe natural disasters were addressed. The workshop featured four plenary speakers.

Major activities of member societies of IFORS in the Asia-Pacific region in the year 2013 are reported below

Operations Research Society of China (ORSC)

Highlighting the various activities of the ORSC in 2013 is the Sino-German joint Symposium organized by GOR and ORSC (http://www.orsc.org.cn/news.php?cid=128&id=202). The first Sino-German Symposium on Operations Research convened at a lakeside resort in Germany's Bavarian Spitzingsee on September 25-27, 2013. Prof. Dr. Martin Groetschel gave the keynote lecture at the Symposium. A total of 50 OR professionals attended this GOR and ORSC joint workshop, including 20 Chinese OR professors from Chinese Academy of Sciences and top Chinese universities. The 7th International Conference on Systems Biology ((ISB2013) was held at Huangshan on Aug 22-25, 2013. Dalian University of Technology hosted the fifth BOM workshop in Dalian, jointly with Tsinghua University, on Dec 18-19, 2013. An international symposium on combinatorial optimization and applications was held in Chengdu, Dec 12-14, 2013. The 19th Annual International Computing and Combinatorics Conference (COCOON'13) was held in Hangzhou, China, on June 21 - 23, 2013.

Meanwhile, the ORSC council meeting held April 12-14 at the Shanghai East China University of Science and Technology reviewed organizational issues and discussed plans for 2013. It also featured a visit to the Shanghai Yangshan deep-water port to review the logistics system developed by the Shanghai OR chapter. Two ORSC journals, OR transaction (4 issues/year) and OR/MS (6 issues/year) are in Chinese and is joined by the newly-launched quarterly English journal, the Journal of the Operations Research Society of China, JORSC, published jointly by Springer and China Science Press (http://www.springer.com/mathematics/applications/journal/40305).

Operations Research Society of the Philippines (ORSP)

ORSP started 2013 with the Annual Student Congress highlighted by the OR Quiz Bee which featured 10 competing schools. This was followed by a May hands-on workshop on "Optimizing Decision Making Through Spreadsheet Modeling" conducted by the De La Salle University faculty at the Asia Pacific College, aimed at equipping practitioners with the tools to help them in their work. In August 2013, ORSP held a Technical Forum at Ateneo de Manila University on "OR for Marketing/ Marketing Research". The focus on marketing proved to be a popular one, as the forum was attended by close to six hundred 3rd and 4th year college students taking up Mathematics, Industrial Engineering, and Business Management. Due to the popularity of the forum, ORSP conducted a rerun on September

2013. It was equally successful as the first one, and was attended by close to 500 students from various schools.

Culminating the year was the annual ORSP National Conference on November 8 at The Richmonde Hotel, Eastwood City. The theme was "Keeping Pace with the Business Analytics Revolution". INFORMS Fellow Dr. Grace Lin gave the keynote speech on "Opportunities and Challenges in Realizing Value of Big Data Analytics". The other keynote speakers were from the big analytics firms like SAP, SAS and IBM. Membership had time to socialize and have fun at its annual Christmas party.

Korean Operations Research and Management Science Society (KORMS)

Professor Byung-Man Chang led KORMS during its three 2013 annual meetings held for Spring (May 24-25), Summer (Aug. 19-21), and Fall (Nov. 2). KORMS continued to publish its three official journals, namely, the Journal of the Korean Operations Research and Management Science Society, Korean Management Science Review, and Management Science & Financial Engineering. The end of the year saw the election of Professor Suk-Gwon Chang for a two-year term from 2014 to 2015.

Operational Research Society of Nepal (ORSN)

ORSN National Seminar with theme "Operations Research: Applications in Developing Countries" was held February 1 and 2 at Bode. Its Seventh Annual General Meeting was held September 20, which featured a presentation by Vijaya Shrestha on the topic "National Evaluation System in Nepal Government". A talk on " Building Human Resource Architecture for Greening Workplace" by Prof. Dr. Saman Dassnayake from University of Colombo, Sri Lanka was held October 31. This was followed November 27 to 30 by a workshop on "Emergency Mitigation Using Optimization and Simulation Methods" co-organized with the Nepal-German Academic Association (NEGAAS) and DAAD.

The Management Science / Operations Research Society of Malaysia (MSORSM)

MSORSM resumed its second Lecture Series in Operations Research (LSOR) on 7 – 8 June on the topic Forecasting Methods and Applications. Universiti Putra Malaysia (UPM) and Nottingham University Malaysia Branch jointly organized the Lecture Series.

The Annual General Meeting (AGM) was held June 15 at the Universiti Pertahanan Nasional Malaysia (UPNM). In conjunction with the AGM, a National Seminar on Management Science and Operations Research was held where speakers, one academician and two practitioners shared their experience on the practice of operations research and management science. MSORSM was invited as Technical Sponsor for the 1st International Conference on >>

>> Information Operations Management and Statistics (ICIOMS) 2013 held September 1 to 3 in Kuala Lumpur. MSORSM with University Putra Malaysia (UPM), co-organized the Statistics and Operations Research International conference (SORIC) 2013 from December 3 to 5 in Kuching Sarawak, where 105 papers were presented by participants from all parts of the world.

The Operations Research Society of Japan (ORSJ)
ORSJ organized two annual conferences, the Spring annual conference "Connecting OR" with 128 presentations and 417 participants at University of Tokyo from March 5 to 6, and the Fall Annual Meeting "Tourism and OR" with 129 presentations and 316 participants at University of Tokushima from September 11 to 12. For these two meetings, ORSJ encouraged application papers.

ORSJ also organized the Spring symposium held on March 4 at the National Graduate Institute for Policy Studies under the theme "OR and Optimization Frontier" with 121 participants as well as the Fall symposium with the theme "OR in Shikoku" held at the University of Tokushima on September 10 attended by 51 participants.

Operations Research Society of Iran (IORS)
The Sixth International Conference of Iranian Operations Research Society was held May 8-9 at Institute for Operations Research, Tehran, Iran. During the same period, IORS sponsored 12 workshops on various topics, including Optimization Software, Meta-heuristic Optimization Algorithms, Scale Elasticity in DEA Models, Practical Package for Monitoring Bank Branches, and others.

IORS organized the Annual Operations Research Society University Students Competition, on May 7, 2013 at the Institute for Operations Research in Tehran.

Notably, membership increased by 100, reaching 700 for 2013.

The Operational Research Society of Singapore (ORSS)
For 2013, ORSS is 108 members strong, composed of 105 Honorary Fellows, Life, Ordinary, Associate, and Student and 3 Corporate Members. The Governing Body of ORSS consists of the Honorary President, the Honorary Vice-President, the Honorary Treasurer, the Honorary Secretary, the Honorary Assistant Secretary and 4 other Committee Members with no key appointment. A major activity was a social event held on October 22 for ORSS members to meet and interact. Highlighting the event was a talk by Professor Keith Carter on "Big Data and Actionable Intelligence". 🌐

Report of the VP Representing EURO

Elena Fernández <e.fernandez@upc.edu>

EURO, The Association of European Operational Research Societies, www.euro-online.org, is a regional grouping within IFORS. At present it has 31 member societies. EURO is regulated by a Council consisting of representatives of all its members and an Executive Committee which constitutes its board of directors.

The 2013 Executive Committee of EURO was composed of President Gerhard Wäscher (Germany), Past President Grazia Speranza (Italy), VP1 Sally Brailsford (United Kindom), VP2 José Fernando Oliveira (Portugal), Secretary Jesper Larsen (Denmark), and the permanent treasurer Marino Widmer (Switzerland). The office Manager is Sarah Fores, the webmaster Bernard Fortz (Belgium) and the Website Editor and Administrator Marie-France Rogge (Belgium). The following officers were elected in 2013 for terms starting in 2014: President Elect Elena Fernández (Spain), and VP3 Silvano Martello (Italy) for communication and publications.

The EURO XXVI Conference was a joint EURO/INFORMS Conference. It took place in Rome July 1-4 2013, with over 3500 presentations in 60 parallel sessions and 3700 delegates. The Program Committee Chairs were Marc Sevaux (France) and David Simchi-Levi (USA). The Organizing Committee was chaired by Paolo dell Olmo (Italy). One of the plenary talks in the EURO XXVI Conference was the IFORS Distinguished Lecture by John D.C. Little (United States of America). Clovis Gonzaga of Brazil conducted an IFORS Tutorial Lecture.

In addition to the annual conference, the XXIX EURO mini-Conference on "Collaborative Decision Systems in Economics and in Complex Societal and Environmental Applications" took place in October 17-19 in Graz (Austria). Also, a number of smaller workshops took place, associated with the activity of the various EURO working groups.

EURO recognizes the achievements of its members through a variety of prizes. In 2013 the EURO Gold Medal was awarded to Panos M. Pardalos (University of Florida, USA). The 2013 EURO Distinguished Service Medal Award was given to Theodor Stewart, University of Cape Town (South Africa). The winners of the 2013 EURO Excellence in Practice Award are Andreas Brieden (Universität der Bundeswehr München), Steffen Borgwardt (TU München), and Peter Gritzmann (TU München) for their work "Geometric Clustering for the Consolidation of Farm- and Woodland". The 2013 EURO Doctoral Dissertation Award was given to Christian Raack, Zuse Institute Berlin (ZIB), Germany. The winners of the EURO Award for the Best EJOR Paper are Christian Bierwirth, Frank Meisel in the category of survey paper; Florian Jaehn, Peter Letmathe in the category of Innovative Applications of OR; Maria Isabel Gomes Salema, Ana Paula Barbosa-Povoa, Augusto Q. Novais, in the category of theory/methodology. All these prizes were awarded at the closing session of the Rome XXVI Conference.

2013 also witnessed significant developments in the EURO journals. The European Journal of Operational Research (EJOR) ranked highly in the Thomson Reuters JCR. The three new EURO journals, EURO Journal on Computational Optimization (EJCO), EURO Journal on Decision Processes (EJDP), and EURO Journal on Transportation and Logistics (EJTL), were published regularly and received an increasing number of submissions.

There are 28 working groups in EURO (EWGs) which cover different areas within OR. The EWGs meet regularly during the EURO-k Conferences and, possibly, during other events, where thematic streams are organized. These meetings are all supported by EURO. The EURO PhD Schools (EPS) is an educational instrument created by EURO in 2013 to encourage the organization of post-graduate education initiatives for PhD students under a school format. The first EPS was approved in 2013 and will be held in February 2014. 🌐

Report of the VP Representing NORAM

Michel Gendreau <michel.gendreau@cirrelt.ca>

The North American Research Societies (NORAM) is made up of the Canadian Operations Research Society (CORS) and the Institute for Operations Research and the Management Sciences (INFORMS). In line with promoting the advancement of knowledge, interest and education in operations research, both societies carried out various activities in 2013.

Canadian Operational Research Society
Société Canadienne de Recherche Opérationnelle

CORS publications included a quarterly Bulletin and the *Information Systems and Operations Research* (INFOR) journal. Services continued in 2013 were a traveling speaker program, a student paper competition, and grants to attend teaching effectiveness workshops. CORS Council approved a policy on Special Interest Groups (SIGs), which enables CORS members with common interests to interact and network. SIGs formed so far include Queueing Theory, Health Care Operational Research, and Forestry SIGs. CORS held its 55th Annual Conference from May 27 to 29 in Vancouver, British Columbia.

The following 2013 CORS awards were given: *Harold Lardner Prize* to James B. Orlin of the Massachusetts Institute of Technology; *Omond Solandt Award to Mitacs*, a research organization that coordinates collaborative industry-university research projects; Award of Merit to Derek Atkins of the University of British Columbia; *Service Award* to Samir Elhedhli, University of Waterloo; and the *CORS Practice Prize* to Rick Caron, Esai Selvarajah, Sahand Ashtab, Carly Henshaw, Michael Higgins, Dong Wang, and Lily Wu of the University of Windsor.

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INFORMS has two major conferences - the Annual Meeting in fall, mainly oriented towards academics, and the Analytics Conference in spring for practitioners. For 2013, there were three major meetings: INFORMS Conference on Business Analytics and Operations Research held April 7-9 in San Antonio, Texas; the EURO-INFORMS Joint International Meeting held July 1-4 in Rome, Italy, and the INFORMS Annual Meeting in Minneapolis, Minnesota, October 6-9. In addition, INFORMS held a number of Community conferences, including the INFORMS Healthcare Conference from June 23 to 26 in Chicago, Illinois.

Publications included 13 journals, including *Operations Research and Management Science*, an open-access journal *INFORMS Transactions on Education*, a tutorial and book series. Other activities included a speakers program, a high-school teachers' program, and a doctoral colloquium and young practitioners' workshop. As of 2013, INFORMS has 11 societies, 22 sections, 4 fora and 31 regional chapters.

The following awards were given in 2013: *Doing Good with Good OR - Student Paper Competition* to P. Shi, Massachusetts Institute of Technology; *Daniel H. Wagner Prize for Excellence in Operations Research Practice* jointly to: A. Avrahami, Yedioth Group, Israel, Y. Herer, Israel Institute of Technology, and R. Levi, Massachusetts Institute of Technology; *George B. Dantzig Dissertation Prize* was given to J. Acimovic, Penn State University; *George E. Kimball Medal* to R. Schneur, Verizon Laboratories, E. Wolman, George Mason University, and T. Cryan, INFORMS; *George Nicholson Student Paper Prize* to R. Jiang, University of Florida; *Saul Gass Expository Writing Prize* to F. Kelly, University of Cambridge; *Frederick W. Lanchester Prize* to D. Williamson and D. Shmoys, Cornell University; *INFORMS President's Award* to A. Geoffrion, UCLA; *INFORMS Prize* to the Ford Motor Company; *Prize for the Teaching of the OR/MS Practice* to A. Newman, Colorado School of Mines; *INFORMS Undergraduate Operations Research Prize* jointly to: University of Pennsylvania's F. Abiprabowo, N. Harinsuit, S. Lim, and W. Zhang, , and Bilkent University's N. Akar, B. Kepir, Ç. Koçyiğit, I. Koyuncu, M. Özer, and T. Turkoglu,; John von Neumann Theory Prize to M. Balinski, C.N.R.S. and École Polytechnique; *Philip McCord Lectureship Award* to D. Bertsimas, Massachusetts Institute of Technology; *UPS George D. Smith Prize* to the Naval Postgraduate School; and *Franz Edelman Award for Achievement in Operations Research and the Management Sciences* to the Dutch Delta Program Commissioner. Inducted as INFORMS Fellows in 2013 were D. Bienstock, M. Carter, M. Cohen, Z. Drezner, T.C. Hu, S. Jacobson, P. Jaillet, J. Lee, A. Nagurney, S. Ross, M. Savelsbergh, and D. Shmoys.

Report on Education Initiatives

Lorena Pradenas Rojas <lpradena@udec.cl>

OR teaching occurs in IFORS member countries. An important part of this education is provided directly through lectures and tutorials conducted in the various annual and biannual events. The active participation of undergraduate and postgraduate students as well as teachers makes this possible.

While the IFORS on line initiative, Educations Resources (http://educationresources.ifors.org/) consistently receives contributions and new material from different OR societies, it has not ceased to send out invitations to those who wish to share in the learning of others by sending links and suggestions.

Report on IFORS Lectures

Yuan Ya-xiang <yyx@lsec.cc.ac.cn>

The IFORS Distinguished Lecture (http://ifors.org/web/ifors-distinguished-lectures/) is a program to encourage international cooperation in OR and to recognize successful and influential OR researchers. For 2013, an IDL was given by John Little during the EURO-INFORMS Joint International Meeting in Rome. Later during the INFORMS Annual Meeting in Minneapolis on October, 2013, an IDL was given by Pascal Van Hentenryck .

Started in 2012, the IFORS Tutorial Lecture (http://ifors.org/web/ifors-tutorial-lecture/) is intended to encourage new research in emerging areas of Operations Research or to highlight new teaching technologies and approaches. For 2013, Clovis Gonzaga gave an ITL during the EURO-INFORMS Joint International Meeting in Rome, Italy.
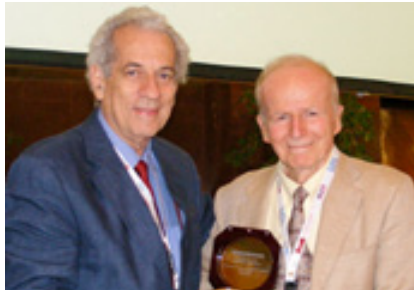
IFORS President Nelson Maculan (left) presents the IFORS award to IDL John D.C. Little.
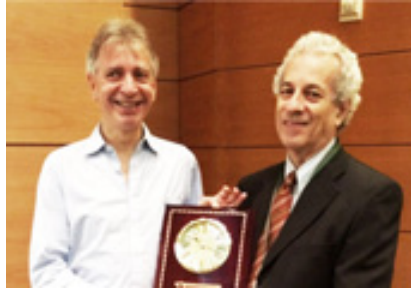
IFORS President Nelson Maculan (right) presents the IFORS award to IDL Pascal Van Hentenryck.

IFORS VP Sue Merchant presents the ITL award to Clovis Gonzaga.

IFORS 2014 Conference Report

Elena Fernández <e.fernandez@upc.edu>

The next triennial IFORS Conference will take place in Barcelona, July 13-18 2014. Expected attendance is over 1500. The Organizing and Programme Committees are actively working for a successful event. Please see details on page 1 of this issue of the IFORS News.

Report of the Chair, IFORS Publications Committee

Graham Rand <g.rand@lancaster.ac.uk>

The journals published by IFORS are an important component of what IFORS offers the worldwide OR community. They raise the IFORS' profile amongst researchers and authors. They also provide an important revenue stream to enable IFORS to undertake a wide range of activities. Each generates, with the publisher, a profit share. In a typical year, *ITOR* generates, omitting subscriptions received as part of a conference fee, revenue of $45,000 and *IAOR* revenue of $80,000. This is offset, of course, by editorial expenditure, of some $25,000 in the case of *ITOR* and $40,000 in the case of *IAOR*, thus providing a gross profit of approximately $60,000 from the two journals.

gross profits with a small (2%) rise in gross revenues for 2014.

A few societies were recently contacted to suggest that they might wish to offer their members access to *IAOR* through a member-only section on their website. At the time of writing, interest had been expressed by three societies.

Arrangements are in place for placing a link to IAOR from the Developing Countries page of the IFORS website. IAOR is made available as a free site license to a large number of institutions (581 in the latest list in 26 countries) in the developing world through the INASP initiative. Anyone accessing IAOR from these institutions will have free access. The full list of developing world institutions that thus have access to IAOR will be made available. (A user from one of the listed institutions accessing via that institution will get full access via the free site license when they go to the Palgrave site.)

There are two crucial issues regarding the publication of IAOR: the size of issues and the size of the backlog. There is a large backlog of approximately 8500 unprocessed abstracts, which was reduced by only a small amount this year. Abstracts are processed by the editors using what is called an Electronic Work Bench (EWB). It is desired to improve this to allow work with multiple abstracts and folders at once and pre-screening. Three issues have been identified:

International Abstracts in Operations Research (IAOR)
K. Preston White, Jr. continues to edit *IAOR*, with the support of associate editor Peter Whitehead, and it continues to be published by Palgrave. Neil Henderson, Senior Publishing Editor at Palgrave was replaced by Guy Edwards in January 2014. The 2013 issues have been published ahead of schedule, and contained 4518 abstracts. Thanks are due to the editors for the great job they are doing.

Palgrave reduced their sales estimates for 2013, but with some cost savings forecast that IFORS will be slightly ahead of budget on

• Coverage: Getting abstract data from the journals into the EWB in useable format. Sorting this issue out would, of course, have the effect of increasing the backlog.
• Editor usability: Speed and functionality of the EWB makes processing abstracts very time consuming.
• Quality of exported data: XML data coming out of the EWB still needs considerable manual checking, cleaning and correction.

Unfortunately, resource constraints at Palgrave had resulted in slower progress than hoped for. The editor usability issue makes quickly processing the backlog very difficult. The editors do a great job in managing to push through just enough abstracts to make each print issue despite the limitations of the system. This results in inability to publish more abstracts, or more frequently, or publish online significantly ahead of print.

International Transactions in Operations Research (ITOR)

Celso Ribeiro continued to do an excellent job as editor of ITOR, published by Wiley-Blackwell represented by Graham Russel, Journals Development Editor. All issues were published ahead of schedule in 2013. Papers published by year have increased from 25 (2006) to 44 (2013), pages printed by year increased from 584 (2006) to 936 (2013). Web readership increased by 30% from 2011 (36,133 downloads) to 2012 (46,939 downloads). Operations are being monitored in the light of the change of person responsible for ITOR production and the potential change in the person responsible for ScholarOne support.

The news last year that ITOR had received an inaugural Impact Factor of 0.648 led to a greater than 60% increase in the number of submissions. This was on top of a 55% increase in the previous year. In fact, submissions have increased from 68 (2007) to about 350 (2013, estimate), which have come from 61 countries. ITOR truly is an international journal, with an editorial board of 47 editors from 20 countries. The impact factor dropped a little in 2013 to 0.588. The average acceptance ratio in the period 2007-2013 is 22.8%.

It has been the case for previous IFORS conferences that participants received a subscription to ITOR as part of their conference fee. Whilst Wiley is happy to continue the current arrangement of $25 for each of the three years as part of the 2014 Barcelona conference fee, it has been decided by the AC not to continue this arrangement. As an alternative, it is proposed that Barcelona delegates are "opted in" to receive the ITOR alerts (they would be able to opt out later if they wished). Of course, as the money received per delegate currently forms part of the 50% profit share, the profit share pay-out would go down, but so would IFORS' costs. Wiley-Blackwell will be asked to contact those who are subscribers as a result of being at the Melbourne conference to encourage them to continue their subscription.

Following a request from Developing Countries Chair Sue Merchant, it was agreed that a specific ITOR Developing countries paper may be linked from the website. Wiley-Blackwell kindly made the article free to access until the end of 2014. 🌐

Report of the Chair, IFORS Website and IFORS News

Elise del Rosario <elise@jgdelrosario.com>

Aiming to keep the OR international community abreast of OR issues and events in various parts of the world, quarterly electronic issues IFORS News appeared on schedule. Alerts were sent to the national societies as soon as the issues were uploaded to the IFORS website. Apart from the electronic version, hardcopies of the March issue (containing the IFORS 2012 Annual Report) were distributed during the EURO INFORMS meeting in Rome. The regular features enjoyed good feedback from readers. Sue Merchant and John Ranyard had been successful in soliciting outstanding practical applications for OR Impact. OR for Development edited by Arabinda Tripathy gave readers with interest in the promotion and practice of OR in developing countries an update of IFORS activities and events. Tutorials, along with feature articles, tackled a wide range of topics, and so did the Editorials which the AC took turns in writing. The Book Review by Hans Ittmann brought to the attention of readers interesting insights into books relevant to the profession. Conferences brought to the readers various meetings all over the world while updates on IFORS activities were regularly shared. The growing corps of IFORS News correspondents ensures we'd never have to miss a column on OR Society in Focus along with OR activities in the IFORS world.

The IFORS website continued efforts in bringing to members and visitors a site that is current, welcoming, easy to use, and conducive to sharing ideas and information. The website provided support to the Education Committee through maintenance of the Educational Resources Section. Additionally, in support of the Developing Countries Committee activities, the OR Resources Website continued to offer the OR worker all publicly available materials on the topic of Operations Research for Development. The website continued maintaining its members-only section which logs the status of issues brought for a vote before the membership. 🌐

IFORS News Correspondents	
ALIO	Annibal Parracho
APORS	Degang Liu
EURO	Gerhard Wilhelm Weber
NORAM	Grace Lin
Austria	Raimund Kovacevic
Canada	Dionne Aleman
China	Degang Liu
Croatia	Snjezana Pivac
Czech Rep	Jaroslav Ramik
France	Luce Brotcorne
Germany	Brita Rohrbeck
Greece	Evangelos Grigoroudis
Iran	Nezam Mahdavi-Amiri
Ireland	Cathal Brugha
Lithuania	Leonidas Sakalauskas
Malaysia	Ilias Mamat
Nepal	Sunity Shrestha Hada
Philippines	Malu de Guzman U
Poland	Jan W. Owsiński
South Korea	Chang Won Lee
Spain	Juan-José Salazar-González
Sweden	Tomas Gustafsson
USA	Grace Lin
Uruguay	María E. Urquhart

55 Years
IFORS

55 YEARS
50 COUNTRIES
20 CONFERENCES
20 PRESIDENTS

Argentina	Australia	Austria	Belarus	Belgium	Brazil	Canada	Chile	China	Colombia
Croatia	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hong Kong	Hungary
Iceland	India	Iran	Ireland	Israel	Italy	Japan	Korea	Lithuania	Malaysia
Nepal	Netherlands	New Zealannd	Norway	Peru	Philippines	Poland	Portugal	Serbia	Singapore
Slovakia	Slovenia	South Africa	Spain	Sweden	Switzerland	Turkey	United Kingdom	United States of America	Uruguay

1957 Oxford (UK) — 1960 Aix-en-Provence (France) — 1963 Oslo (Norway) — 1966 Boston (USA) — 1969 Venice (Italy) — 1972 Dublin (Ireland) — 1975 Tokyo/Kyoto (Japan) — 1978 Toronto (Canada)

1981 Hamburg (Germany) — 1984 Washington (USA) — 1987 Buenos Aires (Argentina) — 1990 Athens (Greece) — 1993 Lisbon (Portugal) — 1996 Vancouver (Canada) — 1999 Beijing (China) — 2002 Edinburgh (UK)

2005 Honolulu (USA) — 2008 Sandton (South Africa) — 2011 Melbourne (Australia) — 2014 Barcelona (Spain)

Charles Goodeve (UK) — Philip Morse (USA) — Marcel Boiteux (France) — Charles Salzmann (France) — Alec Lee (Canada) — Arne Jensen (Denmark) — T. Matsuda (Japan) — David Hertz (USA) — R. H. Collcutt (UK) — Heiner Muller-Merbach (Fed. Rep. of Germany)

Jacques Lesourne (France) — William Pierskalla (USA) — K. Brian Haley (UK) — Peter Bell (Canada) — Andres Weintraub (Chile) — Paolo Toth (Italy) — Thomas Magnanti (USA) — Elise del Rosario (Philippines) — Dominique de Werra (Switzerland) — Nelson Maculan (Brazil)

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