IFORS

International Federation of Operational Research Societies

What's Inside

From the President

Getting the Word out on Operational Research

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Despite being President of the International Federation of Operational Research Societies, representing societies that comprise more than 40,000 members, I find it hard to explain exactly what "operational research" is.   This is not surprising: the history of our field is littered with discussions of the name, proposals for new names, new societies with different names, the embracing of whatever buzzword seems vaguely related to our field and so on. I know operational research when I see it, but trying to explain the field to outsiders is fraught with misunderstandings and frustrations.

This is particularly bothersome since I do not believe there is a time in our history when operational research is more relevant or successful. The rise of "analytics" has meant that people understand that data for its own sake serves no purpose. It is only through methods like those within operational research that the data can be transformed into decisions, unlocking the value of the data. The world needs operational research in order to truly enact analytics.

But the world still doesn't understand us. We, as a field, do a good job of recognizing excellence in both the theory and the practice of operational research.   But much of that recognition doesn't leave the field: it is OR people recognizing other OR people. How can we make the larger world understand the importance of what we do?

Some of the larger member societies of IFORS address this issue by having practitioner-facing magazines and extensive public relations activities. INFORMS, our United States member society, and the ORS, based in the United Kingdom, are particularly active in this area. And I will particularly point out the efforts to support pro-bono projects (like the ORS's well established program) do a tremendous amount of good in matching organizations that might have just a vague feeling that they could use some OR, with students, faculty, and professionals who can provide significant aid through OR. This is the sort of activity that every member society should consider. Many already have.

In addition to these large scale efforts, social media outlets provide individuals the opportunity to advertise results in our field to a large audience with practically no overhead. There are already hundreds of members of the operational research world who are tweeting, blogging, instagramming, and so on, all about the successes in our field. But this is something our field needs far more of. It is only through seeing the successes of OR that those outside our field might consider engaging with us. And it is only through this engagement that our field can be successful.

So, for member societies, most of whom provide wonderful services for their members, I will ask: "What are you doing to get   word out about our field?" And for members of those societies, I encourage you to let the world know of your e x c i t e m e n t about our area, and to advertise the value of OR in changing the world. 🌎

From the Editor

OR Making Difference in the World

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The June issue of IFORS News presents a sampling of successful applications of OR around the world!

The OR Impact Section presents an article that describes how OR is being used to facilitate the automatic fingerprint identification system of China. This work was one of the finalists of the 2017 IFORS Prize for OR in Development. Applications from all over the world are expected for the 2020 IFORS Prize for OR in Development, which is being announced in this issue by the chair of the next Prize, Prof. Mario Guajardo. The OR for Development also brings an article about how OR was used to build a community healthcare network in Liberia. I first listened to this beautiful work in ICORD 2017, when Marie-Ève Rancourt presented it, and it is great a broader audience can now know it.

At every year, in each Regional Conference, IFORS sponsors two talks, denominated IDL (IFORS Distinguished Lecture) and ITL (IFORS Tutorial Lecture). The tutorial section of this issue reports briefly the ITL that will be presented at EURO Conference this year given by Prof. Andrés Medaglia. Other ITLs and IDLs sponsored by IFORS this year are listed by Prof. Nelson Maculan in his Report, available in the Annual Reports section. Reports from all other members of the Administrative Committee of IFORS are also available in this section.

In his Book Review article, Prof. Hans Ittmann highlighted some of the excellent subjects present in the book entitled "50 Years of Integer Programming 1958 – 2008". I have this great book on my shelf!

On the events side, we allocated a section only for OR schools. In this section, you can find reports from the organizers of the Latin-American Summer School in Operations Research (ELAVIO), held in Chile, and of the EURO Winter Institute on Lot Sizing and Related Topics (EWI), held in Germany. For both events, you can also find reports from the two students sponsored by IFORS. With great pleasure, we also announce in this issue an OR School that will be held in Benin/Africa, in November 2018.

The Conferences section brings reports of the last GORS Conference, and DEA 40th Anniversary Conference, both held in the UK, and the International Days of Competences for the Future, held in Poznan. Following, you will find an editorial of the International Abstracts in Operations Research (IAOR), that unfortunately, is in its last issue. The Prizes and Challenges section presents the call for nominations of the TSL Dissertation Prize. Finally,in the Association Governance and Management, you will find an article from Octavio Peralta that challenges each one of us asking "what is your cathedral thought for your organization?".

I want to close this editorial congratulating the group who won the 2018 INFORMS Franz Edelman Award! They are Steve Charbonneau, James Costa, Anthony Coudert, Paul, Salasznyk, Brian Smith, Rudy Sultana, all of NCI, Inc., Karla Hoffman of George Mason University, and Michael Trick of Carnegie Mellon University who served as a consultant to the team. Karla Hoffman kindly wrote the tutorial entitled " Optimizing the U.S. Billion-Dollar Spectrum Auction," subject that won the prize, in the 2017 June issue of IFORS News.

And once again, many thanks to James Bleach and the obex project editorial team (http://www.theobexproject.co.uk/) for the English editing of many of the articles published in this issue! 🌐

OR *Impact*

Articles demonstrating direct benefits from implementing OR studies

OR Applied to Fingerprint Recognition in China

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Background

Because of the well-known distinctiveness of fingerprints, they are one of the most widely deployed tools in the detection of crime. The Chinese Automatic Fingerprint Identification System (AFIS) was first introduced as a method for detecting a criminal case over 26 years ago. Now every province in mainland China has established such a system and established its own fingerprint database. Fingerprints from nearly 300 million people are stored in these provinces. These are taken from possible suspects (ten fingerprints from each suspect) including many repeat prints in different situations, times and locations. The total number of fingerprints continues to grow by over 20% per year, including many repeat prints. In addition, there are more than 400 million citizens who have two thumbprints recorded in their ID cards.

A few years ago the sheer volume of fingerprints was causing a problem for police when they needed fingerprint checks. The volume resulted in a loss of precision in the fingerprint system and a low speed of comparison, as well as restricting the further development of AFIS. Firstly, the matching rate was decreasing significantly - it was very difficult for the existing core algorithms to obtain identical matches for suspects when the system capacity rose to over tens of millions of people (hundreds of millions of fingerprints). Secondly, users had increasing expectations of high checking accuracy and speeds at the same time that the fingerprint database capacity increased, so the actual demand of police grassroots work was becoming hard to meet.

The current speed requirement of AFIS is 800 thousand fingerprints per second. In order to meet this, the existing system needed to use accelerator boards or parallel computers, both of which are very expensive. Additionally, the system could not guarantee effectiveness due to its high power consumption, high pollution, and high instability. Therefore, developing fast and accurate fingerprint recognition algorithms was becoming vital.

Overview of the technicalities of fingerprint recognition
The core role of AFIS (which can be viewed as a pattern recognition system) is to determine whether two fingerprints are from the same person. To carry out this role, feature extraction and matching are the two most important steps and a series of optimization models is used to achieve the whole process of fingerprint identification, see Figure 1.
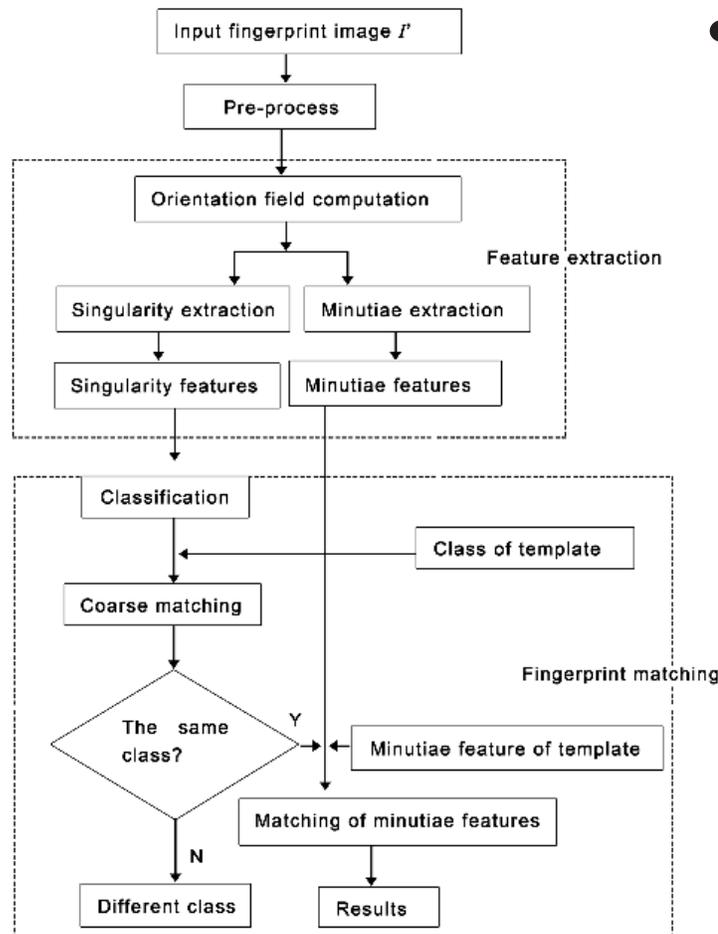
● Figure 1: The process of fingerprint recognition.

Models and Algorithms developed to speed up fingerprint identification
Three main improvements in the new system to handle the large-scale database were added:

1) estimating the fingerprint orientation field; 2) detecting singular points and 3) fingerprint matching. These are described below. See also ref.[1].[2]..

Estimating the fingerprint orientation field: The fingerprint orientation field is a global feature of fingerprints and plays a critical role in fingerprint enhancement, fingerprint segmentation, singular point detection, fingerprint classification, fingerprint indexing, and fingerprint matching. It is clearly important to obtain a good orientation field in order to improve the performance of a fingerprint recognition system.

A global orientation field estimation method based on seed growth was developed for this purpose. First, the fingerprint is divided into overlapping blocks and each block is enhanced by mean filtering. Good blocks which have satisfied some conditions are selected as seeds. From these seeds, a whole orientation field can be generated through a optimization model. The method is described in detail in ref.[2].
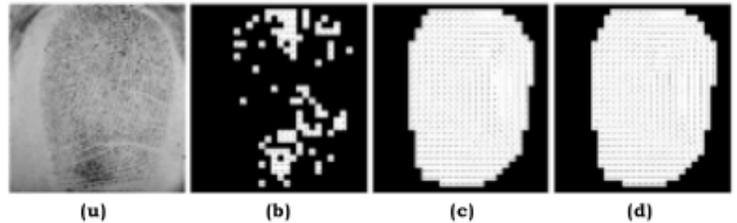
● Figure 2: A low quality fingerprint (21.bmp in Set A). (a) Original fingerprint image; (b) Its corresponding seeds; (c) Orientation field estimated by our algorithm;(d) Orientation field marked manually by experts.

The proposed algorithm was tested on two public test databases. From Figure 2 it can be seen that the orientation field estimated by our algorithm was very similar to that marked manually by experts which indicates that the seed growth method is valid. The method was compared with several state-of-art approaches and it was found that the new algorithm performed well for both good and poor-quality fingerprints[2]..

Detecting singular points: The common strategy to speed up the search in databases of over hundreds of millions of fingerprints is fingerprint classification, which only requires a fingerprint to be compared with the fingerprints in the corresponding class. Fingerprint classification is generally based on global features, especially singularities including core and delta[1]., see Figure 3.
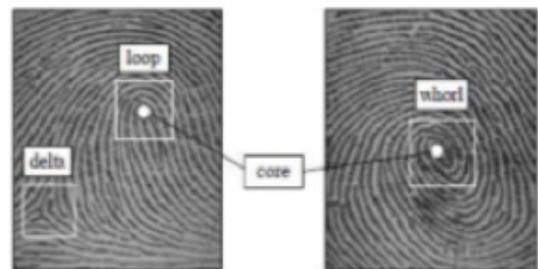
● Figure 3: An example of fingerprint image and its singularities points core and delta.

From the Galton−Henry classification [1]. method, a fingerprint can be simply classified into several classes according to the number and position of the singularities, see Figure 4.

Singular points of fingerprints are those which are invariant to translation, rotation, enlargement and shrinking. There are some simple methods which can be used to detect singularity but they are easily affected by noise and other problems. Inspired by the zero-pole model [5], which generates an orientation field based on the location and number of known singularities, a new model was developed by the team to find the location and number of singularities and overcome existing problems [3]. Based on the minimum error between the orientation fields by direct estimation and by the Zero-pole model, a variable dimension optimization model was proposed. In this model the number and the position of singular points are decision variables and the number of decision variables is variable. >>
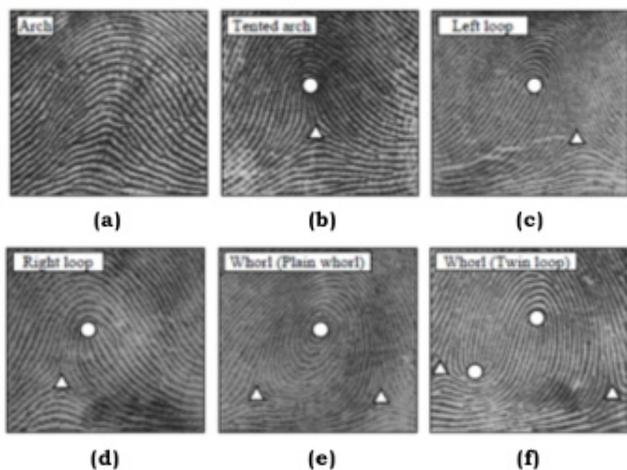
● Figure 4 : Fingerprints classified into six classes by number and the position of the singularities. (a)no singular point;(b),(c) and (d) one core and one delta, but belong to different class;(e)one core and two deltas;(f)two cores and two deltas.

The optimal solution of this model is the position and number of determined singular points[2].. This model is very difficult to solve. According to the characteristics of the fingerprint, it must be transformed to the complex plane and solved using a Hough transformation . Finally, each singular point is refined by solving the corresponding optimization model constrained with its own search window.

The proposed models and algorithms were tested on two public fingerprint databases. The results show the method to be fairly robust to noise[2]..

Fingerprint matching by minutiae: Fingerprint matching by minutiae is the comparison of two fingerprint images and the calculation of a similarity score that represents the probability of a match between the two. There is a risk however that spurious matching may occur because it is processed locally without reference to global information. These spurious matchings seriously affect the results, so a novel and efficient algorithm was proposed based on a convex hull method for eliminating spurious matches [4].. An example is shown in Figure 5. Compared with the results of other algorithms, the performance of the revised algorithm is good [4]..
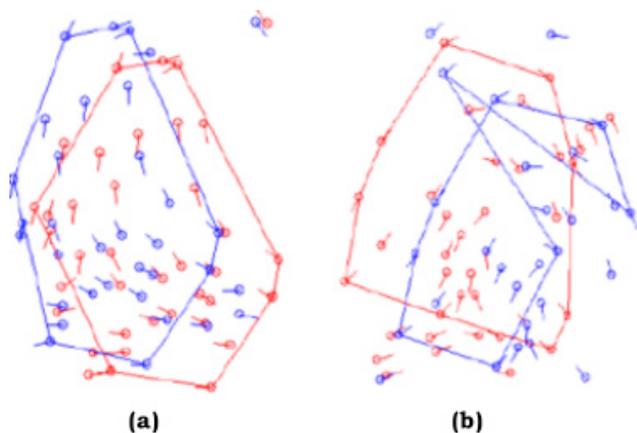
● Figure 5: Examples of convex hulls of point sets. (a)Two similar successful matching convex hulls;(b) Spurious matching pairs can be easily found from a convex hull.

Impact of the new system
The Golden Automatic Fingerprint Identification System (GAFIS),

using the models and algorithms mentioned in this article, is one of the AFIS's which is now used in many provinces of China. The optimization models and algorithms developed by the team have increased the speed of the GAFIS twenty-fold while keeping the accuracy unchanged. The old GAFIS version could only search a database of 5-8 million people and needed 40 servers. But the updated version based on the new algorithms is being used in the 12-15 million people database and only needs 10 servers.

GAFIS has been successfully used in the forensic systems of number of provinces and cities in China, such as Shanghai, Chongqing cities, Jiangxi, Liaoning, Xinjiang, Guizhou, Shandong provinces etc. As of 2015, these forensic systems cracked about 370 A-cases (A-case is an emergency, a very serious case, or a malignant case), 2,400 B-cases (B-case is a serious case such as murder) and 90,000 other cases, through successful fingerprint matching. Since 2005, Shanghai city has captured more than 1,500 criminal suspects and cleared up over 3000 cases each year using GAFIS. In particular, Shanghai city has directly cracked at least 6 murder cases through direct archival inquiry and fingerprint matching. Since 2009, Jiangxi province has cleared up more than 1800 important joint investigations using GAFIS. GAFIS has achieved important results in criminal investigation, public security, anti-terrorism and stability, and other fields.

The Fingerprint Office of Criminal Science Research & Management Center of Shanghai Public Security Bureau commented: "The operation and application of the system has given very important technical support to the maintenance of social stability and the effective fight against crime in Shanghai".

The team was runner-up in the IFORS Prize Competition 2017 and commended for their innovative work.

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Yong A   Chao-Chao Bai   Si-Qi Tang   Min Wu

References
[1]. Maltoni, D., Maio, D., Jain, A., and Prabhakar, S (2009). Handbook of fingerprint recognition. Springer Science & Business Media.
[2]. Tiande G, Congying H. etc. Optimization Models and Algorithms for Fingerprint Recognition and Its Applications in AFIS of China. Submitted to International Transactions in Operational Research.
[3]. Lingling F, Shuguang W, Hongfa W and Tiande G(2008). Singular Points Detection Based on Zero-Pole Model in Fingerprint Images. IEEE Trans. Pattern Analysis and Machine Intelligence, 6: 1-12.
[4]. Chengming W, Tiande G(2009). An efficient algorithm for fingerprint matching based on convex hulls. The 2009 International Conference on Computational Intelligence and Natural Computing, 66-69.
[5]. B. Sherlock and D. Monro(1993). A Model for Interpreting Fingerprint Topology. Pattern Recognition, 26: 1047-1055. 🌐

Solving Hard Shortest Path Problems with the Pulse Framework

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The pulse framework implements ideas and strategies that have been available in the playground of network optimization for years, but when used collectively under a single framework they become stronger and are able to solve a wide array of hard shortest path problems.

The idea behind the pulse algorithmic framework is very simple, almost naïve. The underlying algorithm is based on the idea of recursively propagating *pulses* through a network from a start node s to an end node e. As a pulse traverses the network from node to node, it builds a partial path $\mathcal{P}$ recording the nodes already visited and attributes associated with the partial path being explored, such as the cumulative cost or resource consumption. Each pulse that reaches the final node e contains all the information for a feasible path $\mathcal{P}$
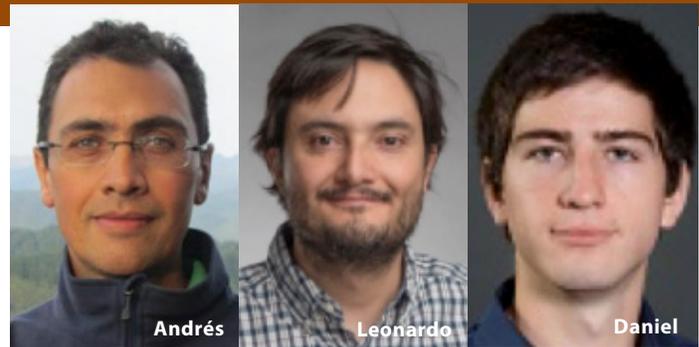
from s to e. If nothing prevents the pulses from propagating, the algorithm completely enumerates all possible paths from s to e, ensuring that an optimal path $\mathcal{P}^*$ is always found.

At the core of the algorithm lies the ability to (effectively and aggressively) prune pulses as soon as there is enough evidence that the partial path will not lead to a feasible or improved solution. Pruning a partial path discards *all complete paths* that share this initial partial path (not just one!). So the earlier we prune a partial path the better, because this action discards many paths that no longer need to be explored. As a result, the strength of the pulse algorithm depends heavily on creative *pruning strategies*. The pulse algorithm shares this implicit enumeration concept with other mainstream algorithms like branch and bound.

Sharing the same intuition, it is possible to tackle different variants of shortest path problems by adapting and extending pruning strategies. Fig. 1 shows a map of the relationships among six problem classes that are challenging by their own merits and that may also be used as building blocks of harder combinatorial problems. Some core pruning strategies are shared among different problem classes; and other problem-specific strategies incorporate particular knowledge of the problem at hand.
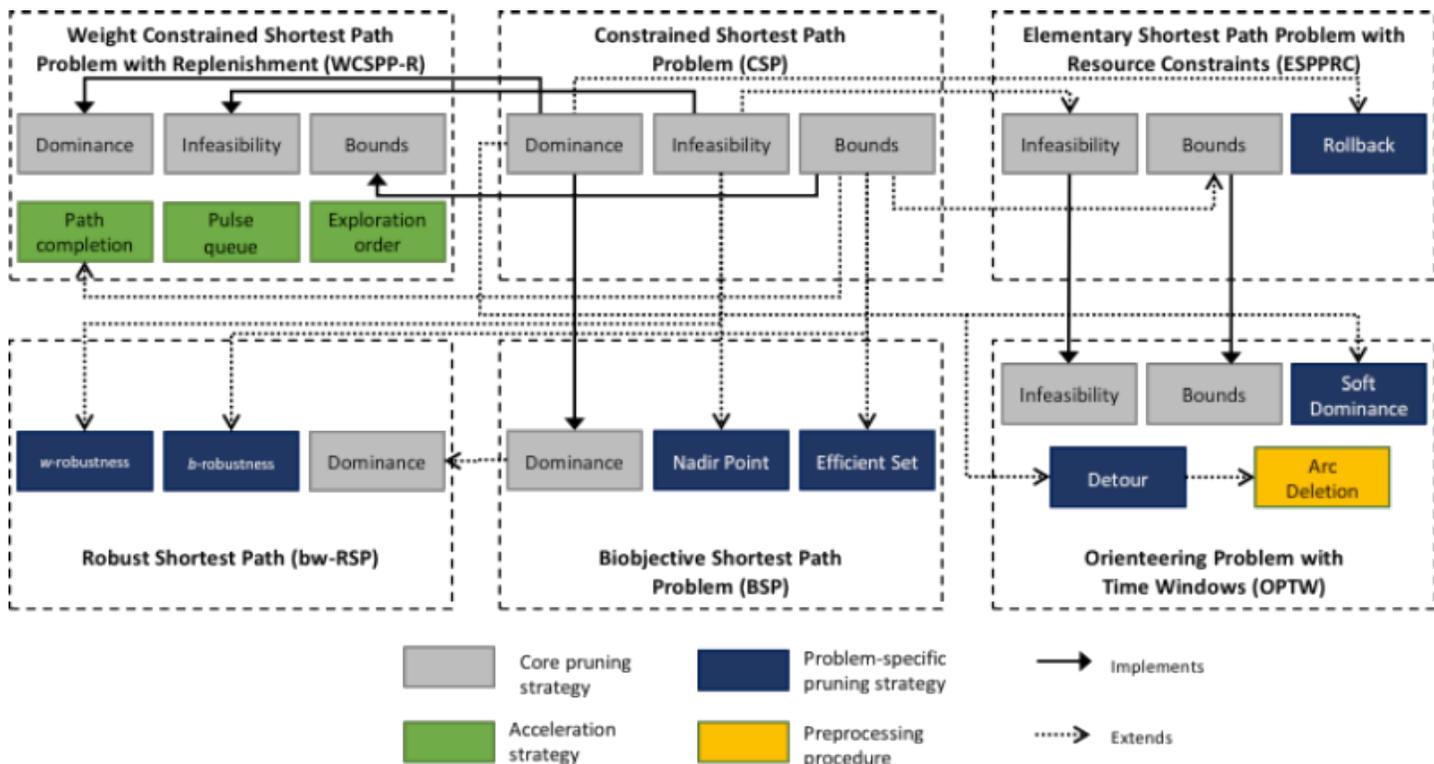

Fig. 1: Sample of pruning strategies of the pulse algorithmic framework

The Constrained Shortest Path Problem (CSP) was the first problem tackled with the pulse algorithm. The objective of the CSP is to find a minimum cost path that meets a side resource constraint (e.g., a time budget). For the CSP, Lozano and Medaglia (2013) proposed three core pruning strategies: dominance, infeasibility, and bounds. For the *dominance pruning* strategy, there is a fixed set of labels that contains the cost and time of paths that have passed through any given node. The key behind this strategy is that there is no need to store all labels, but only a small subset. Although some pulses may inefficiently bypass a node, by storing and checking dominance over a small subset of labels the algorithm derives some significant computational savings. The second core pruning strategy for the CSP is *infeasibility pruning*. The rationale behind this strategy is to prune pulses at an early stage, as soon as it is known that the best possible way to complete a given partial path is infeasible. The third and last core strategy for the CSP is *bounds pruning*. The insight of this strategy is to prune a path as soon as it is known that the best possible way to complete the partial path exceeds the cost value of the best solution obtained so far. Fig. 2 shows a schematic summary of the pulse pruning strategies for the CSP.
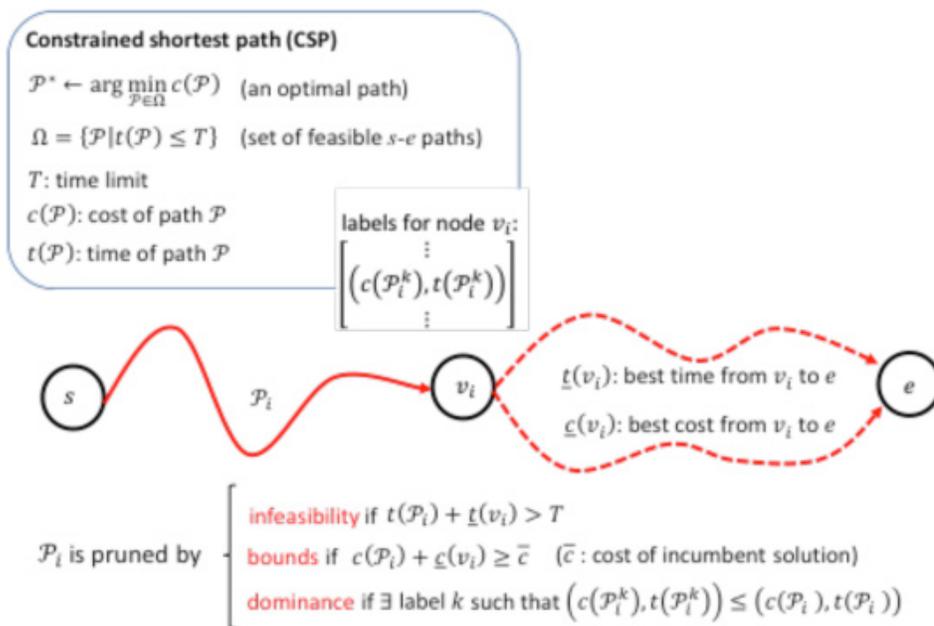

Fig. 2: Summary of pruning strategies for the CSP

Several extensions followed the successful application of the pulse algorithm to the CSP. For the Elementary Shortest Path Problem with Resource Constraints (ESPPRC), Lozano, Duque, and Medaglia (2016) extended the infeasibility and bounds pruning strategies, and added a dominance-based problem-specific strategy called rollback. The key element in this work was a bounding scheme that shares the same spirit of a state-space relaxation in dynamic programming. Duque, Lozano, and Medaglia (2015a) handled the Biobjective Shortest Path Problem (BSP), implementing the dominance pruning strategy from the CSP and proposing two new problem-specific pruning strategies: nadir point and efficient set. For the Weight Constrained Shortest Path Problem with Replenishment (WCSPP-R), Bolívar, Lozano, and Medaglia (2014) proposed three acceleration strategies for the pulse algorithm, namely path completion, best-promise exploration order, and pulse queueing. From this work, the latter strategy is key to balance a breadth- and depth-first search via a pulse queue that controls the depth of the exploration. For the Orienteering Problem with Time Windows (OPTW), Duque, Lozano, and Medaglia (2015b) implemented the core pruning strategies developed for the ESPPRC and added two new

problem-specific pruning strategies, namely soft dominance and detour.

The pulse algorithm can be used as a component to solve hard combinatorial problems beyond the shortest path domain. Restrepo, Lozano, and Medaglia (2012) proposed a column generation approach to solve a multi-activity shift scheduling problem. Within the column generation scheme, the pulse algorithm finds shifts over an auxiliary network with embedded constraints. Castillo, Pacheco, and Gómez (2018) addressed a crew scheduling problem for a large urban transit system. The pulse algorithm allows a fast exploration of the decision space within column generation, leading to a significant computational improvement when used in conjunction with dynamic programming strategies. Lozano and Smith (2016) used the pulse algorithm as a sampling procedure within an interdiction problem. Arslan, Jabali, and Laporte (2018) used the pulse algorithm for separating fractional solutions in a branch-and-cut algorithm for solving the evasive flow capturing problem. Montoya et al. (2016) proposed a multi-space sampling heuristic for the Green VRP. The pulse algorithm acts as a repair mechanism that optimally inserts visits to refueling stations to restore the feasibility of routes. Lozano, Duque, and Medaglia (2016) used the pulse algorithm under a column generation scheme devised to solve the relaxation of the Vehicle Routing Problem with Time Windows (VRPTW).

To facilitate the use and adoption of the pulse algorithm to other domains, the authors have made available a Java implementation and animation of the pulse for the CSP at https://github.com/dukduque/jPulseBase.

References

Arslan, O., Jabali, O. & Laporte, G. (2017). Exact solution of the evasive flow capturing problem. Operations Research. Forthcoming.

Bolívar, M. A., Lozano, L. & Medaglia, A. L. (2014). Acceleration Strategies for the Weight Constrained Shortest Path Problem with Replenishment. Optimization Letters. 8(8): 2155-2172. DOI:10.1007/s11590-014-0742-x

Castillo, J. C., Pacheco, L., & Gómez, C. (2018). A math-heuristic approach for the bus driver scheduling problem for a company in Bogotá-Colombia. Forthcoming talk at the 29th EURO (Valencia, España).

Duque, D., Lozano, L. & Medaglia, A. L. (2015a). An exact method for the biobjective shortest path problem for large-scale road networks. European Journal of Operational Research. 242:788-797. DOI:10.1016/j.ejor.2014.11.003

Duque, D., Lozano, L. & Medaglia, A. L. (2015b). Solving the Orienteering Problem with Time Windows via the Pulse Framework. Computers & Operations Research. 54:168-176. DOI: 10.1016/j.cor.2014.08.019

Lozano, L. and Medaglia, A. L. (2013). On an exact method for the constrained shortest path problem. Computers & Operations Research. 40 (1):378-384. DOI:10.1016/j.cor.2012.07.008

Lozano, L. and Smith, J.C. (2016). A backward sampling framework for interdiction problems with fortification. INFORMS Journal on Computing, 29(1):123-139. DOI:10.1287/ijoc.2016.0721

Lozano, L., Duque, D. & Medaglia, A. L. (2016). An exact algorithm for the elementary shortest path problem with resource constraints. Transportation Science. 50(1):348–357. DOI:10.1287/trsc.2014.0582

Montoya, A., Guéret, C., Mendoza, J. E., & Villegas, J. G. (2016). A multi-space sampling heuristic for the green vehicle routing problem. Transportation Research Part C: Emerging Technologies, 70, 113-128. DOI:10.1016/j.trc.2015.09.009

Restrepo, M. I., Lozano, L., and Medaglia, A. L. (2012). Constrained network-based column generation for the multi-activity shift scheduling problem. International Journal of Production Economics. 140(1):466-472. DOI: 10.1016/j.ijpe.2012.06.030

Using OR to Design A Community Healthcare Network In Underserved Areas Of Liberia

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Poverty, lack of transportation and health infrastructures as well as other challenges hinder access to healthcare services in remote communities. In some communities of Liberia, villagers have to walk more than ten hours to reach the nearest clinic. To improve healthcare accessibility in such a context, non-governmental organizations (NGOs) in partnership with the Ministry of Health implement community programs. In these programs, community healthcare workers (CHWs) are recruited within underserved communities (i.e., those further than five kilometers from the nearest clinic), and they receive the necessary training to prevent, diagnose, and treat the most common health conditions (e.g., malaria, pneumonia, and diarrhea). Every day, CHWs walk to their assigned communities, and, once a week, receive one-on-one training and supplies from their appointed supervisor.

Supervisors travel on motorbikes to conduct these training visits. The optimization problem underlying the organisation of such healthcare programs, coined the location-routing covering problem, consists of designing a network to identify the location and coverage of CHWs, as well as the location, coverage, and routing schedules of supervisors.

Step 1
Problem definition

- Interviews and discussions
- Secondary data collection
  - Road network
  - Socio-demographics
  - Health program standards and costs

Step 2
Mathematical formulation and solution method

- Four set-partitioning models
- Techniques to reduce the dimensionality of the problem

Step 3
Validation and execution

- Sensitivity analyses
- Recommendations on where to recruit and train CHWs and supervisors

Figure 1 Solution approach

In order to support the design of this network in a specific area of Liberia, our team, in collaboration with a Liberian NGO, developed a three-step solving approach: 1) problem definition, 2) mathematical formulation and solution method, and 3) validation and execution. Figure 1, provides an overview of this process.

In Step 1, interviews have been conducted with our partner to clarify their objectives and operational constraints. In addition, our partner gathered data describing the road network and geolocalized socio-demographic information. This step took several months.

In Step 2, we identified three types of decisions for the problem: location, assignment, and routing. For the routing decisions, two modeling strategies were investigated: route variables where the depot is determined a priori (known depot) and cycle variables where the depot has to be determined within the mathematical model (unknown depot). For each routing modeling strategy, two scheduling modeling strategies were also investigated for the number of training periods per community: generating the number of training periods a priori (known training periods) and determining the number of training periods within the mathematical model (unknown training periods). This led to four set-partitioning models, with different sets of variables and of constraints. Figure 2 provides an overview of the four mathematical models. Because the set-partitioning models have a large number of variables, techniques to reduce the dimensionality of the problem were developed.

Figure 2 Overview of the four implemented mathematical models

In Step 3, sensitivity analyses were conducted to determine the most appropriate parameter values (e.g., what would be the impact of allowing CHWs to cover 50 additional villagers on system costs?). To allow conducting iteratively these sensitivity analyses according to our partner feedback, it was important to develop efficient mathematical formulations to obtain good quality solutions in a short time frame (Step 2). Finally, our team made suggestions on where to recruit CHWs and supervisors to our partner, and they were implemented on the field. The map in Figure 3 illustrate an example solution.

To conclude, this project has provided a practical and interesting setting where operation research techniques can be used to facilitate the recruitment of CHWs and supervisors in underserved communities. The developed methodology has allowed both researchers and practitioners to conduct sensitivity analyses quickly and efficiently, which has not been done before.

References
Cherkesly M, Rancourt M-È, Smilowitz K. A set-partitioning formulation for community healthcare network design in

Figure 3 Example of a solution map provided to our partner

underserved areas. Les Cahiers du CIRRELT, CIRRELT-2017-24, 2017.

VonAchen P, Smilowitz K, Raghavan M, Feehan R. Optimizing community healthcare coverage in remote Liberia. Journal of Humanitarian Logistics and Supply Chain Management, 6(3):352–371, 2016.

Announcement: IFORS Prize for OR in Development 2020

Mario Guajardo <Mario.Guajardo@nhh.no>, Chair of the 2020 Prize

The Prize will be awarded during the 22nd Triennial conference to be held in Seoul, South Korea, June 21-26, 2020. The competition aims at promoting the practice of OR in developing countries. Past winners and finalists include works that have improved health, wellness, education, public investments and other issues in Africa, Asia and Latin America. Note the submission process has been simplified with respect to previous years. It will consist of two stages, where the first requires a short summary – more details shown below.
• Prizes will be awarded at the close of the 2020 Triennial conference in Seoul: the winner will receive a grand prize of US$4,000 and the runner-up a prize of US$2,000;
• One person from each finalist team will be given free registration to the conference;
• Abstracts of all finalist works, and an article about the winning work, will be published in the IFORS Newsletter;
• Material about the finalist works will also be uploaded to the Developing Countries Online Resources page of the IFORS' website.

Entry and Selection Criteria:
1. Entries must describe an OR application implemented in practice in a developing country, to assist one or more specific organizations in its decision-making process, and should demonstrate original features in methodology or implementation.
2. The submission process and selection of finalists consist of two stages. In the first stage, all entries must submit a summary of the application (maximum five pages) including context/ problem description, methodology/solution approach, results/impact,

timeline, and involvement of local researchers. In the second stage, a selection of entries will be invited to submit a full-length manuscript.
3. If selected to be among the finalists, the entry should be presented by at least one of the authors during the 2020 IFORS Triennial Conference.
4. The entries must include some description of the application's social context and its impact on the decision-making process or on the organization(s) for which it was conducted. Where appropriate, the relevance of the country's state of development to the study should be addressed. A stress on developmental issues will be an important factor in the judging. Works of a purely technical nature, or those which have no relevance in the developmental context, will not be considered.
5. Winners will be selected on the basis of problem definition, creativity and appropriateness of approach, MS/OR/Analytics content, stress on developmental issues, extent of involvement of local researchers, impact of the study, manuscript organization and structure and quality of written and (if selected as finalist) oral presentation.
6. Entries describing novel contributions will be encouraged to submit a full-length manuscript to the IFORS' journal International Transactions in Operational Research (ITOR), although this will not be a requirement to participate in the competition.

The first call for entries will be communicated in early 2019.

Report of the IFORS President

Mike Trick <trick@cmu.edu>

IFORS was tremendously active, and, with one notable exception, successful in 2017. In the various Vice President and Committee Chair reports, many of the activities of IFORS are given in more detail. I would like to provide some highlights in this report.

As a year with an IFORS Triennial Conference, that conference is clearly a highlight of the period. The conference held in Québec City was a success by any measure. With more than 1600 participants, including a large number of students, the conference was one of the larger IFORS conferences. The selection of plenary speakers and keynote speakers well represented modern operational research, and the venue and services were superb. It is notable that the conference was recognized as the "Event of the Year" by the organization that attracts events to Québec. Preceding this was our International Conference on Operational Research in Development (ICORD) whose participants came primarily from developing countries, exploring ways in which OR can aid in advancing those countries.

Plans are now well underway for the 2020 conference to be held in Seoul, South Korea. A subgroup of the Administrative Committee has visited the site, and it looks to be a wonderful place to hold a conference. A call for organizers has been made for 2023. A key goal, and the subject of much discussion, has been to identify aspects that will differentiate the IFORS conference from other conferences in the busy OR conference schedule.

At the conference, two new member societies were confirmed. The membership voted to accept the applications from Colombia and Russia, giving IFORS 54 member societies.

I would particularly like to highlight the IFORS Newsletter as a great source of information about international operational research. This newsletter was started and edited by Elise del Rosario, President of IFORS (2007-2009). Elise stepped down from the Newsletter at the end of 2017, and it is now being edited by Luciana Buriol, VP of IFORS. Elise deserves special recognition for all that she has done with the Newsletter, website, Developing Countries Committee, and much more.

In publications, our flagship *International Transactions on Operational Research*, capably edited by Celso Ribeiro. has become a preeminent publication outlet in the field, with rapidly improving citation rates and other measures of journal quality.

Unfortunately, the situation with our other main journal, *International Abstracts in Operational Research*, is not as positive. After 57 years of publication, we have had to cease production of the Abstracts due to lack of a publisher. While the *Abstracts* provided an incomparable resource for many decades, it appears that publishers did not see a future for it in the world of general searchable resources. We are currently looking for a permanent home to archive the entire set of volumes.

Financially, the Federation is stable. The success of the conference means that there are sufficient resources to cover the expenses until the next conference without dipping into our reserves. Unfortunately, the loss of *IAOR* and its income will require a decrease of activities, an identification of new funding sources, or a decrease in reserves in the upcoming years.

The other reports give more details on all the activities of the Federation. All this is done through the engagement of volunteers, coordinated by the Administrative Committee and the Secretary of IFORS. I am grateful for everyone's efforts in advancing international operational research. 🌍

Report of the Vice-President

Luciana Salete Buriol <buriol@inf.ufrgs.br>

In the process of giving administrative and executive support to the President, the IFORS Vice President has mainly helped in analyzing and processing the demands and proposed activities received by IFORS in 2017. Among the activities managed by the Vice President, the following can be highlighted:

decision making and discussions about IFORS activities during the 21th IFORS triennial conference held in Quebec; interacting and discussing details and criteria for the formation of OR groups and OR African societies; discussing concerns of OR societies presented to IFORS; and analyzing and discussing all other activities fostered and promoted by IFORS related to publications and communication with people and professional societies.

As a member of the Developing Countries Committee (DCC), I have been involved in deliberating several pertinent issues concerning the developing countries committee activities. Some of these activities were related to my participation in the organizing committee of the International Conference on Operational Research for Development (ICORD 2017) held in July 2017 at the Université Laval, Québec, Canada. ICORD was held in conjunction with the IFORS Triennial Meeting. I have also interacted with different OR researchers in Africa to discuss several issues, such as symposium organization (AFROS, future ICORD, possible summer school) and other topics.

During 2017, the IFORS administrative committee decided that from January 2018 I would become the chair of the Developing Countries Committee. This required closer interaction with Sue Merchant, who has served as chair in the last five years. Moreover, from January 2018 I also became (acting) editor of IFORS News, a role previously played by Elise del Rosario for the last 10 years. Due to this, I took part in the preparation of the December issue of the IFORS News. Assuming these activities after they have been coordinated by Sue Merchant and Elise del Rosario is an honor, given their high level of competence in such roles, and for such a long time.

The above coordinative activities are made possible through technology, including fortnightly Skype meetings. 🌍

Report of the Treasurer

Richard Hartl <richard.hartl@univie.ac.at>

The 2017 budget (approved by the IFORS AC) showed an operating surplus of $ 107,500 while it was clear that the financial result would heavily depend on the success of the Quebec conference. It turned out, that the Quebec conference was an outstanding success for IFORS both scientifically and financially. This led to an annual surplus for IFORS of $ 77,172. These unaudited results (before accruing) do not show the profit share of $ 79,964 for the International Abstracts in Operations Research which belongs to the year 2017, but was only paid by the publisher in January 2018. So in fact, 2017 was a very successful year and the profit was able to recover the IFORS operating deficits over the last few years. What follows is a summary of the unaudited results for 2017 (all numbers in $US).

Unaudited results for 2017 show publications revenues of $ 42,424 from ITOR, significantly below the budget of $ 60,000 (mainly due to the weak pound). Publications revenues for IAOR ($ 79,964) would have been above budget ($ 60,000), but do not show up in the unaudited numbers because payment was not received before 2018.

Members' dues collections at $ 31,623 were above the $ 22,500 budget, which was a singular event, because the 2016 payment by a large society was only received in 2017. Interest revenue continued to be positive but negligible due to the global decrease in interest rates. The net effect of these revenue movements was an income of $ 276,154, lower than the budget of $ 349,500 (not counting the IAOR revenues for 2017).

2017 spending at $ 198,982 was slightly higher than 2016 ($ 183,877), but was significantly below budget ($ 242,000). Only two items were slightly above budget, the expenses for the ITOR editors, and the expenses for the office and secretary since the triannual conference led to extra workload. The ICORD conference, while creating income of $ 2,930 from conference fees, caused expenses of $ 3,858 but this slight deficit was much smaller than the savings of the Developing Countries Committee compared to the budget.

As mentioned, a surplus of $ 107,500 was budgeted, while at the end of December the actual unaudited surplus was $ 77,172. The audited statements will be different as a result of the way that the auditors handle accruals. Most likely, they will contain the IAOR profit share leading to an audited surplus of over $ 150,000.

The total assets of IFORS consist of checking accounts with the Bank of Ireland and the Bank of America, and

Investments with the Bank of Ireland, totaling $ 1,415,926 by the end of 2017.

The 2018 budget (approved by the IFORS AC in Quebec) shows an operating deficit of almost $ 116,000. If history repeats itself, the actual deficit will be much lower than this, since typically most expenses will be below the budget frame.

On balance, 2017 did not materially change IFORS financial strength. In view of the Federation's financial position and prospects, no change in member society dues is recommended at this time. 🌐

	2017 Budget	Unaudited 2017 Actual	Approved 2018 Budget
INCOME			
Member Society Dues	22,500	31,623	22,500
Royalties			
IAOR	65,000		50,000
ITOR	60,000	42,424	40,000
Interest	2,000	854	1,500
Triennial Conferences : Quebec 2017	200,000	198,323	
Special Conferences: ICORD		2,930	500
TOTAL INCOME	**349,500**	**276,154**	**114,500**
EXPENSES			
Activities Administrative Committee	18,000	13,809	18,000
Publications Committee			
IAOR Editor	34,500	34,690	34,500
ITOR Editor	23,000	24,650	23,000
Scientific Activities & External Affairs			
IDL, ITL, Fellowships, & Grants	8,000	3,780	13,000
IFORS Website	7,000	4,685	7,000
Summer/Winter Schools	10,000		10,000
Education Committee	7,500		7,500
Meetings Committee			
Quebec 2017	15,000	14,601	
Quebec President's Dinner		9,676	
ICORD		3,858	5,000
IFORS Newsletter	11,000	16,014	11,000
Developing Countries Committee	35,000	10,076	27,000
General Business Operations			
Office & Secretary	56,000	59,620	58,240
Auditor	3,000	1,978	2,000
Banking	1,500	1,162	1,500
Contingency	2,500	383	2,500
Preparation new legal structure	10,000		10,000
TOTAL EXPENSES	**242,000**	**198,982**	**230,240**
OPERATING RESULT	**107,500**	**77,172**	**(115,740)**

Report of the Vice President representing ALIO

Guillermo Durán <gduran@dm.uba.ar>

The Association of Latin-Iberoamerican Operational Research Societies (ALIO) was created in Rio de Janeiro in November, 1982. ALIO´s purpose is to promote the exchange of experience and information among researchers, academics and professionals related to Operational Research in the region, as well as the circulation of techniques and methodologies related to these disciplines. ALIO is also the Latin American Regional Chapter of IFORS.

National societies taking part in ALIO are those from Argentina, Brazil, Chile, Cuba, Ecuador, México, Perú, Uruguay, Spain and Portugal. These societies are also part of IFORS with the exceptions of Cuba and Ecuador. The society of Colombia has recently joined IFORS and is in the process of joining ALIO.

The main activity of ALIO is its biennial meeting the Latin Iberian American Conference on Operations Research, CLAIO. In 2016 the XVIII CLAIO was held between October 2nd 6th in Santiago, Chile, jointly organized by the School of Engineering at Pontificia Universidad Católica de Chile (PUC), the Chilean Institute for Operations Research, ICHIO, and ALIO. The conference was attended by more than 430 researchers, students and professionals from several countries, including Chile, Brazil, Colombia, Argentina, Mexico and many others, not only from Latin America. The XIX CLAIO will be held in September 2018 in Lima, Perú.

During 2017, important and relevant Operations Research events were organized and carried out by ALIO and Operations Research Societies that are part of ALIO (http://www-2.dc.uba.ar/alio/eventos.htm) in the different countries. A brief summary of these events is indicated as follows.

XXI Latin-American Summer School in Operational Research - ELAVIO
The first ELAVIO was held in Chile in 1994. Since then, the School has run the event every summer to promote education in operational research among young researchers and graduate students (PhD and Master's degree levels), mainly from Latin America.

The purpose of ELAVIO is to stimulate new collaborations and encourage the involvement of young people in OR by bringing them up to date on research topics through short courses and plenary conferences. Participants also have the opportunity to present and discuss their works. At every School a strong sense of camaraderie has developed, solidifying contacts between the members of research groups from different countries.

ELAVIO XXI was held in 2017 in Argentina from February 24th to March 4th, in the cities of Buenos Aires and Miramar. Located 450 km (280 miles) south of Buenos Aires on the Atlantic coast, Miramar is an attractive tourist destination known for its beautiful beaches and a wide range of cultural and culinary attractions that significantly enriched the experience for participants. Hosting the event was the University of Buenos Aires, one of the Argentina's main centres for scientific and academic activity, and the Alto Miramar Hotel in Miramar.

The 2017 event was financed primarily by CELFI, a programme run by the Argentine Ministry of Science and Technology, with significant support also provided by IFORS (the international OR organisation), EURO (the European OR association) and CONICET (Argentina's main scientific research institution). The activities were organized jointly by the Calculus Institute and the Department of Computer Science in the Faculty of Exact and Natural Sciences at the University of Buenos Aires (UBA), and ALIO (the Ibero-American OR society).

The event opened at UBA in Buenos Aires on February 24th, shifting to Miramar on the 26th where it closed 6 days later on March 4th. A total of 61 students and young researchers participated, 58 of whom came from various Latin American institutions (21 young researchers from Argentina, 10 from Brazil, 9 from Chile, 7 from Colombia, 4 from Mexico, 3 from Uruguay, 2 from Cuba and 1 each from Ecuador and Peru) and 3 from Europe (1 each from Belgium, Italy and Macedonia, the first two on EURO scholarships and the third on an IFORS grant). Thirty of the students presented posters highlighting the key points of their research on the first day of the School at a session held during the inaugural cocktail party.

The fourteen academics who participated in the event gave four plenary 45-minute lectures, two 3-hour tutorials and four mini-courses. Two of the courses were 4½ hours each and the other two 6 hours each, covering a range of different Operations Research topics. Five of the academics were from Argentina (Flavia Bonomo, Guillermo Durán, Luciano Grippo, Javier Marenco, Martín Safe), 4 from Brazil (Luciana Buriol, Rosiane de Freitas, Ana Friedlander, Mario Martínez), 3 from Chile (Cristián Cortés, Pablo Rey, Denis Sauré) and 1 each from Italy (Stefano Smriglio) and Norway (Mario Guajardo).

The closing activity was the "Who wants to be an operations researcher?" contest, which consisted of 15 questions relating to issues covered in the courses. Participants had to respond to the questions one by one, continuing on to the following question as long as they answered correctly but dropping out as soon as they got one wrong. Six made it to the last question, although none of them got it right. The contest was a lot of fun and most of the students took part.

The School also organised a number of social and recreational activities, including a walkabout in Buenos Aires on the first weekend, a dune buggy excursion along the beach at Miramar ending with a sandboarding activity, and a trip to the famous beach resort town of Mar del Plata, 50 km from Miramar, to see the sights and take in an important professional basketball game. Participants also had free time to enjoy the beach, experience the local night life, lounge around the comfortable facilities at the hotel where the event was held and even take part in soccer or pool mini-tournaments.

The next ELAVIO, number XXII, will be organized in Chile by the Instituto Chileno de Investigación de Operaciones (ICHIO) in March of 2018.

46 JAIIO

JAIIO (Argentine Conference on Informatics) is the annual event of the Argentine OR Society (SADIO), which has been expanded in recent decades to include all branches of computer science and informatics. The 46 JAIIO was a special event, since it was co-located with the XLIII CLEI (Latin-American Conference in Informatics), organized by the "Centro Latinoamericano de Estudios en Informática".

It was co-organized by SADIO, the Universidad Tecnológica Nacional, and the Centro Latinoamericano de Estudios en Informática. It took place on September 4-8, 2017, in Cordoba City.

More information can be found at http://www.clei2017-46jaiio.sadio.org.ar

XLIX Simpósio Brasileiro de Pesquisa Operacional

The "Simposio Brasileiro de Pesquisa Operacional" is the annual event of SOBRAPO (Brazilian OR Society). In this opportunity this XLIX Symposium was organized by SOBRAPO and the Universidade Regional de Blumenau. It took place in Blumenau on August 27th - 30th, 2017.
The L Symposium will be held in August 2018 in Rio de Janeiro.

VI SMIO

The Sixth Conference of the Mexican OR Society (SMIO) took place at Universidad Panamericana in Guadalajara, México.

The conference ran from October 4th to October 6th, 2017. The main topic of the Conference was "Operations Research in the Knowledge Society".
For more information, please visit: https://vicongresosmio.up.edu.mx/

XII OPTIMA

Big Data, Analytics and Health Care were some of the current trends in OR that have gained an important place in the OPTIMA Congress, the main event of the Chilean OR Society ICHIO. The 2017 congress, organized by the Adolfo Ibañez University in the beautiful city of Viña del Mar, was quite successful in attracting attendees and high-quality submissions, showing that operational research is in continuous growth. A total of 110 presentations were given by speakers from 10 countries.

The ICHIO would like to thank the authors, participants, and the keynote speakers for their valuable contributions to this event. Also, we would like to say a big thank you to the OPTIMA 2017 organizers whose commitment was fundamental for the success of the congress. Next OPTIMA congress will be held in 2019.

Report of the Vice President representing APORS

Chang Won Lee <leecw@hanyang.ac.kr>

Established in 1957, APORS aims to promote the cause of Operational Research and its applications in the Asia Pacific region with a number of countries. The APORS Council includes one representative from each of its 12 member countries. It organizes the triennial APORS Conference. The first conference was held in Seoul in 1988, and the 11th Triennial meeting will be in Kathmandu, Nepal (Aug. 6 – 9, 2018). For more information of the APORS Kathmandu 2018 meeting, please visit at http://apors2018-nepal.org/

Operations Research Society of China (ORSC) conducted a joint China-Euro symposium on Combinatorial Optimization with ECCO was held at Kopper Slovenia on May 3-6 2017. This was the second joint EURO-ORSC-ECCO conference after the Shanghai conference on continuous optimization in 2015. 35 ORSC members attended the conference with paper submissions. An article about the interregional event was published in the IFORS Newsletter June 2017 issue on page 20. Currently, ORSC has two journals in Chinese: OR transaction (4 issues/year) and OR/MS (to become monthly) receiving papers written in Chinese. Both of the two journals become online since 2011 and available for registered readers. In 2016 during the conference the two journals renewed their editorial and board members to strengthen impact and management. ORSC's 2014 launched quarterly English journal: the Journal of the Operations Research Society of China, JORSC, published jointly by Springer and China Science Press. This English publication aims to a world-standard journal in OR related theories and solutions. The ORSC calls for excellent original papers from authors in world OR communities. The correspondent is Dr. Degang Liu.

Operational Research Society of Hong Kong (ORSHK). As reported by Lai Kin Keung, the Society sponsored four lectures at the City University of Hong Kong as follows: Dr. Wei Yunjiei, "A Study on the Lead-Lag Relationship Between China's Onshore and Offshore Exchange Rates," on March 10; Dr. Wang Chao, "A study on RMB Volatility Analysis," on April 10; Dr Fu Yelin, A Study on Robust Decision Making under Uncertainty, on May 20; and Dr. Lau Chun Kit, "Robust Optimization in Healthcare Resource Management in Hospitals," on July 25.

The Operations Research Society of India (ORSI) has 16 chapters with a membership of around 1120. Activities organized by chapters during the year include AFOR2017 (International Conference on 'Advancing Frontiers in Operational Research: Towards a Sustainable World during December 21 to 23, 2017 in conjunction with Diamond Jubilee as well as the 50th Annual convention organized by the ORSI in collaboration with the Heritage Institute of Technology, Kolkata.

Iranian Operations Research Society (IORS) established in 2005 and joined IFORS in 2009, announcing its Iranian Journal of Operations Research (IJOR), and its annual international conferences in Operations Research. The conference published a book of abstracts and featured workshops and sightseeing. The 10th International Iranian Operations Research Society conference. This conference will be held on May 3-5, 2017 at Babolsar (University of Mazandaran) with the cooperation of Iranian Operations Research Society, International Center of Optimization and Decision Making and certain scientific organizations of Mazandaran province, Iran.

Operations Research Society of Japan (ORSJ) celebrated its 60th anniversary in 2017. As one of the commemorative events, a semi-annual national conference of the society was held in Naha city, Okinawa, March 15 to 17. This was the first opportunity for the society to have the regular conference in Okinawa, which is in the southernmost part of Japan. The number of participants was more than 400 and 212 oral presentations at parallel technical sessions. The society launched several special events and published a special issue of the Journal of Operations Research Society of Japan (JORSJ). A financial support program to encourage OR researchers in Japan to stay oversea OR research institutes/universities started and sent two young Japanese researchers to universities abroad (University of Alberta, USA, and University of Southampton, UK). Another (regular) semi-annual conference was held on September 14 and 15 at Kansai University in Toyonaka city, Osaka, gathering more than 300 participants. The correspondent is Dr. Jun-ya Gotoh.

Korean Operations Research and Management Science Society (KORMS) had two annual conferences: Spring joint conference in Yeosu on April and 691 participants attended the conference with 436 paper presentations, and Fall conference in Seoul and 200 participants attended the conference with 69 paper presentations. The conference programs include technical sessions, invited lectures, and tutorials. General assembly meetings are also held during the conferences; these comprise both regular and special sessions. Eight organizing committees of IFORS 2020 Seoul Meeting (Jun. 21 to 26) attended IFORS 2017 Quebec Meeting to promote its Seoul conference as well as some representative attended in INFORMS annual meeting, Houston, USA. Two KORMS journals have published total 56 papers. KORMS currently has 10 SIGs and each SIG held one or two annual meetings in 2017. The correspondent is Dr. Kun Soo Park.

Management Science/ Operations Research Society of Malaysia (MSORSM), in conjunction with MS/OR Seminar 2017 and its 26th Annual General Meeting (AGM) on May 20, co-organized with the faculty of computer and mathematical sciences, Universiti Teknologi Mara (UiTM), Shah Alam, Malaysia. The conference theme was "OR Applications and Its Future in Malaysia". MSORSM was registered as a professional society in July 1986. Members are highly encouraged to join the AGM and impart new ideas and suggestion to improve our activity. Lecture series in Operations Research 2017: Applying optimization to the real world held to inform that the laboratory of computational statistics and operations research, Institute for Mathematical Research (INSPEM) at Universiti Putra Malaysia (UPM), May 19. The correspondent is Dr. Adibah Shuib.

Operational Research Society of Nepal (ORSN) had following activities. The 7th ORSN national seminar on the occasion of the 10th annual day of ORSN, February 1-2, 2017. There were two plenary sessions and four technical sessions with a total of 27 papers. The number of delegates was 79. The conference was conducted in the Patan College for Professional Studies, Kopundole under the co-organization with Lord Buddha Education Foundations (LBEF). Training cum Workshop on Research Methodology and Data Analysis at Khwopa College, Bhaktapur. July 2-5, 2017. Sunity Shrestha Hada and Govinda Tamang were resource persons in the event where 30 faculty members from various Management Colleges within Kathmandu Valley were participating. Representatives attended IFORS 2017 Quebec Meeting to promote APORS 2018 Kathmandu Meeting. The correspondent is Dr. Sunity Shrestha Hada.

Operations Research Society of the Philippines (ORSP) celebrated 30th ORSP Anniversary & 11th National Conference: Sustaining the Environment through OR · 2017. ORSP technical forum for 2017 featured three speakers who spoke on the Big Data that comes from Social Media and how this has been used to market products and assess consumer reactions to products and services. The conference held at Eastwood Richmonde Hotel, Eastwood, Quezon City. This conference is endorsed by The Philippine Commission on Higher Education (CHED). ORSP publishes its newsletter covering the activities of the society and distributed to its membership. ORSP Holds Workshop on Predictive Analytics organized by ORSP on June 17, 2017, at the Asia Pacific College in Humabon Place, Magallanes, Makati City. The Workshop materials were developed by ORSP Past President Francis Miranda.

Operational Research Society of Singapore (ORSS) organized the 5th Annual International Conference on Operations Research and Statistics on May 6 to 7, 2017 at Hotel Fort Canning, Singapore. The conference was organ¬ised by the Global Sci¬ence and Tech¬nol¬ogy Forum (GSTF). The goal of the conference is to bring together active researchers from the various disciplines to showcase their state-of-the-art research results and hopefully to forge new cross-disciplinary interactions among the participants. The programs had Work¬shop on "Simulation and Its Application"; Panel Proposals; and Best Paper Awards and Best Stu¬dent Paper Awards. ORSS has a bi-monthly journal published by World Scientific.

The Australian Society for Operations Research (ASOR) held The 22nd International Congress on Modelling and Simulation (MODSIM2017) at The Hotel Grand Chancellor Hobart, Tasmania, Australia from Sunday 3 to Friday 8 December 2017. The theme for this event was Managing cumulative risks through model-based processes. The meeting sponsored by NSW, CSIRO, and UNSW had Plenary papers, Keynote papers, Session papers, and posters as well as Student awards.

Operational Research Society of New Zealand (ORSNZ) held The 51st ORSNZ annual conference jointly with the IASC/NZSA at the University of Auckland, from Sunday 10 December – Thursday 14. December 2017. The meeting had Plenary Speakers, ORSNZ Young Practitioners' Prize (YPP). ORSNZ held its Annual General Meeting during the ORSNZ conference on Tuesday the 12th of December. 🌍

Report of the Vice President representing EURO **Jacek Blazewicz** <jblazewicz@cs.put.poznan.pl>

www.euro-online.org, is a regional grouping within IFORS. At present it has 32 member societies, Russia joining EURO in November 2017. EURO is regulated by a Council consisting of representatives of all its members and an Executive Committee which constitutes its board of directors. The 2017 Executive Committee of EURO was composed of President Richard Eglese (United Kingdom), Past President Elena Fernández (Spain), VP1 Albert Wagelmans (The Netherlands), VP2 Kenneth Sörensen (Belgium), VP3 Silvano Martello (Italy), Secretary Jesper Larsen (Denmark), and the treasurer Marino Widmer (Switzerland). The Manager is Sarah Fores (United Kingdom), the Webmaster Bernard Fortz (Belgium) and the Website Editor and Administrator Marie-France Rogge (Belgium). In addition, IFORS Vice-President for EURO – Jacek Blazewicz (Poland) is responsible for the links between EURO and IFORS.

During 2017 some elections for positions in Executive Committee took place. Immanuel Bomze from the Vienna University has been elected for a position of the new EURO President (starting in 2019), while Claudia Archetti from the Universita degli Studi di Brescia has been elected for a position of VP3 (starting in 2018).

In 2017 no EURO-k Conference was organized (IFORS Congress year). During IFORS Congress the winners of EURO Award for the Best EJOR Paper have been announced in three categories:

Innovative Applications of OR: *Burak Boyaci, Konstantinos Zografos, Nikolas Geroliminis*. An optimization framework for the development of efficient one-way car-sharing systems.

Review: Michael Drexl and Michael Schneider. A survey of variants and extensions of the location-routing problem.

Theory and Methodology: Stefan Lessmann, Bart Baesens, Hsin-Vonn Seow, Lyn Thomas. Benchmarking state-of-the-art classification algorithms for credit scoring: An update of research.

Although there was no EURO-k conference in 2017, significant preparation is underway for both the 2018 EURO conference in Valencia (8-11 July) and the 2019 conference in Dublin (23-26 June). Luis Gouveia has been confirmed as the PC Chair for the 2019 conference.

On the other hand, a pretty high number of smaller workshops took place, associated with the activity of various EURO working groups.
https://www.euro-online.org/web/pages/100/conferences

The last – 2017 year also witnessed significant developments in the EURO journals. The European Journal of Operational Research (EJOR) kept being ranked among the best OR journals in 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. The EURO e-newsletter continues to be a success.

There are 32 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. EURO continues also to roll out new webpages for the Working Groups as part of the overall improvement to the EURO branding.

The EURO PhD School (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 2018 EURO PhD School, devoted to Multicriteria Decision Making (MCDA/MCDM) will be organized in Chania, Crete, Greece (July 23 – August 3).

EURO continues to offer scholarships to PhD students who wish to attend NATCOR courses held in the UK. In 2017 12 scholarships were funded.

The series of EURO Summer and Winter Institutes (ESWIs) was launched in 1984. The basic idea is that about 25 early stage researchers can meet for about two weeks, present their material, discuss it with others and with a handful of specially invited senior experts in the field, and finally prepare a paper to be considered for inclusion in a feature issue of an OR publication. In 2017 one EWI was organized in Bressanone (2017 EURO Winter Institute on "Methods and Models in Transportation Problems", at the University of Padova Winter-Summer Campus).

https://www.euro-online.org/media_site/reports/EWI33_Report.pdf

EURO accepted also a bid to host the 2018 EWI on "Lot-Sizing and Related Topics" in March 2018 in Frankfurt/Oder.

EURO supports an attendance of young European scholars in ELAVIO conferences. The 2017 ELAVIO was held in Argentina; two students whose trip was supported by EURO were: Mr. Tulio A.M.Toffolo from KU Leuven (supervisor - Greet Vande Berghe) and Mr. Maxene Delorme from the University of Bologna (supervisor - Silvano Martello).

In order to promote and further develop international cooperation, EURO will (co-organize and support joint conferences with national OR Societies outside Europe and other regional bodies within IFORS. Significant financial support can be made available for the organization of such events (other than EURO-k Conferences).

Report of the Vice President representing NORAM Karla Hoffman <khoffman@gmu.edu>

Karla Hoffman <khoffman@gmu.edu>

The North American Research Societies (NORAM) is made up of two societies: The Canadian Operations Research Society (CORS) and the Institute for Operations Research and the Management Sciences (INFORMS). Activities of the two societies for 2017 are reported below.

CORS ACTIVITIES.
The Canadian Operational Research Society (CORS), a.k.a. Sociéte Canadienne de Recherche Opérationnelle (SCRO) (www.cors.ca) is the leading Canadian professional society for operational researchers. Established in 1958, CORS brings together OR professionals with annual conferences held across Canada, special interest groups, traveling speakers programs, and student support. CORS sponsors the INFOR journal and also publishes the Bulletin, a newsletter of the Society and related activities. It is administered by a Council of eleven members.

Meetings. The IFORS 2017 Triennial Meeting was held in Quebec City, the capital of the province of Quebec, Canada in conjunction with the CORS National Meeting. This meeting had over 1600 researchers, presenters and participants from 165 countries. Around 1300 accepted abstracts were scheduled in 360 different sessions which included applications of OR in Education, Health, History, Ethics, Data Science and Analytics, Performance Measurement, Financial Modeling, Optimization, and Supply Chain Management, to name but a few of the topics covered. The plenary speakers included: **Alvin Roth** on *Marketplace Design; Egon Balas on Disjunctive Programming as a Tool to Convexity/Convex Sets*; **Martine Labbé** on *Bilevel Programming, Pricing Problems and Stackelberg Games*; **Andres Weintraub** on *OR Practice Matters*.   Equally varied topics were discussed by keynote speakers: **Dave Stanford, John Birge, Roman Slowinsk, Stefania Bellavia, Julia Bennell , Avishai Mandelbaum, Detlof von Winterfeldt, Azuman Ozdaglar Ulrike Leopold Wildburger Sophie D'Amours.**

This conference marks the third time that Canada has been honored with an IFORS conference, and is the first IFORS conference held in the province of Quebec. Opened with an entertainment number from circus performers and an ice cream treat at the closing, this conference was a uniquely memorable combination of wonder, whimsy, and operations research. Attendees were treated to the Quebec atmosphere, complete with a Music Festival and a grand 150th anniversary celebration of Canada. A truly perfect combination of fun and learning in a beautiful city.

Awards. The 2015 Harold Lardner Prize was awarded to **Professor Egon Balas**, Carnegie Mellon University (United States). The 2015 recipient of the **Omond Solandt Award** was **FPInnovations** (providing technologies for forest sector management in Canada). The **Award of Merit** recipient was **John Chinneck**, Department of Systems and Computer Engineering, Carleton University and the **Service Award** went to **Louis-Martin Rousseau**, Polytechnique Montréal. Finally, the **2015 CORS Practice Prize** was awarded to **Philippe Grangier, Marc Brisson, Michel Gendreau, Fabien Lehuédé, Louis-Martin Rousseau, John Ye** of Polytechique Montréal.

Publications. CORS publishes the journal INFOR, a quarterly journal on Information Systems and Operational Research, published by Taylor & Francis Publishing.

INFORMS ACTIVITIES.
INFORMS (www.INFORMS.org) promotes best practices and advances in operations research, management science, and analytics through an array of highly-cited publications, conferences, competitions, networking communities, and professional development services.

Meetings. INFORMS holds two major conferences each year: the Annual Meeting in the Fall (held this year in Houston, TX), which is mainly oriented towards academics, and the Analytics Conference in Spring for practitioners (held in Las Vegas). In addition, INFORMS holds many special interest meetings. During 2017, INFORMS held meetings on the following topics: Health Care (Rotterdam), Simulation (Las Vegas), Information Processing (Turkey), Computing (Texas), Marketing Science (Los Angeles), Revenue Management (The Netherlands), Transportation (Maryland), and Applied Probability (Illinois).

INFORMS publishes 14 journals, and three newsletters (OR/MS Today, Analytics and a student newsletter. In addition, it has various subdivisions directed at members of the OR/MS community including 13 Societies, 21 sections directed at technical and application areas, 31 regional chapters, and 32 student chapters.

Awards. The following prize winners for 2017 include: **The Daniel H. Wagner Prize for Excellence in Operations Research Practice** was jointly awarded to **Mohammad Shahabsafa, Tamás Terlaky, Chaitanya Gudapati**, Lehigh University **Anshul Sharma, George R. Wilson, and Louis J. Plebani** all of Lehigh University and **Kristofer B. Bucklen**, Pennsylvania Department of Corrections; **The Doing Good with Good OR - Student Paper Competition** was awarded to **Can Zhang**, Georgia Institute of Technology; The **George B. Dantzig Dissertation Prize** was given to **Negin Golrezaei**; George E. Kimball Medal** was awarded to **Frederick S. Hillier**, Professor Emeritus of Operations Research, Stanford University; **The George Nicholson Student Paper Prize** was awarded to **Andrew Li**, Massachusetts Institute of Technology; The **Frederick W. Lanchester Prize** was awarded to **Martin Shubik**; The **INFORMS President's Award** was given to **David Hunt**, **Oliver Wyman**; The **INFORMS Prize** was awarded jointly to **The Walt Disney Company** and **The U.S. Air Force**; **The John von Neumann Theory Prize** was awarded to **Donald Goldfarb**, Columbia University and **Jorge Nocedal**, Northwestern University; The **Judith Liebman Prize** was awarded to **Andres Patricio Garcia Arce, Mohammad Moshref-Javadi** and **Rozhin Doroudi**; The **Moving Spirit Award for Fora** went to **İ. Esra Büyüktahtakın**; The **Saul Gass Expository Writing Prize** was awarded to **John N. Tsitsiklis**, Massachusetts Institute of Technology; The **Undergraduate Operations Research Prize** was awarded to **Agathe Soret**, Ecole Polytechnique and **Siddharth Reddy**, Cornell University; The **UPS George D. Smith Prize** was given to the The **U.S. Air Force Academy Operations Research Program**; and the **Franz Edelman Award for the Achievement in Operations Research and the Management Sciences** was awarded to **Holiday Retirement Corporation**.

In addition, those inducted as INFORMS Fellows in 2017 included: **Shabbir Ahmed**, Georgia Institute of Technology; **Jeffrey M. Alden**, General Motors; **Jeffrey D. Camm**, Wake Forest University; **James J. Cochran**, The University Of Alabama; **Shane Henderson**, Cornell University, **David Morton**, Northwestern University; **Andy Philpott**, University of Auckland; **R. Ravi**, Carnegie Mellon University; **Edwin Romeijn**, Georgia Institute of Technology; **Andrzej Ruszczynski**, Rutgers University; **Susan M. Sanchez** the Naval Postgraduate School; **Jing-Sheng**, **Jeannette Song**, Duke University; and **Mark S. Squillante**,, IBM Research;

Publications. INFORMS publishes 14 journals: Decision Analysis, Information Systems Research, INFORMS Journal on Computing, Interfaces, Management Science, Manufacturing and Service Operations Research, Marketing Science, Mathematics of Operations Research, Operations Research, Organizational Science, Service Science, Strategy Science and Transportation Science and INFORMS Transactions on Education. The most recent of these publications is Strategy Science which was launched in 2016.   In addition, it publishes two magazines; OR/MS Today and Analytics; and *Tutorials in Operations Research*, published annually. 🌐

Report of the Immediate Past President
Nelson Maculan <maculan@cos.ufrj.br>

One of the more important tasks of the Past President is to propose the IDLs and ITLs.

IFORS Distinguished Lecture (IDL)
Through the IFORS Distinguished Lectures (IDL), IFORS sponsors lectures given by distinguished OR scholars and analysts at conferences of members societies and regional groupings.

In 2017 one IDL was sponsored for the regional group NORAN:

INFORMS Houston/USA, October 2017
Celso Ribeiro, Universidade Federal Fluminense, Brazil
Title: Biased Random-Key Genetic Algorithms: Components, Evolutionary Dynamics and Applications

In 2018 IFORS will sponsor four IDL's:
APORS – Kathmandu/Nepal August 2018
Leo Liberti, École Polytechnique, France

EURO – Valencia/Spain July 2018
Cynthia Barnhart, Massachusetts Institute of Technology (MIT), USA

CLAIO – Lima/Peru September 2018
Edoardo Amaldi, Politecnico di Milano, Italy.
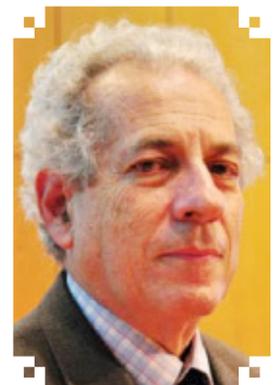
INFORMS – Phoenix/USA November 2018
Mario Veiga Ferraz Pereira, PSR – consulting in electrical power, Brazil

IFORS Tutorial Lecture (ITL)
Given by outstanding scholars, the ITL presents the fundamentals of emerging OR technologies, application areas or teaching approaches to a large diverse audience. It is intended to inspire and raise interest in pursuing these new ideas.

In 2017 no ITL was sponsored since there were no regional meetings, but in 2018 three ITL's will be sponsored by IFORS:

EURO – Valencia/Spain July 2018
Andres Medaglia, Universidad de los Andes, Colombia

APORS – Kathmandu/Nepal August 2018
James MacGregor Smith, University of Massachusetts/USA

CLAIO – Lima/Peru October 2018
Dohoon Kim, University of Massachusetts, USA 🌐

Report of the Chair, Conferences

Karla Hoffman <khoffman@gmu.edu>

All of the intensive preparation for the **2017 IFORS triennial meeting** which began on July 17, 2017 with the opening ceremonies resulted in a totally enjoyable meeting for the over 1600 attendees. The theme *OR/Analytics For A Better World* took center stage at the Quebec International Convention Center, Quebec City, Canada. The conference covered a wide range of topics within a collection of over 360 sessions. The breadth of the topics can be gleaned from the **plenary talks** given by: Alvin Roth on *Marketplace Design*; Egon Balas on *Disjunctive Programming as a Tool to Convexity/Convex Sets*; Martine Labbé on *Bilevel Programming, Pricing Problems and Stackelberg Games*; Andres Weintraub on *OR Practice Matters*. Equally varied topics were discussed by **keynote speakers**: Dave Stanford on *Key Performance Indicators and their Optimal Performance*; John Birge on *Stochastic Optimization with Particles* and Markov Chains; Roman Slowinski on *Preference Learning through Robust Ordinal Regression*; Stefania Bellavia on *Computational Aspects in Second Order Methods for Large Scale Optimization*; Julia Bennell on *Get Packing! Key Concepts and Future Directions in Cutting and Packing Problems*; Avishai Mandelbaum on *Theomperical Research in OR/IE/OM: A Theory and Data-Based Journey though Service Systems*; Detlof von Winterfeldt on *Decision Analysis to Improve Homeland Security*; Azuman Ozdaglar on *Incremental Methods for Additive Convex Cost Optimization*; Ulrike Leopold Wildburger on *Operations Research and Behavioral Economics* and Sophie D'Amours on *Value Chain Modeling and Optimization in the Forest Sector*.

Of course, this result owes much to the organization led by the Organizing Committee Chair, Irene Abi-Zeidand the Program Committee Chair, M. Grazia Speranza. This team put together a fruitful learning experience against the backdrop of the beautiful city of Quebec. The social program included tours of the historic city as well as trips to the surrounding countryside. Other treats included a Music Festival and a grand 150th anniversary celebration of Canada that took place in the city before and during the conference. Festivities at the conference included a circus performance at the opening ceremonies, free ice cream at the closing session, and a soprano for banquet entertainment. To round off this terrific program, the IFORS-sponsored International Conference on OR for Development (ICORD) was held prior to the meeting at the nearby Laval University.

The planning for our next IFORS meeting in Seoul Korea in 2020 has already begun and based on the energy shown by the organizing committee, they are planning to top the Quebec experience. The Korean Operations Research and Management Science Society are the hosts for this meeting with Suk-Gwon Chang serves as chair of the Organizing Committee. Based on my visit with others of the IFORS Administrative Council, I am sure that this meeting is likely to be one of the most successful meetings in IFORS history.

And, looking even farther forward, IFORS is now evaluating applications for the 2023 meeting. Yes, planning takes place that much in advance of the meetings! The Administrative Council will be reviewing the proposals in the coming months and will send out ballots to the IFORS Member Societies sometime this summer. The location of the meeting will be announced in the fall.

Other upcoming meetings of our member societies include: The APORS (The Association of Asia-Pacific Operational Research Societies) meeting in Kathmandu, Nepal (6-9 August, 2018); the EURO (The Association of European Operations Research Societies) XXIX meeting in Valencia Spain (8-11 July 2018), and the Joint EURO and ALIO conference on combinatorial optimization will be held in Bologna, Italy (25-27, June 2018). In the meantime, detailed plans are being made for the Association of Latin-Iberoamerican Operational Research Societies ALIO conference, CLAIO 2018, to be held in Lima, Peru on September 24-27, 2018.

On a less exciting, but administratively important note, the Conference Manual for IFORS meetings has been updated this past winter and is now going out for review by the Member Societies. Publication of the new manual should take place sometime this summer. 🌐

Report of the Chair, Publications Committee   **Graham Rand** <g.rand@lancaster.ac.uk>

January 2018
The journals published by IFORS are an important component of what we offer the worldwide OR community. They raise IFORS' profile amongst researchers and authors. They also provide an important revenue stream to enable IFORS to undertake a wide range of activities, as can be seen in the treasurer's report.

International Transactions in Operations Research (ITOR)
ITOR is published by Wiley-Blackwell. Celso Ribeiro continues to do an excellent job as editor. ITOR truly is an international journal, with an editorial board of 61 editors from 23 countries. The impact factor for 2016, reported in 2017, improved dramatically from 1.255 to 1.745. This placed ITOR 30th out of 83 Operations Research and Management Science journals. This is a remarkable achievement.

The number of submissions continues to increase dramatically: at the start of the decade there were just over 100 annually, now there are about 600. The average acceptance ratio has remained constant, at just over 20%. >>

>> The journal size, in terms of page numbers, increased significantly in 2017, and will continue to do so. Papers published by year have increased from 25 (2006) to 72 (2017), and pages printed by year from 584 (2006) to 1588 (2017). ITOR downloads show a steady increase year by year.

The 2017 volume included special issues on Applied Combinatorial Optimization (a double issue) and Optimization of industrial systems with market disruptions. Special issues in the pipeline include Improving healthcare: New challenges, new approaches, Variable Neighborhood Search and Metaheuristics (arising from MIC'2017 in Barcelona).

At the IFORS Conference in Quebec, a strategy morning discussion with Wiley staff was held. A number of issues were discussed and subsequently several decisions were made. These include the aim to reduce the backlog of papers in Early View over 4-5 years to about a year's worth of papers, and that the journal will become online only in 2019.

International Abstracts in Operations Research (IAOR)
2017 was the last year of IAOR's publication. In May 2016, as a direct consequence of its merger with Springer, Palgrave told us that it would not renew its agreement with IFORS beyond the contract period that expired on 31st December 2017.

The publisher concluded that the enhanced content platform to which all Palgrave Journals migrated could not support the unique needs of IAOR. We have not been able to find a new publisher.

Executive editor, K. Preston White, Jr. and editor Peter Whitehead have been responsible for IAOR for the last 8 volumes. IFORS' thanks are due to them for the great job they have done, often in the face of severe technical difficulties with the abstracting and classification process. This was suitably acknowledged at the IFORS conference in Quebec.

The first issue of IAOR appeared in November 1961, containing 116 abstracts. This year saw the publication of the 140,000th abstract. It is still to be decided what will happen with the database of abstracts from the last 30 volumes. It is hoped that it can be hosted somewhere, so that it can be accessed by those still interested in using it.

IFORS President, Mike Trick, has said: "All of us at IFORS regret the need to end the publication of IAOR. Throughout its lifetime, IAOR provided organization and insight into the burgeoning literature of operational research. We are tremendously grateful to the editors and contributors to IAOR over the years, and gain satisfaction from knowing that their work through IAOR has been invaluable to the field for the last 56 years." 🌍

Report of the Chair, Developing Countries Committee
Sue Merchant <suemerchant@hotmail.com>

The DCC continued its work of looking for ways of supporting OR in developing countries during 2017, thanks to the efforts of its members Luciana Buriol (VP at large, IFORS), Elise del Rosario (Philippines, editor of IFORS Newsletter and Website editor), Adam Ouorou (France/Benin), Yindong Shen (China),Theo Stewart (South Africa). My thanks are due to all members and to Mary and Marisa in the IFORS office for all their support for our activities.

During the year we organised or assisted with organising the following events and activities:
• In July 2017 Elise del Rosario, Luciana Buriol, Gerhard-Wilhelm Weber and I organised an International Conference on OR for Development in Quebec City at the University of Laval, thanks to the much appreciated support from members of the University: in particular Yan Cimon and Olivier Duval-Montminy, sponsors Cirrelt and the Carré des Affaires FSA University of Laval, and delegates themselves especially Sadia Samar Ali. About 30 people (from India, the Philippines, Canada, USA, Brazil, UK, Australia, Tunisia, New Zealand and South Africa) attended the conference including some excellent invited speakers. These included Dr Carlos Gonzalez-Calderon (USA), Ana Maria Anaya-Arenas (Canada), Leandro Coelho (Canada), and Marie-Eve Rancourt (Canada). It was disappointing that a number of delegates were unable to attend because of the length of time it took to acquire visas.
• Also in Quebec City the triennial IFORS conference and its Prize Competition took place. The latter was chaired by Mikael Rönnqvist who did an excellent job of organising the judging panel and making sure that a worthy winner and runner up were selected from amongst the 4 finalists (sadly a 5th was unable to attend). The winner (as has been fully reported elsewhere) was the team from Colombia who presented their work on the optimal location of recreation hubs in Bogota, and the runner-up was the Chinese team who described their work on developing a new and efficient method of fingerprint checking. See IFORS News June 2017 for details of both entries.
• Planning commenced for an international meeting in the autumn of 2018 in South Africa to try to attract more African delegates.
• Support was given to a number of organisations in furtherance of good OR research and practice. For example, continuing encouragement was given to the newly formed AFROS (African OR regional society) including discussions about how IFORS might support AFROS' first conference in 2018 in Tunisia.

Other Activities
The developing countries resources website continues to evolve, thanks to the efforts of many interested individuals throughout the world. Special thanks go to Gerhard Wilhelm Weber and Elise del Rosario and their wide range of contacts who provide many articles on issues connected with development for the site. A student summer project was commissioned from the London School of Economics into ways of making the site even more accessible and the recommendations will be considered during 2018. 🌍

Report of the Chair, IFORS News and Website

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

Ten years since its June 2007 debut, IFORS News has continued to keep the OR international community abreast of OR issues and events in various parts of the world through four electronic issues published in 2017. Through the **OR Society in Focus** section, the IFORS community got to know long-time society members Japan and Portugal as well as those of the newly-joined Colombia and Russia.

Readers were also treated to the accounts of national society and working group **Conferences** in the US, Canada, Greece, Turkey, Iran, Mexico, Spain and the Philippines, as well as of fora all over the world attended by IFORS News correspondents, such as those held in Indonesia and Turkey. Of course, **IFORS Affairs** led by the 2017 Triennial Conference was well-covered, along with streams that celebrated IFORS 60th year, and the attendant business meetings. In keeping with tradition, the IFORS News carried the 2016 Annual Report, which was printed in hard copy for distribution to members and attendees of the General Membership meeting. A celebration of the IFORS Journal ITOR was highlighted along with the **Summer School** events within EURO and ALIO. The IFORS President's perspectives on the uniqueness of IFORS, its members, conferences and volunteers were well-explained in the **From the President** column.

The **OR for Development** section featured the SDGs and OR and also covered the topics taken during the IFORS International Conference on OR for Development (ICORD). This section also featured the finalist papers in the IFORS Prize for Development Competition, as well as the competition itself, with the results.

Readers from the academe and industry were treated to the regular informative sections that include **OR Impact**, where Sue Merchant and John Ranyard sourced and edited successful applications in the UK police, South American football, New Zealand volunteer work, and Colombia's recreation hubs. The **Tutorials** section touched on wide-ranging topics of chance-constrained optimization, E-commerce, spectrum auction in the US and beehive location in the UK. The **Book Review** by *Hans Ittmann* brought to readers' attention books on forestry, multi objective programming, cutting and packing and a joint biography of OR scientists.

During the year, two **Feature** articles appeared which highlighted healthcare and OR approaches that include differently-abled workers in assembly lines. The publication said hello to more **IFORS correspondents** and bade goodbye to past IFORS president Brian Haley, Past IFORS Organizing Committee chair Jeff Arthur and Nigerian Society founder Joseph Akingbade in its **Obituary** section edited by IFORS historian *Graham Rand*.

Starting with the September 2017 issue, a new section on **Society Administration and Governance** was added. This was in recognition of the nature of IFORS as an association of associations, whose members will benefit most from tips on keeping their respective societies healthy and dynamic.

The **IFORS website**, through webmaster *Ruel Tan*, continued efforts in bringing to members and visitors a site that is current, through news and conference updates, as well as functional, through daily monitoring of the website. Member profiles were updated as necessary. The website carried the IFORS News and provided on line resources, namely for Educational Resources and for Developing Countries OR Resources Website. Continued monitoring of access and improvement based on feedback were done throughout the year. The website continued maintaining its members-only section which logs the status of issues brought for a vote before the membership. For 2017, two society applications were voted on using the on line voting feature of the website. The IFORS website also maintained a microsite for ICORD 2017.

The IFORS Facebook was launched in order to reach more members and this involved posting news and announcements both in the website and social media. Email assistance was extended to the Secretariat, the AC and member societies. Graphics work were produced for posting in the website, for enhancing the IFORS Facebook pages, as well as for the Anniversary presentation during the Triennial Dinner.

The webmaster also optimized the website to improve search engine rankings. During the year, page views averaged 8000 per month.

Transition activities to the interim IFORS News Editor and Website Editor were carried out during the last quarter of 2017. In order to concentrate on her other activities, the Website and IFORS News Editor has asked to be replaced starting 2018. 🌍

Book Review

50 Years of Integer Programming 1958-2008

Hans W. Ittmann, University of Johannesburg <hittmann01@gmail.com>

50 Years of Integer Programming 1958 – 2008: From the Early Years to the State-of-the-Art by Michael Jünger, Thomas Liebling, Dennis Naddef, George Nemhauser, William Pulleyblank, Gerhard Reinelt, Giovanni Rinaldi and Laurence Wolsey Eds., 2010, Springer-Verlag, Heidelberg Berlin, pp. 803, ISBN 978-3-540-68274-5 (Print) and e-ISBN 978-3-540-68279-0 (eBook), 139.00 US dollar (Hardcover), 109.00 US dollar (eBook).

The book that is reviewed this quarter was already published in 2010 and the material presented in the book comes from a Combinatorial Optimization Workshop held in January 2008 in Aussios, France. The workshop theme was *Fifty Years of Integer Programming* and was to celebrate the 50th anniversary of integer programming. The material in the book captures in essence the history and subsequent development of an important optimization technique, integer programming. When browsing the Springer website, searching for available books on Operations Research topics, this book pop-up. >>
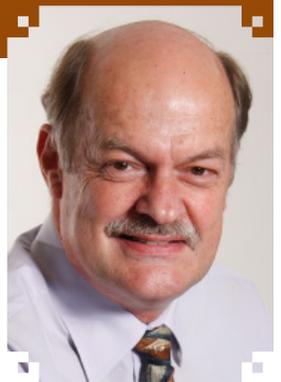
>> The book gives an introduction and a historical perspective of integer programming. It is a concise, yet voluminous, book giving the theoretical, algorithmic and computational aspects of integer programming. Even though it is now 10 years since the workshop the material contained in the book remains a fascinating collection of documentation on how integer programming developed over the first 50 years.

Integer programming is that class of constrained optimization problems in which some or all of the variables are regarded to be integers. As a generalization one can state that in integer programs' and integer problems that have been most widely used, solved and studied, the objective function is linear and the constraints are linear inequalities. George Dantzig in 1947 developed the simplex method which is a finite method for optimizing a linear objective function subject to a finite set of linear constraints. Adding integrality constraints to some or all of the variables would make the models more applicable but there was in the early years no known general method to solve these kinds of problems. Gomory in 1958 published his ground breaking paper that was surprisingly short, outlining how, with relatively straightforward modifications, the simplex method can be adapted to provide a finite algorithm for finding an optimal finite integral solution.

50 Years of Integer Programming 1958 - 2008 is organized into four main parts with in total nineteen chapters. Part I has the title The *Early Years* and covers the period 1954 to 1979. It contains copies (reprints) of ten fundamental papers published during that period, in order of publication date, on various issues concerning integer programming. *From the Beginnings to the State-of-the-Art* is the title of Part II with only three chapters and then Part III, Current Topics, containing the last six chapters. Part IV is two video DVDs that captures the entire first day workshop discussion that included all the pioneers of the field that attended the workshop.

There is a short introduction to Part I where the contribution of each of the ten papers/chapters in Part I is highlighted and then there is a list of some 40 odd "most influential papers" that contributed to the different facets of integer programming over the period 1954 -1973. Two references to books covering the history of integer programming are also listed. What makes the reprints of the chapters in Part so interesting is that there are introductions to each of the papers. For example in the case of the paper of Gomory (Chapter 4), Gomory himself tells the story of how he got interested in finding solutions that were integer (some Navy guys remarked in a presentation that it would be nice to have whole numbers instead of 1.3 aircraft carriers as the solution!!) and how he went about developing the algorithm to find a solution to integer programming problems. Gomory worked on very small problems, with a few variables, since all calculations still had to be done by hand! Just these introductions at the start of each of the chapters in Part I make for fascinating reading.

The first article in Part I appeared in 1954 and outline the solution of a large scale travelling salesman problem. A problem of 49 cities was solved but what is so historic of this paper is that it marked the birth of the cutting-plane method. The titles of the next nine chapters gives a clear indication of the value of these contributions, these are: the Hungarian method for the assignment problem; polyhedral approaches to mixed integer programming; the algorithm of Gomory and "an algorithm for the mixed integer problem" that he developed; an automatic method for solving discrete programming problems (in this paper published in 1960 by Land and Doig they introduced the concept of branch-and-bound for the solution of integer programming problems);

Integer Programming: methods, uses, computation; Matroid partition; reducibility among combinatorial problems; Lagrangian relaxation for integer programming and disjunctive programming. The authors of the ten chapters are all pioneers in the field. The chapters in Part I give a good overview of various developments of different facets in integer programming over the first 20 years. The three chapters in Part II are all surveys addressing specific topics on integer programming and combinatorial optimization from the beginning to current state-of-the-art. In Chapter 11 the focus is on tools from polyhedral theory that are used in integer programming. Giving some context the theory and methodologies that has been developed over the years are presented. In Chapter 12 solution approaches to combinatorial problems as it has evolved over fifty years are discussed. Combinatorial optimization problems, such as the traveling salesman problem, have influenced the development of techniques and methods for solving integer programming problems and these are discussed in this chapter. The use of relaxations is important when using branch-and-bound methods. Ways to reformulation of integer and mixed integer programs to obtain stronger linear programming relaxations are outlined and a comprehensive surveyed of these methods are given in Chapter 13.

Up to date overviews and surveys of current hot topics in integer programming is contained in the next six chapters. Chapter 14 the survey topic is integer programming and algorithmic geometry of numbers and the survey considers a number of results from the interplay between integer programming and the geometry of numbers. Not surprising there is also a chapter on nonlinear integer programming. In Chapter 15 this is outlined where the primary goal is to present a simple version of general nonlinear integer problems where all the constraints are still linear. Solving integer and mixed integer programming problems has come a long way over the last 50 years and there are solvers that provide reliable and effective solutions. The history of computational developments is highlighted in Chapter 16 while it is shown that a lot of work is still required to improving and extending the modelling capability of these solvers. Chapters 18 and 19 both deal with aspects related to relaxations for integer programming. Semidefinite relaxations and recent theoretical and computational advances in the study of the group-theoretic approach in mixed integer programming are the hot topics in these two chapters respectively.

It is almost impossible to do justice in a short book review of **50 Years of Integer Programming 1958 – 2008**. It is not only a comprehensive history of how integer programming and the solution of integer programming problems have developed from 1958 but it is an excellent encyclopaedia of all the methods, techniques and computational approaches towards solving integer programming problems. The book provides and serves as an excellent introduction to integer programming. In addition it gives an in depth and great historical perspective of the huge amount of research and development that has taken place in the field of integer programming over a period of 50 years. A lot of the material in the book is now possible dated especially the hot topics where further research has taken place subsequent to the 2008 workshop. Nevertheless the value of the book lies in the fact that it is a single source of integer programming material while the history it contains cannot be found elsewhere.

The cover of the book is also of interest. The four figures on the cover illustrate adding Gomory mixed integer cuts to a polyhedron of dimension 3. A full explanation of the meaning of these figures and how they should be interpreted is given after the Preface of the book. 🌍

Summer Schools
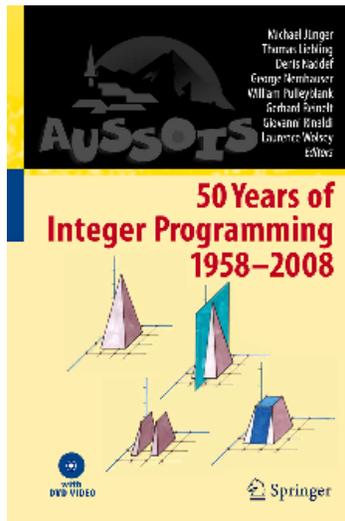
Successful Edition of the ELAVIO in Chile

Jaime Miranda Pino <jmirandap@fen.uchile.cl> **Javier Marenco** <jmarenco@campus.ungs.edu.ar>, from the Organizing Committee

Professors from Latin-America and Europe participated in this school, presenting recent work on applications of operations research for solving problems in sustainability, healthcare, logistics, sports, agro-industry, engineering, communications, finance, and big data.

The 22th edition of the Latin-American Summer School in Operations Research (ELAVIO) was held in Marbella, Maitencillo, Chile, from March 4th to March 9th, 2018. This school -regularly scheduled by ALIO since 1994- was organized by the "Departamento de Control de Gestión y Sistemas de Información" (DCS) from the "Facultad de Economía y Negocios" of the University of Chile, together with the Chilean Institute on Operations Resarch (ICHIO) and the "Instituto Milenio Sistemas Complejos de Ingeniería" (ISCI) from the University of Chile.

Jaime Miranda, president of ALIO and chair of this event, stated that "the purpose of the ELAVIO is to stimulate new collaborations and foster the participation of young researchers in Operations Research, while keeping them updated on research topics with short courses and plenary conferences". He added that this meeting was a complete success, due to the high level of interest among students. More than 50 students took part in this edition.

In this ELAVIO, professors from Chile, Argentina, Uruguay, and Spain presented their recent work in operations research and its applications. **Guillermo Durán** gave a short course on "Applications of OR to Real Problems in Argentina and Chile over the last 15 years"; **Mario Guajardo** gave a course on "Collaborative Logistics and Cooperative Game Theory"; **Maya Jakobine Stein** presented an "Introduction to Extremal Graph Theory"; **Javier Marenco** gave a course on "Polyhedral Techniques for Combinatorial Optimization Problems", **Antonio Mauttone** presented "Models and Algorithms for Public Transportation Network Design", **Marcelo Olivares** talked on "Empirical Methods in Management Science"; and **Lluís Miquel Plà** gave a short course entitled "OR in Agriculture: Pitfalls and Critical Success Factors".

Also, prof. Celina de Figueiredo from the Universidade Federal do Rio de Janeiro (Brasil) gave the plenary talk "Complexity-Separating Graph Classes for Vertex, Edge and Total Colouring". 🌎

ELAVIO 2018 – Engaging, Sociable and Unforgettable

Arturo Pérez Rivera <a.e.perezrivera@utwente.nl>, IFORS Scholar for ELAVIO 2018

From the 4th to the 9th of March, the XXII edition of the Operations Research Summer School for Young Latin American Scholars (ELAVIO in Spanish) took place in Marbella, Chile. The selected participants, among which were experienced professors and curious undergraduate students, contributed to the event with interesting lectures and discussions about theory and applications of Operations Research (OR). In addition, the beautiful Pacific coast resort was the ideal setting for making new friends and long-lasting memories. In short, ELAVIO 2018 was engaging, sociable, and unforgettable.

During the poster presentations, students presented their work to the other students and professors. The presentations attracted the curiosity of the listeners and lead to interesting discussions. I presented my work entitled "Combined Scheduling of Pre-haulage and Long-haul Freight Transportation", for which I got questions about both the OR methodology and the applicability to the logistics industry. Those questions gave me new insights on the algorithmic challenges of my approach, as well as new problems to which my scheduling approach could be used.

The lectures and poster presentations covered a variety of topics and applications, giving a thorough overview of the richness of the OR field. Besides learning about classical theoretical topics such as graph theory and polyhedral techniques, we learned about applications in agriculture, transportation, logistics, etc. Furthermore, it was fascinating to learn about OR applied to subjects such as scheduling football matches, wine production, and emergency evacuation; as well as more abstract applications such as heuristic tuning/selection and simulation of fluid dynamics. >>

>> It was motivating to see that OR can have an impact in diverse areas, and that this impact is increasingly visible due to the work done throughout Latin America.

Naturally, the attractive touristic location of the ELAVIO, and the good summer weather, gave plenty of opportunities to make new friendships. The location had it all: walks on the beach, a swimming pool, games and sports —and of course— delicious food and great Chilean wine. More importantly, the program was designed such that the participants could enjoy it all! These activities made the program very sociable, increased the interaction among the participants and allowed them to meet each other in an informal environment. As closing events, we had a fantastic party with a lot of singing and dancing (a proper Latin party) and a traditional ELAVIO game/quiz.

Overall, ELAVIO 2018 was a great experience for me. I refreshed my knowledge about some topics, learned about new applications, and made new friends in the process. I'm thankful to the organizers for putting together such an event, and to IFORS for their sponsorship. I would highly recommend to students and researchers that they attend future editions of ELAVIO! 🌏

EWI 2018– EURO Winter Institute on Lot Sizing and Related Topics

Christian Almeder (almeder@europa-uni.de) , from the Organizing Committee

The EURO Winter Institute on Lot Sizing was held from March 5th to March 16th, 2018 at the European University Viadrina in Frankfurt(Oder), Germany. Frankfurt(Oder) is a small city located 70km east of Germany's capital Berlin directly at the Oder river which is the border to Poland. The European University Viadrina was founded in 1991 at the same place where already the First University of Brandenburg from 1506 to 1811 was located.

The EURO Winter Institute addressed advanced PhD students and young PostDocs to meet and learn from senior experts and to study various special topics in the context of lot-sizing. The institute also served as a platform for presenting and discussing research with other researchers and for supporting participants in pursuing their academic careers. It was the first institute organized by the EURO working group on Lot-Sizing and in particular by Christian Almeder, who serves currently as one of the two coordinators of the working group.

In total 21 PhD students and young PostDocs attended the Winter Institute together with 7 senior researchers. Participants came from various parts of the world: Germany (5), France (3), UK (3), Brazil (3), Portugal (2), Italy (1), Turkey (1), Canada (1), Iran (1), Australia (1).

The senior researchers participating were Alistair Clark (University of the West of England, UK), Richard F. Hartl (University of Vienna, Austria), Bernardo Almada-Lobo (University of Porto, Portugal), Stéphane Dauzère-Pérès (École des Mines de Saint-Étienne, France), Wilco van den Heuvel (Erasmus University Rotterdam, Netherlands), Christian Almeder and Achim Koberstein (both from European-University Viadrina Frankfurt-Oder, Germany). Each of them gave a 3-hours tutorial covering various topics of lot-sizing and related OR-topics such as stochastic optimization and metaheuristics.

In addition, all participant gave extensive 45min presentations about their current research and received detailed feedback through discussion with the whole group as well as discussion in smaller feedback rounds with one or two senior researchers and two other participants. Furthermore, there was plenty of room for individual discussions between the participants on various research topics.

Besides the research, a lot of social activities supported the interaction, communication, and collaboration within the group. There were excursions to the steel mill of ArcelorMittal in Eisenhüttenstadt, the brown coal mines in the Lausitz and the cloister and small brewery of Neuzelle. Most evenings the whole group joined for dinner and other sportive and cultural activities such as bowling and badminton or visiting a classical concert and the Heinrich von Kleist museum. A visit to Slubice, the neighboring town in Poland just across the Oder river, was on the schedule as well, including a visit to the Wikipedia monument and a typical Polish dinner. Sunday, March 11th was a day off which most participants used for a sightseeing trip to Berlin while having the best sunny weather of the whole two weeks. In fact, as one might suppose for a Winter Institute, there was snow as well on the first days.

The Winter Institute was financed by EURO, GOR (German OR society), and the European University Viadrina Frankfurt(Oder). Gislaine Melega from Brazil was awarded with the IFORS scholarship. 🌏

EWI 2018 – Enriching knowledge

Gislaine Mara Melega <gislainemelega@gmail.com>, IFORS Scholar for EWI 2018

The EWI goal is to promote education in operations research and lot-sizing among PhD degree level and young researchers, stimulating new collaborations among the participants and promoting inter-cultural integration. To encourage the involvement of young people in OR, EWI brought them up to date on research topics through lectures provided by senior experts in operational research and by studying various topics related to lot-sizing. Lectures from Portugal, Germany, UK, France, Austria and Netherlands covered topics such as: introduction to lot-sizing, exact solution approaches for single-item lot-sizing problems, metaheuristics for logistics problems, applications of lot-sizing, stochastic optimization, mathematical programming-based heuristics for integrated lot-sizing, and integration of lot-sizing decisions with other tactical and/or operations decisions.

During the institute, students had the opportunity to present and discuss their research with the other participants and lecturers. The format used was for participants to give a presentation, and then a round of feedback was provided by a senior lecturer and two other students in order to give support to their current research and academic careers.

Cultural activities included excursions to Eisenhüttenstadt Steel Mill, Lausitz Lignite Mining Region and the Cloister and Brewery of Neuzelle, as well as a visit to and tour of the Kleist Museum. Social and recreational activities included bowling and badminton, with all the participants and some lecturers present. Participants also had free time to enjoy the surrounding cities, experience the local night life and relax in the comfortable facilities at the hotel where the event was held.

During my participation in the institute, I was impressed with the opportunity it afforded me to meet people from different cultures, to improve my understanding of the English language in several accents from around the world, to build friendships and establish connections with professionals in the field of lot-sizing and related problems. As I go back to the Federal University of Sao Carlos (UFSCar) in Brazil, I shall treasure all the enriching knowledge that I gained, both in my research area and in culture. I thank IFORS, which made this possible by granting me the travel scholarship and the opportunity to participate in this event, as well as the Federal University of Sao Carlos (UFSCar) and the União das Faculdades dos Grandes Lagos that released me to attend this great event. 🌍

OR Techniques and Applications School for Africa (ORTASA)

Jules Degila <jules.degila@gmail.com>

The school will be held in Dangbo, Benin in November 26th-30th, 2018, hosted at the University of Abomey-Calavi. ORTASA is a one-week school promoted by the African Center of Excellence in Mathematical Sciences and Applications (ACE-SMA) and supported by different OR Societies around the world, mainly aimed at young researchers, graduate students (PhD and Master students) and professionals from African countries, with outstanding performance and interest in the areas of Operations Research, Machine Learning, Systems Engineering and Applied Mathematics. Professionals are highly encouraged to attend this school that will emphasize in decision making tools and the applications of OR in areas such as health, transport, communication, logistics, finance and project management. The program of ORTASA 2018 will include 3 tutorials by international invited speakers, 8 sessions on the applications where participants will have the opportunity to present and discuss their work.

Candidate students as well as guest speakers are invited to submit their applications. More information can be found at www.imsp-uac.org/ortasa. 🌍

GORS Conference – OppORtunity Knocks

James Bleach <managingeditor@theobexproject.co.uk>

In the United Kingdom (UK) the Government Operational Research Service (GORS) supports and champions operational research (OR) across more than twenty five government departments and agencies. Employing over seven hundred operational researchers, GORS staff are the analytical minds behind many of the UK Government's policies. From justice to health to education and beyond, they look objectively at the complex problems faced and apply an array of scientific, analytical and modelling techniques to help find better solutions – influencing the decisions of policy makers and helping to ensure that public money is spent wisely. Better solutions, of course, mean better policies – policies which, when brought into being, touch the lives of everyone in the UK.

The theme of the traditional autumn GORS annual conference, which was held at the Westminster Conference Centre in the heart of London on the 30th and 31st October 2017, was 'OppORtunity Knocks' – with the hope that as a profession, OR can take those opportunities that will come knocking and expand into new and exciting areas. Attended by around three hundred operational researchers from across government and from sixteen different geographic locations, the almost fifty presentations given over the two conference days demonstrated both the quantity and, importantly, the high quality of the work that GORS members are producing.

Presentations were categorised into the following streams:
  • Case studies
  • Data Science
  • Networking
  • Professional development
  • Simulation & Modelling

Plenary sessions included:
• *GORS Strategy*
Tony O'Connor (Head of GORS and Chief Analyst, Ministry of Defence) and Bill Parnham (Head of Profession, Department for Work and Pensions) presented on the latest GORS Strategy.

• *OR, The OR Society, and you: looking back, looking forward*
Ruth Kaufman, OR Society President (at the time of the conference, now immediate Past President) briefly summarised some of the key themes of her presidency, including the current flourishing of OR, the opportunities and challenges inherent in the nature of OR itself, and the latest developments from the OR Society. Ruth then handed over to John Hopes, the OR Society President Elect (now President). John drew on his wide experience to present Ernst & Young perspectives on business modelling and analysis, before going on to discuss some of the key issues now facing the OR Society and wider OR community.

• *WITNESS simulation platform to create a 'virtual factory' for Hayward Tyler's strategic manufacturing operations*
Hara Papachristou (Senior Consultant with Lanner Group), presented on a project that used simulation to help a mid-sized manufacturer of performance-critical pumps and motors for the energy industry, Hayward Tyler, transform their manufacturing capability. This project was the winner of the President's Medal 2017, which is awarded for the practical application of OR and is one of The OR Society's most prestigious awards.

• In the final plenary session of the conference a panel of GORS Heads of Profession answered questions posed by conference attendees on the following topics:

  • GORS Strategy
  • Opportunities
  • Off the record

This lively and enlightening session proved a great opportunity to learn from the panel's experience at the forefront of the profession.

An excellent addition to this year's conference was Pecha Kucha: no not a Pokémon character, but a rapid-fire presentation session that provided a fun and engaging overview of the fantastic contributions OR has made to government decision-making. Each department/agency was challenged with the task of securing the attention of conference attendees and drawing them to their posters (displayed in the marketplace) so they could tell them more. With only one minute, and three slides, to pitch, and with slides running back to back, the pressure really was on presenters to convey their analysis and excite the audience before making a smooth and swift changeover with the next presenter. The fact that the subsequent marketplace sessions had vibrancy akin to a Moroccan bazaar was testament to the success of Pecha Kucha.

As for social events, following the first day there was the opportunity to attend an evening social in The Feathers public house, a traditional British pub of unique character, revered for its eclectic range of real ales and good food. Alternatively, or even additionally, for those in a Halloween mood there was a ghost walking tour of some of London's spookiest haunts.

With so much high quality OR on offer, and surrounded by iconic London landmarks, the GORS Conference 2017 truly was an OppORtunity not to be missed. 🌐

International Days of Competences for the Future - OR giving a hand to Emerging Research and Applications

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On 12-13 March 2018, *International Days of Competences for the Future (IDCF)* were held for the first time (http://idcf.put.poznan.pl/). They took place at *Poznan University of Technology* **Lecture and Conference Center** (the venue of prestigious conferences, e.g. EURO 2016) and were organized by *Poznan University of Technology (PUT)*, its *Faculty of Management Engineering (FEM)*, and the *Poznan University of Technology Initiative*.

The main theme of *IDCF* was *management*, with an emphasis placed on *competences for the future*. New technologies are changing the *labor market*; Artificial Intelligence, Neural Networks, Machine Learning, Robotics, Interactive Voice Response and Natural Language Processing systems are all emerging. Developments include computerization and automation, but also other creative industries. Issues relating to knowledge and skills management were discussed: skills and competences in organizations, intelligent organizations, intelligent factories; quality in the contexts of competency and knowledge management; methods of accelerating the acquisition of cross-cutting competences: communication skills, teamwork, entrepreneurship and creativity; leadership and the problems of process automation 4.0.

On the first day, there were workshops for entrepreneurs and representatives of the educational institutions involved in creating the *Wielkopolska Network of Education and Economy*. The workshops were in Polish and English. Entrepreneurs that came to the workshop were involved in the project "*Time for professionals BIS – Professional Wielkopolska*". This project was launched under the *Wielkopolska Regional Operational Program 2014+* and is to be implemented by 2022 through **Wielkopolska Regional Government** (Department of Education and Science, Office of Marshal of Wielkopolska) and PUT in cooperation with interested local governments, employers and schools educating professionally. *"Workshops are always well received by participants"*, said **PhD. Eng. Magdalena Graczyk-Kucharska** from FEM: *"This form of cooperation and the exchange of experiences and insights is the most fruitful"*. Representatives of **MAHLE Behr Ostrów Wielkopolski Sp. z o.o. and Schaltbau RAWAG** participated in many such meetings; "This is the best proof for us that the reception of participants is positive", **PhD. Eng. Marek Goliński** from FEM highlighted: *"The relationships we have built with the Wielkopolska companies have been established by us for many years"*. *"Work during the workshop always evokes a lot of emotions"*, **PhD. Eng. Maciej Szafrański** from FEM said: *"Appropriate moderation of the meeting allows you to keep working in certain frameworks established before the meeting"*. This was a novelty: to maintain the *workshop* character in the atmosphere of an *international conference*. *"It was a great opportunity to practice English"*, said **Klaudyna Bogurska-Matys, relationship specialist** in the **project "Time for Professionals BIS – Professional Wielkopolska"**: *"Exchange of opinions and presenting problems that turned out to be transnational and common discussion caused a real brainstorming"*. **PhD. Eng. Maciej Szafrański, PhD. Eng. Marek Goliński, PhD. Eng. Małgorzata Spychała and PhD. Eng. Magdalena Graczyk-Kucharska** (PUT) will prepare a scientific report on the meeting that assessed the most **important competences of the future manager**.

The **first day** ended with an open Plenary Lecture by Prof. Dr. Scott Erickson, professor of marketing at the School of Business at Ithaca College, NY: *"Organizational Learning and Knowledge Management in the Age of Big Data"*. He was greeted by *Professor PhD. DsC. Joanna Józefowska*, Vice-Rector for Science, who introduced him. She greeted and thanked everyone involved in organizing this meeting. Prof. Dr. Scott Erickson introduced well-known US companies, discussing data collected by them. He showed how they are collected, which often even the client has no idea about; they are later used by large corporations. The value of the information was underestimated 20 years ago, and no one thought that following the movements and decisions of the client would be important. Only now, collecting, storing, analyzing and using these data in marketing, as he admits, is quite frightening.

On the second day, an international conference was held, *"The acceleration method of development of transversal competences – results of research and analyses"*, which addressed scientists, students, enterprise representatives and institutions related to education and the labor market.

The conference was opened by *Professor PhD. DsC. Tomasz Łodygowski,* Rector of PUT, who welcomed all guests. Then the following spoke: *Professor PhD. DsC. Magdalena Wyrwicka*, Dean of FEM, and *PhD. Eng. Maciej Szafrański* from FEM. They warmly welcomed guests from abroad and Poland, and thanked all involved in organizing this event. Institutions that gave honorary patronage were: Marek Woźniak, Marshal of Wielkopolska Region; Jacek Jaśkowiak, President of the City of Poznan; Polish Academy of Sciences represented by Prof. Zenon Wiśniewski; and Media Patron, Editorial Office of Wielkopolska, Radio Poznan and TVP3 Poznan. During the Plenary Session, PhD. Eng. Maciej Szafrański presented the Method Developed in the Project ATC Erasmus+: "The acceleration method of development of transversal competences in the students – practical training process", and Willi elaborated on, "Knowledge Acceleration by Competences and Multivariate Adaptive Regression Splines".

Most of the speeches could be followed on Facebook under Accelerate Transversal Competences, with live broadcasts. A video promoting the event shall be released soon. It will be possible to watch speeches of Plenary Session and Session 1 – further information will be available on Facebook. 🌍

DEA40: Data Envelopment Analysis Kicks Off with Its 40th Anniversary Conference

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International Conference on Data Envelopment Analysis (https://deaconference.com/dea40/call-for-papers/) was organized to celebrate the success of DEA on its 40th anniversary of the publication of its seminal paper. It was held on April 16-18, 2018, at Aston Business School, Aston University, Birmingham (http://www.aston.ac.uk/aston-business-school/), United Kingdom, one of the largest and most successful business schools in Europe.

The conference, mainly organized by Professor Ali Emrouznejad and Professor Emmanuel Thanassoulis, both from Aston Business School, was proven extremely successful as reflected by the number and quality of papers submitted. It attracted 190 participants, with 200 papers from 43 different countries - including emerging and developing countries, for which the methods of DEA mean a great promise.

Charnes, Cooper and Rhodes introduced DEA as a linear-programming based method for measuring the comparative efficiency of Decision Making Units (DMUs) in their paper which appeared in European Journal of Operational Research 2 (1978) 429-444. Ever since those early days, DEA has grown exponentially in theory and real-world application. Today, DEA enjoys a high reputation and it is a very important element of so many prestigious conferences in every year and in all over the world – including of conferences of EURO, IFORS, etc.

During recent decades, many thousands of theoretical works extended the methodology of DEA and were published, in order to address numerous aspects of real-life problems, to teach our community of researchers, educators, decision makers and practitioners. With some delay after the theoretical advances, strong applications became implemented, and they are well-established nowadays. They cover subjects from the regulation of utilities to service delivery in finance, health care, education and further private or public service sectors.

As the 40th Anniversary of the publication of the aforementioned seminal EJOR article on DEA, the congress DEA40 celebrated the great success of DEA with a large number of excellent and premium papers in the field.

A special feature of the conference was a stream dedicated to the use of DEA in Regulation which encouraged the participation of non-academic practitioners in the Regulation of Energy from Norway, Finland, Denmark, Holland, Brazil, Germany and the United Kingdom.

Other streams included in the parallel sessions were Banking and Finance, Transportation, Statistical Inference, Productivity in Industry or State Level, Education, Target Setting and Index Measures, Cross Efficiency Computation and Application, Regulation, Agriculture, Returns to Scale, Network DEA, Discrimination in DEA, Bibliometrics, Health and Hospital, Stochastic Frontier, Fuzzy DEA, and other DEA Applications.

DEA is one of the key methods of assessing the comparative efficiency of organizations like schools, hospitals, banks, sales outlets and the like. It is widely used as a performance measure in the assessment of the scope for efficiency gains that regulators make in the context of price determinations.

The intermingling of academicians and practitioners created a lively atmosphere for exchange of ideas which enabled them to gain more knowledge on areas needing further research collaborations and learned more about the latest developments in the methods which they need in the course of their own work. The conference further featured a special session dedicated to the neophytes in the field of research and how they can make research outputs that could be published in top journals in their fields of specialization, by listening to a panel of top academic journal editors.

During the days of the conference, friendship between participants became deepened, new friendship became established, and exciting joint research projects were discussed – including the role of modern Operational Research and its scientific community worldwide, endorsed by DEA. After the conference, Mila and Willi provided the organizers and, thus, all participants from all over the world, with helpful and attractive material about two upcoming highlights of our international OR community: EURO 2018 in Valencia, Spain, and EURO 2019 in Dublin, Ireland.

The carefully prepared scientific program and the social community provided, together with the amazing and buzzling city of London, were enjoyed by all the participants who came from near and far. In fact, we hope and trust that this conference in London was a special moment in the history of OR and on the service of DEA to the people of the world, to their living conditions, cooperation, peace and well-understanding. 🌐

Last Issue of the International Abstracts in Operations Research (IAOR)

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

It is with regret that we announce that this is the last issue of International Abstracts in Operations Research (IAOR). As a direct consequence of the merger with Springer, last year Palgrave announced its decision not to renew its agreement with IFORS beyond the contract period that expires at the end of this year. The main reason for this was a technical one – after close analysis, the publisher concluded that the enhanced content platform to which all Palgrave Journals migrated could not support the unique needs of IAOR. Palgrave, originally Macmillan Press, have been publishing IAOR since 1991.

At the second conference of the International Federation of Operational Research Societies (IFORS) held in Aix-en-Provence in 1961, it was proposed, and formally agreed later by mail ballot, that the Operations Research Society of America (ORSA) would publish the journal for IFORS. Each member society would be invited to become a "contributing society", and thus be responsible for the production and submission of all abstracts of articles published in its own country, by appointing a contributing editor, and for circulating the journal to all its members. The responsibility for publishing IAOR was passed to IFORS in 1970. The national contributing editors were later augmented by editors who were responsible for subject areas.

The first issue of IAOR appeared in November 1961, containing 116 abstracts. The editor was Herbert P. Galliher (Massachusetts Institute of Technology). During 1968, Herbert Galliher handed over the editorship to Hugh Bradley of the Upjohn Company, Kalamazoo. He continued to edit IAOR until 1979, when Graham Rand, of the University of Lancaster U.K. was appointed as his successor. He served for 12 years before the editorship passed to David Smith, University of Exeter, UK, in 1992. Both successors to Hugh Bradley had previously been the UK contributing editor to IAOR for several years.

The 10,000th abstract was published in 1971, the 20,000th in 1979, the 50,000th in 1992, the 100,000th in 2007. This year saw the publication of the 140,000th abstract. This increase in publication rate reflects, to some extent, constraints in the budget, as OR literature has proliferated over the years.

In the early years of this century, under the leadership of David Smith, a comprehensive plan of action was undertaken to completely transform IAOR from a paper-based publication to an online journal capable of meeting the challenges created by the widespread availability of powerful browsers on the Internet. The objectives of this transformation were to regain IAOR's role as the "First Source" for those researching the OR literature by being: a one-stop-source format; easily searched; possessing added value; up-to-date; and with a printed version also available.

After 18 years as editor, in 2010 David Smith handed over the editorship to K. Preston White Jr. of the University of Virginia (USA). N. Peter Whitehead joined the team, and they were designated Executive Editor and Editor respectively, in 2015. In a case study available at http://www.palgrave-journals.com/iaor/iaor_case_study_2012_08_14.pdf, White and his research student, Lawrence Bonczar, compared literature search and retrieval in the OR/MS field using IAOR and Google Scholar. The authors showed that the results of IAOR and GS searches are complementary. It is with regret that this complementarity will no longer be available for researchers in the OR and MS community.

Graham K. Rand, Chair IFORS Publications committee, and UK contributing editor for IAOR (1974-79), editor IAOR (1979-91), specialist contributing editor for IAOR (1990-2008)

All of us at IFORS regret the need to end the publication of IAOR. Throughout its lifetime, IAOR provided organization and insight into the burgeoning literature of operational research. We are tremendously grateful to the editors and contributors to IAOR over the years, and gain satisfaction from knowing that their work through IAOR has been invaluable to the field for the last 56 years. We hope that the gap created by the ending of the journal will be filled by increasingly powerful online search, but we know that those systems will never fully replace what we have lost.

Michael Trick, President, IFORS 🌐

TSL Dissertation Prize for Emerging Economy: Call for Nominations

Dirk C. Mattfeld <d.mattfeld@tu-bs.de>

This new TSL dissertation prize focusses on transportation and logistics in emerging economies and is sponsored by Commodity Repository Limited (India), CCRL. The award is accompanied by a $500 honorarium for the winner. In addition, the winner and the recipient of an honorable mention (if any) each receives an 8x10 plaque announcing the award.

The following criteria will be used in judging candidate dissertations:
• Practical importance and applicability in solving transportation or logistics problems of emerging economies.
• Nominations are welcome from colleagues affiliated with academic institutions located in emerging economies, classified by the World Bank as lower income or lower middle income countries, see list of countries.

To make this new prize happen this year already, the 2018 TSL dissertation prize committee is handling the emerging economy prize in addition to the well-established TSL dissertation prize. Both prizes are considered separately by the committee.

Eligible doctoral dissertations are those completed and submitted between June 1, 2017 and May 31, 2018 in the general area of transportation science and logistics. Nominations can be filed either for the emerging economy prize or for the TSL dissertation prize.

To be considered, a dissertation must be nominated by the thesis supervisor, who should submit the following items, all electronically in Adobe PDF format with the shown filenames:
• An electronic copy of the letter of nomination from the dissertation supervisor supporting the submission and stating his/her assessment of why the thesis is worthy of the award (candidate name-EENL.pdf),
• An electronic abstract of 300 words without formulas or mathematical notation (candidate name-EESA.pdf),
• An electronic copy of the extended abstract (3-5 pages), separate from the thesis (candidate name-EEEA.pdf), and
• An electronic copy of the dissertation (candidate name-EED.pdf)

The above documents should be submitted online using this URL. A password can be set optionally if additional documents are to be uploaded in subsequent steps.

Once you have completed your submission, please send an e-mail to d.mattfeld@tu-bs.de indicating the name of the candidate. The deadline for receipt of submissions is June 30, 2018. The recommendations of the judges will be announced at the 2018 INFORMS Annual Meeting during the TSL Society business meeting.

2018 Committee
Dirk C. Mattfeld, Business Information Systems Eng., Technische Universität Braunschweig
Sandra Eksioglu, Industrial Engineering, Clemson University
Emma Frejinger, Dept. of Computer Science and Operations Research,Université de Montreal
Dimitri Papageorgiou, Corporate Strategic Research, ExxonMobil Research and Engineering Company
Annandale, New Jersey
Lei Zhao, Department of Industrial Engineering, Tsinghua University 🌍

Association Governance and Management

Editor's Note: *Since IFORS is an Association of Associations, IFORS News features articles about association governance and management. In this issue, we feature an article from the Business Mirror column (https://businessmirror.com.ph/associations-and-cathedralthinking/)*
of Octavio Peralta who is concurrently the secretary-general of the Association of Development Financing Institutions in Asia and the Pacific (ADFIAP) and the CEO and founder of the Philippine Council of Associations and Association Executives (PCAAE).

Associations and Cathedral Thinking

Octavio Peralta <obp@adfiap.org>

In my reads, I always try to pick up and write about interesting acronyms, buzzwords and ideas that I feel will resonate with and apply to associations, including this one, which I am sharing with you.

Author Rick Antonson considers himself as a "cathedral thinker." He says cathedral thinking is about adopting the long-term view, doing things today that are important for generations, and knowing that you will be involved in an unfinished work. It sounds like this concept can be relevant to associations, too.

The concept of cathedral thinking, he elaborates, stretches back to medieval times when architects, stonemasons, and artisans laid plans and began the construction of soaring and cavernous structures that would one day serve as places of worship, community gathering spaces, and safe havens. Those who began such work knew they'd never live to see their task completed. Yet, their actions kept the living generation tethered to the future.

The concept of thinking that these "cathedral builders" did, in Antonson's mind, is synonymous with long-term planning.

Cathedral thinking has since been applied to space exploration, city planning, corporate mandates, and other long-range goals that require decades of foresight and preparation so future generations can enjoy their full realization. Though there are many instances in which cathedral thinking can be applied, they all require the same foundation: a far-reaching vision, a well-thought-out blueprint, and a shared commitment to long-term implementation.

I think association leaders (boards and managers) should, likewise, be cathedral thinkers. Associations are there for the long haul because of their strategic purpose, cause and advocacy. As defined, associations are organizations or groups of individuals affiliated with one another, who share a common purpose, interest or mission, and exist for the mutual enrichment and advancement of their membership. Members will come and go, but the association's reason for being will live on for a long time. Here are my cathedral thoughts for associations:
• Association's purpose—Ensure that the association's "why" (e.g., why it does what it does, why it exists, and why it serves a higher purpose) is crystal clear and timeless.
• Associations as communities—Build the association around the concept and strategy of a community where members know each other, help one another, and celebrate together.
• Associations' additionality role in society—Create offerings and activities that enrich lives (e.g., volunteerism), nurture competitiveness (continuing education, industry standards, research) and impact the economy (enterprise development, product innovation).
So, what is your cathedral thought for your organization? 🌍

THE SECOND SEMESTER OF 2018 IS FULL OF IMPORTANT EVENTS!

1ST AFROS CONFERENCE TUNIS/TUNISIA JULY 2-4

29TH EURO CONFERENCE VALENCIA/SPAIN JULY 8-11

11TH APORS CONFERENCE KATHMANDU/NEPAL AUGUST 6-9

19TH CLAIO CONFERENCE LIMA/PERU SEPTEMBER 24-27

2018 INFORMS MEETING PHOENIX/USA NOVEMBER 4-7

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