International Society on Multiple Criteria Decision Making

E-News • 2007 • Issue 3 (November)

Contents

Front: Matsushima Bay, Japan. © Martin J. Geiger

Letter from the Editor

Dear friends and colleagues,

it is my distinct please to provide you with this newsletter.

Again, we managed to collect numerous contributions, including important announcements on behalf of the society (see Section 2) and reports on past activities (Section 3).

But first, there will be the 19th International Conference on Multiple Criteria Decision Making in Auckland, New Zealand, organized and hosted by Matthias Ehrgott and his team. A list of accepted contributions is already available online, and I am certain that this major event is going to be a great success.

Other upcoming events are described in Section 4, so as you can see, there will be plenty of opportunities to get together and exchange ideas in the future.

A new original contribution has reached us from Xavier Gandibleux and Matthias Ehrgott, who are giving a research group presentation in Section 5. I personally believe that this is of great interest to the members of the society as it simply gives a concise overview about their research activities.

New books projects/series are presented in Section 6 by Constantin Zopounidis, including the request for your contribution. So if you have publishable results in the scope of the book series, feel free to contact him.

Please let me finish with thanking everybody who contributed to this issue of our newsletter! I also would like to encourage everybody to contribute to future issues, providing information on upcoming events, reports on past activities, or other information being of interest to the community.

Looking forward to see you in Auckland, sincerely yours,

Martin Josef Geiger
November 2007

1 19th International Conference on Multiple Criteria Decision Making, January 7–12, 2008

MCDM for Sustainable Energy and Transportation Systems

Matthias Ehrgott, The University of Auckland

Call for Papers and Sessions

The 21st century heralds an age of exponentially increasing demand for energy and transportation services in a globalised economy. Climate change and other environmental impacts of human economic activity necessitate the consideration of conflicting goals in decision making processes to develop sustainable systems. The science of multiple criteria decision making has a lot to offer in addressing this need. The International Society on Multiple Criteria Decision Making (MCDM) is organising its 19th International Conference under the theme MCDM for Sustainable Energy and Transportation Systems.

Abstracts are now called for and should be submitted by email to mcdm2008@esc.auckland.ac.nz. All areas of MCDM are welcome and papers related to the theme of the conference are especially encouraged.

- Multiple Criteria Decision Aiding
- Multiple Criteria Classification, Ranking, and Sorting
- Multiple Objective Continuous and Combinatorial Optimisation
- Multiple Objective Metaheuristics
- MCDM and Preference Modelling
- Fuzzy MCDM
- MCDM Software
- Applications of MCDM
- Foundations of MCDM
- MCDM and Social Science

Extended abstracts should be up to two A4 pages in 12pt font or similar. Abstracts must contain the name and affiliation of all authors, plus the email address of the corresponding author for notification of acceptance. Abstracts can be submitted in plain text, Latex, or Word formats, but postscript and pdf files are not acceptable. In order to be included in the conference programme at least one author must have registered and paid the appropriate fee.

Colleagues interested in organising invited sessions should contact the organising committee at mcdm2008@esc.auckland.ac.nz as soon as possible.

Track on Evolutionary Multiobjective Optimisation

As part of the conference a special track on Evolutionary Multiobjective Optimisation (EMO) will be organised. EMO utilizes evolutionary computation techniques to determine/approximate Pareto optimal solutions and became very popular in recent years. Besides comparison and integration of EMO and MCDM, the track will also cover EMO algorithm developments, test problems, metrics and comparative studies for EMO as well as real-world and industrial applications of EMO algorithms. It is intended to deepen interactions and collaborations of EMO and MCDM.

The EMO track is organized by Boris Naujoks, University of Dortmund, Germany. For more information contact boris.naujoks@uni-dortmund.de

Invited Speakers

- Jim Petrie (University of Sydney)
- Anna Nagurney (University of Massachusetts at Amherst)
  Title of the talk: Multicriteria Decision-Making for the Environment: Sustainability and Vulnerability Analysis of Critical Infrastructure Systems from Transportation Networks to Electric Power Supply Chains
  Abstract In this talk, I will demonstrate how multicriteria decision-making can be utilized as a powerful framework for evaluating the sustainability of the critical infrastructure networks that underpin our societies and economies. These networks, which include transportation networks and electric power supply chains, in their present realizations, contribute in a major way to global pollution. I will show how environmentally conscious decision-makers can achieve the same environmental standards/results acting independently as would be achieved from certain governmentally imposed environmental standards. I will also describe recent results in network efficiency measurement and vulnerability analysis that allow one to determine, in the context of relevant criteria, which nodes and links (or combinations thereof) of network systems are most important in that their removal has the greatest impact on the network efficiency. This research has major implications for security, including environmental security, and infrastructure protection.

Social Programme

- Powhiri at the Waipapa Marae
- Cruise to Waiheke Island and Conference Banquet at Mudbrick Winery http://www.mudbrick.co.nz
- Visit to Auckland Museum including a Maori performance http://www.aucklandmuseum.com

Proceedings Volume

Springer will publish a proceedings volume in the "Lecture Notes in Economics and Mathematical Systems". A call for full papers will be published on the conference website.

Registration Fees

- Full registration fee is NZD 600 (early) or NZD 750 (late).
  Includes attendance at all sessions, coffee breaks, lunches, book of abstracts, conference dinner, excursion, and a two year electronic subscription of the Journal of Multi-Criteria Decision Analysis, http://www.wiley.com/WileyCDA/WileyTitle/productCd-MCDA.html
- Student registration fee is NZD 300 (early) or NZD 375 (late).
  Includes the same as full registration, except for the journal subscription. Student registration must be accompanied by proof of full time student status that can be sent by email to mcdm2008@esc.auckland.ac.nz or fax to MCDM 2008 Secretariat, +64 9 373 7468.
- Registration is only possible via the conference website: http://mcdm2008.orsnz.org.nz

Dates

- The deadline for the submission of abstract has passed. The list of accepted contributions can be found online on the conference website.

- Late registration deadline: 15 December 2007

Local Organising Committee
Matthias Ehrgott (Chair), Ivan Kojadinovic, Richard Lusby, Michael O'Sullivan, Andrea Raith, Paul Rouse, Lizhen Shao, Bassy Tam, Cameron Walker, Judith Wang, Hamish Waterer, Oliver Weide

International Executive Committee
Theodor J. Stewart, University of Cape Town (President); Valerie Belton, University of Strathclyde; Carlos A. Bana e Costa, Technical University of Lisbon; Jose R. M. Figueira, Technical University of Lisbon; Martin Josef Geiger, University of Hohenheim; Salvatore Greco, Universita di Catania; Birsen Karpak, Youngstown State University; Kathrin Klamroth, University of Erlangen Nuremberg; Murat M. Köksalan, Middle East Technical University; Hirotaka Nakayama, Konan University; Mark Ridgley, University of Hawai'i at Manoa; Daniel Vanderpooten, Université Paris Dauphine; Luis Vargas, University of Pittsburgh; Jyrki Wallenius, Helsinki School of Economics; Constantin Zopounidis, Technical University of Crete; Kaisa Miettinen, Helsinki School of Economics


MCDM
19th International Conference on Multiple Criteria Decision Making
MCDM for Sustainable Energy and Transportation Systems
7th – 12th January 2008
The University of Auckland, Auckland, New Zealand
THE UNIVERSITY OF AUCKLAND
FACULTY OF ENGINEERING
Deadline for abstract submission September 30, 2007
Deadline for early registration October 15, 2007
www.esc.auckland.ac.nz/mcdm2008
mcdm2008@esc.auckland.ac.nz

2 Society News

2.1 Announcement – Wiley Prize

Valerie Belton, University of Strathclyde

The Wiley Prize has been awarded for the best paper describing a real-life application of multicriteria decision analysis presented at the International Conference on MCDM since 1996. At the 18th International Conference, which was held in Chania, Crete, from 19–23 June, 2006, we experimented with a new format for the competition. Authors who presented an application at the conference and wanted this to be considered for the award were invited to submit a paper describing their work for publication in a special issue of JMCDA. All the papers accepted for publication, which are the ones presented in this issue, became candidates for the award and were evaluated by a panel of judges whose MCDA expertise spans the range of MCDA approaches reflected in the papers.

As you can read for yourself, the candidate papers demonstrate the application of a range of MCDA methods to a diversity of interesting and topical issues, illustrating the significant potential for MCDA to inform decision making in practice.

Each of the judges evaluated the papers are against the four published criteria for award of the Wiley prize, which are:

- Effectiveness of the application
- Innovation
- Clarity of presentation
- Appropriateness of the methodology to the problem context.

The panel was impressed by the quality of all submissions and their task was both enjoyable and difficult as several papers were rated highly across the criteria and were felt to be deserving of the award. However, the paper which everyone agreed stood out above the others was *"Combining Scenario Planning and Multi-Criteria Decision Analysis in Practice"* by *Montibeller, Gummer and Tumidei*. The paper describes the integration of scenario planning with MCDA in the context of two case studies, in the first a decision faced by a small provincial insurance broker about the future direction of the company in the light of changes in the business environment and in the second a property developer has to make a decision with regard to the retention or sale of land in the light of uncertainties permitted usage. Although the integration of scenario planning and MCDA was previously suggested and illustrated in the literature (Goodwin and Wright, . . .), I believe that this is the first real-life application and thus represents a significant innovation from a practical perspective, but also from a methodological perspective as the challenges faced in the applications necessitated changes to the suggested approach. The panel also welcomed the authors' detailed reflections on their interventions, providing a springboard from which they and others can learn and proceed to more effective future interventions. They have recommended that this be included as an explicit evaluation criterion for future Wiley prize competitions.

I would like to take this opportunity to congratulate the award winners and also to record special thanks Constantin Zopoundis, for his work in editing this special issue of JMCDA and in organising the successful and very enjoyable conference which was the source of it.

Valerie Belton, Editor – Journal of Multicriteria Decision Analysis

2.2 Announcement – Candidates for available offices in 2008

The elections committee has appointed candidates for available offices in 2008. The candidates are:

President-Elect:

- Constantin Zopounidis (Greece)
- Murat M. Köksalan (Turkey)

Member of the Executive Committee: (four available positions)

- Tetsuzo Tanino (Japan)
- Gilberto Montibeller (UK)
- Kalyanmoy Deb (India)
- James Corner (New Zealand)
- Jose Maria Moreno (Spain)

Additional candidates may be nominated by the members of the Society not later than the Business Meeting (which shall take place during the MCDM2008 conference in January 2008). You may nominate any member of the Society and the nomination must be supported by four members of the Society. The name of the candidate and the names of the supporting members should be sent to the secretary of the Society, Kaisa Miettinen, at miettine@hse.fi.

More information concerning the elections can be found at http://project.hkkk.fi/MCDM/bylaws.html.

3 Past Conferences, Workshops, and Other News

3.1 Honorary Doctorate for Prof. Fandel in Freiburg

Prof. Dr. Günter Fandel, FernUniversität in Hagen, Chair for business administration, especially production theory and production management, Faculty of Economics

For his scientific life's work Prof. Dr. Günter Fandel, FernUniversität, has been awarded an honorary doctorate degree by the Faculty of Economic and Behavioral Sciences of the University of Freiburg. As only the fourth honorary doctor since the end of the war the former Rector in Hagen is now on the exclusive list which includes the names of the world renowned researchers Tinbergen, Hirschmann and Singer.

He was recognized as an important economist for his significant contributions to the further development of research on production planning and operations management with regard to methodological as well as application-oriented aspects. His publications on issues of capacity control and just in time logistics are internationally recognized and highly regarded beyond the scientific community. Apart from his numerous essays and monographs the pupil of Horst Albach is well-known in the scientific community by his numerous conference papers and his guest lectures. He is Editor-in-Chief and Department Editor of the "Zeitschrift für Betriebswirtschaft".

Günter Fandel regards the honorary doctorate as an invitation to continue his research with the same commitment.

From left to right: Prof. Dr. Karl-Reinhard Volz (University of Freiburg), Prof. Dr. Fandel (FernUniversität in Hagen), Prof. Dr. Dr. Jürgen Bengel (University of Freiburg)

3.2 EMO 2007, March 5–8, 2007

Shinkyu Jeong (Tohoku University, Japan) Shigeru Obayashi (General Chair, Tohoku University, Japan) Tadahiko Murata (Program Committee Chair, Kansai University, Japan)

The 4th International Conference on Evolutionary Multi-criterion Optimization (EMO2007) was held during March 5-8, 2007, in Matsushima/Sendai, Japan. This was the fourth international conference dedicated entirely to this important topic, following the successful EMO 2001, EMO 2003 and EMO 2005 conferences, which were held in Zürich, Switzerland in March 2001, in Faro, Portugal in April 2003, and in Guanajuato, México in March 2005. EMO2007 was hosted by the Institute of Fluid Science, Tohoku University. EMO2007 was co-hosted by the Graduate School of Information Sciences, Tohoku University, the Japan Aerospace Exploration Agency (JAXA), and the Policy Grid Computing Laboratory, Kansai University.

Among 124 submitted papers from 30 countries, 65 papers from 24 countries were accepted and published. Among 65 papers, 26 papers were selected for oral presentation and the rest were presented at poster sessions. This process was performed with the help of 101 international programming committee members and 16 local organizing committee members.

96 active participants from 26 countries enjoyed state-of-the-art technical sessions on evolutionary multi-criterion optimization (See the attached picture). There were six oral sessions as follows: "Performance Evaluation and Objective Handling", "Algorithm Design", "Many Objective Optimization", "Engineering Design", Alternative Method and Application. And four invited presentations were performed: "Decision Making in Evolutionary Optimization" by Dr. Fonseca, "Improving the efficacy of Multi-Objective Evolutionary Algorithm" by Prof. Tan, "Aspiration Level Methods in Interactive Multi-Objective Programming and Their Engineering Applications" by Prof. Nakayama and "MOEAs in the Design of Network Centric Systems" by Dr. Lamont. The conference proceedings was published through Springer. Next EMO will be held in 2009. The detail information will be sent through several mailing lists of multi-criterion optimization community. If you are interested in joining it, please send e-mail to one of the steering committee member of EMO shown in the web site:

http://is.doshisha.ac.jp/emo07/index.html

3.3 Operations Research 2007

Jutta Geldermann (Chair for Production and Logistics, Georg-August University Göttingen, Germany)

This year, the International Conference "Operations Research 2007", as the annual main meeting of the GOR (Gesellschaft für Operations Research e.V.) took place at the Saarland[1] University in Saarbrücken, from 5th–7th September 2007. The conference was devoted to the role of Operations Research in the service industry, since the transition of many countries from a production orientation to a service society combined with a continuous demographic change generated a need for intensified Operations Research activities in this area. Accordingly, the OR2007 was preceded by a one day tutorial on Operations Research in Hospitals, emphasising the practical relevance of scientific methods for improved decision making.

The scientific program consisted of over 310 contributed talks, which are organized in 18 scientific sections, including one section devoted to software applications in the field of Operations Research. Three plenary and twelve semi-plenary talks were offered to the approximately 400 participants from 30 countries. In addition, several publishing and software companies exhibit their current, OR related, products.

The session Multi Criteria Decision Making comprised four sections, demonstrating the large scope of our research topic:

- Data Envelopment Analysis (DEA) (chaired by Andreas Kleine, Institute of Business Administration, University of Hohenheim)
- Multi Objective Decision Making (MODM) (chaired by Stefan Ruzika, Department of Mathematics, University of Kaiserslautern)
- Fuzzy Systems (chaired by Jutta Geldermann, Chair for Production and Logistics, University of Göttingen)
- Applications of MCDM (chaired by Martin Josef Geiger, Chair for Industrial Management, University of Hohenheim)

It should be noted that topics of multi criteria decision making had been tackled as well in numerous other sessions with special sections, e.g. "Facilities Planning and Multiple Criteria" in the session "Production and Service Operations Management" or "Data Envelopment Analysis" in the session "Finance, Banking and Insurance". In addition, the sessions on Production and Service Operations Management, Scheduling and Project Management, Project Management, Simulation, System Dynamics and Dynamic Modelling, Supply Chain Management and Traffic, Graphs and Networks, Applied Quantitative Analysis, Health Care and Applied Probability offered presentations on the application of Multi Criteria Decision Making as well. This underlines the importance of our field of research, which obviously reached significant relevance for practical application.

Since up to 17 presentations in different sessions took place in parallel, the individual sections could retain their familiar atmosphere, giving space for intense discussions. A most gratifying development is the growing participation of colleagues from all over the world, namely from France, Serbia and Thailand in our session. Unfortunately, the colleagues from Iran, who submitted several papers, neither appeared nor excused themselves, leaving gaps in the programme, which raised complaints by several conference attendees.

[1] The Saarland is a state in Germany on the Franco-German border with roughly 1 million inhabitants. It is named after the Saar River, which flows through the area. Because of its extensive coal deposits, the region was long contested between Germany and France, especially after World War I, when the League of Nations assigned the administration of the newly formed Saar Territory to France. After a 1935 plebiscite Saarland became a German province, but it was again placed under French control in 1945. Autonomy was rejected by the populace in 1955, and the region officially became a state of West Germany in 1957.

The semiplenary talk "Assessing Decision-Making Practices: The Good, the Bad and the Ugly" was given by Nadia Papamichail, Senior Lecturer in Information and Decision Systems at the Manchester Business School and the University of Manchester. She highlighted the results of an ongoing research project on decision lifecycles in a leading UK telecommunications company, concluding that decision making practices can be improved through consultations with stakeholders (i. e. customers, shareholders, investors, business partners and employees) with the aim of establishing a decision vision as well as a strategic plan to achieve this.

Jutta Geldermann (University of Göttingen

Nadia Papamichail (University of Manchester)

The informal get together at the registration, the welcome reception and the conference dinner gave ample opportunities to discuss with colleagues and friends. Especially the Conference Dinner should be mentioned, which took place at the World Cultural Heritage Völklingen Ironworks (Völklinger Hütte) built in 1873. At the moment, the exhibition "Genius I - The mission: discover, research, invent" opens up the vast panorama of the most significant inventions that have impacted human life from ancient times to the present day in the impressive environment of the blower hall of the Ironworks.

Altogether, the OR 2007 was a major event of the Operations Research Society in Germany, and our special thanks go to Stefan Nickel (Chair for Operations Research and Logistics, Saarland University) and his team for their tremendous effort to make the conference a success. More information, including the Final Programme with all abstracts, can be found at: http://www.or2007.de

4 Upcoming Events

4.1 GOR Working Group Meeting, March 12–14, 2008, Wittenberg, Germany

The next meeting of the GOR Working Group "Decision Theory and Practice", together with the GOR Working Group "OR in Energy, Environment and Life Sciences", covering Multi Criteria Decision Making, will be organized by Frank Heyde and Christiane Tammer (Institute for Mathematics, Martin-Luther University Halle-Wittenberg; Email: frank.heyde@mathematik.uni-halle.de) at the LEUCOREA in Wittenberg (http://www.leucorea.de) from 12th - 14th March 2008. Any interested researchers and practitioners are cordially invited.

4.2 EWG-MCDA'67 meeting, April 3–5, Rovaniemi, Lapland (Finland)

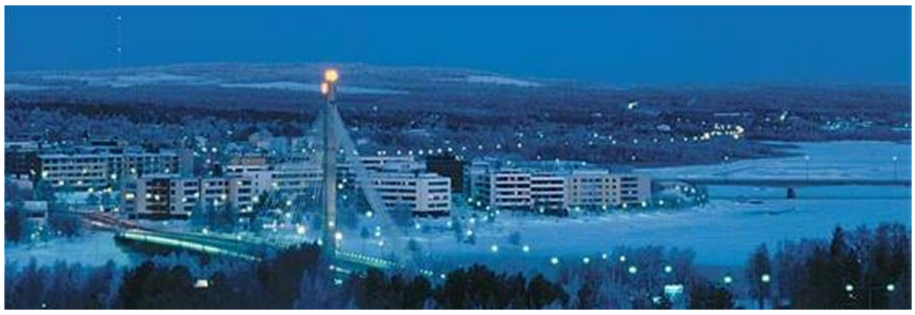
Risto Lahdelma, University of Turku

The 67th meeting of the European Working Group "Multiple Criteria Decision Aiding" will be held on April 3–5 in Rovaniemi, Lapland (Finland).

Location of Rovaniemi on the Arctic Circle

The working group was created at the initiative of Bernard Roy during the first EURO conference (Brussels, 1975); since that time, it remains one of the most active EURO Working Groups (EWG). The working group is open to anyone who wishes to participate. For becoming a member, it is sufficient to advise either the chairman of the group (Bernard Roy, roy@lamsade.dauphine.fr), or the organizer of the next meeting.

The meeting is organized by the Finnish Operations Research Society (FORS). The theme of this meeting is "Public and private interests in MCDA". All contributions dealing with multiple criteria decision aiding, and in particular those relating to the theme of the meeting, are welcome. Communications can be made in both official languages of the group: English and French.



Night-view over Rovaniemi from Ounasvaara hill

Rovaniemi is the 'capital' of Lapland, located on the Arctic Circle. Rovaniemi is a small town with diverse cultural and recreational possibilities. The Ounasvaara arctic hill with lifts for down-hill skiing and snowboarding lies next to the city centre. You can also try out cross-country skiing, hiking or driving a snowmobile, reindeer or dog sledge into the vast backwoods and let the silent beauty of the wilderness surround you. For a really refreshing experience, you can do as the Finns do – take a quick swim in a hole in the river ice – and then rush into a hot sauna to warm up.

Cross-country skiing in Lapland

Reindeer sledge

The meeting site lies in the city centre. Accommodation options extend from a four star city hotel to a hostel, all within walking distance from the meeting site. Luxury cottage apartments of different sizes with common living room, kitchenette, bathroom, sauna and separate 2-person bedrooms are also available for 1–N persons. These are located next to the skiing centre some 3 km from the meeting site.

The organizers appreciate registration before January 7, 2008. Additional information and registration forms are available at the site www.operaatiotutkimus.fi/mcda67/. The organizers can also be contacted by email: mcda67@gmail.com.

We look forward to meeting you with lots of snow, fun and MCDA in Lapland!

Risto Lahdelma
Chairman of the organizing committee

4.3 CORS'2008, May 12–14, 2008, Quebec, Canada

Belaid Aouni, Laurentian University

The CORS/Optimization Days 2008 joint Conference will take place from May 12 to 14, 2008 at Université Laval, Quebec City (Canada). I am organizing a cluster on Multicriteria Decision Aid and Multi-Objective Programming. I would like to invite you to participate in this cluster.

The guidelines for submitting abstracts are available online at the conference web page http://www.cirrelt.ca/scrojopt2008/. Please send me a copy of your abstract or submit it through the conference website.

Please do not forget to specify that your abstract is for the Multicriteria Decision Aid Cluster. For additional information on the CORS/Optimization Days 2008 meeting, please go to the conference web page. Please send me a notice if you plan to participate in this Conference.

My e-mail is: baouni@laurentian.ca.

5 Research Team Presentation

5.1 Operations Research and Multi-Objective Optimization, University of Nantes and CNRS, France

Xavier Gandibleux and Matthias Ehrgott

Environment
The LINA (Laboratoire d'Informatique de Nantes Atlantique) is the Computer Science laboratory of the Nantes-Atlantique region of France (FRE CNRS 2729 today, UMR CNRS from January 2008). The lab is hosted by the University of Nantes and the Ecole des Mines de Nantes (School of Engineering) and counts 70 permanent staff. Its scientific project is to develop international research in the "Computer Sciences", with two principal orientations: Distributed software architectures and decision-aid systems. The lab's research teams work on several areas of optimization, such as constraint programming, integer programming, graph theory, bio-informatics, preference modelling and data mining, to name a few.

Formally created in December 2006, the team "Operations research and multi-objective optimization" (ROOM) is the youngest and the smallest of the 11 research teams hosted by the LINA. It is located at the Faculty of Sciences, University of Nantes. With this team, OR and MCDM are now two additional areas of optimization covered by the lab.

The Team
With the recruitment of Xavier Gandibleux in 2004 as full professor in Computer Science by the University of Nantes, and Matthias Ehrgott in 2006 as director of research at the CNRS within LINA, the team is built on basis of more than 10 years of joint work in multi-objective optimization. In 2007, Anthony Przybylski has been recruited by the University of Nantes and he

has joined the team as assistant professor. The core of the team consists of these three permanent members.

Non-permanent members are involved in the team for some periods. Sana Belmokhtar (from Ecole des Mines de Saint-Etienne) has joined us as researcher in 2006–2007. She is now assistant professor at the University of Nancy at Epinal. Hadrien Hugot (who is finishing his PhD thesis at LAMSADE, University of Paris Dauphine) got a post-doctoral position in our team funded by the CNRS. He will join us for one year, starting in October 2007.

Master and PhD students contribute to the works of the team. Currently Julien Jorge is preparing his PhD thesis and another PhD student will joint us soon. Former PhD students who prepared their thesis under our supervision are Xavier Delorme (now assistant professor, Ecole des Mines de Saint Etienne) and Anthony Przybylski (now assistant professor, University of Nantes).

Research Activities

Our work, based on discrete optimisation in Operations Research, focuses on the accumulation of knowledge towards the development of advanced optimization methods that are capable of solving complex optimization problems in reasonable time. The optimization problems of interest are reference problems in discrete optimization and their application in socio-economic contexts, such as railway transportation (capacity of railway infrastructure), airline operations (crew scheduling), communication networks (routing policies, deployment of new infrastructure), and health (radiotherapy treatment of cancer).

In this context, the motivation characterizing the research direction of the team is to study, model, and solve large scale multiobjective discrete optimization problems. Procedures for these problems are essentially problem dependent and employ, among others, efficient enumerative methods or hybrid optimization techniques (multiobjective metaheuristics and exact algorithms). Our research directions are:

1. *Fundamental*: Study, characterization, and understanding of discrete and combinatorial multiobjective optimization problems.
2. *Methodological and algorithmical*: New techniques and methods for the solution of large scale discrete and combinatorial multiobjective optimization problems; Development of algorithms to improve the efficient solution of NP-hard single and multiobjective problems.
3. *Validation and verification*: Application to real world multiobjective optimization problems with the ultimate goal of being able to solve concrete problems in complex real world environments (production systems, transport, communication, health). Most applications are collaborations with industrial partners such as Alcatel, France Telecom, SNCF, DB, Auckland Hospital, Air New Zealand.

Some Results of Our Work

State of the Art Annotated Bibliographic Survey. For many years we collected and summarized the literature on multi-objective combinatorial optimization (MOCO) problems. In 2000 and in 2002, papers reporting our synthesis have been published. Later we did a similar work about multi-objective metaheuristics (MOMH). M. Ehrgott, X. Gandibleux (2000). A Survey and annotated bibliography of multiobjective combinatorial optimization. OR Spektrum, 22(4): 425-460.

Path-relinking for multi-objective optimization. Approximation methods for MCDM problems have received a lot of attention in recent years. With two Japanese colleagues we introduced the path-relinking concept for MOMH with success for many MOCO problems. X. Gandibleux, H. Morita, and N. Katoh (2004). Evolutionary operators based on elite solutions for bi-objective combinatorial optimization. Chapter 23 in Applications of Multi-Objective Evolutionary Algo-

rithms (C. Coello Coello and G. Lamont Eds.), pp. 555-579. Advances in Natural Computation Vol. 1, World Scientific, Singapore.

Two phase method for MOCO problems. Introduced in the nineties by Ulungu and Teghem, this method has been considered as a generic method for bi-objective optimization problems. One of the major contributions Anthony Przybylski's PhD thesis has been the generalisation of this method for dealing with problems with more than two objectives. A. Przybylski (2006) Méthode en deux phases pour la résolution exacte de problèmes d'optimisation combinatoire comportant plusieurs objectifs : nouveaux développements et application au problème d'affectation linéaire. PhD thesis, University of Nantes, December 2006 (In French).

Exact and efficient procedures for solving the linear assignment problem with two and three objectives: Considered as a fundament optimization problem, we proposed algorithms for the exact solution. They have been demonstrated to be the most efficient algorithms considering the literature available. A. Przybylski, X. Gandibleux and M. Ehrgott (2008). Two-phase algorithms for the bi-objective assignment problem. European Journal of Operational Research 185(2):509-533

Railway infrastructure capacity: The question investigated here can be stated as follows: "How many trains can go through a junction or a station?". With the cooperation of partners we developed methodologies, algorithms and software dealing with this question. The case studies are real situations from the SNCF (France) and the DB (Germany) networks. J. Rodriguez, X. Delorme, X. Gandibleux, Gr. Marlière, R. Bartusiak, F. Degoutin, and S. Sobieraj (2007). RECIFE: models and tools for analyzing rail capacity. Recherche Transports Sécurité, 95:19-36.

Optimization of radiotherapy treatment design: This complex problem concerns the selection of beams, optimization of beam intensity and scheduling of the treatment unit in order to deliver a radiation dose that destroys the tumour while protecting healthy tissue. The team has conducted work on all aspects of this problem. L. Shao, M. Ehrgott (2007). Approximately solving multiobjective linear programmes in objective space and an application in radiotherapy treatment planning. Mathematical Methods of Operations Research. Accepted for publication.

Some Major Events Involving the Team Members

The members of the team have been involved in several international scientific events, four of which are immediately related to the MCDM field.

1. MOMH 2002: Multiple Objective Metaheuristics Workshop, November 4-5, 2002, Paris - France http://webhost.ua.ac.be/eume/welcome.htm?workshops/momh/fillinaddress.php&1
2. MOPGP 2006: 7th International Conference on Multi-Objective Programming and Goal Programming, June 12-14, 2006, Loire Valley (Tours), France http://www.mopgp06.org/
3. MCDM 2008 : 19th International Conference on Multiple Criteria Decision Making, 7 - 12 January 2008, Auckland, New Zealand https://secure.orsnz.org.nz/mcdm2008/
4. EMO 2009: 5th International Conference on Evolutionary Multi-Criterion Optimization. First Semester 2009, Nantes, France http://www.emo09.org/

At the national level, the French Working Group dedicated to Multiple-Objective Programming (PM2O) has been co-founded on 1999 by Xavier Gandibleux. He has served as the coordinator of this group for four years.

Visitors and Collaborators

Invited professors who visited us recently for a period of one month were Kathrin Klamroth in

2005 (University of Erlangen-Nuremberg, Germany), Eric Taillard in 2006 (HEIG-VD, Switzerland), and Margaret Wiecek in 2007 (Clemson University, USA). The team also hosts visiting PhD students: Daniel Salazar Aponte from University Las Palmas de Gran Canaria (6 months from Sept 2005) and Andrea Raith from Auckland University (3 months from August 2007). If you are interested in visiting us, please contact us.

We have a long tradition of working with colleagues in OR and MCDM. Several collaborations are on-going with Karl Doerner and Sophie Parragh (University of Vienna, Austria), Dario Da Silva (University of Nottingham, UK), Naoki Katoh (Kyoto University) and Hiroyuki Morita (Osaka Prefecture University) to name a few.

Since 1999 we are involved in research works related to railway transportation. Joaquin Rodriguez (from INRETS, the French National Research Institute on Transportation and Security) is one of our collaborators on this topic.

To conclude this section, we are collaborating also with colleagues of regional institutions: Fabien Le Huédé (Ecole des Mines de Nantes), Philippe Dépincé (Ecole Centrale de Nantes), Vincent Barichard (University of Angers) and Marc Sevaux (University of South Brittany-Lorient).

Projects
The team is strongly involved in a large regional project called MILES since the regional council "Pays de la Loire" has recognized "Decision Aid Systems" as a prioritized research theme. In associating the regional research teams in optimization inside this project, it represents a significant task force in the west of France.

Software
RECIFE is a decision support system specifically designed for the analysis of railway infrastructure capacity. For a given station or node of the network, various functionalities such as verifying the feasibility of expected traffic, studying infrastructure saturation and stability of resulting timetables are offered to a decision maker. Two geographical situations have already been studied: The Pierrefitte-Gonesse node located north of Paris and the Lille-Flandres station.

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6 New Books/ Book Series

6.1 Advances in Operations Research

Series Editor: Prof. Constantin Zopounidis, Technical University of Crete

Since its introduction in the 1940s, operations research (OR) has evolved rapidly in terms of its theory and its real world applications. OR is now a well established field, covering a broad field of topics, including but not limited to inventory management, logistics, transportation, telecommunications, finance, service operations, health care, public policy and marketing.

This book series focuses on the publication of high quality books (monographs and edited volumes) on new OR and Multicriteria Decision Making methodologies, but it also emphasizes on real world applications from a broad range of fields. Special interest is given on books exploring the interdisciplinary character of OR and its connections with other fields, such as probability theory and statistics, artificial intelligence and computer science, fuzzy sets, simulation, etc.

Proposals should be submitted electronically to the Series Editor.
https://www.novapublishers.com/catalog/product_info.php?cPath=23_29&products_id=6829

6.2 Studies in Financial Optimization and Risk Management (Series Description)

Series Editor: Prof. Constantin Zopounidis, Technical University of Crete

Risk management has evolved within the field finance as a topic of major practical importance for corporate entities, firms, organizations and investors. Optimization models and methods play an increasingly important role in financial risk management. Many problems in quantitative finance and risk management such as asset allocation, derivative pricing, value at risk modeling and model fitting, are now efficiently solved using state-of-the-art optimization techniques.

The purpose of this book series is to cover this exciting and rapidly growing field through the publication of high quality books (monographs and edited volumes) related to financial optimization and risk management, which would be of interest to researchers and practitioners working on this field.

Proposals should be submitted electronically to the Series Editor.
https://www.novapublishers.com/catalog/product_info.php?cPath=23_29&products_id=6430

7 Sources of Information

- Homepage of the International Society on Multiple Criteria Decision Making. Website: http://www.terry.uga.edu/mcdm/
- Kaisa Miettinen's website has several interesting links with Operational Research and Multi-Criteria websites (scientific societies, journals, conferences, etc.). Website: http://www.mit.jyu.fi/miettine/lista.html
- The website of the EURO Working Group on Multicriteria Decision Aiding has lots of useful information on multi-criteria. Website: http://www.inescc.pt/~ewgmcda/index.html
- Vincent Mousseau's database of research publications on MCDA has more than 2400 records, and it is a good source of information. Website: http://www.lamsade.dauphine.fr/mcda/biblio/
- Carlos A. Coello Coello maintains the EMOO web page, an archive of publications, software and other material related to multi objective optimization. Website: http://www.lania.mx/~ccoello/EMOO/

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The newsletter of the International Society on Multiple Criteria Decision Making is published three times a year (March, July, November). Contributions can be sent at any time to the editor (please see the address provided above).