Editorial

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Biographical notes: Pascal Oberti is an Associate Professor in Environmental Economics at the University of Corsica since 1998, with accreditation to supervise doctoral research (in French HDR) from the University of Versailles Saint-Quentin-en-Yvelines. He led academic activities and is in charge of Master courses such as participatory MCDA and environmental evaluation. Since 1995, he is a member of the European Working Group on MCDA. At the University of Corsica, his scientific research is part of the laboratories UMR CNRS 6240 LISA, UMR CNRS 6134 SPE and FRES FR3041. His scientific interests are operational research and multi-criteria evaluation based on ELECTRE outranking methods, participatory MCDA and software development. The real territorial studies relate energy policy, sustainable energy systems, solar energy and environmental management. He is a Scientific Advisor of MPAs Managers in Corsica and reviewer in *Journal of Environmental Management*, *Journal of Systems Science and Systems Engineering* and *Journal of Regional and Urban Economics*.

Dominique Bollinger is a graduate in Rural and Environmental Engineering from the Ecole Polytechnique Fédérale de Lausanne and is a Senior Professor in Environmental Engineering at the Haute Ecole d'Ingénierie et de Gestion du Canton de Vaud (UAS) where he is in charge of Bachelor and Master courses in environment while leading the environmental laboratory of the G2C Institute. His background combines environmental and territorial expertise with strong MCDA practical and methodological experience. Since 1996, he is a member of the European Working Group on MCDA, co-author of two books on MCDA, which became practical studies references and public call for tender world. He is the author of more than 20 scientific articles about multi-criteria approaches and environmental case studies. In 1998, he co-founded with Jacques Pictet the Bureau d'aide à la décision «Pictet et Bollinger».

This special issue on 'Environmental and spatial considerations in multicriteria evaluation' is a selection of substantially extended papers presented at the 73rd and 74th Meetings of the European Working Group on Multicriteria Decision Aiding (see http://www.cs.put.poznan.pl/ewgmcda/). Conference papers have been rewritten and peer-reviewed according to strict standards of the *International Journal of Multicriteria Decision Making* (*IJMCDM*). The aim of this special issue was to attract papers that develop and promote environmental and spatial considerations in the research area of multi-criteria evaluation (ME). Were particularly expected original contributions on applications to concrete territories or/and using geographic information systems (GIS), new tools and frameworks, integration between GIS and ME for decision analysis.

The peer review process led to seven accepted papers, such as theoretical contributions, methodological ones, software and applied works. The key covered topics are the following: levels of MCDA-GIS integration, spatial ME, preference modelling on decisional maps, assessment of sustainability, effectiveness and participatory multiple criteria decision aid. The tools and methodologies involved are varied: outranking multi-criteria methods such as ELECTRE TRI or ELECTRE TRI-C sorting models and the PROMETHEE-GAIA framework, Choquet integral, utility model, analytic network process, dominance-based rough set approach, but also distributed open source web-application. The application cases concern decision support systems infrastructure, best location for a new waste incinerator plant, improved farming practices and risk of surface water pesticide contamination, urban transformation scenarios and wind power development. The countries considered are Italy, France and Canada. The seven accepted papers are summarised hereafter.

The first article is by K. Lidouh, with the title 'On the motivation behind MCDA and GIS integration'. This paper explores the current offer in the MCDA-GIS field. It presents first the reasons for integrating MCDA and GIS, since the start of the '90s. The characteristics of three levels of MCDA-GIS integration (weak coupling, tight coupling and full integration), the operational and technical aspects of such systems and their strong and weak points are considered. Existing software that provide integrated solutions for a general decision problem and the used tools to produce a working MCDA-GIS solution for a specific purpose are described. Paper deals with the usability aspects of the integration, particularly the lack of studies to assess the expectations of all the actors in a decision problem and to help them communicate and work together. The author concludes that the analysis and communication of the results can truly benefit from the integration in a single system.

The second article is by L. Boerboom and Ö.O. Alan, with the title 'A distributed open source web-application for spatial multi-criteria evaluation for decision support systems infrastructure'. In this paper, the authors consider that the growing amount of spatial data on the web, organised in spatial data infrastructures, is not necessarily good for decision making. A lot of effort has been spent on providing and sharing data but in the absence of web-based applications for spatial decision aiding relatively little returns have been gained in terms of an integrated use of these data. Thus, they discuss the opportunities that new spatial and multi-criteria decision analysis web service technologies offer in combination with technology to distribute computing and analysis. Is reported the architecture and a new framework based on the first prototype of the open source distributed spatial multi-criteria evaluation (D-SMCE) web application.

The third article is by S. Aimé Metchebon T., V. Brison and M. Pirlot, with the title 'Two models for comparing decisional maps'. This paper explores the preference

modelling on a set of maps representing the state of a given region at different stages of an evolution. A first approach only takes into account the frequency distribution of the zones that belong to the various categories of the ordinal assessment scale. This model is a direct transposition of the expected utility model in decision under risk. A second model, given by the authors and based on the Choquet integral, also takes into account one related to geographic location, namely the contiguity of the zones belonging to the same category. For both models are developed procedures for eliciting the models parameters and illustrate them on an example taken from a real world application. A section is dedicated to more general models integrating contiguity, and examples of tests for validating or invalidating the chosen model are suggested.

The fourth article is by M. Bottero, V. Ferretti and G. Mondini, with the title 'A Choquet integral-based approach for assessing the sustainability of a new waste incinerator'. This paper proposes to study the contribution that the Choquet integral offers in sustainability assessment of undesirable facilities location problems, taking into consideration the existence of interactions among the criteria and paying particular attention to the use of quantitative indicators in the evaluation process. The analysis takes into account the opinion of several experts in determining the importance of the different elements of the model. The multi-criteria approach is able to support decision makers in the choice of the best location for a new waste incinerator plant that has to be constructed in the Province of Torino (Italy)

The fifth article is by F. Macary, J. Almeida-Dias, D. Uny and A. Probst, with the title 'Assessment of the effects of best environmental practices on reducing pesticide contamination in surface water, using multi-criteria modelling combined with a GIS'. The paper presents a methodology, combining the ELECTRE TRI-C sorting multi-criteria outranking model with a GIS, applied to improved farming methods on a study site located in the southwest of France. The approach is able to assign each farming parcel to one of the five levels of risk associated with surface water pesticide contamination and also to assess the effectiveness of best environmental practices.

The sixth article is by F. Abastante, M. Bottero, S. Greco and I.M. Lami, with the title 'Dominance-based rough set approach and analytic network process for assessing urban transformation scenarios'. In this paper, the authors show the contribution that two different multiple criteria decision aiding (MCDA) methods could provide in the field of strategic decisions and urban and territorial planning. In particular, the analytic network process and the dominance-based rough set approach have been considered and discussed in the work with reference to their role in supporting such decision-making processes. The different contributions given by the two approaches are compared in this specific domain of application involving urban and territorial transformations, sustainable development, urban requalification and transport planning.

The seventh and final article is by M. de L. Vazquez, J-P. Waaub and A. Ilinca, with the title 'Territorial intelligence modelling for energy development (TIMED) – a case study for the Baie-des-Sables (Canada) wind farm'. This paper presents the application of a new approach, territorial intelligence modelling for energy development (TIMED), developed in response to growing concerns about the social acceptance of wind farms. Project development is based on procedure transparency and involvement of all stakeholders, involving two approaches: multi-criteria decision aid (MCDA) based on the PROMETHEE-GAIA outranking method, coupled with participatory and collaborative GIS. The model was tested an academic research. If this approach requires more efforts

from the wind farm developer at the preparation stage it has the advantages of reducing the risks and overall duration of the infrastructure launching.

The Guest Editors of this special issue, Pascal Oberti and Dominique Bollinger, would like to thank the authors of the papers and the anonymous reviewers for their time and efforts to fulfil this endeavour. They would also like to especially thank Professor Constantin Zopounidis, Editor-in-Chief of *IJMCDM*, for his help in the final publication of this special issue. Acknowledgements are also addressed to the Professors Bernard Roy and Roman Słowiński, previous and current Presidents of the European Working Group on Multicriteria Decision Aiding (http://www.cs.put.poznan.pl/ewgmcda/), the committees of the MCDA‘73 and MCDA‘74 meetings, the laboratories UMR CNRS 6240 LISA, the HEIG-VD Board of Directors, the G2C institute, the Association of European Operational Research Societies (EURO), Christophe Paoli and Jacques Pictet for their full supports. The Guest Editors hop that this special issue will be beneficial for the MCDA community.