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Editorial

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Intelligent management systems in operations is an important area of application at the interface of Operational Research (OR) and Artificial Intelligence (AI). This is our fourth special issue in this area and the second in *Journal of the Operational Research Society*. Three of the papers in this special issue were presented at the Second European Conference on Intelligent Management Systems in Operations, which was held at Salford in July 2001 and sponsored, like its predecessor, by the Operational Research Society.

There has been a number of efforts that use the joint strengths of OR and AI to solve managerial decision problems since the late 1980 s (see the classic work of Simon, Interfaces, July 1987). Both the AI and OR communities agree about the value of marrying the well-developed OR methodology with the more pragmatic AI approach of using heuristics based on quantitative as well as qualitative criteria. This special issue is focused on the use of AI in Operations, that is, the function which is responsible for the production of goods and services in industry. What characterizes all the papers in this special issue is that they deal with practical problems, present case studies and the lessons learnt.

The first paper, by Perris and Labib, utilizes fuzzy logic to develop a new model for prioritizing patients awaiting organ transplants. The paper presents a systematic study that begins with an analysis of an existing scoring model that is used for prioritizing kidney transplants in the UK. A fuzzy logic version of the existing scoring model is first developed to illustrate some of the key benefits of fuzzy logic. The authors then argue that, given the sensitive nature of the decision-making process, such models must include more humanistic criteria and present a second model that enables the incorporation of criteria such as level of pain and quality of life.

The paper by Barbosa-Povoa and Vieira develops a model for the optimal scheduling of batch production facilities. Unlike most previous studies, which focus primarily on scheduling of production, this paper takes a more holistic view, incorporating both scheduling and distribution. The authors formulate a mixed integer linear program that models production, storage and distribution. The formulation provides the basis for a prototype system that is tested on a case study that aims to optimize the production of polymers.

Bazargan-Lari presents a paper describing the experience of implementing a timetabling system aimed at scheduling flight resources for students on Federal Aviation Approved programmes. The problem tackled is even more challenging than a standard timetabling problem in that it is more dynamic, requires greater flexibility and the life-time of any schedule is short. The author first presents the findings of an attempt to use the timetables generated by a linear integer programming model. This provides the motivation for the development of a distributed web-based approach that allows instructors to publicize their periods of availability and allows students to book sessions on a weekly basis, with the system ensuring that schedules satisfy appropriate constraints. The paper concludes by giving the results of an evaluation of this approach using a simulation.

The effective use of Genetic Algorithms often requires the selection of appropriate values for its parameters, such as population size, rate of mutation and rate of crossover. The paper by Stewardson and Whitfield illustrates how the use of factorial experimental design can be effective in determining appropriate values for such parameters. The paper begins with an introduction to experimental design techniques and summarizes four different experimental designs. The different designs are evaluated by application to a scheduling problem, their relative merits considered and a particular strategy is recommended.

The final paper, by Kobbacy, gives an interesting historical perspective on the development of an intelligent maintenance optimization system. The paper begins with an overview of the author's early work on developing preventative maintenance models for equipment on a North Sea Oil platform some 16 years ago. This early experience is used to motivate the development of a knowledge-based maintenance system, called (IMOS) Intelligent Maintenance Optimization System, which used production rules to select appropriate models. This system is shown to have some weaknesses, including limitations in the number of situations in which it is unable to propose any model. This, together with other aspects of IMOS, are improved by the develop-

ment of a hybrid system that utilizes both rules and case-based reasoning.

We intend to continue our effort to consolidate research in this important area which spreads across a wide spectrum and where publications tend to appear in a range of specialized journals. Organizing conferences that bring these areas together and publishing special issues of journals are definite routes to reinvigorate research efforts in this interdisciplinary area. As such, we are planning for the third European Conference in this area in July 2005 and hopefully you may see our next special issue in this journal shortly thereafter.

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