

Editorial

This second issue of ORiON Volume 26 contains four interesting papers of a vary varied nature.

In the first paper, titled *Modelling household responses to energy efficiency interventions via system dynamics and survey data*, Ian Durbach and Stephen Davis develop a system dynamics model of the way households might respond to interventions aimed at reducing energy consumption. In particular, the authors use a literature review of past research to build an initial integrated model of household electricity consumption, and this model is used to generate a number of research hypotheses about how households possessing different characteristics might react to various types of interventions. A total of five hypotheses are put forward, and these hypotheses are tested using data gathered from an efficiency intervention conducted in a town in the South African Western Cape in which households were able to exchange regular light bulbs for more efficient compact fluorescent lamp light bulbs. In this fascinating paper the authors draw a number of interesting general conclusions, namely (a) that a soft *Operations Research* (OR) approach may prove useful in advancing a non-traditional point of view for which, for historical and/or economic reasons, data are not abundantly available, (b) that, whereas traditional models are heavily quantitative, some scepticism to a soft OR model may be expected, and (c) that a statistical comparison of model results by means of empirical data may be an effective tool in reducing such scepticism.

Remaining with the general theme of electricity consumption, accurate prediction of daily peak electricity demand is very important for decision makers in the energy sector. Such predictions help in the determination of consistent and reliable supply schedules during peak consumption periods. Furthermore, accurate short term load forecasts enable effective load shifting between transmission substations, scheduling of startup times of peak stations, load flow analysis and power system security studies. In the second paper of this issue, titled *Daily peak electricity load forecasting in South Africa using a multivariate non-parametric regression approach*, Caston Sigauke and Delson Chikobvu develop a *multivariate adaptive regression splines* (MARS) modelling approach towards daily peak electricity load forecasting in South Africa over the period 2000–2009. MARS modelling is a non-parametric, multivariate regression model building technique which may be used effectively in high-dimensional problems with complex model structures, such as nonlinearities, interactions and missing data. The models developed in this paper consist of components that represent calendar and meteorological data. The performances of these models are evaluated by comparing them to that of a piecewise linear regression model. The authors find that the MARS models outperform the piecewise linear regression approach by a large margin.

In the third paper, titled *Modelling T4 cell count as a marker of HIV progression in the absence of any defense mechanism*, Sarma Yadavalli, Moremi Labeodan, Swaminathan Udayabaskaran and N Forche develop a model of the evolution of the T4 cell count in an HIV infected individual. This count is considered one of the markers of disease progression and the World Health Organisation has recently advocated that countries encourage HIV infected patients to commence antiretroviral treatment once their T4 cell count drops

below 350 cells per ml of blood (this threshold was formerly 200 cells per ml of blood). This recommendation was issued because when the T4 cell count is low, the T4 cells are unable to mount an effective immune response against antigens and foreign matters in the body, resulting in the individual becoming susceptible to opportunistic infections. The authors develop a stochastic catastrophe model in order to obtain the mean, variance and covariance of uninfected, infected and lysed T4 cells as a function of time. The amount of toxin produced in an HIV infected person from the time of infection to a later time may also be derived from the model. They illustrate the working of their model by means of a series of numerical examples.

A player b in a round-robin sports tournament receives a so-called *carry-over effect* from another player a if some third player opposes a in round i and b in round $i + 1$. For example, if a is a very strong opponent, the third player may be physically exhausted after round i , with b benefiting from this third player's inability to perform to the best of his abilities during round $i + 1$; this situation clearly results in an unfair advantage to player b . Therefore, it is common practice to attempt to construct round-robin tournament schedules in which the sum total of such carry-over effects is minimised. The minimum achievable value of this total carry-over effects value for a round-robin tournament for n players is denoted by $\Gamma(n)$. It is known that $\Gamma(n) \geq n(n - 1)$ for all $n \in \mathbb{N}$ and this bound is realised when there exists a round-robin tournament for n players in which each player receives a carry-over effect from each other player exactly once. It has been shown that this bound is attained for $n = 2^r$ (where r is any natural number) and for $n = 20, 22$. It is also known that round-robin tournaments achieving total carry-over effects values close to $n(n - 1)$ may be constructed from smaller combinatorial objects called *starters*; round-robin tournaments constructed in this way are called *cyclic*. In the final paper of this volume, titled *A tabu-search for minimising the carry-over effects value of a round-robin tournament*, Martin Kidd uses a tabu-search to find starters which produce cyclic tournaments with small carry-over effects values. He is able to match the best solutions in the literature for all $n \leq 22$, while producing new upper bounds on $\Gamma(n)$ for $24 \leq n \leq 40$. He lists tournament schedules achieving small carry-over effects values in a useful appendix.

As always, I trust that the diversity and quality of the four papers in this issue are such that each reader of ORiON will find something suiting his/her particular tastes and interests. Suggestions and comments on publications in ORiON, in the form of letters to the editor, are welcome and may be published in future issues of the journal.

I have been editing ORiON for seven years now, and this has been a very rewarding period of service to the Society for me. However, I believe the time has come for someone else to take over the reins of ORiON, so as to bring new blood and ideas to the editorial team of the journal and to steer ORiON to new heights. I have therefore decided to step down as editor-in-chief of ORiON at the end of this year, this issue of the journal being my swansong.

I would like to thank all the authors who have submitted their interesting operational research work to ORiON over the past seven years; it has been a privilege for me to be able to keep my finger on the pulse of South African operations research by reading all these manuscripts. I would like to urge members of ORSSA to keep on using ORiON

as publication vehicle for making their work known to the local and international OR communities. Thank you also to all the referees who have served ORiON over the past seven years by reviewing manuscripts; their often thankless work has invariably led to substantial improvements in the quality of manuscripts that were accepted for publication. They are the true custodians of ORiON's standards of publication. I would also like to thank the members of the Advisory Board who have so carefully and meticulously advised me with respect to standards on a post-publication basis since 2008, and for helping to resolve refereeing disputes.

I would like to single out six members of the Editorial Team for special mention. First, I would like to thank associate editor John Hearne for managing the review process of a number of papers in Australia on my behalf over the past seven years so as to avoid a conflict of interest. His professional management of this process is much appreciated. Then there are Stephan Visagie, business manager for the last seven years, and his two typesetting assistants of the last four years, Lieschen Venter and Anton de Villiers, whom I would like to thank for their considerable patience and skill during the typesetting and publication processes of each issue since 2004 — without them my hands would be tied. Finally, I would like to thank my two editorial assistants, Adri van der Merwe and Martin Kidd, who have assumed many of my editorial administrative duties over the last four years very meticulously, freeing me to focus on the identification of suitable referees for submissions, the consolidation of referees' reports, publication decisions and high-level strategizing for the journal.

Editing ORiON has at times been a heavy burden, but certainly a very richly rewarding one — may the journal grow from strength to strength during the next seven years of its existence! Finally, I would like to wish the next editor of ORiON, Stephan Visagie, and the new journal manager, Martin Kidd, all the best for their combined term of service to the Society in their new capacities.

Jan van Vuuren
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