



## Editorial: Operational Research – Making an Impact

**Belton, Valerie; Bedford, Tim; Pisinger, David**

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# Accepted Manuscript

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David Pisinger

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## Introduction

The origins of Operational Research are well known. OR developed – in particular in the UK - in the early 1940s as an area in which science was applied and new research inspired by real-world challenges, primarily in military analysis and in industrial production. As OR developed, a community of academic OR scholars became established alongside OR practitioners and this has led quite naturally to the situation that, over time, much of the OR academic literature is inspired by theoretical development rather than by immediate application.

Practical challenges, however, are a constant source of renewal to OR, and the problems thrown up by government and business are ever changing. The UK Operational Research Society serves both the professional and academic communities, bringing these together and ensuring their continuing interaction. A particularly successful initiative in recent years has been the introduction of “Making an Impact” events within the OR Society conference programme which provides a number of different mechanisms to exchange information and to build collaborations.

OR academics are innately comfortable with “Making an Impact” and this put the discipline in a strong position when the UK Government advanced a wider agenda for academic research, taking into account the quality of impact beyond the academic community. This was first formally assessed as part of the 2014 UK Research Excellence Framework, in which the OR academic community demonstrated the extent of its impact through the contribution of a substantial number of impact cases. This approach has received a lot of attention and undoubtedly variants will be applied elsewhere, with corresponding impacts on university funding and opportunities to highlight the benefits of OR research.

When we organised the EURO2015 conference in Glasgow it seemed very natural to celebrate the link of academic research with OR practice and to highlight the way top class research can be intrinsically connected with making an impact in practice. This built on existing initiatives such as the ROADEF/EURO Modelling Challenge, jointly sponsored by the French OR Society ROADEF together with EURO and, for the first time, introduced a wider stream of activities dedicated to stimulating practitioner-academic engagement to the conference programme, highlighting new challenges, demonstrating cases of successful collaboration and practitioner mentorship, all supporting “Making an Impact”. In addition, a number of plenary and keynote presentations provided fascinating insights into challenges from OR practice and highlighted new challenges emerging from industry and public policy.

This special issue of EJOR brings together a collection of papers that illustrate the way that Operational Research continues to develop excellent research with a strong linkage to real world challenges.

The special issue is organised into clusters of papers, firstly a selection of keynote papers presented at the conference, and thereafter sections which focus on:

- OR in Health Services and Humanitarian Projects

- Green Energy
- Supply Chain and Logistics
- Economy

The keynote papers (authored by EURO conference keynote speakers) illustrate nicely the breadth of applicability of OR which makes it such an exciting discipline, covering: developments in the computational algorithms underlying DNA sequencing (Jacek Blazewicz and colleagues); Supply Chain Planning in the modern economy including Internet of Things (IoT) (Stefan Nickel and colleagues); Transport and Logistics challenges, the impact of IoT, big data and more (M Grazia Speranza); and, new approaches to assessing the robustness of solutions to uncertain combinatorial optimization problems, with applications to emergency evacuation (Horst Hamacher and colleagues).

The other papers similarly demonstrate the way that OR is evolving and providing analytical tools to old and new areas.

Within the Health Services section, the challenge areas range from service planning across short term, seasonal and long term time ranges; a predictive diagnostics problem; and the organisation of stem cell registries.

Green energy is a very fruitful area for OR, with lots of new and emerging challenges arising to ensure the successful implementation of new and emerging energy technologies. This section covers challenges such as: logistics planning for the installation of offshore wind farms; location of small-scale hydropower generation; and the design of pricing systems for the international electricity market, which will better enable cross-border sharing of wind energy resources.

While Supply Chain Management and Logistics are a long-standing areas for OR modelling, there are all sorts of new problems emerging from changes to business models and in particular from new technologies. The papers in this section address challenges such as: investment decision support for major engineering companies who wish to improve the production quality of their supply chain; the optimal allocation of products across distribution centres for transportation to retail stores; the forecasting of demand for call centres on special days where exceptional demand may appear; and, disaster preparedness logistics problems

The final section on the economy looks at three other areas of application of OR techniques: supporting the reform of the personal tax system so that policy objectives such as redistribution can be achieved without the creation of too many “losers”; the siting of new biorefineries taking account of raw material availability, scale, and markets; and, the assessment of underlying structural changes in Chinese equity markets where different modelling approaches are required.

In conclusion, we feel that this special issue of the European Journal of Operational Research provides an excellent window on the potential for OR in Practice to Make an Impact on new and important challenges faced by business and society in the world today

and is a fitting legacy of EURO 2015, the 27<sup>th</sup> European Conference on Operational Research.

ACCEPTED MANUSCRIPT