

## Tools and Techniques for Managing Many-Criteria Decision-Making

Peter J. Fleming, *Fellow, Royal Academy of Engineering, Fellow, IET, Fellow, InstMC*

**Abstract**—Design problems arising in business and industry can often be conveniently formulated as multi-criteria decision-making problems. However, these often comprise a relatively large number of criteria. Through our close association with designers in industry and business we have devised a range of machine learning tools and associated techniques to address the special requirements of *many*-criteria decision-making. These include visualisation and analysis tools to aid the identification of features such as “hot-spots” and non-competing criteria, preference articulation techniques to assist in interrogating the search region of interest and methods to address the special computational demands of these problems. With the aid of test problems and real design exercises, we will demonstrate these approaches and also discuss alternative methods.

Peter Fleming is Professor of Industrial Systems and Control in the Department of Automatic Control and Systems Engineering, University of Sheffield S1 3JD, UK (email: [P.Fleming@sheffield.ac.uk](mailto:P.Fleming@sheffield.ac.uk)).