Quot homines, tot sententiae

This volume is a Festschrift in honour of Stanley Zionts. The occasion is his upcoming 60th birthday in January, 1997. Dr. Zionts, Alumni Professor of Decision Support Systems, State University of New York at Buffalo, is one of the leaders of the field of Multiple Criteria Decision Making. He is the founder of the International Society of Multiple Criteria Decision Making and its first President. In the seventeen years since its formation, under his leadership and under the leadership of Professor Ralph Steuer, the Society has grown and become very international, reflecting the nature of the field. Today it encompasses some 1200 members representing 82 different countries.

The personal contributions to research of Stanley Zionts are far reaching. They range from mathematical programming to financial modelling to multiple criteria decision making to negotiation modelling. He has written important contributions to the theory and practice in all of these fields, but particularly to the interrelated fields of multiple criteria decision making and negotiation modelling – and undoubtedly will continue producing such contributions. In his research, Stanley Zionts has always maintained a healthy balance between theory and the needs of practice.

Stanley Zionts has over the years served in many capacities. He has acted as the adviser and mentor to numerous graduate students. He has been a stimulating colleague and co-author to many of us. His quest for the highest standards of excellence in research has served – and will serve – as an example for all of us.

This volume consists of more than twenty original contributions written by some of Stanley Zionts' former students, colleagues, co-authors and friends, of whom more than a few are in leading positions in the academic world in different countries all over the world. In fact we cannot recall a research monograph in our field written by such a distinguished group of scholars. The contributions discuss recent research in the theory and practice of multiple criteria decision making and related fields.

Our idea of writing a Festschrift in honour of Stanley Zionts was met with enthusiasm. Our friends and colleagues expressed their willingness to contribute to such a volume, even though at that point we had no idea of the publisher.
The editors wish to thank all contributors to this volume and the Springer Verlag for their efficient and professional publishing of this volume. We hope that this volume will not only be a fitting birthday present for Stanley Zionts, but that

many graduate students and scholars working in the field would find it a valuable and stimulating reference. We also want to express our gratitude to our secretaries. Their kind assistance was indispensable in managing the globetrotting streams of information and papers, both in electronic and hardcopy format, going between the authors and the editors. A special word of thanks goes to Hélène Molenaar who took the responsibility for preparing the manuscript of the total volume as it was sent to the publishers.

Apart from this introduction and a final part in which the life and work of Professor Zionts is highlighted, this volume consists of three parts. The first part has been devoted to multiple objective linear programming and interactive methods. Stewart discusses the convergence and validation of interactive methods in MCDM. In his paper he reviews simulation studies, in which interactive methods of both the value function and goal programming types have been implemented in hypothetical computer-generated decision contexts. The results of these simulation studies provide a substantial level of validation for both types of interactive methods, but do also provide warnings of how careless implementation of these methods can lead to very poor results. Also Wierzbicki has studied the issues of convergence of interactive methods in multiobjective optimization and decision support. Known procedures with guaranteed convergence under classic assumptions are reviewed. An alternative approach to convergence based on an indifference threshold for increases of value functions or on outranking relations is proposed and illustrated by a new procedure called Outranking Trials. Kaliszewski, Michalowski and Kersten propose a new hybrid interactive technique, which allows the decision maker to use different search principles depending on his/her perception of the achieved values of the objectives and trade-offs. Angur and Lotfi compare the aspiration level interactive method (AIM) and conjoint analysis. They present the results of an empirical analysis based on subjects' preferences for a multiattribute product (buying a house) and a service (selecting an MBA program for study). Korhonen provides a historical overview and state-of-art review of the development of the reference direction approach to multiple objective linear programming. Steuer implements the Tchebycheff method in a spreadsheet available on almost everyone's PC, thus greatly increasing the transportability of interactive multiple objective programming software.

The second part of this volume has been devoted to the analysis of preferences and learning. Zeleny develops the notion of optimum conceived as a balance among multiple criteria. He proposes a classificational scheme of eight different, separate and mutually irreducible optimality concepts, with the traditional single-objective 'optimality' representing a one special case. Bouyssou, Pirlot and Vincke present a general model which encompasses many procedures used for aggregating

preferences in multicriteria decision making (or decision aid) methods. They cover MAUT, ELECTRE and several other outranking methods. Atherton and French highlight some of the anomalies between how people 'should' make and how they 'do' make intertemporal decisions: i.e. between findings in the normative and descriptive literatures. The intention is to identify some of the bridges which need to be built between descriptive and normative ideas if decision makers are to be supported effectively in making intertemporal decisions. Fishburn discusses cancellation conditions for multiattribute preferences on finite sets in the broad context of the theory of additive conjoint measurement. Axiomatic theories for additive utilities are well developed but are not without gaps. In this contribution, a number of interesting new insights are delivered. Larichev investigates how to measure differences in the preferences of different decision makers or the same decision maker (DM) over time when using the Weighted Sum of Criteria Estimates method. A new measure is suggested: the number of alternative pairs in complete order given by WSCE for which the superiority of one alternative upon the other depends on DM's preferences. Yu and Liu describe basic concepts of the habitual domain theory. They present three of the most commonly used principles of expanding habitual domains. In addition, they present a theoretical interpretation of the principles using the notion of activation probabilities and attention spectra. Nakayama writes that one of the main themes in artificial intelligence is to simulate brains of human beings. Techniques in artificial intelligence are usually discussed for different brain functions separately. For example, decision making is a major brain function. This paper shows several kinds of multi-objective problems which appear in artificial intelligence along with some trials for solving them.

The third part of this volume consists of a number of real life problems and cases approached by different types of decision-oriented methods. Kim, Moskowitz and Shin propose a decomposition algorithm that can also be applied to forming machine cells and part families in flexible manufacturing systems when the design incidence matrix is nonbinary with no diagonal structure and the column entities are correlated. Brockett, Cooper, Kwon and Ruefli compare ex ante and ex post evaluations of mutual fund investment strategies. Ex ante evaluations of risk and return are found to be positively correlated – as posited in the finance, decision theory and economics literatures – but their ex post pairings are negatively related. Somewhat surprisingly, ex ante to ex post evaluations of risk are positively correlated while ex ante to ex post evaluations of return are negatively correlated. Hallerbach and Spronk present a multi-dimensional framework that can serve as a decision aid in the portfolio selection and management process. The framework yields room for different settings of the portfolio management problem and offers

an alternative to both unstructured ad hoc approaches and complex approaches that severely restrict the decision process. Cohon starts from the position that sustainable development has emerged as the centerpiece of natural resources management and environmental protection. The purpose of his paper is to demonstrate the potential role of MCDM in planning for sustainable development, using the example of water resources in India. Teich, Korhonen, Phillips and Wallenius contribute to the discussion on BATNA, the Best Alternative to a Negotiated Agreement by offering some extensions. In addition they improve the methodology of conducting negotiation experiments. They illustrate this by means of an experiment testing several hypotheses concerning the role of BATNA. Köksalan and Kondakci briefly review various categories of approaches to multiple criteria scheduling on a single machine. They then present a general approach to find the most preferred schedule in a bicriteria environment for any given nondecreasing composite function of the criteria. Boffey and Narula review research on point location covering problems and their development from the Maximal Covering Location Problem. With this as a basis, a particular path problem (the Maximal Covering Shortest Path Problem) is chosen to serve as a prototype combined covering – location – routing problem and possible developments are suggested. Keeney and Von Winterfeldt evaluate the U.S. policy to manage nuclear waste from power plants. With many different assumptions about uncertainties and objectives, this strategy is shown to be the equivalent of $10,000 million to $50,000 million inferior to other available strategies. The implications of the analysis strongly suggest that the national policy to manage nuclear waste should be changed.

The editors join the authors in wishing Stan a happy birthday! We are looking forward to new joint adventures with Stan. We trust that you will always share an enthusiasm and interest in research – and travelling! As the Chinese proverb says, don't count your birthdays, enjoy them! Long live MCDM – and we don't mean the Roman numeral!

In Buffalo, Rotterdam and Helsinki, October 1996
Mark Karwan, Jaap Spronk and Jyrki Wallenius