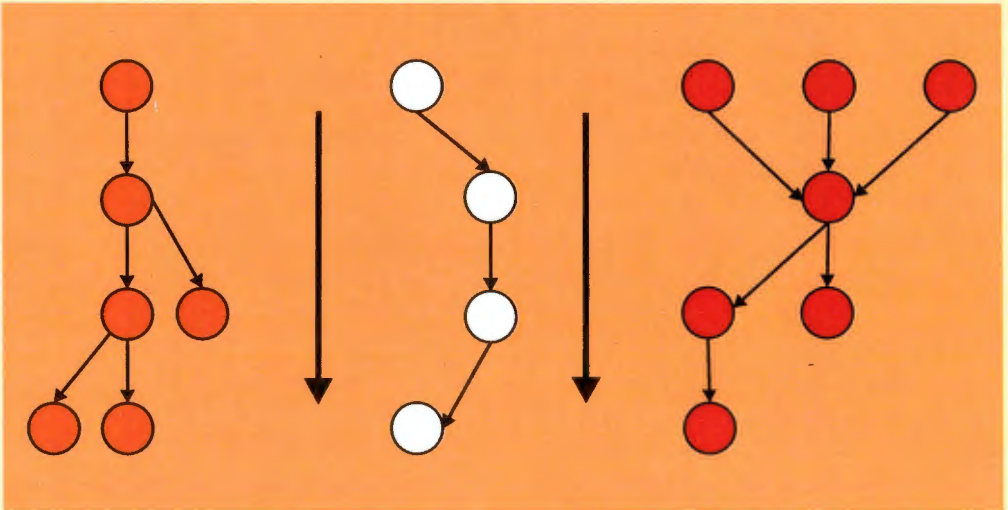


**SYSTEMS RESEARCH INSTITUTE
POLISH ACADEMY OF SCIENCES**

**MULTICRITERIA ORDERING AND RANKING:
PARTIAL ORDERS, AMBIGUITIES
AND APPLIED ISSUES**



**Jan W. Owsinski and Rainer Brüggemann
Editors**

Warsaw 2008

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This book is the outcome of the international workshop held in Warsaw in October 2008 within the premises of the Systems Research Institute. All papers were refereed and underwent appropriate modification in order to appear in the volume. The views contained in the papers are, however, not necessarily those officially held by the respective institutions involved, especially the Systems Research Institute of the Polish Academy of Sciences.

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Hasse Diagram Workshops: an Introduction

Tadeusz Kotarbiński (1886-1981):

*Do jasnych dążąc głębin – nie mógł trafić w sedno
Śledź pewien, obdarzony naturą wybredną.
Dokądkolwiek wędrował, zawsze nadaremno:
Tu jasno, ale płytko – tam głębia, lecz ciemno.*
(1942)

*A picky herring couldn't hit the mark:
Looking for the **clear depths** he would always fail –
Wherever he went, the very same sad tale:
Here **clear**, but **shallow** – there **deep**, but **dark**.*
(1942)

This short epigram of Tadeusz Kotarbiński, Polish philosopher and theorist of “effective action”, is an epitome of the fundamental difficulty with multicriteria evaluation, choice, ranking, ordering etc. Yet, in everyday life, in economics, business, administration, politics, war and peace, we have to confront multicriteria realities and live with them, making reasoned decisions, based on rational analyses.

The present volume contributes to technical and methodological competence in this domain by bringing together the studies, related to the 8th “Hasse Diagram” Workshop, which was held in Warsaw in October 2008. Thus, according to the series title, main focus here is also on analysis of partial orders and their (effective and handy) representation with Hasse diagrams, but there are also interesting papers, reflecting on other aspects of multicriteria ranking and choice.

The Hasse Diagram Workshops were initialized 1998 by Rainer Brüggemann in Berlin. The idea was then taken up and the series continued, as shown below:

Year	Site	Country	Local organisers
1998	Berlin	Germany	R. Brüggemann
1999	Roskilde	Denmark	P. Sørensen and L. Carlsen
2000	Berlin	Germany	S. Pudenz and H. Lühr

2001	Iffeldorf	Germany	K. Voigt and G. Welzl
2002	Roskilde	Denmark	P. Sørensen and L. Carlsen
2004	Bayreuth	Germany	H. Frank, A. Kerber and R. Brüggemann
2006	Verbania	Italy	R. Todeschini, M. Pavan
2008	Warsaw	Poland	J.W. Owsiniński, R. Brüggemann

The scope of these workshops was primarily constituted by theoretical developments and practical applications of partially ordered sets in the fields of chemistry and environmental systems. One may characterize the application of partial order theory as an attempt of “let first the data speak”, before a decision is derived. As such the application of partial order can be seen as a multivariate statistical approach to support decisions regarding complex systems. Up to now most applications were concerned with chemistry, biology, ecology, data availability and water management. The papers, devoted primarily to applications, associated with partial orders, contained in this volume, are the ones by S. Tsakovski and V. Simeonov: “*Hasse diagrams as exploratory tool in environmental data mining: a case study*”, P. Annoni, E. Garofalo, R. Brüggemann: “*Partial order theory for assessing the sensitivity of planktonic algae to anthropogenic disturbances in regulated lakes*”, M. Weckert, S. Gerstmann and H. Frank: “*Comparison of LCA results with those based on METEOR. Case study of refrigerants in mobile air-conditioning systems in passenger cars*”, P. Annoni, M. Fattore and R. Brüggemann: “*Analysing the structure of poverty by fuzzy partial orders*” and L. Carlsen: “*Partial order ranking methodologies in CSR driven innovation*”. As can be seen, not only we deal with a variety of application domains, but also a range of approaches, either directly related to Hasse-Diagram paradigm, or used in a complementary manner.

A separate stream has been made up of the work devoted to algorithmic and software tools for dealing with visualisation, analysis and aggregate ranking. These traditions are well apparent in the present volume, as represented by papers of R. Brüggemann, G. Restrepo and K. Voigt: “*Towards a new and advanced partial order software: PYHASSE*”, and K. Voigt, R. Brüggemann, K.-W. Schramm, M. Kirchner: “*PYHASSE: A new software tool for partially ordered sets: ranking soil against needles*”.

The studies on theoretical or methodological aspects are represented in the volume by the papers of K. De Loof, B. De Baets and H. De Meyer: “*Properties of mutual rank probabilities in partially ordered sets*”, M. Rademaker, B. De Baets and H. De Meyer: “*Informative combination of multiple partial order relations*”,

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I. Kaliszewski and M. Chmielewski: “*An upper bound on the number of rankings satisfying order preferences*”, L. Klukowski: “*Estimation of the preference relation on the basis of medians from pairwise comparisons*”, D. Viattchenin: “*Discriminating fuzzy preference relations based on heuristic possibilistic clustering*”, and L. Schulz: “*Structural constraints in the optimization of parameter systems in time consuming large scale computations*”.

Then, there are two papers of very pragmatic orientation, related to practical choice problems in economic and administrative domains, namely those by L. Krus: “*Some experiences with a group multicriteria method for project evaluation*”, and J.W. Owsinski: “*Ranking and ordering: some practical issues with a bearing on methodological and technical requirements*”.

The organizers of the Workshop series and the editors of the book are deeply convinced that the presentations and the papers will bear a valuable impact on the domain in both practical and methodological sense.

The Editors

This book is a collection of papers, prepared in connection with the 8th International Workshop on partial orders, their theoretical and applied developments, which took place in Warsaw, at the Systems Research Institute, in October 2008. The papers deal with software developments (PYHASSE and other existing software), theoretical problems of ranking and ordering under various assumed analytic and decision-making-oriented conditions, as well as experimental studies and down-to-earth pragmatic questions.

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