

Proceedings of the Workshop on

# Uncertainty Management in Information Systems: From Needs to Solutions

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Edited by

Amihai Motro

Philippe Smets

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## Foreword

Uncertainty permeates real world scenarios, and must therefore be incorporated into every information system that attempts to provide a complete and accurate model of the real world. Yet, present generation information systems have limited capabilities in this regard. On the other hand, many theoretical models have been proposed for the management of uncertainty, but often without thorough understanding of the problems that are faced by researchers, developers, designers and users of information systems.

The aim of the workshop, entitled *Uncertainty Management in Information Systems: From Needs to Solutions* (UMIS), is to bring together leading researchers in the scientific communities of *information systems* (e.g., database systems, information retrieval systems, expert systems, office information systems) and *uncertainty modeling* (often working within frameworks such as mathematical logic, probability theory, fuzzy set theory, possibility theory, and evidential models) to study the needs of the information systems community and to tap the expertise of the uncertainty modeling community, for solutions that respond to these needs.

To assure maximal benefits from this exchange, this workshop will hold *two meetings*. This first meeting focuses on the *types of uncertainty* that are encountered in common applications, and on the *practical constraints* that must be considered by developers, designers and users of information systems. Thus, the purpose of this meeting is to advise the uncertainty modeling community of the needs and experience of the information systems community. An interim period of several months will then give the parties opportunity to consider the issues, and devise solutions that build on the experience of the information systems community and respond to its needs. The second meeting will consider various uncertainty models, and discuss their applicability and limitations. Thus, the workshop will examine past experience and present needs, but will also devise new solutions and energize future research.

We hope that this planning workshop will establish the state of the art in this field and set the course for future research, and that it will promote a true dialogue between the two research communities and foster collaborations between researchers in the United States and Western Europe.

For the first meeting we divided the broad area of information systems into five domains: (1) relational and object-oriented databases, (2) logic-based data and knowledge bases (aka intelligent databases), (3) statistical and scientific databases, (4) expert systems (including knowledge acquisition and knowledge discovery), and (5) information retrieval systems.

In each domain, we commissioned a survey paper, that identifies the different instances of uncertainty that are encountered in this domain, discusses the constraints particular to this domain that must be considered by every solution, and reviews past attempts to manage uncertainty and the lessons learned from those attempts. In addition, a sixth report provides an introductory overview to uncertainty in information systems.

The preliminary versions of these six reports are included in this volume. Eventually, the final reports from both meetings will be published in a book. In the meantime, these proceedings will assure timely dissemination of these contributions.

Finally, we are grateful to the researchers that accepted our invitation to participate in this project for their valuable contributions, in suggesting issues that should be discussed in this workshop, in writing reports and position papers, and in reviewing the reports written by their fellow participants. We also thank the agencies that recognized the importance of this undertaking, and provided the financial support: ESPRIT II (Basic Research Action) in Europe, and the National Science Foundation (the Database and Expert Systems Program of the Division of Information, Robotics and Intelligent Systems) in the United States.

Amihai Motro

Department of Information and  
Software Systems Engineering  
School of Information Technology  
and Engineering  
George Mason University  
Fairfax, VA 22030-4444  
USA  
ami@gmu.edu

Philippe Smets

Institut de Recherches Interdisciplinaires et de  
Développements en Intelligence Artificielle  
Université Libre de Bruxelles  
Avenue Franklin Roosevelt 50  
CP 194/6  
B-1050 Bruxelles  
BELGIUM  
psmets@ulb.ac.be

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