

# Lecture Notes in Computer Science

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Tung X. Bui

Co-oP

A Group Decision Support System for  
Cooperative Multiple Criteria Group Decision Making

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## PREFACE

Decision Support Systems (DSS) — introduced as a concept in the early 1970's — are computerized systems intended to assist managers in preparing and/or justifying decisions. In recent years, especially with the proliferation of microcomputers, DSS usage has enjoyed considerable growth, due to their elegant integration of databases, decision models (e.g., spreadsheets, statistical models, optimization models), and user interfaces (e.g., menu, mouse, windowing). Traditionally, DSS have been single-user systems although it is well-known that many relevant decisions are made or at least prepared by groups rather than individuals. At the same time, progress in communication technologies enforces faster and faster decisions, thus making face-to-face meetings by such groups more and more difficult.

This book presents an early attempt to integrate DSS methods with computer-assisted group techniques and micro-based communication technology. It has two objectives. First, it provides a general understanding of distributed group decision making and its requirements with respect to computerized support. Second, it presents the design of a specific group decision support system, Co-oP, characterized by the following design characteristics:

- (1) The decision setting is *cooperative* as contrasted to hostile. Although negotiations take place, there is no consideration of intentional misrepresentation of data or preferences.
- (2) Decisions are made in a *distributed and democratic* fashion. Each decision maker has his own workstation (personal computer) connected to others via a network. There is no group leader but only a chauffeur or secretary to expedite the discussion. The arbitration among different opinions (aggregation of preferences

and negotiation support) is provided by the system itself rather than by a human. Norms for the group decision process are agreed upon by the group but enforced by the system automatically, although mechanisms are provided for changing the rules of discussion dynamically.

- (3) *Multiple Criteria Decision Methods* (MCDM) form the kernel of the system and the basis for exchange of information among the decision makers. This together with game-theoretic axioms, provides a formal basis for the otherwise very unclear tasks of group decision support. However, group decision making is not pressed into a static formal framework. Rather, the MCDM approach is embedded into a process-oriented group decision methodology that also includes the use of more informal group techniques, ranging from Delphi and Nominal Group Techniques to simple electronic mail and computer conferencing.

The approach in this book integrates theoretical work on extending computerized decision methods from the single-user to the multiple-user case. The book outlines a design framework for developing a generalized architecture for GDSS that emphasizes structured man-machine-man communication. It also discusses initial results of an empirical evaluation of a Pascal-based prototype implemented on a network of microcomputers. The experiences reported in this book seem to confirm the opinion that the development of group decision support systems is an important area in Information Systems research that deserves much further study by computer scientists.

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