

## THE MANIFESTO OF THE NEW MCDA ERA.

Multiple Criteria Decision Aid (MCDA) is now thirty years old. After so many books, papers, software and real-world applications, where do we stand ? What distinguishes MCDA from other Operational Research/Management Science approaches ?

The following Manifesto summarizes our thoughts on the past and expresses our objectives for the future. MCDA is in the age of growth, but maturity of the field is also evident. Since 1975, when the first meeting of the EURO working group on MCDA was held, this field of research has incurred a tremendous activity. Important theoretic results have been achieved and a variety of publications are now available on the basis of this approach. However we claim that a "shadow line" has been reached that should force us to rethink our past and propose new directions for the future.

MCDA as it presently stands can be seen as:

- an attitude towards providing decision-aid to actors involved in a decision process;
- a methodology for providing such a decision-aid;
- a collection of methods and
- a corpus of experience obtained after many real world applications.

A closer examination of these achievements may lead to a less optimistic evaluation of the field, however. We have a lot of methods that have been applied to real-world problems but very little serious ex-post analysis of these applications has been made. The lessons learned from these applications, if any, are not publicized: researchers and practitioners speak about them, but nothing highlighting and definitive has appeared until now. Although the great diversity of MCDA procedures may be seen as a strong point, it can also be a weakness. Up to now there is no possibility of deciding if one method makes more sense than another towards a specific problem situation. A systematic axiomatic analysis of decision procedures and algorithms is yet to be carried out.

Our methodological basis needs strengthening in many respects. MCDA has always claimed that real world decision problems are affected by conflicting information, uncertain or imprecise knowledge and ambiguity in the actors' positions. In the face of such, preference modeling requires the use of specific tools, techniques and concepts which make it possible to model and exploit the preference information. It would be profitable to be able to catch with more nuances and realism both the conflicting and fuzzy nature of such information. Fuzzy sets are just now becoming a key issue in theoretical research. Partial and conflicting information situations are yet to be transformed into theoretical issues and concepts for the methodology. Logic, social choice theory, measurement and meaningfulness theories, mathematical psychology are for the moment disciplines yet to be explored in order to build solid theoretical foundations for multidimensional preferences.

An MCDA approach to decision aid is yet to be conceived as such. The process of decision-aiding is yet to be studied, validation procedures are yet to be introduced, information retrieval for MCDA is yet to be investigated. Cognitive science, artificial intelligence, value theory, organizational theory are yet to be exploited in order to build a valid MCDA approach.

Finally there is another dimension to be explored. Almost all complex human decisions are multicriteria problems. Not surprisingly, however, a lot of "mechanized", "routine" decisions are also multicriteria problems, but are not treated as such. Planning, scheduling and logistics can be multicriteria problems, diagnosis and monitoring can often be multicriteria problems, "intelligent agents" may often face multicriteria problems. MCDA has a lot to learn from other disciplines, but has also a lot to teach in other fields like artificial intelligence, control theory and industrial planning and logistics.

So what ? We feel that at the beginning of the new age of MCDA some priorities have to be settled. We do not need new methods that just extend old ones or complicate already existing procedures. We do not need conventional examples and applications that do not allow us to learn more about MCDA. We believe that two main subjects should be explored:

- theoretical and axiomatic foundations of MCDA at all levels (approach, methodology, methods);
- conceptual and operational validation of the use of MCDA in real world problems.

Aiding decisions inevitably means muddling through decision processes. We have to understand these processes, communicate with actors involved, take into account their preferences and come up with recommendations. The development of our theories and methods should be guided by the desire to represent a larger number of problem situations. In such contexts, relying on "optimality of solutions" or "convergence of procedures" is seldom very helpful. The theory of MCDA is thus an open theoretical field and not a closed mathematical theory solving a specific class of problems. Key theoretical and methodological issues have to be addressed. New potential areas of applications have to be explored. "True" applications are needed as well as ex-post analysis. Connections between MCDA and other areas of research have to be explored. We await from these activities the obtaining of solid results in defining the MCDA approach and methodology.

This manifesto is a first call for the interest of all MCDA researchers and practitioners. We have no wish to establish a new authority in the field. Our objective is to propose a framework for future work and research. We are eager to receive experience, opinions, projects, papers in the directions announced. Our intention is to establish a "forum" where these questions are discussed and the results are monitored. We are interested in a collective advance of all people involved in this area. We like movement and change. Everybody interested may contact any of the promoters (see joint list) and send him his/her observations, criticisms, adhesions or comments. The new version of this manifesto, updated by your contributions, will be published in the special issue of the International Journal of Multicriteria Analysis on "Theoretical Foundations of Multicriteria Decision Aid" (see the joint call for papers).

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