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Opinion Makers Section

Decision Aiding and Psychotherapy

by

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1 Introduction

This note is a provocation. Operational Researchers and Decision Analysts intuitively feel to belong to a culture which completely different from the one of Psychotherapists and vice-versa. Why this provocation?

Despite this (more or less) apparent distance, the two professions share more than a first glance may allow to think. There is somebody (a client or a patient) who has a "problem". She or he thinks that (s)he is not able to handle this problem alone. Moreover, (s)he considers (or a third person suggests) that it is necessary a support of somebody with precise skills and knowledge (an adviser, not just your best friend). The client/patient expects that such an adviser (a decision analyst or a therapist) is able to formulate a recommendation and to convince him/her to follow it. The situation just described fits both for a decision aiding setting and for a psychotherapeutic one. Nevertheless practitioners and researchers in both fields still feel to do different jobs. It might be interesting therefore to better explore where similarities end, and what the common grounds of these two disciplines can teach us.

Indeed the two authors come from these two distinct areas, the first being a psychologist (working for the Italian National Health Service), practicing psychotherapy and the second being a decision analyst working for the CNRS (the french national science foundation), mainly doing theoretical research. We had the opportunity to discuss several times our respective experiences and theoretical backgrounds. Although we still feel to belong to two different cultures and professions we also discovered to share several common theoretical concerns and, what is more important, several common practical concerns. In this note we try to summarise part of these discussions, hoping this will be interested to the reader. The note is organised as follows. The next two sections briefly describe the settings of a decision aiding activity and of a psychotherapy (possibly independently from the approach followed). In section 4 we discuss the common characteristics, but we also emphasise the differences, while in the conclusion we present our ideas for the future.

2 Decision Aiding

An important characteristic of decision aiding, at least the one conceived by decision analysts, is the use of an abstract and formal language, aiming to reduce the ambiguity structured in human communication. Decision aiding aims, among others, to clarify, to allow to better understand, to improve communication, hence reduction of ambiguity is essential. Decision aiding is an activity concerning at least two actors: a client who, involved in a decision process, has at least a concern for which (s)he feels that (her)his resources are not sufficient to handle, and an analyst who is invited by the client to enter the decision process and provide some help in order to establish a behaviour towards the above mentioned concern (for more details see [4, 18, 19, 20, 22, 23]).

These two actors, possibly with the implication of others, engage themselves in a decision aiding process aimed to produce a shared representation of the client's concern, a representation which is expected to be useful in order to undertake an action (including waiting and doing nothing) with respect to the concern and the reference decision process. The decision aiding process is characterised by the emergence and establishment of the following cognitive artifacts:

- a representation of the problem situation;
- a problem formulation;
- an evaluation model;
- a final recommendation.

As already shown in [5, 22] this is a very general descriptive model of the decision aiding activities and allows to include any type of decision aiding approach, from normative methods and optimisation techniques to constructive and soft approaches.

What we want to focus upon in this note are the resources used by the two actors. The client has a domain

knowledge concerning the decision process in which (s)he is involved and the precise concern for which the decision aiding has been requested. The analyst has a methodological knowledge, independent from any application domain, which is expected to be instantiated on the client’s concern through the domain knowledge.

A “successful” decision aiding process (cfr. [13, 14, 15]) is expected to produce a final recommendation which is:
- meaningful from a theoretical point of view (thanks to the methodological knowledge of the analyst);
- meaningful for the client and (her)his concern (thanks to the client’s domain knowledge);
- legitimate with respect to the organisational context and the decision process (thanks to the craft and skills of the client and the analyst).

3 Psychotherapy

In a psychotherapeutic setting we can also recognise two actors: the client (here called patient) carrying an uneasiness, possibly expressed through one or more symptoms of mental trouble and the psychotherapist who is expected to work with the patient in order to establish the origin, nature and structure of the patient’s psychic pain and allow (the patient) to confront (her)himself with such a pain, take posses of it and face it. There are at least two cognitive artifacts established during a psychotherapy:
- a diagnosis;
- the therapy itself.

An informal contract is generally established between the patient and the therapist. In such a “contract” the timing of the therapy is settled as well as the final objectives of the therapy (estimated by the therapist and accepted by the patient). Such a contract may evolve during the therapy, but there is always one such agreement holding during the process. It should be noted that generally the patient recognises to the psychotherapist a competence and a leading role within the process. At the same time the psychotherapist is expected to fix a-priori:
- the timing of the therapy (how many sittings and how much time per sitting);
- the space of the therapy (which is usually precisely structured depending on the type of therapy adopted);
- the rules which will be followed (how sittings are payed, what type of relations are allowed between the two actors, if any etc., cfr. [21]).

What resources do the two actors use within the process? The patient will carry (her)his personality, (her)his relations, (her)his culture and possibly (her)his commitment to the therapy. The psychotherapist will carry also a personality and a culture (possible to a precise level of awareness due to a precise training), a specific training in at least one particular type of psychotherapy, the possibility to obtain a supervision by other peers or tutors and a finally a set of rules: practical (depending on the type of therapy conducted, see for instance [17]) and ethical ones (often precisely coded, cfr. [2]).

When does a therapy can be considered successful? Usually is the patient who ends a therapy for reasons going from simple regression of the symptom to a deeper management of the (her)his psychical pain. The therapist may also decide to end a therapy usually because it appears as leading to no where. In both cases is a subjective evaluation that establishes that the therapy does not apport any further improvement to the patient and that possibly the objectives fixed at the informal contract at the “beginning” of the therapy have been reached. That said, a third person is usually able to assess independently whether the therapy has fulfilled the contract or not.

4 Discussion

"The sponsor normally identifies a set of symptoms that have resulted from inadequate decision making in the past. Our first problem is to diagnose the situation; ...." (quoted from [1]). Obviously, we are not the first to notice the similarities between the two professions. A first common characteristic of the two settings is the existence of two actors, the first carrying a “problem” (for which no intuitive, ready made or immediately available solution exists) and the second carrying a knowledge which is recognized and accepted to be useful for this particular “problem”. A set of interactions, a process, is then established between the two actors and in both cases such a process is aimed to produce some cognitive artifacts which are expected to allow the client or patient to understand the “problem” and to establish a behaviour towards such a “problem”.

At the same time a big difference between decision aiding and psychotherapy concerns the vehicle of the interaction between the two actors. In decision aiding the vehicle is a formal and abstract language (mathematics, logic, abstract models), while in psychotherapy the vehicle is human language and communication (see [24]). In some cases the language is THE TOOL of the therapy (see [11, 12]). On the one hand decision aiding tries to reduce the ambiguity of human communication and ultimately to reduce the complexity of the problem situation. For this purpose decision aiding has to use models of rationality. On the other hand psychotherapy uses the ambiguity of human communication as a resource, while the complexity of human personality and behaviour is treated as a whole. Under such a perspective psychotherapy might induce further complexity since it focus on what the patient does not show (see for instance [3]). This should not be understood as absence of any a-priori model of human personality (each approach in psychotherapy do use such models). However, psychotherapy does not use models of rationality this concept being irrelevant.

A second common characteristic in both activities is their process dimension. Both decision analysts and psychotherapists engage themselves in interactions with their clients/patients under the hypothesis that the cognitive artifacts they produce ought to be shared (owned) by both (if any success is to be expected). Under such a perspective very little information is considered as

given and invariant. The information used during the process is co-constructed by the actors during the process itself. Of course different approaches in decision aiding and psychotherapy will start with different hypotheses about their clients and will focus the interactions on different aspects (for instance a psycho-dynamic approach will focus on the patient's personality and intra-psychical processes, while a family therapist will focus on the patient's relationships; in decision aiding a normative approach will impose a model of rationality, while a prescriptive approach will try to derive such a model from the client).

However, the way such a process is conducted is totally different. In decision aiding there is no established procedures on how to conduct the process. It is left on the craft and the skills of the analyst. The influence of the analyst on the client is usually underestimated as well as the biases such an influence may introduce in the process. It is expected that the use of a model of rationality will prevent such drawbacks, but there is no guarantee that in practice this will not occur. Indeed is rare that an analyst will submit a decision aiding case to a supervisor in order to obtain advice and an external point of view on the whole process. In the rare cases where this happens it occurs on a very informal basis. On the other hand therapies are conducted following precise rules and operational settings, depending on the approach used. Quite often such rules are coded in manuals and in any case they are part of the informal contract established between the patient and the therapist (cfr. [7], [8], [10]). The influence of the therapist on the patient's behaviour is a crucial issue for the therapy and in several cases therapists are trained to situate themselves with respect to their personality and the therapy (see [16]) . Last, but not least, psychotherapists regularly submit their cases to supervision sittings and this is expected to be part of their life-long training if not a help for the precise therapy.

5 Conclusions

Decision aiding and psychotherapy, although apparently grounded on different approaches and purposes share several common characteristics. These mainly concern the help that somebody (the analyst, the therapist) can provide to somebody else (the client, the patient) facing an apparently difficult to handle situation of uneasiness.

The brief discussion introduced in this note shows that, from a practical point of view and despite the high complexity of human personality troubles and psychical pains, psychotherapists have a much more structured approach as far as the conduction of the aiding process is concerned. Decision analysts, despite the use of models of rationality which are expected to simplify interaction, pay little attention to the conduction of the process although they know this is not neutral.

A first conclusion to establish is that a decision aiding methodology should pay more attention on the decision aiding process conduction and try to develop a "doctrine" about it and more general about the profession of decision aiding. A second conclusion could be that decision analysis might dedicate more research efforts in better understanding how precise approaches in psychotherapy handle issues such as establishing a contract with a client, formulating a problem, inducing a change in a person's behaviour etc. (see for instance [6], [9], [25]). We consider that there is still several things to learn from this "sister discipline" which also aids in deciding.

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MCDA Research Groups

MCDA in Catania

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The Group of MCDA of Catania has an important place in the history of MCDA. Effectively one of the most important appointment in the MCDA community is the International Summer School on MCDA,. More or less each three years this is an important meeting between young researchers and well known experts which permits to transmit to the former the knowledge of the latter. The first International Summer School on MCDA, held in Catania in 1982, was born upon an idea of Benedetto Matarazzo in collaboration with Jaap Spronk. In 2000 the seventh Summer School was organised by Benedetto Matarazzo and Salvatore Greco again in Catania, which therefore has been the first town to host two editions of this School. This explains how important has been the role of the Group of Catania in the history of MCDA.

Effectively, in 1982 the group of Catania was composed of only one component: Benedetto Matarazzo. In the following years some students of Benedetto Matarazzo reached the group, which is now composed also by Salvatore Greco, Silvestro Lo Cascio, Alfio Giarlotta, Fabio Lamantia and Silvia Angilella. Another researcher who started to work in Catania with Benedetto Matarazzo and now is working in Barcellona is Giuseppe Munda. The group of MCDA of Catania conducts its researches in some different areas, the most important of which are: Pairwise Criterion Comparison Approach, rough sets approach to MCDA, axiomatic basis of MCDA, fuzzy integral. In most of this research the MCDA group of Catania has some very prestigious cooperations with other very important research groups: Technical University of Poznan, LAMSADE, Technical University of Mons, Graduate School of Engineering of Osaka University.

The Pairwise Criterion Comparison Approach (PCCA) has been proposed by Benedetto Matarazzo. It consists in the possibility to compare feasible actions with respect to all the possible unordered pairs of distinct criteria considered. The partial results thus obtained are then suitably aggregated and used in order to aid the decision maker in a variety of problems. From this viewpoint, therefore, the approach proposed may be considered as an attempt to take explicit the limited capacity of the human mind to make comparisons between numerous and often conflicting evaluations simultaneously; it offers, instead, a series of comparisons easy to execute one at a time. A further work of Salvatore Greco showed that it is interesting also to consider the possibility of not comparing all the possible pairs of criteria. Indeed DM may be interested in comparison only with respect to some pairs of criteria rather than other and moreover because to consider all the possible pairs of criteria is too requiring for the human capabilities. Another interesting feature of PCCA is the high level of flexibility in preference modeling of this methodology, which permits to take into consideration both importance of criteria and intercriteria tradeoff. This characteristic of PCCA is quite interesting because usually importance of criteria and intercriteria tradeoff are used in completely different MCDA approaches (importance in outranking methods and intercriteria tradeoffs in multiattribute utility approach).

Another important subject extensively invetigated by the Catania Group of MCDA, in cooperation with Roman Slowinski from the Technical University of Poznan, is the

application of rough set approach to the multicriteria decision aid.

The original rough set approach proved to be very useful in dealing with inconsistency problems following from information granulation. It operates on a data table composed of a set U of objects (actions) described by a set Q of attributes. Its basic notions are: indiscernibility relation on U, lower and upper approximation of either a subset or a partition of U, dependence and reduction of attributes from Q, and decision rules derived from lower approximations and boundaries of subsets identified with decision classes. The original rough set idea is failing, however, when preference-orders of attribute domains (criteria) are to be taken into account. Precisely, it cannot handle inconsistencies following from violation of the dominance principle. This inconsistency is characteristic for preferential information used in MCDA problems, like sorting, choice or ranking. In order to deal with this kind of inconsistency a number of methodological changes to the original rough sets theory have been proposed by Salvatore Greco, Benedetto Matarazzo and Roman Slowinski. The main change proposed is the substitution of the indiscernibility relation by a dominance relation, which permits approximation of ordered sets in multicriteria sorting. To approximate preference relations in multicriteria choice and ranking problems, another modification was necessary: substitution of the data table by a pairwise comparison table, where each row corresponds to a pair of objects described by binary relations on particular criteria. In all those MCDA problems, the new rough set approach proposed by Salvatore Greco, Benedetto Matarazzo and Roman Slowinski ends with a set of decision rules playing the role of a comprehensive preference model. It is more general than the classical functional or relational model and it is more understandable for the users because of its natural syntax. In order to workout a recommendation in one of the MCDA problems, a suitable exploitation procedures of the set of decision rules was proposed. Other recently obtained results have been the following: rough approximations by means of fuzzy similarity relations, rough set handling of missing data, fuzzy set extension of rough set approach based on dominance, results on equivalence of a decision rule preference model and a conjoint measurement model which is neither additive nor transitive. Another recent and quite interesting result of the research of Salvatore Greco, Benedetto Matarazzo and Roman Slowinski is the proof that the decision rule model obtained by rough set approach gives a preference representation more general than Sugeno integral which is considered the most general ordinal aggregation operator of the max-min average type.

Recently the Catania Group of MCDA has started to deal with two new very interesting area in multicriteria decision aid: axiomatic basis of multicriteria aggregations and fuzzy integrals. The reaserch about the axiomatic basis of multicriteria aggregation is also conducted in cooperation with the Technical University of Poznan and for some subjects in cooperation with Denis Boyssou (LAMSADE (CNRS - France) and Marc Pirlot Technical University of Mons. The most interesting results in this field can be summarized as follows: axiomatic basis of multicriteria sorting, axiomatization of ELECTRE I methods, axiomatizations of Sugeno integral and its particular cases (max, min, ordered weighted maximum, weighted maximum, order statistics), axiomatization of associative operators of multicriteria aggregation.

With respect to the fuzzy integrals, the Catania Group of MCDA has developed a methodology for inferring the preferential parameters necessary to apply Choquet integral from the DM perferential information. Let us remember that the main interest to use fuzzy integrals in MCDA is to consider the interactions between criteria, that is, in simple words, the case in which the importance of two criteria is different from the sum of the importance of the single criteria, due to their positive or negative sinergy. With respect to this specific aspect the Catania Group of MCDA has developed two specific approaches. The first approach can be considered as an extension of the UTA approach to the case in which the utility functions are represented by a Choquet integral. The advantage of the proposal of the Catania Group of MCDA with respect to other competitive approach is that the methodology proposed by the Catania Group of MCDA permits not only to infer the interactive weights, but allows also the use of a common scale for all the criteria, which permits to compare evaluations of a criterion with evaluations of other criterion. The second approach developed by the Catania Group of MCDA with respect to Choquet integral is an extension of the method of Simos for determining the importance of criteria to the case in which the importance of the considered criteria interacts.

Finally another very interesting subject has recently been introduced by the Salvatore Greco, Benedetto Matarazzo and Roman Slowinski: the bipolar Choquet integral and the Sugeno fuzzy integral. The bipolar Choquet integral was proposed independently also by Christophe Labreuche and Michel Grabisch too. These new type of fuzzy integrals permits to take into account specific kinds of interactions which cannot be considered using classical fuzzy set approach. More precisely, the bipolar fuzzy integrals consider the fact that each evaluation with respect to considered criteria can be positive or negative with respect to a neutral level. The bipolar integral permits to model the interaction between positive values, with respect to a given set of criteria, and the opposite negative values, with respect to another set of criteria.

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Forum

About Robustness Analysis

by

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Introduction

It is probably not useful any more to justify the introduction of the concept of robustness and to emphasise the interest of this concept in decision aiding. Confronted to the necessity (or, simply, the wish) to help a decision-maker, the analyst cannot avoid the presence of a lot of uncertainties, at least at three levels, as illustrated in figure 1. Traditional tools (like probability theory) or more recent ones (possibility theory, fuzzy sets, rough sets, ...) are useful but not sufficient to cope with all these uncertainties. Moreover they introduce themselves new uncertainties at the three levels of figure 1. So, we need a theoretical framework and methodologies to take into account the irreducible part of ignorance contained in any decision aiding process.

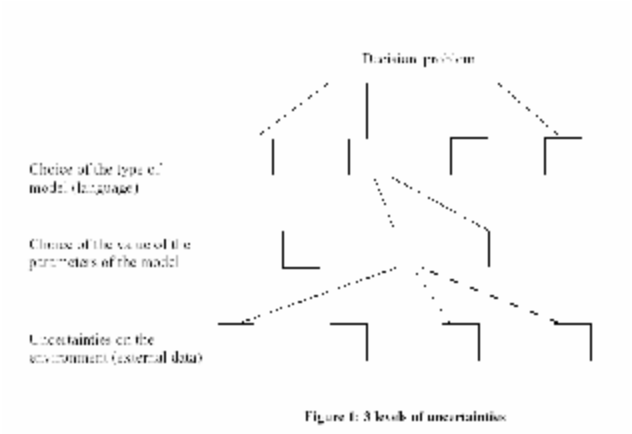

Figure 1: 3 levels of uncertainties

Definitions of robustness

No unique definition of robustness has been accepted by the scientific community until now and this is rather natural: the diversity of situations is so large that it will probably be necessary to classify the types of decision problems and the types of uncertainties before proposing different kinds of robustness which could be operational. In the literature, we can essentially distinguish 4 concepts, which could be starting points for future developments:

1. the concept of robust decision in a dynamic context (Gupta and Rosenhead, 1972; Rosenhead et al., 1972; Rosenhead, 1989) which could also be called flexibility in the sense that a decision at a given time is robust if it keeps open as many ``good'' plans as possible for the future;
2. the concept of robust solution in optimisation problems (Rosenblatt and Lee, 1987, in facility design problem; Mulvey et al., 1994, in mathematical programming; Kouvelis and Yu, 1997, in combinatorial optimisation) where robust means ``good in all or most versions'', a version being a plausible set of values for the data in the model;
3. the concept of robust conclusion (Roy, 1998) where robust means ``valid in all or most versions'', a version being an acceptable set of values for the parameters of the model;
4. the concept of robust method (Vincke, 1999 a, b, Sorensen, 2001) where robust means ``which gives results valid in all or most versions'', a version being a possible set of values for the data of the problem and for the parameters of the method.

Remark that we have adopted here the term “version”, recently proposed by B. Roy, instead of “scenario”, in order to avoid any reference to an unknown future and to the traditional probabilistic approaches.

There is no contradiction between these definitions: they only illustrate the fact that different kinds of robustness should be introduced in decision aiding. It is also important to avoid any confusion between robustness and the traditional stability property associated to sensitivity analysis. In this last context, a solution (decision) is determined in a particular version and an a posteriori study is made of the neighbourhood of that solution. The idea of robustness leads to consider, a priori, several versions (eventually rather different from each other) and to look for solutions (decisions, conclusions) which are good (valid) in all or most versions. In this perspective, the expression ``robustness analysis'' should be avoided because robustness considerations must be integrated during the decision aiding process and are not the result of an a posteriori analysis.

Robustness and MCDA

In the case where the decision problem is modelized as an optimisation problem and where a finite number of versions (sets of values for the data and the parameters of the model) has to be taken into account, one could argue that there are some similarities between searching for a good robust solution of the optimisation problem (that is a solution which is good in most versions and not too bad in the other) and searching for a good compromise solution of a multicriteria problem where the versions play the role of criteria. A concept like efficiency (non-dominance) could be used to select the candidates to the qualification of robust solutions and multicriteria methodologies could be applied to determine good robust solutions. The interested reader will find an illustration of that approach in Hites (2000), where the robustness of a solution does not only depend on its worst performance (as in Kouvelis and Yu) but simultaneously on its good an bad performances (without trivially applying an arithmetic or a weighted mean whose inconvenients were abundantly illustrated in Bouyssou et al., 2000). See also the concept of generalised Lorenz dominance used by Perny and Spanjaard (2002) in the same kind of problem.

Despite the similarities between searching for a good compromise solution of a multicriteria problem and searching for a good robust solution of a multiversions optimisation problem, one should avoid to consider that the only difference is the vocabulary (on this subject, see Hites et al., 2003). In the formulation of the problem, the family of criteria is built in such a way that the opinion of the decision-maker is as well represented as possible (cf. the concept of coherent family of criteria in Roy and Bouyssou, 1993), while the set of versions is often at least partially imposed by external conditions. Moreover the number of versions can be infinite (if the values of the parameters are defined through intervals) and the concepts of relative importance or preferential independence are not easy to transpose. Finally, most decision problems are simultaneously multicriteria and multiversions. In conclusion, we are convinced that the concept of robustness justifies the development of a specific theoretical framework and of new methodologies.

The subjective dimension of robustness

An important feature of robustness, in our mind, is its subjective dimension.

The fact that a decision (solution, conclusion) can be considered as robust depends on the more or less great margin the decision-maker is ready to concede in the information he wants to receive form the analyst. Let us consider an optimisation problem and suppose that the decision-maker is not affected by a difference of 5% between the values of different solutions. In this case, a solution whose value differs by less than 5% from the optimum in each version could be called robust (in the sense «good in all the versions »). Replacing 5% by another value will change the set of robust solutions. In another context, if you aggregate preferences in an outranking relation by using weights for the criteria, the robustness of the final relation (the versions being the sets of values for the weights) will depend on which modification of the relation is considered as negligible by the decision-maker. If he is very severe and considers that any modification is important, then imposing the robustness of the result will lead to a very poor relation (as it must be the same for all the sets of weights). But if he accepts some modifications (for example the replacement of some strict preferences by indifferences) then other robust results will be possible. More details on these examples and a proposition of theoretical framework in this direction were proposed in Vincke, 1999b.

Conclusion

Thirty years ago, the scientific community in decision aiding was confronted to the challenge of solving problems where several criteria were present. This led to the development of MCDA and to a lot of new concepts and tools. We are now facing to the challenge of taking into account the uncertainties, which are irremediably present in any decision aiding process. This probably justifies the development of a specific vocabulary, a specific theoretical framework, a new typology of the decision problems and new methodologies.

It is an open field for the future.

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N.B.: A list of references on robustness is maintained by Romina Hites at the following address http://smg.ulb.ac.be/ then choice Research / Robustness. Every suggestion of new reference is welcome.

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Commentaires sur l'article « Robustness Analysis » par J. Rosenhead

by

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Dans le bulletin n° 6 de l'automne 2002, Jonathan Rosenhead terminait un très intéressant article par un paragraphe intitulé « Robustness analysis after Roy ». Dans ce même numéro, j'avais signé une « Opinion Makers Section » intitulée « Robustesse de quoi et vis-à-vis de quoi mais aussi robustesse pourquoi en aide à la décision ? ». Parlions-nous de la même chose ? Je pense que oui … et je pense que non !

Je pense que oui car, pour l'un comme pour l'autre, la recherche de robustesse vise à prendre en compte, de façon aussi rationnelle que possible, le caractère imparfait de certaines connaissances (concernant notamment l'avenir) qui affecte la façon dont on peut éclairer certaines décisions. Je pense que non car Rosenhead et son équipe ont travaillé sur ce sujet d'une part depuis beaucoup plus longtemps que moi et, d'autre part, avec une approche fortement conditionnée par le type de contexte décisionnel auquel ils se sont intéressés (cf. le forum cité plus haut dont sont extraites les citations qui suivent).

Deux traits caractéristiques conditionnent leur approche. Tout d'abord, la connaissance imparfaite concerne avant tout (et peut-être même exclusivement) l'avenir : « Robustness Analysis is the way of supporting decision making when there is radical uncertainty about the future » (première phrase de l'article). Ce point est rappelé en haut de la page 8 comme constituant la première condition pour pouvoir appliquer l'analyse de robustesse. Il est suivi d'une seconde « decisions must be or can be staged – that is, the commitments made at the first point of decision do not necessarily define completely the future state of the system ». Ainsi restreinte par ces deux conditions, la recherche de robustesse peut être prise en compte au travers de la plus ou moins grande variété des possibilités d'avenir qui se trouveront préservées par la décision mise en œuvre dans un premier temps. Ceci justifie en particulier la façon suivante d'appréhender un critère de robustesse : « A simple statement of the robustness criterion is that, other things being equal, an initial commitment should be preferred if the proportion of desirable future situations that can still be reached once that decision has been implemented is high". Ce qui est appréhendé ainsi est essentiellement une notion de flexibilité (Rosenhead utilise d'ailleurs ce terme à plusieurs reprises).

La robustesse, telle que l'appréhende Rosenhead, est, selon moi, une acception assez particulière (compte tenu des deux conditions rappelées ci-dessus) d'une notion et d'une préoccupation qui me paraissent être beaucoup plus générales en aide à la décision et recherche opérationnelle. Dans l'opinion maker section citée plus haut, j'ai pris appui sur des travaux d'auteurs variés (y compris ceux de Rosenhead) qui traitent de robustesse en recherche opérationnelle et aide à la décision (mais en laissant volontairement de côté les travaux relevant d'autres disciplines, telle la statistique, où le mot robustesse figure) pour analyser la polysémie de ce terme en vue de découvrir et de mettre en évidence ce que ces diverses acceptions avaient en commun (et qui se retrouvent aussi dans l'usage qu'en fait Rosenhead). En posant des questions, j'ai souhaité ouvrir des pistes de réflexion. Je crains de l'avoir fait de façon un peu maladroite, ne particulier en utilisant un vocabulaire parfois mal adapté à l'ouverture que je recherchai.

Le schéma conceptuel sur lequel Rosenhead prend appui pour asseoir sa méthodologie d'analyse de robustesse ne repose pas sur un formalisme destiné à déboucher normalement sur des procédures complètement formalisées et informatisables. Je comprends qu'il ait pu croire que tel était la perspective dans laquelle je me situais et pensé que je ne m'intéressais à la robustesse que dans l'optique suivante : « As with sensitivity analysis this approach seeks to incorporate the real world experience of uncertainty into the understanding of mathematically derived results (…). Uncertainty, however, remains attached to parameter values, rather than to the swathe of intangible uncertainties that may be resistant to credible quantification. And as with sensitivity analysis, the idea of exploiting sequentiality to achieve flexibility is absent". Non ; ceci est tout à fait inexact. Sans doute l'usage de termes tels que « instanciation », « instruction » ainsi que la façon dont j'avais cherché à positionner la recherche de conclusions robustes par rapport à l'analyse de sensibilité dans un article de 1998 (cité en référence dans l'opinion maker section) sont-ils à l'origine de cette incompréhension. Dans cet article, j'avais employé "jeux de données" ou encore "scénarios" à la place d'"instanciation". Chacun de ces termes me paraît trop réducteur car trop particulier, trop connoté. L'opinion maker section citée plus haut devant être révisée en vue de publication [1], j'ai choisi de les englober sous celui de **version du problème d'aide à la décision**. J'espère que cette nouvelle expression n'entraînera pas d'autres incompréhensions. En outre, je me suis efforcé de mieux m'expliquer quant à la façon dont une même

[1] *« Robustesse de quoi et vis-à-vis de quoi mais aussi robustesse pourquoi en aide à la décision ? », in the proceedings volume based on a selection of papers presented at the 56th Meeting of the European Working Group Multiple Criteria Decision Aiding / 56e Journées du Groupe de Travail Européen « Aide Multicritère à la Décision », Coimbra, Portugal, 3-5 octobre 2002.*

préoccupation de recherche de robustesse pouvait, dans des contextes très variés et avec des approches différentes, jouer un rôle crucial en aide à la décision.

ENGLISH VERSION

Comments on the article « Robustness Analysis » by J. Rosenhead

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In the Autumn 2002 issue of the Newsletter (number 6), Jonathan Rosenhead concluded a very interesting article with a paragraph entitled "Robustness after Roy". In the same issue, I published an article in the "Opinion Maker Section" which I called « Robustesse de quoi et vis-à-vis de quoi mais aussi robustesse pourquoi en aide à la décision ? ». Were we in fact talking about the same thing? I think so … and I think not!

Yes, I think we were talking about the same thing because for each of us robustness analysis attempts to take into account, in as rational a fashion as possible, the imperfect nature of certain knowledge (in particular, concerning the future) which will affect the way in which we might shed light on certain decisions. But I think we are *not* talking about the same thing inasmuch as Rosenhead and his research group have been working on this subject, first of all, for a much longer period than I have and, secondly, they have been working on it from an approach strongly influenced by the type of decision-making context they have explored (cf. the forum cited above, from which the quotations below have been taken).

Two characteristics have conditioned their approach. First, imperfect knowledge is concerned above all (and even perhaps exclusively) with the future: "Robustness Analysis is a way of supporting decision making when there is radical uncertainty about the future" (first sentence from Rosenhead's article). This point is repeated at the top of page 8 as comprising the first condition for applying robustness analysis. It is followed by a second point, "decisions must be or can be staged – that is, the commitments made at the first point of decision do not necessarily define completely the future state of the system". Thus restricted by these two conditions, robustness analysis can be taken into account in terms of the number of possibilities the initial decision implemented leaves open for the future. In particular, this justifies the following way of grounding a robustness criterion: "A simple statement of the robustness criterion is that, other things being equal, an initial commitment should be preferred if the proportion of desirable future situations that can still be reached once that decision has been implemented is high". What is meant here is essentially a notion of flexibility (Rosenhead himself uses this term several times).

In my view (in light of the two conditions quoted above), robustness, as tackled by Rosenhead, corresponds to a rather restricted use of a notion and a concern which seem to me to be much broader in decision aiding and operational research. The ideas I expressed in the Opinion Maker section referred to above were supported by the use of this term in the work of a variety of authors, including Rosenhead, who deal with robustness in decision aiding and operational research (intentionally leaving aside work from other disciplines, such as statistics, where the word "robustness" is also used) in other to analyse the multiple meanings of this term with a view to discovering and making clear what these various meanings have in common (and which would also be found in Rosenhead's use of the term). B asking these questions, I had hoped to open up new avenues of thought. I fear that my way of doing this may have been a bit maladroit, particularly the use of vocabulary which was not always in keeping with the broad-minded approach I was seeking.

The conceptual scheme Rosenhead uses as support to establish his methodology of robustness analysis does not rest on formalism designed to lead naturally to completely formalized and computerized procedures. I understand that he might have believed that such was the perspective I was working in and thought that I was interested in robustness only within the following framework: "As with sensitivity analysis this approach seeks to incorporate the real world experience of uncertainty into the understanding of mathematically derived results (…). Uncertainty, however, remains attached to parameter values, rather than to the swathe of intangible uncertainties that may be resistant to credible quantification. And as with sensitivity analysis, the idea of exploiting sequentiality to achieve flexibility is absent".

No; this is completely inaccurate. No doubt the use of such terms as *instanciation* and *instruction*, as well as the way in which I sought to position seeking robust conclusions with reference to sensitivity analysis in an article published in 1998 (cited in the Opinion Makers section) are responsible for this misunderstanding. In this article I used the terms *jeux de données* and *scénarios* instead of *instanciation*. Each of these terms seemed to me too simplistic, because they were too narrow or too specific to certain fields. As the Opinion Maker section mentioned above was due to be revised for publication, I chose to envelope these terms in the expression ***version du problème d'aide à la décision***. I hope that this new expression will not result in other misunderstandings. In this new publication I have endeavoured to express myself more clearly on how the same concern with robustness analysis can play a crucial role in decision aiding in a variety of diverse contexts and within the framework of a number of different approaches.

Software

EQUITY

Prioritisation and resource allocation with multi-criteria decision analysis

by

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All managers in all organisations face the common problem of how best to allocate limited resources. Typically, the problem is made difficult by conflicting objectives: minimising cost, maximising value, accepting a tolerable level of risk.

A first step in solving this problem is to prioritise the things to which those resources can be allocated: strategies, policies, programmes, projects, equipments, systems, operations, functions…anything that will help to create value. But the task of prioritisation is daunting: too many elements to be compared in too many ways, resulting in a feeling that oranges are being compared, not even to apples, but to shoes, accompanied by complexity that is too great for a single human brain to integrate all the pieces.

For the past 20 years, I have been engaged in applying multi-criteria decision analysis to this problem, in organisations large and small, in both private and public sectors, on problems ranging from establishing corporate strategy, to prioritising R&D projects, to allocating local authority budgets, to managing buildings and estates, even to designing ships. The approach makes it possible for an organisation to evaluate its current position and see how much additional value it could obtain from the same resource, or from less or more. Recent research shows that the approach identifies value improvements of 30%, on average, simply by reallocating the existing resource. In several cases, with large corporations, these increases amounted to more than $1 billion in expected (probability weighted) net present value!

So, how is it done? By working with groups of key players and using multi-criteria decision analysis (MCDA), a combination that is both social and technical. The social process has been described before in this newsletter: decision conferencing, which is a facilitated work group. The technical element, MCDA, is implemented with the help of the Equity computer software.

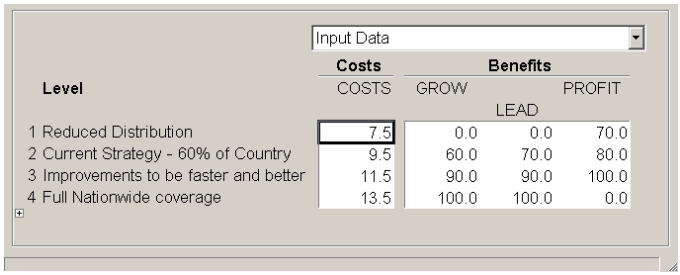
The original version of Equity, known as Design, was invented back in the late 1970s at Decisions and Designs, Inc., a small consulting company outside Washington, D.C., that specialised in working on government contracts. In the early 1980s, the Decision Analysis Unit at the London School of Economics acquired rights to the software, which is now in its third version, released this year as Equity 3. So I am presenting here a tool that has been developed in the heat of application for a great many years, and considerably modified in response to suggestions from users throughout the world. Its unique strength is its ability to integrate decision making across different areas of an organisation, creating a portfolio of decisions that creates more value for money than can be achieved by separate, 'silo' decisions.

How does Equity work? That is most easily described by showing a case study. It's simple, but it really happened. I was facilitating a decision conference for a multi-national subsidiary that had been told by its head office it was spending too much money advertising a particular product; call it a women's shampoo, to disguise the real product. The managing director of the subsidiary argued that this was a new type of product for which it was necessary to create the market, so the TV advertising was necessary. His argument fell on deaf ears, and he didn't know what to do, but agreed to look at possible ways forward in a two-day decision conference. Several alternatives were explored on the first day, leading to his realisation that resources were possibly not appropriately allocated between distribution, promotion and advertising. We began the second day by creating a small model of possible strategies within each of those three functions, including the current strategy. The basic structure of the resulting Equity model is shown here.

5			Nationwide TV Advertising campaign
4	Full Nationwide coverage		Increase the frequency of TV advertising.
3	Improvements to be faster and better	Increase Sampling Coverage	Current Strategy - 80% of country covered
2	Current Strategy - 60% of Country	Current Strategy - Simple promotions	Reduce frequency of TV advertising
1	Reduced Distribution	No Promotional activity	Reduced TV advertising - Frequency & Area
	Level of Distribution	Promotional Coverage	TV Advertising

The three areas, distribution, promotion and advertising are represented by the columns, while the strategic options for each of the areas are shown in the white cells.

Discussions on the previous day had identified the key objectives for this product: to grow the market and the Company's share of it, to attain and maintain leadership and to be profitable in the short and long run. A couple of hours were spent with the group evaluating and appraising the options against those criteria. Here is the result for the distribution strategies:



Input Data

Level	Costs	Benefits		
	COSTS	GROW	LEAD	PROFIT
1 Reduced Distribution	7.5	0.0	0.0	70.0
2 Current Strategy - 60% of Country	9.5	60.0	70.0	80.0
3 Improvements to be faster and better	11.5	90.0	90.0	100.0
4 Full Nationwide coverage	13.5	100.0	100.0	0.0

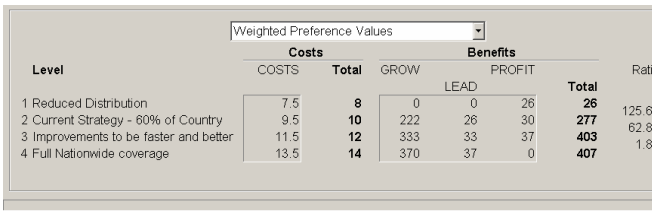
Costs were obtained by first asking for the budget associated with the current strategy; it was 9.5 million yen. I then asked how much additional resource would be needed to make a significant difference to the current strategy. The distribution manager said he could do the current job better and faster with an additional 2 million yen. I asked if he could make good use of even more resource, and he added that with another 2 million yen he could provide full nationwide coverage. I also asked what he would do if he suffered a 2 million yen cut to his current budget, and he replied that he would reduce distribution, though he was currently sufficiently constrained that the impact would be serious.

Participants’ collective judgements provided the benefit numbers. To begin, I asked the group to identify the least and most preferred strategies for growth. That was easy: least preferred is reduced distribution, most preferred, fully nationwide coverage. These two reference strategies were then assigned 0 and 100, respectively, thereby anchoring an interval scale (effectively fixing the zero point and the unit of measurement). I then asked the group to locate the current strategy between those limits, paying attention to the relative distances to 0 and to 100 from that point. The group agreed a figure of 60, and I checked this by asking the group if they considered reducing distribution to be half again as bad, compared to the current strategy, as full nationwide coverage was good, a simple comparison of 60 with 40. They agreed, then went on to locate the improvement strategy at 90, which I checked by asking if the 60 to 90 increment in value really was three times as good as the increment from improvements to full coverage. Again, they felt that was about right.

In similar manner, we assessed the benefit figures for the remaining two scales. Sometimes the consistency checks were found wanting, and the scores were revised. It took careful thought to generate the profit figures, because the time frame was three years, and the distribution manager was worried that the extra two million yen might not be recovered adequately in that time frame. Thus, they felt that option was least preferred for profit.

Many applications of Equity depend on performance-related data to populate the benefit scores. In this case, Equity provides for a transformation of the input data into preference values via a user-defined value function. After all, one performance score may be twice as good as another, yet not realise twice as much value. Thus, the necessity in MCDA to impose value functions to represent preference value, which is the basis for decision making. It is also important to incorporate the effects of uncertainty, and this can be done in several ways. One simple one is to add a certainty criterion, with the option whose consequences are most certain to occur assigned 100, the least certain given 0, with the other options scaled in between. Other techniques that involve probabilities are also accommodated in Equity 3.

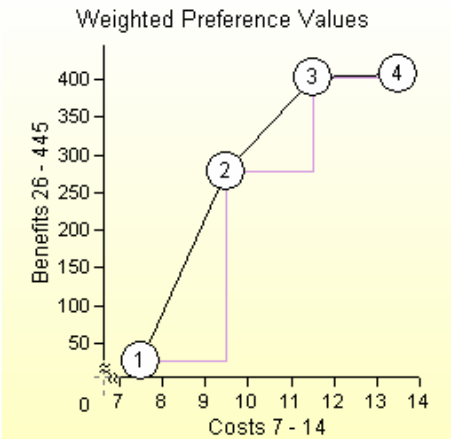
With three benefit scales in three areas, making nine scales altogether, the group next turned to a weighting process that equated the unit of preference value from one scale to the next. The process is called ‘swing-weighting’, and it requires participants to consider the added value in swinging from 0 to 100 on each scale, and comparing those swings. Both Celsius and Fahrenheit scales contain 0 to 100 portions, but the former represents a larger swing in temperature. So it is with these interval scales—if one scale represents twice the swing of another, then its weight should be twice as big to equate the units of measurement on the scales. After completing this weighting process, the scores are multiplied by the weights, enabling overall weighted preference values to be obtained. Here is the result for the distribution area:



Weighted Preference Values

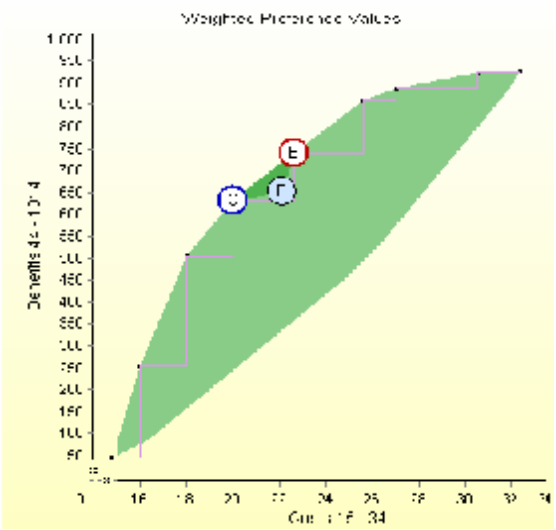
Level	Costs	Total	Benefits			Total	Rati
	COSTS		GROW	LEAD	PROFIT		
1 Reduced Distribution	7.5	8	0	0	26	26	125.6
2 Current Strategy - 60% of Country	9.5	10	222	26	30	277	62.8
3 Improvements to be faster and better	11.5	12	333	33	37	403	1.8
4 Full Nationwide coverage	13.5	14	370	37	0	407	

A further result is the key to prioritisation: the ratio of an increment of benefit to an increment of cost. For example, the cost increment in moving from option 1 to 2 is 2 million yen. The increment of overall benefit is 277-26= 251. Divide 251 by 2 and the result is the ratio shown, 125.69 (the 26 is actually 25.878). That ratio represents the added value for money of moving from option 1 to 2. Equity 3 plots the curve of benefits versus costs, which shows that moving to full nationwide coverage is not worth the cost.

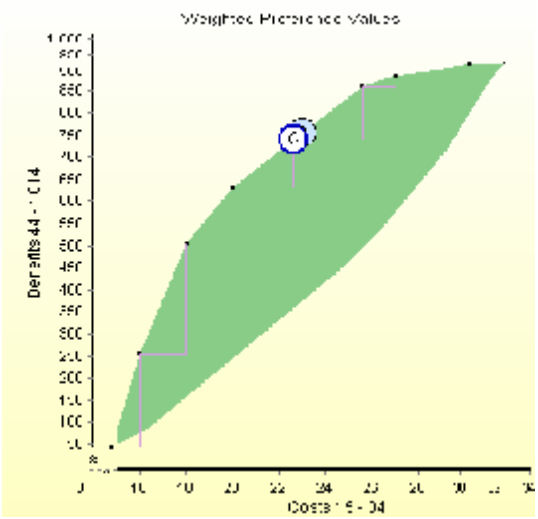


The increments from one option to another can now be shown altogether, providing an efficient frontier.

Also shown is the location of the current strategy: at point P, which is inside the efficient frontier. Equity moves vertically upward from P to find the closest better point, at B. It also moves horizontally to the left of P, finding the
closest less costly point at C.



This display showed the group that their current strategy could be improved. Interrogation of Equity showed that the B position involved distributing faster and better, cutting out promotions altogether, and that advertising was properly positioned. That trade-off was unacceptable to the managing director, who asked to try his preferred strategy, having admitted that he now understood better the great importance of distribution for his product in Japan. He chose improved distribution, full promotion and a reduction in the frequency of TV advertising. Here is the result:



That strategy package, which is 1 million yen more costly than the current strategy, is almost on the efficient frontier. He declared that was close enough, and would satisfy head office. He turned to his advertising manager and said his budget was cut 10%, and to submit a new plan that would minimise the damage. He then asked the promotions manager to promote the shampoo properly, using the additional resource, and requested a new distribution plan for the extra 2 million yen. By the end of the month all these new strategies were in place, with subsequent good results.

The purpose of the model was to provide structure for thinking more clearly about the issues, enabling the group and the managing director to become more confident about the best way forward. The model is not intended to provide ‘the right answer’ (if such exists).

Equity 3 is perhaps the most powerful modelling tool we decision conference facilitators use, for the difference between the P and B positions is typically very much greater than in this example. As I said at the start, the potential improvements in benefits, risk adjusted, in moving from P to B is, on average, about 30%. Well worth the investment in the modest amount of time it takes to establish the shape of the efficient frontier and the position of the current strategy.

For more information about Equity 3 (and Hiview 3), including free downloads, go to www.catalyze.co.uk.

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Persons and Facts

Freerk Lootsma (Delft University of Technology) passed away several months ago. He was a regular visitor of the MCDA workshops and presented various new ideas on applied MCDA models, often based on pairwise comparison methods. His bright insights and friendly personality will remain in our memory.

Our colleague and friend Alexis Tsoukiàs is the President Elect of EURO starting his term the 1st of January 2004. He will be EURO President the 1st of January 2005 for two years. Congratulations! Break a leg! From the next 1st of January 2005, pay attention my friend, you will have no time to take a power nap.

About the 58th Meeting

by

Alexey B. Petrovsky

The 58th Meeting "MCDA and Verbal Decision Analysis" took place in Moscow (Russia) on October 9-11 2003, at the small hotel 'Uzkoe,' belonging to the Russian Academy of Sciences and locating in the park in the West-Southern part of the town. The Meeting has been organized by the Department of Decision Making, the Institute for System Analysis, the Russian Academy of Sciences (ISA RAS).

ISA RAS (former name in the Soviet times -- All-Union Institute for System Studies) was founded in 1976. ISA RAS is the acknowledged national and world leader in a number of traditional and interdisciplinary studies. The main research activities involve Computer Science, Information Technology, Management, Decision Making, Artificial Intelligence, Mathematical Modeling, Economics, Sociology, and Philosophy. Scientific studies of ISA RAS deal with application of the system approach to the analysis of the complex engineering, environmental and socioeconomic objects and processes, including, but not limited, assessment of investment effectiveness, regional development management, industrial infrastructures and natural monopoly restructuring, medical informatics, methodological and sociological problems of modern times.

Department of Decision Making is one of the major units of ISA RAS. For many years it has been headed by academician Oleg I. Larichev. The current head of Decision Making Department is Prof. Alexey Petrovsky. The Department consists of two laboratories: (1) Methods and Systems for Decision Support and (2) Knowledge-Based Computer Systems. Its scientific staff has high qualification and great experience in such fields as multiple criteria decision making (MCDM) decision support systems (DSS), and artificial intelligence (AI).

The Meeting was devoted to the memory of Oleg I. Larichev who was one of the prominent and well-known members of the European Working Group "Multi-criteria Aid for Decisions". For many years, the studies of Professor Oleg I. Larichev were related to MCDM area. Oleg I. Larichev together with his colleagues developed a number of new decision support methods. These tools allowed the solution of problems of ordering and classifying multi-criteria alternatives while taking into account Decision Maker's preferences. New approaches to the analysis of such complex problems as combinatorial models with multiple qualitative criteria, multiple criteria bin packing and assignment problems were proposed by them as well.

Oleg I. Larichev's scientific interests extended further within the AI area. The conceptual model of intelligent decision support system (IDSS) was suggested, which includes intellectual components for structuring the problem solved, search for the optimal solution, explanation of results. While studying processes of the knowledge acquisition for solving classification problems, Oleg I. Larichev and his collegues proposed a new original approach to construction of complete and contradiction-free expert knowledge bases. This approach promotes a fast and efficient formulation of decision rules for the diagnostic-type problems.

The success of the MCDM techniques influenced Oleg I. Larichev to study the field of psychological aspects of decision-making, the subject, which attracted his attention all his life. The most interested results in this field were related to the investigation of human capabilities in individual decision making with many criteria, cognitive validity of decision aiding procedures, and psychological validity of preference elicitation techniques.

Oleg I. Larichev researches in the fields of MCDM, AI and cognitive psychology culminated in a new scientific approach – Verbal Decision Analysis. In the framework of this approach, abilities and skills of a human being are combined with the possibilities of modern computers in solving ill-structured problems, while taking into account subjective preferences as well as models based on both qualitative and quantitative information.

The MCDA58 Meeting has been started with the session "In Memorium of Professor Oleg I. Larichev". It has been opened by Prof. Alexey Petrovsky. The Director of ISA RAS, the Correspondent Member of Russian Academy of Sciences, Prof. Yu.S. Popkov told many warm words about Oleg I. Larichev. He introduced the Institute for System Analysis as well, and, in particularly, the Department of Decision Making, the Organizer of the Meeting. Professor P. Humphreys, London School of Economics (UK), and Dr. V. Kalika, Haifa University (Israel), shared their recollections of their contacts and collaboration with Oleg I. Larichev.

Verbal decision analysis was the main theme of the Meeting. 35 papers have been presented at the Meeting: 2 papers extended for 40 minutes, 15 papers for 20 minutes, and 18 papers were submitted for a discussion. There were 51 participants from 16 countries (Belgium, Bulgaria, Canada, Czech Republic, France, Israel, Italy, Lithuania, Morocco, Poland, Portugal, Romania, Russia, Spain, Switzerland, UK). There were 13 new welcome participants: Aissi Hassan, Ashikhmin Ilya, Chakhar Salem, Chistiakov Victor, Descalzo Senoran Miguel Angel, Furems Eugenia, Humphreys Patrick Christie, Michnik Jerzy, Royzenson Gregory, Shepelyov Gennadiy, Sternin Mikhail, Yeremeev Alexander, Zavialov Alexander.

It should be noted again, that not all papers have been presented billingually (i.e. French with English slides, and vice versa). However, in comparison with the previous

meetings, more participants took into account the recommendation of Prof. Bernard Roy in respect of billingual presentations.

In the Thursday's evening, after the sessions, the participants were invited to the Welcome party, that took place in the hotel 'Uzkoe'. And in the Friday's evening, once the Meeting has been closed, those, who wished to participate, took part in the Meeting Dinner in the Academy Club, locating on the 22nd floor of the new building of the Russian Academy of Sciences Presidium. Besides dinner itself, the guests had an opportunity to enjoy with beautiful panorama of evening Moscow and bright firework from the top of the Academy building.

The excursion on Saturday took the participants to see old Moscow Monasteries, including Novodevichiy, Novospassky and St. Danilov Monasteries; the latter is the headquarters of the Russian Orthodox Church. The participants were familiarized with notable architecture monuments of the 16th-18th centuries. There were two buses with English- and French-speaking guides. The excursion and MCDA'58 itself finalized with dinner in the small charming tavern "Chulanchik"(i.e. "Small pantry").

Final Program / Programme Définitif

MOSCOW, October 9-11, 2003

Thursday, October 9/ Jeudi, 9 octobre

Opening Session/Session d'overture
"In Memorium of Professor Oleg I. Larichev"

14:00 – 14:10	Yu.S. Popkov, Director, Institute for System Analysis, RAS (Russia)
14:10 – 14:20	B. Roy, Professor, Lamsade, University Paris-Dauphine (France)
14:30 – 14:45	P. Humphreys, Professor, London School of Economics (UK)
14:45 - 15:00	V. Kalika, Senior Research Fellow, Haifa University (Israel)

Session 1. Theory and Methodology I. Chairman: A. Petrovsky

15:00 - 16:00	B. Roy, J.-M. Martel. "Modélisation des préférences et préoccupation de significance"
16:00 - 16:30	A.V. Lotov, G.K. Kamenev, V.A. Bushenkov. "Informing decision makers on feasibility frontiers and criterion tradeoffs by on-line visualization of Pareto frontier"
16:30 – 17:00	*Coffee Breake/Pause café*

Session 2. Theory and Methodology II. Chairman: A.Lotov

17:00 – 18:00	R. Slowinski, S. Greco, V. Mousseau. "Assessing a partial preorder of alternatives using ordinal regression and additive utility functions - a new UTA method"
18:00 – 18:30	C. Bana e Costa, J.-C. Vansnick, J.-M. De Corte. "Dealing with verbal Intercriteria preference information in MACBETH"
18:30 – 19:00	Flourentzou Flourentzos, Gerard Greuter. "Hermione, a new rule based qualitative aggregation method"

Paper submitted for discussion/Papier soumis a discussion

- R. Bisdorff, M. Roubens. "On good choices with kernels from ordinal valued binary relations"
- A. Petrovsky, A. Litvinova. "Ordering Multi-Attribute Objects by Closeness to Ideal Solution"
- V. Levin. "Aggregation of individual evaluations"

19:00 *Welcome Party*

Friday, October 10/ vendredi, 10 octobre

Session 3. Theory and Methodology III. Chairman: R. Slowinski

09:00 – 09:30	V. Nogin. "The General Edgeworth-Pareto Principle"
09:30 – 10:00	I. Ashikhmin, E. Furems. "Decision Support System for the Best Object Selection with Inconsistency Control"
10:00 – 10:30	S. Chakhar, V. Mousseau. "Towards a typology of spatial decision problems"
10:30 – 11:00	M. Ozturk, A. Tsoukias. "A new modelization for interval comparison"

Paper submitted for discussion/Papier soumis a discussion

- D. Mentagui. "A global quantitative method to approximate the set of all strategies of a player in game theory"
- G. Shepelyov, M. Sternin. "Representation of expert knowledge by means of generalized interval estimations"
- V. Dulov, N. Tontchev, D. Dimitrovski. "Multicriteria Aid for Decision Making by Movable Limits"

11:00 – 11:30 *Coffee Breake/Pause café*

Session 4. Risk and Uncertainty. Chairman: J. Teghem

11:30 – 12:00 R. Hites, Y. De Smet, N. Risse, M. S. Neumman, P. Vincke. "A Comparison of Multicriteria and Robustness Frameworks"

12:00 – 12:30 J. Michnik, M. Nowak, T. Trzaskalik. "Liquidity and Interest Rate Risk Management in a Bank with Simulations and ELECTRE III Methodology"

12:30 – 13:00 H. Aissi, D. Vanderpooten, J-M. Vanpeperstraete. "Robust Approaches For The Passive Sensor Data Association Problem"

- P. Vincke. "Robustness: Some Open Questions"
- V. Kalika, G. Rossinsky. "A new methodology of MCDM accounting for uncertainty and its applying to multi-criteria analysis of stock buying on stock market"
- V. Kalika. "A methodology of multi-criteria decision making accounting for uncertainty and its application"
- J. Montmain, A. Akharraz, G. Mauris. "Legitimate multi-criteria decision: argumentation and controlled risk"

13:30 – 15:00 *Lanch/Déjeuner*

Session 5. Applications. Chairwoman: A. M. Ostanello

15:00 – 15:30 M.F. Norese, S. Borrelli. "How to integrate MCDA methods in a monitoring system"

15:30 – 16:00 M. Pirlot, J. Teghem, B. Ulungu, P. Bulens, C. Goffin. "Utilisation de l'analyse multicritère pour le choix d'une source froide dans une centrale à cycle combiné"

16:00 - 16:30 S. Damart, V. Mousseau, I. Sommerlatt. "Procedure Itteratives D'Inference D'un Modele de Tri multicritere En Contexte multiacteur"

Paper submitted for discussion/Papier soumis a discussion

- L. Ustinovichius, D. Kochin. "Verbal decision analysis method SNOD for determining the efficiency of investments in construction"
- M. Garcia Centeno, G. Fernandez Barberis, M. Escribano Rodenas. "Evaluation of the different 'change types' by the volatility and yield through the PROMETHEE methods"
- V. Postolică, A. Scarelli, L. Venzi "New proposals for the study of the equilibria in the fish wars using the splines in H-locally convex spaces and Pareto efficiency"
- R.M. Ciobanu. "Decision making: the most important project manager's task"

16:30 – 17:00 *Coffee Breake/Pause café*

Session 6. Applications. Chairman: J.-P. Waaub

17:00 – 17:30 V. Chistiakov. "Double criteria problem of queuing the renovation of a branch of N>>1 enterprises"

17:30 – 18:30 B. Roy. "MCDA 59 & 60"

Paper submitted for discussion/Papier soumis a discussion

- B. Jaretti Sodano. "Real life structuring approach"
- J. Halova, M. Aust. "Relationships between Name and Properties of Complex Compounds Using Linguistic Descriptors"
- V. Dulov, N. Tontchev, D. Dimitrovski. "Information system for management of quality parameters of educational process"
- A. Zavialov. "Multiobjective assistance system in management"
- G. Royzenson. "DSS for a choice of high-performance computing clusters"

19:00 *Meeting Dinner/Le Banquet des Journés*

Forthcoming Meetings

(This section is prepared by Luís Dias and Carlos Henggeler Antunes)

Forthcoming EWG Meettings/Prochaines réunions du Groupe

Note:

- It should be remarked again that this is a bilingual group; all the papers should be presented in both official languages of the group (i.e. French with English slides, and *vice-versa*).
- Ceci en un groupe bilingue ; tous les papiers doivent être présentés dans les deux langues officielles du groupe (i.e. en français avec les transparents en anglais et *vice-versa*).

Avril 29-30, 2004. 59èmes Journées du Groupe de Travail Européen « Aide Multicritère à la Décision » et du Groupe de travail PM20, Brest, France. Theme : "Banque et Finance". Organisateurs : Jean-Pierre Barthelemy et Philippe Lenca. www-iasc.enst-bretagne.fr/~mcda59/. **Le 28 au matin il y a aussi la réunion du groupe « risque dans les assurances »**

October 7-8 or October 14-15, 2004. 60th Meeting of the European Working Group on MCDA, Tilburg University, Netherlands. Topic: MCDA in electronic markets, auctions and negotiations. Organiser: Bartel Van De Walle. www.tilburguniversity.nl/faculties/few/mcda60.

Other Meetings

November 18-21, 2003, Switzerland, 2nd International Workshop on Global Constrained Optimization and Constraint Satisfaction (Cocos'03), URL: http://liawww.epfl.ch/cocos03/.

December 8-10, 2003, New Delhi, India, The Sixth Conference of the Association of Asian-Pacific Operational Research Societies (APORS) within IFORS* URL: www.apors2003.com.

December, 8-12, 2003. The Congress on Evolutionary Computation, co-sponsored by the IEEE Neural Networks Society, the Evolutionary Programming Society, the IEAust, and the IEE, is the leading international conference in the field. The 2003 Congress will be held in Canberra, Australia (http://www.cs.adfa.edu.au/cec_2003-/index.html).

AIMS International Conference on Management, Bangalore, India. Dates: December 28, 2003 - December 31, 2003, Sunday Monday Tuesday Wednesday. www.aims-international.org

37th Annual HAWAI'I INTERNATIONAL CONFERENCE ON SYSTEM SCIENCES, Big Island of Hawaii, USA. Dates: January 5, 2004 - January 8, 2004, http://www.hicss.hawaii.edu

XIV INTERNATIONAL SYMPOSIUM ON MATHEMATICAL METHODS APPLIED, San Jose, Costa Rica, Dates: January 17, 2004 - January 20, 2004. http://www.itcr.ac.cr/simmac/

The International Association of Science and Technology for Development (IASTED) will organize an International Conferences on Artificial Intelligence and Applications (AIA) that will be held in Innsbruck, Austria from February 16-18, 2004. http://www.iasted.org/formatting-initial.htm

INFORMS Telecommunications Conference 2004, Boca Raton, FL; USA. Dates: March 7, 2004 - March 10, 2004. http://www.informs.org/Conf/Telecom04/

CO 2004, Lancaster, U.K. Dates: March 28, 2004 - March 31, 2004. http://www.co2004.org

4th European Conference on EVOLUTIONARY COMPUTATION IN COMBINATORIAL OPTIMIZATION (EvoCOP 2004), Coimbra, Portugal. Dates: April 5, 2004 - April 7, 2004. http://evonet.dcs.napier.ac.uk/eurogp2004/evocop/

Multi Objective Programming and Goal Programming (MOPGP'04), Hammamet, Tunisia. Dates: April 14, 2004 - April 16, 2004. http://www.cck.rnu.tn/mopgp04

INFORMS Conference on OR/MS Practice, Cambridge, MA, USA. Dates: April 25, 2004 - April 27, 2004. http://www.informs.org/Conf/Practice04

NINTH INTERNATIONAL WORKSHOP ON PROJECT MANAGEMENT AND SCHEDULING. Nancy, France. Dates: April 26, 2004 - April 28, 2004. http://www.loria.fr/conferences/pms2004/

ISCRAM2004, the International Workshop on Information Systems for Crisis Response and Management, to be held on May 3-4, 2004 in Brussels. www.tilburguniversity.nl/iscram2004

May, 10th-12th May, 2004. Optimization Days 2004. Montreal, Canada. www.crt.umontreal.ca/jopt2004

CORS/INFORMS Joint International Meeting 2004, Banff, Canada. Dates: May 16, 2004 - May 19, 2004. http://www.informs.org/Conf/CORS-INFORMS2004

ISCRAM2004, The International Workshop on Information Systems for Crisis Response and Management, May, 3-4, 2004. Brussels. www.tilburguniversity.nl/iscram2004.

International Conference on Automated Planning and Scheduling 2004 (ICAPS 2004), Whistler, BC, Canada. Dates: June 3, 2004 - June 7, 2004. http://icaps04.icaps-conference.org

IPCO X, New York City, USA. Dates: June 9, 2004 - June 11, 2004. www.corc.ieor.columbia.edu/meetings/ipcox/ipcox.html

EURO XX 4-7 July 2004. Rhodes. Greece. OR and the Management of Electronic Services. http://www.euro-rhodes2004.org/

Optimization 2004. The fifth international conference on optimization. Faculty of Sciences. University of Lisbon. Portugal. 25th-28th July. www.opti2004.fc.ul.pt

FRANCORO IV, August 18th-21st, 2004. Switzerland, Fribourg. Organizer: Marino Widmer: marino.widmer@unifr.ch.

15th Mini-EURO Conference: "Managing Uncertainty in Decision Support Models", Coimbra, Portugal. Dates: September 22, 2004 - September 24, 2004. http://www.inescc.pt/mudsm2004

INFORMS Annual Meeting Denver 2004. Denver, Colorado, USA. Dates: October 24, 2004 - October 27, 2004.

October 20th-22nd, 2004. International Symposium TICE 2004 – UTC, France. Anne.claire-prevost@utc.fr, karine.sliwak@utc.fr

2nd International Industrial Engineering Conference. Riyadh, Saudi Arabia. Dates: December 19, 2004 - December 21, 2004. http://www.iiec2004.ksu.edu.sa/

17th Triennial Conference of the International Federation of Operational Research Societies 2005. Honolulu, Hawaii, USA. Dates: July 11, 2005 - July 15, 2005. http://www.informs.org/Conf/IFORS2005/

INFORMS Annual Meeting, New Orleans 2005, New Orleans, Louisiana, UAS. Dates: November 13, 2005 - November 16, 2005

Call for Paper

The CORS/INFORMS joint Meeting will be held on May 16-19, 2004 at Banff Centre, Banff (Alberta, Canada). I am organizing a cluster on Multicriteria Decision Aid and Multi-Objective Programming. I would like to invite you to participate in this cluster. The guidelines for submitting abstracts are available online at the conference web page: www.informs.org/conf/CORS-INFORMS2004. Please send me a copy of your abstract. The preliminary submission deadline is February 6, 2004. Abstract received by that date will receive preference in scheduling. For additional information on the CORS/INFORMS 2004 Conference, please go to the conference web page. Please send me a notice if you plan to participate in this Conference. My e-mail is: baouni@laurentian.ca.

Web site for Call for Papers:
www.inescc.fe.uc.pt/~ewgmcda/CallforPapers.html

Books

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Multiobjective Optimisation and Control

by

G.P. Liu, and **J.B. Yang** and **J.F. Whidborne**

Description: Explores how practical control systems can be designed to accommodate different and often conflicting performance objectives, such as closed-loop stability, low feedback gains and insensitivity to model parameter variations. Presents fundamental theory, a number of design methods and algorithms, and some practical applications in multiobjective optimisation and control, including recent research work on this subject. Traditional approaches to control system design objectives make use of scalar summation of all weighted objectives in one cost function. In contrast, this book seeks to clarify how each objective is affected by the controller. In control system design there are often a number of design objectives to be considered. The objectives are sometimes conflicting and no design exists which can be considered best with respect to all objectives. Hence, there is an inevitable trade-off between design objectives, for example, between certain performance objectives and stability robustness. These considerations have led to the study of multiobjective optimisation methods for control systems. During the last two decades, multiobjective control has been considered in the design process. The control system objectives are described by a set of performance indices. This type of control problem appears in flight control design, in the control of space structures and in industrial process control. The concept of a generic multiobjective control problem which involves different types of performance indices is generating increasing research interest.

Content: Chapter 1: Introduction; Chapter 2: Nonlinear Optimisation; Chapter 3: Constrained Optimisation; Chapter 4: Multiple Objective Optimisation; Chapter 5: Genetic Algorithms and Optimisation; Chaper 6: Robust Control System Design by Mixed Optimisation; Chapter 7: Multiobjective Control of Critical Systems; Chapter 8: Multiobjective Control Using Eigenstructure Assignment; Chapter 9: Multiobjective PID Controller Implementation Design; Chapter 10: Multiobjective PI Controller Design for a Gasifier; Chapter 11: Multiobjective Nonlinerar Identification; Chapter 12: Multiobjective Fault Diagnosis; Bibliography; Index.

Readership: Researchers in Universities and Engineers in industry who work in control system design and/or decision making; under-graduates and post-graduates who study automatic control and/or optimisation

Published: Research Studies Press, January 2003. ISBN: 0 86380 268 4

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Intelligent Support Systems for Marketing Decisions

by

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Yannis Siskos
Technical University of Crete, Chania, Greece

Intelligent Support Systems for Marketing Decisions examines new product development, market penetration strategies, and other marketing decisions utilizing a confluence of methods, including Decision Support Systems (DSS), Artificial Intelligence in Marketing and Multicriteria Analysis. The authors systematically examine the use and implementation of these methodologies in making strategic marketing decisions.

Part I discusses the basic concepts of multicriteria analysis vis-a-vis marketing decisions and in new product development situations.

Part II presents basic concepts from the fields of Information Systems, Decision Support Systems, and Intelligent Decision Support Methods (agent-based, expert systems, neural nets, ..). In addition, specialized categories of DSS (multicriteria DSS, web-based DSS, group DSS, spatial DSS) are discussed in terms of their key features and current use in marketing applications.

Part III presents IDSS and a multicriteria methodology for new product development. Further chapters present a developmental strategy for analyzing, designing, and implementing an Intelligent Marketing Decision Support System. The implementation discussion is illustrated with a real-world example of the methods and system in use

Contents. Preface. Part I: Marketing Decisions. 1. Decision Analysis and Support. 2. The Structure of Marketing Decisions. 3. Strategic Marketing Decisions. Part II: Intelligent Support Systems. 4. Information Systems. 5. Decision Support Systems. 6. Advanced Decision Systems. 7. Intelligent Decision Support Methods. 8. Intelligent Decision Support Systems in Marketing. Part III: New Methodology - Applications. 9. New Product Development Methodology. 10. Analysis and Design of MARKEX. 11. Applications in Marketing. References. Index

Kluwer Academic Publishers. Book Series: INTERNATIONAL SERIES IN OPERATIONS RESEARCH AND MANAGEMENT SCIENCE: Volume 54. http://www.wkap.nl/prod/b/1-4020-7194-9

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Spaces of Sets and Multisets

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There are a lot of problems where the objects under analysis are characterized by many diverse features (attributes), which may be quantitative and qualitative. Furthermore, the same objects may exist in several copies with different values of attributes, and their convolution is either impossible or mathematically incorrect. Examples of such problems are the classification of multicriteria alternatives estimated by several experts, the recognition of graphic symbols, text document processing, and so on. A convenient mathematical model for representing multiattribute objects is a multiset or a set with repeating elements. The multiplicity of elements is the most essential property of multiset that allows us to distinguish a multiset from a set and to consider multiset as a qualitatively new mathematical concept.

The spaces of sets and multisets with a measure are considered in this book. Principal characteristics of multiset are introduced. General properties of the set and multiset measures are found. Concepts of the set and multiset sequences, new sorts of their convergence are defined. Properties of the convergent sequences are investigated. New types of spaces of the measurable sets and multisets, and new kinds of metrics are described. Features of different distances between sets and between multisets are investigated. Metric and topological properties of the spaces are considered. Methods for classifying and ordering objects that may exist in several copies with different values of quantitative and qualitative attributes characterizing their properties are suggested.

The book is interesting for specialists in the fields of discrete mathematics, decision making, artificial intelligence, pattern recognition, programming languages, post-graduate students, students, for everybody, who needs to analyze and process multifarious (numeric and symbolic, diverse and contradictory) information.

Contents. Preface. 0. Basis Concepts of Multiset Theory. 0.1. Notion of multiset. 0.2. Operations with multisets. 0.3. Properties of operations with multisets. 0.4. Calculation of multiset cardinalities and dimensionalities. 0.5. Forms for representing multisets. 1. Metric spaces and consequencies. 1.1. Metric and metric space. 1.2. Distances between points and sets. 1.3. Techniques for a construction of metric spaces. 1.4. Convergence and limit of points sequences. 1.5. Properties of convergent sequences. 1.6. Monotone and multiple sequences. 1.7. Homeomorphism and isometry of spaces. 1.8. Other types of distances and spaces. 1.9. Metric transformations of spaces. 2. Properties of metric spaces. 2.1. Open and closed sets. 2.2. Closure, connectivity. 2.3. Density, separability. 2.4. Completeness and completion. 2.5. Compactness. 2.6. Topological sets. 3. Continuous functions, sequences of functions, sets and multisets. 3.1. Limit and continuity of function. 3.2. Properties of continuous functions. 3.3. Semi-continuous and one-sided continuous functions. 3.4. Limit and continuity of a function of several variables. 3.5. Convergence and limit of functions sequences. 3.6. Convergence and limit of sets sequences. 3.7. Convergence and limit of multisets sequences.
4. Set measure spaces. 4.1. Set measure. 4.2. Properties of a set measure. 4.3. Measurable sets. 4.4. Sequences of measurable sets. 4.5. Measurable functions. 5. Multiset measure spaces. 5.1. Multiset measure. 5.2. Properties of a

multiset measure. 5.3. Measurable multisets. 5.4. Sequences of measurable multisets. 6. Functional spaces. 6.1. Vector spaces. 6.2. Spaces of bounded number sequences. 6.3. Spaces of convergent number sequences. 6.4. Spaces of continuous and bounded functions. 6.5. Spaces of bounded measurable functions. 6.6. Spaces of measurable functions. 6.7. Metric spaces and algebras of sets. 7. Spaces of measurable sets. 7.1. Metrics generated by a set measure. 7.2. Power transformation of distances between sets. 7.3. Peculiarities of distances generated by a set measure. 7.4. Geometric properties of distances between measurable sets. 7.4. Continuity of metrics generated by a set measure. 7.6. Convergence on a space of measurable sets. 7.7. Properties of metric spaces of measurable sets. 7.8. Axiomatic approach to a metrization of spaces of measurable sets. 8. Spaces of measurable multisets. 8.1. Metrics generated by a multiset measure. 8.2. Power transformation of distances between multisets. 8.3. Peculiarities of distances generated by a multiset measure. 8.4. Geometric properties of distances between measurable multisets. 8.4. Continuity of metrics generated by a multiset measure. 8.6. Convergence on a space of measurable multisets. 8.7. Properties of metric spaces of measurable multisets. 8.8. Axiomatic approach to a metrization of spaces of measurable multisets. 9. Examples of applications. 9.1. Forms for representing multi-attribute objects. 9.2. Cluster analysis of objects. 9.3. Classifing of objects. 9.4. Ordering objects. References. Principal notations. Subject index

Editorial URSS, Moscow, 2003. ISBN 5-354-00486-1 (in Russian).

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Adjuger un marché au mieux-disant Analyse multicritère, pratique et droit des marchés publics

par

Jacques Pictet et **Dominique Bollinger**
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Sujet: L'analyse des soumissions dans un marché public, c'est un problème à critères multiples: on cherche le «mieux disant», qui n'est pas nécessairement l'auteur de l'offre la plus basse. Le sérieux d'un soumissionnaire, son expérience, ou sa capacité à tenir les délais promis - parmi d'autre critères - peuvent amener à s'écarter du seul critère prix. Encore faut-il être sûr de son choix, et notamment être capable de le défendre devant un juge. Or naviguer entre les exigences légales d'une part, et l'application rigoureuse de l'aide multicritère à la décision d'autre part, cela ne va pas de soi. Les auteurs on donc décidé d'amener progressivement le lecteur à une compréhension minimale des règles qui s'imposent, si l'ont veut rester mathématiquement cohérent tout en respectant les contraintes relevant du droit des marchés publics.

Public: Ouvrage destiné en priorité aux praticiens, mais sans visée scientifique: peut servir de base d'enseignements dans différents domaines (architecture, génie civil, génie rural, droit, sciences administratives, etc.)

Contenu: Préface - Avant-propos - Introduction - Définition des éléments constitutifs - Contraintes pesant sur la moyenne pondérée - Importance et poids des critères - Types de critères et transformation des échelles - Un cas particulier: le critère «Prix» - Notes pondérées et sous-critères - Limites de la moyenne pondérée - Avant l'envoi de l'appel d'offres - De l'ouverture des offres à la notification de la décision - Pour échapper à la moyenne pondérée - Divers - Vers une mise en œuvre des règles - OUtils - Index - Glossaire français-allemand-italien-anglais.

Informations: Presses Polytechniques et Universitaires Romandes, ISBN: 2-88074-556-X, 2003, 16x24cm, 266 pages, broché.

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Distributed Decision Making

by

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Distributed decision making (DDM) has become of increasing importance in quantitative decision analysis. In applications like supply chain management, service operations, or managerial accounting, DDM has led to a paradigm shift. The book provides a unified approach to such seemingly diverse fields as multi-level stochastic programming, hierarchical production planning, principal agent theory, negotiations or contract theory. Different settings like multi-level one-person decision problems, multi-person antagonistic planning, and leadership situations are covered. Numerous examples and real-life planning cases illustrate the concepts. The new edition has been considerably expanded by additional chapters on supply chain management, service operations and multi-agent systems.

Contents: Distributed Decision Making, Decision Theory, Hierarchical Production Planning, Principal-Agent Theory, Supply Chain Management, Managerial Accounting.

Springer-Verlag. 2nd ed., 2003, XVI, 528 p. 120 illus., Geb. ISBN: 3-540-40201-2

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Proceedings

Modeling and simulation of business systems. International conference the Association of European Operational Research Societies, May 13-14, 2003 Vilnius, Lithuania. Edited by H.Pranevičius, E.K.Zavadskas and B.Rapp. Kaunas: Technologija, 2003, 382 p. (ISBN 9955-09-420-6). (Chairman of the Conference prof. Edmundas Kazimieras Zavadskas, Lithuania, Co-Chairman of the Conference prof. Birger Rapp, Sweden, Chairman of Organising and Programing Committee prof. Henrikas Pranevičius, Lithuania)

MCDA: R.Ginevičus, V.Podviesko. Quantitative evaluation of significance of hierarchically structured indexes, 22-25 p. T.Riismaa. Optimization of the structure of fuzzy multi-level decision – making system, 31-35 p. A.Stasiulionis. Multicriteria based estimation of selection of commercial property's construction project, 36-42 p. T.Vilutienė. The application of multiple – criteria analysis to decision support for the facility management of a city's residential district, 47-51 p. N.Lepkova, E.K.Zavadskas, A.Kaklauskas. Modeling of facilities management process, 132-136 p. J.Šaparauskas. Evaluation and comparison of alternative building design scheme by using the internet's potentialities, 319-323 p. E.K.Zavadskas, A.Kaklauskas, V.Trinkūnas, E.Trinkūnienė. Model of construction e-business system, 359-363.

Articles Harvest

(This section is prepared by Maria João Alves and Carlos Henggeler Antunes)

Announcement: An extensive bibliography on Robustness can be found at the following address: http://smg.ulb.ac.be (click on Research and then Robustness). Any new references concerning robustness are welcome and can be sent to Romina Hites (rhites@smg.ulb.ac.be).

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Séminaires du LAMSADE

"MODÉLISATION DES PRÉFÉRENCES ET AIDE MULTICRITÈRE À LA DÉCISION"

Responsables: Bernard ROY et
Daniel VANDERPOOTEN
(le mardi, de 14:00 à 17:00, en salle P510)

21 octobre 2003	Discussion des travaux de **Benjamin Rousval** (LAMSADE Université Paris-Dauphine) : Outil d'évaluation pour la mesure de l'impact des transports sur l'environment.
18 novembre 2003	Conférence de **Vincent Mousseau** (LAMSADE Université Paris-Dauphine) : Construction robuste de modèles de tri multicritère.
9 décembre 2003	Discussion des travaux de **Fernando Tavares-Pereira** (INESC-Coimbra, LAMSADE, Université Paris-Dauphine) Partition multicritère d'un territoire en zones.

Other Works

(Communicated by the authors)

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D. BOUYSSOU, M. PIRLOT. 'Additive difference' models without additivity and subtractivity. Cahier nº 206, LAMSADE.

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A. O. KAZAKCI, A. TSOUKIAS. Designing or Planning? - Cognitive foundations for design aiding (septembre 2003). Cahier nº 213, LAMSADE.

L. DIAS, V. MOUSSEAU. IRIS-Interactive Robustness analysis and parameters' Inference for multicriteria Sorting problems (2.0). User Manual. Document nº 128, LAMSADE (avril 2003).

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No. 7/2003. "A scatter search method dedicated to the bi-criteria knapsack problems" - Carlos Gomes da Silva, João Clímaco, José Figueira

No. 5/2003. "A multiple objective evolutionary approach for the design and selection of load control strategies" - Álvaro Gomes, Carlos Henggeler Antunes, António Martins

Dissertations

GODINHO, Pedro. "The use of bicriteria decision trees in project analysis (in portuguese)". Ph.D Dissertation, University of Coimbra, Coimbra, Portugal. June 2003. Jury: Supervisor : João Paulo COSTA (FEUC), João Oliveira SOARES (IST), Manuel MATOS (FEUP), João CLÍMACO (FEUC), João Sousa ANDRADE (FEUC), António MARTINS (FEUC).

ABSTRACT: This work presents a multicriteria approach to the analysis and selection of strategies in investment projects. This approach uses decision trees and discrete-time real option models, and it is based on the identification of the non-dominated strategies. The present work only considers the use of two criteria, time and financial value, but this approach can be extended to other criteria. Since the decision trees that correspond to the approach may sometimes become quite large, their construction by human users may be a hard task. However, there are several particular situations that may be modelled with a limited number of parameters, allowing the corresponding trees to be automatically built by a computer. A specific model, based on the multicriteria approach, is defined for the analysis of some tasks that can be undertaken through the use of several different processes.

The trees generated by the model will usually be very large, and calculations may take a long time and require large amounts of memory. Therefore, the use

of the model may become impracticable, even on a computer. With this fact in mind, an algorithm is proposed for a faster identification of the non-dominated strategies, without actually building the tree. Some tests are performed, in order to compare the performance of the algorithm with the performance of the method that consists on building and evaluating the tree. It is concluded that the algorithm performs particularly well when the number of non-dominated strategies is small.

When there is a large number of non-dominated strategies, the decision-maker will often have some difficulties in selecting the preferred alternative. In such cases, an interactive approach may help the decision-maker to choose a strategy. So, an interactive approach to the selection of a strategy is proposed, for the particular situation in which average time is used.

The present work begins with a presentation of the classical measures for project evaluation, and it discusses which situations may be suited for the use of different measures. It also proposes a multicriteria framework for the simultaneous use of different measures, and presents some tools and models for incorporating risk in project value when sequential decisions may be made. A multicriteria approach, based on the use of decision trees, is then presented. A bicriteria model, based on that approach, is also presented, as well as some of its mathematical properties. An algorithm is proposed for a faster identification of the non-dominated strategies of the model. Finally, an interactive approach to the selection of a strategy in the bicriteria model is also presented.

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RIAD AZIBI, Amine. « Construction de Critères en Aide à la Décision : Aspects Méthodologiques, Techniques et Pratiques », Thése de doctorat, Université Paris-Dauphine, septembre 2003. Jury : Directeur de thèse : Daniel VANDERPOOTEN (Université Paris-Dauphine), Bruno URLI (Université du Québec à Rimouski), Philippe VINCKE (Université Libre de Bruxelles), Denis BOUYSSOU (Directeur de Recherches CNRS), Patrice PERNY (Université Paris VI), Bernard ROY (Université Paris-Dauphine).

RESUME : Cette thèse traite de la construction de critères en aide à la décision. La construction de critères constitue une étape clé du processus d'aide à la décision. Cette étape soulève certaines difficultés techniques liées notamment à la prise en compte d'aspects qualitatifs.

Nous nous intéressons dans cette thèse plus particulièrement aux critères agrégeant des conséquences qualitatives, ce qui est notamment le cas de critères fondés sur des *conséquences dispersées*. Après avoir souligné le parallèle entre la problématique de l'agrégation d'attributs qualitatifs et celle de l'affectation, nous proposons une méthodologie d'aide à la construction d'un système cohérent d'affectation multi-attribut. Nos travaux sont axés sur l'utilisation de règles d'affectation de type « si … alors … » afin de respecter le caractère qualitatif des attributs. Notre approche repose sur une démarche itérative d'aide à la construction d'une base de règles. Cette démarche originale, de portée générale, vise à enrichir ou affiner progressivement la base de règles en vue d'aboutir à un modèle d'affectation *cohérent*. Les tests de cohérence sont fondés sur une correspondance entre la représentation logique des règles et une représentation algébrique équivalente. Cette correspondance permet d'exprimer les règles par des contraintes linéaires et de tester la cohérence du modèle d'affectation par règles en résolvant une série de programmes linéaires en variables 0--1.

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SIVILEVICIEUS, Henrikas, “The quality improvement of asphalt concrete mixture production technological process”. Vilnius Gediminas Technical university (VGTU) Dr. Sc. Dissertation, 2003, Scientitic Board: E.K.ZAVADSKAS (Chairman), G. DZEMYDA (The institute of mathematics and Informatics), V. STANKEVICIUS (Kaunas University of Technology), P. VASILJEVAS (Vilnius Pedagogical University), R. KACIANAUSKAS, R. MACIULAITIS, Z. KAMAITIS (Vilnius Gedminas Technical university).

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USTINOVICIUS, Leonas. „Decision- support System for determining the Efficiency of Investments in Construction", Report presented for habilitation (Dr.habil). Vilnius Gediminas Technical University, Lithuania, 2003.04.22 Habilitation Committee: Chairman: prof. A. KAKLAUSKAS, Vilnius Gediminas Technical University. Members: prof.P. ADOMENAS, prof. V. RUTKAUSKAS, prof. E.K. ZAVADSKAS (Vilnius Gediminas Technical University, Lithuania), prof. A. MARCINSKAS (Vilnius University), prof. O. KAPLINSKI (Poznan Technical University, Poland), prof. F. PELDSCHUS (Leipzig University of Applied Science, Germany).

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LEPKOVA, Natalija. "Facilities management multiple criteria analysis of public buildings". Doctoral dissertation. Vilnius Gediminas Technical University. Lithuania, 2003 (In Lithuanian). Doctoral committee: Chairman and work supervisor: Prof Dr Habil Artūras KAKLAUSKAS (Vilnius Gediminas Technical University, technological sciences, civil engineering 02T); Members: Prof Dr Habil Edmundas Kazimieras ZAVADSKAS (Vilnius Gediminas Technical University, technological sciences, civil engineering 02T). Prof Dr Habil Aleksandras Vytautas RUTKAUSKAS (Vilnius Gediminas Technical University, social sciences, economics 04S); Prof Dr Habil Josifas PARASONIS (Vilnius Gediminas Technical University, technological sciences, civil engineering 02T); Prof Dr Roode LIIAS (Tallinn Technical university, social sciences, management and administration 03S). Opponents: Prof Dr Habil Romualdas GINEVIČIUS (Vilnius Gediminas Technical University, social sciences, management and administration 03S); Dr Erik BEJDER (Aalborg University, technological sciences, civil engineering 02T).

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TRINKUNAS, Vaidotas. *"Internet-Based Decision Support System of Construction Products"*, Technological sciences, civil engineering (02T), Doctoral committee: Chairman and work supervisor Prof Dr Habil Artūras KAKLAUSKAS (Vilnius Gediminas Technical University, technological sciences, civil engineering 02T). Members: Prof Dr Habil Edmundas Kazimieras ZAVADSKAS (Vilnius Gediminas Technical University, technological sciences, civil engineering 02T); Prof Dr Habil Aleksandras Vytautas RUTKAUSKAS (Vilnius Gediminas Technical University, social sciences, economics 04S); Prof Dr Habil Juozas BIVAINIS (Vilnius Gediminas Technical University, social sciences, management and administration 03S); Prof Dr Habil Friedel PELDSCHUS (Leipzig High Technic, Economic and Culture School, technological sciences, civil engineering 02T) 2002-2003; Assocc Prof Dr Audrius BANAITIS (Vilnius Gediminas Technical University, technological sciences, civil engineering 02T), 2000-2002; Opponents: Prof Dr Habil Josifas PARASONIS (Vilnius Gediminas Technical University, technological sciences, civil engineering 02T); Dr Erik BEJDER (Aalborg University, technological sciences, civil engineering 02T).

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DAMART, Sébastien. "Une étude de la contribution des outils d'aide à la décision aux démarches de concertation. Le cas des décisions publiques de transport." Thèse de Doctorat. Décembre 2003. Université Paris Dauphine. Composition du jury Bernard ROY (Directeur de thèse), Denis BOUYSSOU, Albert DAVID, Georges MERCADAL, Bruno Faivre d'ARCIER, Bruno URLI.

RESUME: De nombreux travaux ont montré que l’évaluation ex ante des choix publics était inadaptée dans le cadre de processus participatifs. L’objet de la thèse est d’identifier la nature et la forme des outils d’aide à la décision qui peuvent instrumenter utilement de tels processus. La thèse s’appuie sur une grille de lecture de la notion de concertation fondée sur les concepts d’intégration et d’identification. Cette grille de lecture est utilisée pour mettre en perspective les rôles d’outils d’aide à la décision dans le cadre de démarches participatives. Une partie de la thèse porte ainsi sur une étude d’un processus de décision et d’une démarche d’aide à la décision portant sur la tarification des transports publics en Ile-de-France. Cette étude permet de faire l’observation que la contribution des outils d’aide à la décision aux démarches de concertation dépend de facteurs contextuels liés aux relations entre acteurs d’une part et liés aux connaissances manipulées d’autre part.

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LE BARS, Marjorie. Un simulateur multi-agent pour l'Aide à la Décision d'un collectif : application à la gestion d'une ressource limitée agro-environnementale. Thèse de Doctorat. Université Paris-Dauphine. Octobre 2003. Jury : S. PINSON (Université Paris-IX-Dauphine, Directeur de thèse),J. M. ATTONATY (INRA, Directeur de thèse), A. DROGOUL (Université Paris VI) J. P. MULLER (CIRAD), S. HADDAD (Université Paris IX-Dauphine), B. ESPINASSE (Université d'Aix-Marseille).

RESUME: L’objectif de la thèse est de fournir méthodes et instruments pour l’aide à la négociation des acteurs concernés par la gestion de l’eau. Cette ressource est l’objet de conflits entre ses différents usagers. Des directives générales ont été édictées au niveau national et européen. Leur mise en œuvre passe au niveau local par la création de réglementations, celles-ci résultent de négociations entre les différents acteurs concernés. Toutefois, leur création se fait bien souvent sans vision de leurs conséquences au niveau global et individuel. Nous avons fait l’hypothèse que les SMA pouvaient apporter un éclairage à ce problème: (i)ils sont capables de prendre en compte une population d’acteurs aux objectifs et aux rationalités différentes (ii) ils correspondent à l'objectif d’aider les décideurs à établir une réglementation en leur fournissant les conséquences possibles de différentes réglementations selon des critères multiples: individuels/collectifs, économiques, environnementaux, éthiques et non pas de leur fournir la réglementation "optimale". Deux approches successives et complémentaires ont été testées. Une première maquette de SMA concerne l'archétype de problème de gestion d’une nappe. Elle a permis d’explorer différents corps de règles d’attribution de l’eau pour des agriculteurs aux comportements différents dans des situations climatiques contrastées. La présentation approfondie du modèle, de son fonctionnement et des résultats obtenus aux acteurs concernés a amené la création d’un modèle plus général utilisable sur un cas concret et sur une méthodologie de conception interactive avec les acteurs de terrain. Ce modèle fait appel aux concepts d’agent BDI. Ceci a entraîné une formalisation de plans, basée sur un langage spécifique, prenant en compte la notion de temps. L’analyse de la mise en œuvre et de son utilisation dans le Tarn et Garonne devrait déboucher sur une méthode de construction interactive de modèle d’aide à la négociation et une architecture généralisable de système multi agent basé sur des agents BDI.

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MERAD, Myriam. Apport des méthodes d'aide multicritère à la décision pour l'analyse et la gestion des risques liés aux mouvements de terrains induits par les ouvrages souterrains. Thèse de Doctorat. Université Paris-Dauphine. Octobre 2003. Jury *:* B. ROY (Université Paris-IX-Dauphine, Directeur de thèse),T. VERDEL (INERIS), S. KOUNIALI D. VANDERPOOTEN (Université Paris IX-Dauphine), E. PARENT (ENGREF), J.-P. PIGUET

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ROUSSEAU, Lambert. Comparaison de points de vue pour la formulation de problèmes en gestion des territoires. Thèse de Doctorat. Université Paris-Dauphine. Octobre 2003.Jury : S. A. TSOUKIAS

(Université Paris-IX-Dauphine, Directeur de thèse),S. PINSON (Université Paris-Dauphine), J. C. POMEROL (Université Paris VI) , F. Le BER, G. DEFFUANT (CEMAGREF), C. ROSENTHAL-SABROUX (Université Paris IX-Dauphine).

RESUME: Cette thèse propose un cadre d'analyse, une méthode d'accompagnement et un outil informatique dans le but de prendre en compte l'impératif d'intégration des différents points de vue des acteurs d'un processus de gestion du territoire. Pour cela nous centrons notre étude sur l'interaction des acteurs durant la phase de formulation de problèmes qui construit les points de vue utilisés par le groupe, à partir de la comparaison des points de vue utilisés par chacun des acteurs pour décrire les problèmes. La méthode d'accompagnement et l'outil informatique découlent du cadre d'analyse et permettent d'en tester les apports opérationnels. Testés sur des cas réels et fictifs ils fournissent un espace d'interaction entre les acteurs et des documents supports et résultats de l'interaction, les artefacts. Les résultats montrent la prise de conscience par les acteurs de leurs nterdépendances et donc l'importance et la faisabilité d'un accompagnement de la formulation de problèmes.

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MOLINES, Nathalie. Méthodes et outils pour la planification des grandes infrastructures linéaires et leur évaluation environnementale. Thèse de Doctorat. Université St. Étienne. Décembre 2003. Jury : Bernard ETLICHER (Univ. St. Etienne), Jean-Jacques CHEVALLIER (Univ. Laval, Québec), Pierre DUMOLARD (Univ. Grenoble), Jean VARLET (Univ. Chambéry), Bernard ROY (Univ. Paris-Dauphine).

RESUME: L’opposition croissante qui entoure l’implantation d’infrastructures linéaires engendre le rallongement des études et l’alourdissement du coût des projets. Pour limiter ces conflits, le gouvernment a fait évoluer la procédure décisionnelle : durcissement du cadre législatif, élargissement de la notion d’environnement, implication des actuers locaux en amont des projets … Cette évolution complexifie les études environnementales et rend absolète les méthodes traditionnelles. L’association des potentialités des SIG et des méthodes d’analyse multicritère est susceptible de répondre aux nouveaux besoins. Nous nous appliquerons, après avoir achématisé la situation décisionnelle complexe et présenté ces outils d’aide à la décision, à démontrer leurs potentialités pour l’étude des infrastructures linéaires. Une palette de méthodes et d’outils sera développée pour l’améliorer l’évaluation environnementale des projets. Elle sera validé sur le projet de lieaison autouroutière Lyon-Narbonne (partie Nord).

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MOUSSEAU, Vincent. "Elicitation des préférences pour l'aide multicritère à la décision". Habilitation à diriger des recherches. Décembre 2003, Université Paris-Dauphine. Jury : Denis BOUYSSOU, Michel LAMURE, Jean-Charles POMEROL, Bernard ROY, Roman SLOWINSKI, Philippe VINCKE.

RESUME : Mes préoccupations de recherche se situent dans le champ de l'aide multicritère à la décision qui considère le comportement décisionnel comme non nécessairement guidé par un critère unique mais comme pouvant être la résultante de plusieurs critères en conflit. Dans ce cadre, les modèles et outils d'aide à la décision développés s'appuient explicitement sur la construction d'une famille de critères traduisant les aspects pertinents du problème de décision. Plus précisément, mes intérêts de recherche concernent la modélisation et l'élicitation des préférences. En effet, la mise en oeuvre opérationnelle d'outils d'aide à la décision dans des contextes réels requiert de disposer d'outils d'élicitation n'imposant pas au(x) décideur(s) de s'exprimer dans les termes du modèle d'agrégation utilisé. La conception de tels outils requiert une étude fine des différents modèles de préférences utilisés ainsi que l'analyse expérimentale des comportements décisionnels. Leur validation se fait au regard de leur applicabilité dans des problèmes de décision issus de contextes réels.

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OBERTI, Pascal. "Développement durable et gouvernance participative : revue de la littérature et contribution fondée sur une démarche multicritère", Université de Versailles Saint-Quentin-en-Yvelines, Centre d’Économie et d’ Ethique pour l’Environnement et le Développement C3ED-EGER, UMR n°063 IRD-UVSQ, Jeudi 29 janvier 2004. Jury: Sylvie FAUCHEUX, Pr. et Présidente de l'Université de Versailles Saint-Quentin-en-Yvelines, Directrice de la recherche Maurice BASLÉ, Pr. à l'Université de Rennes I, Rapporteur Jean-François NOËL, Pr. à l'Université d'Angers, Rapporteur Géraldine FROGER, MC HDR à l'Université de Versailles Saint-Quentin-en-Yvelines, Rapporteur Martin O'CONNOR, Pr. à l'Université de Versailles Saint-Quentin-en-Yvelines Bernard ROY, Pr. à l'Université de Paris-Dauphine.

RESUME : Le sujet que nous nous proposons d’étudier a trait aux processus d’aide à l’évaluation et à la décision en matière de développement durable (DD), dans un contexte participatif faisant intervenir de multiples acteurs, publics ou privés, dont les systèmes d’informations et de valeurs sont plus ou moins conflictuels. Trois chapitres principaux seront développés.

A travers l’objectif général de développement durable, il s’agira en premier lieu de souligner les axes autour desquels l’intervention des pouvoirs publics s’est exprimée; et de relativiser la portée de l’arsenal politique mise en œuvre eu égard aux lourdes menaces écologiques pesant sur la planète, et face à l’émergence de problèmes environnementaux dans une optique prospective de rupture. Nous étayerons que ce déficit de gouvernement dans la gestion de l’environnement, conduit à une demande sociale croissante en matière d’information et de participation aux décisions. Dès lors, il apparaît légitime d’étudier les démarches pouvant favoriser de manière significative l’implication de la société civile aux processus décisionnels et évaluatifs en matière de DD, à coté des experts et décideurs officiels.

C’est l’objet du second chapitre, s’attelant à souligner, comment et pourquoi, une transition s’opère du gouvernement vers la gouvernance participative. Nous rappellerons les nombreux discours sur le DD, faisant appel à la participation dans des contextes divers (institutionnel, juridique, académique, social). Plusieurs formulations du thème de la gouvernance, se recoupant partiellement, seront livrées, en se référant à des considérations de gestion publique, de décision publique, d’évaluation des politiques publiques ; la problématique du DD y étant transversalement inscrite. Les « nouvelles formes de gouvernance » induites ont alors pour objectif de générer d’autres rapports entre l’expertise, l’exercice de la démocratie et la décision publique. Il s’agira de relativiser leurs portées. Face à cette nécessité de mettre en œuvre une gouvernance participative en matière de DD, nous étudierons quelles sont les méthodes, plus ou moins formalisées, dont dispose l’économiste moderne pour s’inscrire dans la problématique. Une analyse des diverses conceptions de la participation pouvant sous-tendre les outils, sera un préalable nécessaire. Aussi, les conditions de réussite et les limites des approches participatives seront évoquées.

Finalement, notre contribution portera plus particulièrement sur une démarche originale de participation, fondée sur l’aide multicritère à la décision. Après une brève présentation de cette discipline de la recherche opérationnelle moderne, nous présenterons une méthodologie visant à mettre en œuvre un processus décisionnel participatif. Diverses applications à grandeur réelle, menées avec succès en région corse, seront présentées à travers les domaines suivants : le contrôle de la qualité des eaux de consommation, l’évaluation ex ante de projets d’éducation à l’environnement, la valorisation durable du patrimoine bâti. Une illustration au Plan d’aménagement et de développement durable sera par ailleurs étayée. Plus longuement, la méthodologie sera illustrée à la localisation d’éoliennes, faisant état des dernières avancées.

Announcement:

The "Useful links" section of the group's homepage

(http://www.inescc.pt/~ewgmcda)

is being enlarged. Contributions of URL links to societies, research groups and other links of interest are welcome.

A membership directory of the European Working Group on "Multiple Criteria Decision Aiding" is available at the same site. If you would like to be listed in this directory please send us your data (see examples already in the directory).

Contact: José Figueira (figueira@fe.uc.pt) and Luís Dias (ldias@inescc.pt)

Web site for the EURO Working Group "Multicriteria Aid for Decisions"

A World Wide Web site for the EURO Working Group on "Multicriteria Aid for Decisions" is already available at the URL:

http://www.inescc.pt/~ewgmcda

This WWW site is aimed not just at making available the most relevant information contained in the Newsletter sections, but it also intends to become an online discussion forum, where other information and opinion articles could appear in order to create a more lively atmosphere within the group.

All information as well as links to other Web sites of interest can be sent to Luís Dias by the e-mail:

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European Working Group "Multiple Criteria Decision Aiding"

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