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Opinion Makers Section

Harmonizing priority weights and indifference judgments in value function implementation

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Introduction

Value functions are one of the most popular ways of dealing with multiattribute decision making problems in real world problems, namely in situations like public tenders where the transparency of the evaluation methodology is an important aspect. The fact is that, many times, value functions used in practice are built in a naïve way, beginning with the definition of "weights" by the Decision Maker (DM), complemented by a more or less arbitrary specification of the individual value functions for each attribute. An additive model is generally assumed, sometimes without really checking the correspondent requirements.

The experience of the author in supporting this kind of processes, namely in the public transport and power systems sectors, showed that DM (and committees acting the DM, the most frequent case) adhere without difficulty to a formal process of building correctly a multiattribute value function and are able to express their preferences in terms of trade-offs or indifference judgments, after some discussion and having gained insight to the problem. However, there are frequently conflicts between the parameters of the multiattribute value function ("weights") determined by the formal process and the intuitive notion of relative importance of the criteria the DM keep in their minds, as a consequence of their personal qualitative analysis of the situation, or want to impose, due to political or social constraints in the decision framework. These conflicts must be taken seriously, since they may compromise the success of the entire decision-aid process.

This paper is devoted to the discussion of the means that can be used to dissolve these conflicts, in order to help building value functions that are technically correct and at the same time are compatible to the perception the DM has about the relative importance of the criteria.

In a first approach to the problem, it may seem that the inconsistency resides in the DM, since all the information comes from him. Of course this may happen: a DM that in his mind privileges environment protection versus cost may show the opposite spirit in specific situations, when faced with real costs and real environmental consequences. But, most of the times, the inconsistency is related with the definition of the range of the individual value function of each attribute, an aspect that generally is not the main concern in the decision-aid process.

In the next section we will review the main concepts associated to the use of value functions, including the usual procedure to determine the parameters, and discuss the origin of the conflict. Section 3 introduces the methodology we advocate to deal with the problem, for the most frequent case of linear additive functions, following our presentation in the 67th meeting of the European Working Group "Multiple Criteria Decision Aiding". A complete methodology for the linear case is presented in section 4. Illustrative examples are distributed along these sections. Conclusions and references conclude the paper.

The problem

Since the topic of value functions is well known - see, for instance, Keeney and Raiffa (1976), Keeney (1992), Clemen and Reilly (2001) or Belton and Stewart (2002) – we will just review the main definitions, in order to establish the nomenclature. However, in relation with the problem in hand, we must point out that methodologies like AHP (Saaty, 1980) and similar procedures do respect the perception of the DM of the relative importance of the attributes. In exchange, they do not use real individual value functions $v_i(x_i)$, since the score of an alternative in each attribute depends on all the remaining alternatives (leading sometimes to rank reversal when a new alternative is introduced).

Differently, the Macbeth approach (Bana e Costa and Vansnick, 1994) takes steps towards the agreement of the process of building the multiattribute value function with the DM's perception of the relative importance of the criteria, by using absolute reference levels in all the attributes. Recently, Bana e Costa et al (2008) show how to use Macbeth in situations close to the ones discussed in this paper, with similar objectives.

Finally, the methods of the "French School", like ELECTRE (Roy, 1991) and related methodologies, are

based in a entirely different approach to decision-aid, where weights do not have the compensatory meaning they have in value function theory, so they are out of this discussion.

We will assume that the requirements for an additive function are fulfilled. In these circumstances, in a decision making situation with n attributes, the normalized value function will be:

$$v(x_1, x_2, \ldots, x_n) = \sum_{i=1}^{n} k_i . v_i(x_i)$$

where the individual (or partial) value functions $v_i(x_i)$ may be linear, polynomial, exponential, or any other specific shape that reflects the variation of the preference of the DM along the correspondent attribute. We will consider through the text that all the partial value functions are normalized, between $v_i(x_{i,worst})=0$ and $v_i(x_{i,best})=1$, so also $\sum_i k_i = 1$. Note that "worst" and "best" are used here to define the range limits, without any connection with possibly existing alternatives.

The typical procedure to build an additive value function for a specific problem has the following steps:

1) Define separately each of the individual value functions $v_i(x_i)$. This means establishing first the range of the function in attribute i, and then determining (or choosing) the appropriate shape for the function, after interaction with the DM;
2) Obtain additional information from the DM in order to determine the parameters k_i of the multiattribute value function. This may be done in a number of ways, the more frequent of which is based on judgments of indifference between (artificial) alternatives. Each indifference generates an equation on the parameters, so *n-1* independent judgments are necessary (and sufficient) in the general case to calculate the totality of the parameters (since $\sum_i k_i = 1$).

We illustrate this process with a simple example that is also used to show the kind of conflict we are speaking about. Note that the method used to calculate the parameters is independent of the shape of the individual value functions.

Example 1

We want to build a methodology to evaluate candidates regarding cost, in millions of € (x_1) and duration, in weeks (x_2) of a specific task. Interaction with the DM led to the definition of the two individual value functions, in this case linear:

$$v_1(x_1) = \frac{x_1 - x_{1,worst}}{x_{1,best} - x_{1,worst}} = \frac{x_1 - 3.2}{2.6 - 3.2}$$

$$v_2(x_2) = \frac{x_2 - x_{2,worst}}{x_{2,best} - x_{2,worst}} = \frac{x_2 - 50}{30 - 50}$$

Now, in order to determine the parameters, two artificial alternatives A=(2.6, 50) and B=(3.2, 35) are presented to the DM. Since he prefers A, we improved B until we reach an indifference, say A~(3.2, 30). This allows us to build the equation $v(A)=v$(3.2, 30) and, since $k_1+k_2=1$,

$$k_1.1 + k_2.0 = k_1.0 + k_2.(0.75)$$
$$k_1 = 0.75(1 - k_1)$$
$$k_1 = 0.429,\ k_2 = 0.571$$

At this point, the DM rejected the value function, because in his mind he was convinced that duration was less important than cost, and the "weights" just determined display the opposite, since $k_1<k_2$.

The point here is: what to do? Of course we may try to convince the DM he is wrong and should accept our model anyway (generally a not very successful option) , but we also may review the process and check if we still have some degrees of freedom to accommodate the DM's strong feeling that cost is more important.

Now, before going to our proposal to deal with this problem, it is worth remembering, for the sake of generality, that, with more than two attributes, the process is similar and subject to same comments. Finding indifference judgments departs generally from artificial alternatives where all the attributes except one are in their worst value. For instance:

$$A_1 = (x_{1,best} \quad x_{2,worst} \quad x_{3,worst} \quad \cdots \quad x_{n,worst})$$
$$B_1 = (x_{1,worst} \quad x_{2,best} \quad x_{3,worst} \quad \cdots \quad x_{n,worst})$$

Therefore, when comparing A_1 and B_1, the DM has just to consider the first two criteria, since A and B are equal in all the others. If $A_1 \succ B_1$, we immediately know that $k_1>k_2$, but would need again to improve the first attribute of B_1 until reaching an indifference.

It should also be noted that, in linear value functions, the judgment of indifference is equivalent to setting trade-offs between the attributes. For instance, in the case of Example 1, the trade-off is 0.6/15=0.04 M€/week. This judgment must of course be preserved by any methodology we choose. Of course, when the individual functions are not linear, trade-offs are only local and cannot be generalized to the whole range of the attributes, so the term "trade-offs between the attributes" makes no sense in that case.

A consistent approach for the linear case

In order to ease the explanation, we analyze, without loss of generality, the case of a two-attribute linear function. We start from the individual value functions, where R_i is the range of attribute i (note that it can be negative, in minimization attributes):

$$v_i(x_i) = \frac{x_i - x_{i,worst}}{x_{i,best} - x_{i,worst}} = \frac{x_i - x_{i,wst}}{R_i}$$

We also know that $A \sim B$, $A=(a_1, a_2)$ and $B=(b_1, b_2)$. Therefore, to calculate the parameters we must solve $v(A)=v(B)$:

$$k_1 \frac{a_1 - x_{1,wst}}{R_1} + k_2 \frac{a_2 - x_{2,wst}}{R_2} = k_1 \frac{b_1 - x_{1,wst}}{R_1} + k_2 \frac{b_2 - x_{2,wst}}{R_2}$$

or

$$\frac{k_1}{R_1} a_1 + \frac{k_2}{R_2} a_2 = \frac{k_1}{R_1} b_1 + \frac{k_2}{R_2} b_2$$

and

$$\frac{k_1}{k_2} = -\frac{R_1}{R_2} \cdot \frac{a_2 - b_2}{a_1 - b_1}$$

This turns manifest a well-known fact, sometimes forgotten: the relation between the parameters depends, not only on the trade-off assumed (directly or indirectly) by the DM, but also on the *ranges* of the individual value functions. For instance, if all preference information remains unchanged, but we modify the range of the first attribute to $R_1' = \alpha . R_1$, the result is:

$$\frac{k_1'}{k_2'} = \alpha \cdot \frac{k_1}{k_2}$$

The point here is: do you have really this degree of freedom regarding the range of values to consider? The answer is: most of the times, yes. All practitioners know that, in many situations, range limits are fuzzy and some discretionary judgment is used to set the values for the individual value function of the specific attribute. So, within certain limits, we can extend or restrict the range considered for the attribute without compromising the representation of the decision situation or include unrealistic values in the range.

A different discussion regards the *absolute* meaning of the value in a specific attribute. One could say that $v(cost)=0.5$ should always mean that the corresponding alternative is halfway in the *internal value scale* of the DM. The fact, however, is that value functions (or utility functions) are valid up to a linear transformation of its scale, so we are just trying to build a mathematical model that respects the DM's relations between *value differences* between pairs of alternatives.

Coming again to the model (and taking $\alpha=2$ to ease the explanation), the new multiattribute value function would be (note that $x'_{1,wst}$ may be different from the former worst value $x_{1,wst}$, since the range has changed):

$$v'(x_1, x_2) = k_1' \frac{x_1 - x'_{1,wst}}{R_1'} + k_2' \frac{x_2 - x_{2,wst}}{R_2}$$

$$v'(x_1, x_2) = \frac{k_1}{k_1 + 1} \cdot \frac{x_1 - x'_{1,wst}}{R_1} + \frac{k_2}{k_1 + 1} \cdot \frac{x_2 - x_{2,wst}}{R_2}$$

$$v'(x_1, x_2) = \frac{1}{k_1 + 1} \cdot \left(k_1 \frac{x_1 - x_{1,wst}}{R_1} + k_2 \frac{x_2 - x_{2,wst}}{R_2} \right) + \frac{k_1 \left(x_{1,wst} - x'_{1,wst} \right)}{R_1 (k_1 + 1)}$$

and

$$v'(x_1, x_2) = M \cdot v(x_1, x_2) + N$$

so, for every alternatives X, Y:

$$\frac{v'(X) - v'(Y)}{v(X) - v(Y)} = constant$$

In summary, the modification of the range of an attribute leads to a change in the parameters, but the new value function is just a linear transformation of the preceding one, so it is equivalent to it, because it induces the same order in any set of alternatives and respects the ratio of difference of value between pairs of alternatives (this conclusion if valid for any value of α, as the reader may check easily).

This can be used to adapt the "weights" of the value function to the desires of the DM, without changing the order induced by the preference information he previously delivered. We now extend Example 1 to illustrate the idea.

Example 2

Following his disagreement with the weights, the DM indicated that k_1=0.6 and k_2=0.4 would be close to his perception of the relative importance of the two criteria. This allowed us to calculate the required change in R_1 through

$$\frac{R_1'}{R_2} = -\frac{k_1}{k_2} \cdot \frac{a_1 - b_1}{a_2 - b_2} = -\frac{0.6}{0.4} \cdot \frac{2.6 - 3.2}{50 - 35} = 0.06$$

leading to $R_1' = 0.06 R_2 = 1.2 = R_1 + 0.6$. Splitting the surplus in two equal parts (other hypotheses are possible), the modified $v_1(x_1)$ would be:

$$v_1'(x_1) = \frac{x_1 - 3.5}{2.3 - 3.5}$$

So, the old unacceptable (for the DM) multiattribute value function:

$$v(x_1, x_2) = 0.429 \frac{x_1 - 3.2}{2.6 - 3.2} + 0.571 \frac{x_2 - 50}{30 - 50}$$

is substituted by:

$$v'(x_1,x_2) = 0.6\ \frac{x_1-3.5}{2.3-3.5} + 0.4\ \frac{x_2-50}{30-50}$$

that fully agrees with the DM's perception of the weights and also respects the preference information (indifference judgment) given by him. In this case, it is easy to see that:

$$v'(x_1,x_2) = 0.7\,v(x_1,x_2)$$

A general procedure to reconcile preference information in the linear case

In order to tackle more general situations, we define the following starting point:

a) A multiattribute linear value function is defined, but the ranges of each attribute are not known in advance. However, an internal and an external range are defined for each attribute. The internal ranges should include all the possible values that may appear in the alternatives, while the external range limits the value functions to credible values of the attribute.
b) The DM defines a set of weights for the value function;
c) There are n-1 independent judgments of indifference (or trade-offs) supplied by the DM.

More formally, our data are the parameters k_1, k_2, …, k_n, judgments $A_j \sim B_j$, $j=2..n$, and internal and external ranges $\left[r_{i-}^{\text{int}}\quad r_{i+}^{\text{int}}\right]$ and $\left[r_{i-}^{\text{ext}}\quad r_{i+}^{\text{ext}}\right]$, respectively. The aim of the exercise is to determine the final ranges $\left[r_{i-}\quad r_{i+}\right]$ for each attribute that respect simultaneously the preferences of the DM and the internal and external ranges. The general form of the multiattribute value function is, assuming minimizing attributes (including maximizing attributes would be straightforward):

$$v(x_1,x_2,\ldots,x_n) = \sum_{i=1}^{n} k_i \cdot \frac{r_{i+}-x_i}{r_{i+}-r_{i-}}$$

Without loss of generality, we will assume that the judgments of indifference involve only two criteria at a time (as mentioned in the previous section), but also that criterion 1 is part of all the indifferences, so

$$A_j \sim B_j \Rightarrow k_1 \frac{a_1-b_1}{r_{1+}-r_{1-}} + k_j \cdot \frac{a_j-b_j}{r_{j+}-r_{j-}} = 0$$

leading to the equation that relates the range limits (note that K_j is a constant):

$$r_{1+} - r_{1-} + \frac{k_1}{k_j} \cdot \frac{a_1-b_1}{a_j-b_j} \cdot (r_{j+}-r_{j-}) = r_{1+} - r_{1-} + K_j \cdot (r_{j+}-r_{j-}) = 0$$

Besides these constraints ($j=2..n$), we must include ($i=1..n$):

$$r_{i+}^{\text{int}} \le r_{i+} \le r_{i+}^{\text{ext}}$$

$$r_{i-}^{\text{ext}} \le r_{i-} \le r_{i-}^{\text{int}}$$

Any solution $(r_{1-}\ r_{1+}\ r_{2-}\ r_{2+}\ \cdots\ r_{n-}\ r_{n+})$ that respects the previous constraints would lead to the desired multiattribute value function. If the solution set is empty, expanding the external ranges would be needed in order to regain feasibility, unless the specifications of the DM are so conflicting that no solution exists really in plausible ranges of the attributes.

In order to solve the problem of finding a specific solution, the simplest way is to build a linear program with a convenient objective function, like for instance:

$$\min f = \sum_{i=1}^{n} \left(\frac{r_{i+}-r_{i-}}{r_{i+}^{\text{int}} - r_{i+}^{\text{ext}}} \right)$$

or

$$\min f' = y \text{ , with } y \ge \frac{r_{i-}^{\text{int}} - r_{i-}}{r_{i-}^{\text{int}} + r_{i+}^{\text{int}}},\ y \ge \frac{r_{i+}-r_{i+}^{\text{int}}}{r_{i-}^{\text{int}} + r_{i+}^{\text{int}}}$$

We now illustrate the procedure using again the situation of Examples 1 and 2.

Example 3

Besides the indifference stated in Example 1 and the weights indicated in Example 2, we obtained from the DM the following internal and external ranges:

$$2.0 \le r_{1-} \le 2.6 \qquad 3.2 \le r_{1+} \le 4.0$$
$$20 \le r_{2-} \le 30 \qquad 50 \le r_{2+} \le 60$$

We may now establish the set of constraints adding the equation:

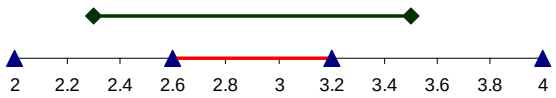
$$r_{1+} - r_{1-} + \frac{0.6}{0.4} \cdot \frac{2.6-3.2}{50-35} \cdot (r_{2+}-r_{2-}) = 0$$

or

$$r_{1+} - r_{1-} - 0.06 \cdot (r_{2+}-r_{2-}) = 0$$

Using now the objective function f mentioned before, we find multiple solutions, as expected due to degrees of freedom of the problem. In fact, all the feasible solutions with R_1=1.2 and R_2=20, like (2.6 3.8 30 50)

or (2.0 3.2 30 50), can be used, because they are equivalent in all senses, as discussed before. With f', we would obtain the solution of Example 2, centered in the internal range. The next figure shows the ranges and depicts this solution.



Conclusions

The paper shows how to deal with the possible inconsistency between value functions built “by the book” and the perception of the DM regarding the relative importance of the criteria, in real decision-aid situations. The discussion turns clear that the answer resides in changing the ranges of the individual value functions, since expanding the range of an attribute leads to an increase of the correspondent weight, while respecting the remaining preference information (judgments of indifference) provided by the DM.

A complete procedure was presented to linear multiattribute functions, and can easily be extended to include exponential functions. The author believes that the material presented in the paper is useful for practitioners, since this kind of situation appears more often than not.

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MCDA Research Groups

AMCDP (Aide multicritère à la décision participative)

par

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1. Préambule

L’Université de Corse Pasquale Paoli (UCPP), fondée en 1765 à Corte, a rouvert ses portes en 1981. C’est au sein du département des sciences économiques qu’apparurent, en 1992, les premiers enseignements de l’aide multicritère à la décision (AMCD) ; dispensés en maîtrise par le Pr. B. Fustier membre du groupe de travail européen sur l’AMCD. Il créa le CEMA - Centre d’Economie et de Modélisation Appliquées - comme structure d’encadrement doctoral, constituant un premier groupe de recherche faisant place à l’AMCD. Les travaux portaient sur l’évaluation subjective multicritère et qualitative à l’aide du modèle satisfaction-regret [Fustier, Oberti, 1995]. Ceci conduit à la première soutenance de thèse sur le sujet « Evaluation et décision : de la théorie des choix de consommation à l’intégration de critères multiples et qualitatifs », publiée la même année sous l’intitulé « Evaluation et décision : du calcul économique à l’analyse multicritère non-optimisante ». En 1997, se déroulèrent en Corse les 46e journées du groupe de travail européen AMCD sur le thème « l’intérêt de la démarche multicritère en économie ».

2. L’émergence de l’AMCDP

En 1998 apparue la préoccupation de distinguer une multiplicité d’experts dans la modélisation satisfaction-regret [Oberti P., 1998], illustrée à l’évaluation du paysage. Ce fut une première étape vers l’étude de l’AMCDP. En 2000, l’enseignement de l’AMCD à l’UCPP franchit la 5e année de formation, avec un séminaire méthodologique de recherche créé au sein du nouveau diplôme d’études approfondies (DEA) « Sciences pour l’environnement », option système économique et développement durable. En 2001, le modèle satisfaction-regret était approfondit [Oberti S. et P., 2001], distinguant d’autres catégories d’acteurs (évaluateurs et décideurs), et

illustré à la protection du patrimoine. C'est en 2002, dans l'optique d'une gouvernance participative en matière de développement durable, que les recherches portèrent sur la définition d'une AMCDP [Froger, Oberti, 2002] ; conduisant à la structuration d'un processus décisionnel multi-acteurs en dix phases clefs, illustrées à la localisation d'éoliennes. En 2004, P. Oberti soutenait une habilitation à diriger des recherches, à l'Université de Versailles Saint-Quentin-en-Yvelines, sur le sujet « Développement durable et gouvernance participative : revue de la littérature et contribution fondée sur une démarche multicritère ». La partie illustrée du mémoire est accessible par la référence [Oberti, 2004]. La même année fut crée un cours assorti de travaux dirigés sur l'AMCDP, commun au Master recherche « Economie géographique et de l'environnement » et au Master professionnel « Ingénierie du développement territorial ». Etaient alors réunies les conditions d'encadrement d'un groupe de nouveaux jeunes chercheurs.

3. Une structuration thématique de la recherche sur l'AMCDP

L'année 2004 fut aussi celle de l'inscription d'un premier Doctorant en sciences économiques de l'environnement, M. Ferracci, sur le thème « Gouvernance environnementale des territoires et politique énergétique : étude de localisation participative de parcs éoliens en région corse ». Cadre à de l'Agence de Développement Economique de la Corse (ADEC), ayant compétence régionale de la politique énergétique, il facilita les relations institutionnelles et pris une part active dans l'étude pilote « Localisation participative d'un parc éolien en Corse : application sur la commune de Bonifacio » [Oberti, 2006]. Sur la base d'un système d'informations géographiques, les sites pertinents d'implantation ont été révélés d'après leurs potentiels énergétiques (logiciel WASP). Des fermes éoliennes furent simulées (logiciel WindFarmer) et comparées à travers divers critères : productible annuel d'électricité, visibilités depuis la ville, les proches habitations et communes voisines, dégradation écologique potentielle, conflits d'usages et fonctionnels. Le modèle multicritère ELECTRE III a permis d'agréger 10 tableaux de performances, tenant compte des divers jeux d'informations selon les acteurs, afin de rechercher un rangement préférentiel robuste des sites de localisation. Outre les acteurs institutionnels impliqués, les citoyens locaux se sont exprimés lors de réunions publiques sur leurs priorités aux regards des conséquences potentielles. Les recommandations conclusives d'implantation d'aérogénérateurs (puissance, taille, nombre, disposition, site d'installation) ont été inscrites au plan local d'urbanisme de la commune. Des éléments d'étude sont livrés dans Oberti et al. [2006a et b].

En 2005 un deuxième Doctorant, A.-M. Poli, allocataire d'une bourse de recherche, s'attela au sujet « Gestion et gouvernance de l'environnement naturel face aux activités dans les aires marines protégées : contribution méthodologique par l'évaluation illustrée à la réserve naturelle des Bouches de Bonifacio », sous la co-direction du Pr. Jean-François Noël. Cette thèse vise à aider l'Office de l'environnement de la Corse dans l'évaluation et l'amélioration de l'efficacité de sa gestion du territoire [Oberti, Poli, 2006]. Le domaine d'application prioritaire porte sur l'exploitation halieutique. Chaque année est évaluée sur divers critères de durabilité, tels la biomasse et les quantités prélevées par les pêches artisanale et touristique. Le caractère participatif de l'approche prendra appui sur les Conseils scientifique (CSRNBB) et consultatif de la réserve, pour garantir une variété d'acteurs et de préoccupations. Cette recherche, adoptée en juillet 2008 par le CSRNBB, constitue aussi la base méthodologique pour une évaluation chemin faisant et ex post de l'atteinte des objectifs de moyen terme inscrits au plan de gestion du territoire (2007-2011). Elle est en rapport avec des projets (AMPHORE, GAIUS) sélectionnés par l'Agence nationale de la recherche.

En 2007, un troisième Doctorant, P.-F. Matteaccioli, Directeur de cabinet du Maire de Sartène, initia l'étude des « Planifications et scénarios énergétiques dans les îles méditerranéennes : modélisation et évaluation multicritères appliquées à la région corse ». Son statut de *zone non interconnectée* au réseau métropolitain d'électricité en fait un territoire d'étude particulier [Oberti, Matteaccioli, 2008]. Cette thèse envisage plusieurs avenirs énergétiques de l'île sur la période 2004-2025, selon qu'ils soient planifiés ou imaginés (exploitation du gaz naturel, fort développement des énergies renouvelables, renforcement de l'interconnexion sous-marine). Ces scenarios seront comparés à travers divers critères tels les émissions escomptées de gaz à effet de serre, les coûts de production et de livraison de l'électricité, le facteur de charge, l'acceptabilité socioéconomique, le réalisme institutionnel. Pourraient en découler des recommandations de pilotage des performances et d'orientations technologiques, destinées à l'ADEC et au Conseil énergétique de Corse, afin de mieux appréhender l'équilibre offre-demande d'électricité.

Depuis le 1er janvier 2008, l'ensemble de ces travaux sur l'AMCDP est inscrit dans le nouveau laboratoire LISA[1] (Lieu Identités eSpaces et Activité) de l'UCPP, labélisé unité mixte de recherches (UMR) n°6240 par le CNRS. Parmi les thèmes, « Dynamiques des territoires et développement durable » est décliné en axes dont « Politique de gestion durable des territoires », lui-même découpé en opérations notamment « Définition d'une nouvelle gouvernance territoriale ». L'enseignement de l'AMCDP à l'UCPP est à présent dispensé au sein du nouveau Master 2 « Développement territorial durable ».

[1] http://umrlisa.univ-corse.fr/page_dynater_03_02.html

4. Une ouverture de la recherche sur l'AMCDP

L'étude pilote sur la localisation participative d'un parc éolien en Corse a été l'occasion d'une recherche pluridisciplinaire, combinant sciences économiques, sciences physiques, sciences informatiques et recherche opérationnelle. Ainsi, ces travaux sont-ils également inscrits dans l'UMR SPE 6134 au sein du projet fédérateur EnR[2]. Corrélativement, une thèse de Doctorat en sciences physiques de l'environnement devrait être initiée par P. Haurant, sur le sujet « Estimations de potentiels d'énergies renouvelables, SIG et aide au dimensionnement et à la localisation d'unités de production d'électricité : applications aux filières solaires et éoliennes en région corse » ; en codirection avec M. Muselli. Aussi, de récentes recherches ont été entreprises avec C. Paoli, sur des algorithmes de calculs en parallèle d'indices de concordance et de discordance ; et sur le développement d'un logiciel d'AMCDP facilitant la prise en compte de multiples acteurs dans un processus. Cette ouverture se concrétise aussi à l'extérieur de l'UCPP. La formalisation de bilan de surclassement est à l'étude avec le Pr. B. Roy de l'Université Paris-Dauphine, tout comme la diffusion des méthodes multicritères dans les sciences économiques et la sphère publique avec le Pr. M. Baslé de l'Université de Rennes 1. Dans cet établissement s'est d'ailleurs tenu, en mai 2008, un séminaire de recherche CNRS-CREM et CNRS-LISA, relatif à la « Méthodologie d'évaluations multicritères de politiques publiques et de programmes : applications à l'analyse d'impact en Europe ». Finalement, est prévu un Workshop en 2009 à l'UCPP, sur le thème « Les outils de la participation des acteurs dans l'évaluation multicritère ». Les membres du groupe de travail européen AMCD y sont attendus !

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[2] http://spe.univ-corse.fr/spip.php?article99

Forum

(Robustness Analysis)

Robustness Analysis and MCDA

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The Editor has invited me to share a few thoughts on the topic of robustness analysis in MCDA. The first question is: Robustness to what? MCDA includes a comprehensive process involving a rich interplay between human judgement, data analysis and mathematical/computational processes. Errors and inadvertent biases can enter at any of these stages, and it is the process as a whole that needs to be robust.

Perhaps some of the key points at which such errors and biases may intrude would be the following:

- External uncertainties;
- Internal uncertainties;
- Choice of preference model;
- Identification of criteria and alternatives.

We discuss each of these in turn.

External uncertainties. In many senses these are the least problematical to the analyst. External random processes may pose challenging mathematical problems, but the uncertainties can typically be described in terms of probability distributions, even if the distributions may need to be assessed subjectively rather than empirically.

The question here, however, is that of robustness. The issues of external uncertainty were discussed at length in Stewart (2005a). There we recognized that in many cases, the probability distributions may not explicitly be incorporated into the decision model except in the case of multi-attribute utility theory. It follows therefore that robustness of solutions generated to external uncertainties needs to be incorporated in some way. Sensitivity analysis is always an option, but can be quite *ad hoc*, not covering all combinations of externalities.

It is possible to incorporate risk measures such as variance in the form of additional criteria in our preference modelling, but this too tends to involve one objective at a time, without recognition of covariances that may exist. In some (unpublished) simulation studies we have managed to demonstrate that the definition of a small number of "scenarios" involving simultaneous variations on a number of externalities can lead to much more robust solutions in value function approaches at least (and we conjecture that this conclusion applies to other methods of MCDA as well). Approaches to incorporation of such scenarios include rank ordering of alternatives in terms of each scenario (to find alternatives which are robustly good performers), or to view performance in terms of each objective under each scenario as metacriteria in their own right.

Internal uncertainties. These relate to the value or preference judgements provided by the decision makers, such as weights, tradeoffs, goals, indifference thresholds, etc. It is a feature of life that such inputs are neither precise nor consistent (in the sense that the same decision maker on different days may give different responses). This situation is aggravated in group decision making where different stakeholders will express different value and judgements.

It is difficult to justify the use of probability measures for direct modelling of this category of uncertainty. Nevertheless, some have suggested Monte Carlo methods in a formalized manner for systematic sensitivity studies (e.g. the SMAA approach of Lahdelma et al., 1998), generating, as for external uncertainties, different rank orders for the alternatives in order to identify those alternatives which are robustly good performers.

Many writers have favoured the use of fuzzy numbers to represent such imprecise inputs. This writer has a concern that not even the ranges of imprecision are precise, so that the limits defining a triangular fuzzy number should really be another fuzzy number! Furthermore, in many cases, the outputs (for example, fuzzy values in a value function model) tend in effect to be determined by combinations of extremes. We then run the risk that the outputs lack usefulness to decision makers. The model may be "robust" in the sense of identifying all consistent rank orders, but it may be difficult to judge which of these rank orders apply only under very extreme limits of the inputs. There is a tradeoff between being sufficiently robust on the one hand, while still providing a parsimonious shortlist of alternatives from which a final choice is to be made.

Choice of preference model. It is not often recognized (by our clients at least), that choice of preference model can introduce biases into the results. For example, in applying value function models, an over-linearization of the marginal (single attribute) value functions can easily lead to more extreme solutions (selection of alternatives which are very good on some criteria and very poor on others) rather than balanced compromises (which might more generally be preferred). In Stewart (1996) we demonstrated that this one issue can lead to much larger biases in resulting rank orders than quite substantial internal errors and even the omission of criteria!

In Stewart (2005b), we demonstrated the extent to which the implementation of interactive goal programming can be sensitive to cognitive biases such as those described by Kahneman and Tversky. This problem may best be addressed by procedural rather than algorithmic means as we shall discuss for the last source of error below. The analyst/facilitator needs actively to

direct and urge the decision maker to explore opportunities beyond his or her comfort zone.

In general, it is not easy to establish the extent to which more general MCDA approaches may tend preferentially to select alternatives with particular characteristics (in the manner identified for value function methods above). Without such knowledge, we cannot comment on whether the methodologies are robust, so that enquiry into the potential for biases would seem to be an important research question.

Identification of criteria and alternatives. It may come as a surprise to some readers to see the inclusion of these issues in a discussion of robustness analysis for MCDA methods. Certainly, at an algorithmic level the sets of criteria and alternatives are assumed given, so that one cannot meaningfully talk about "sensitivity" or "robustness" in the conventional sense. It may be considered self-evident that omission of criteria will generate wrong conclusions, while omission of alternatives will generate sub-optimal results, but it may be thought that neither of these omissions are the direct concern of the MCDA methods or methodologies used.

However, what is required is a total MCDA process which is robust in the sense of rendering such omissions unlikely. We (e.g. Belton and Stewart, 2002, Chapter 3) have urged that MCDA should be an integrated process, and not just a set of algorithms. This process includes formal effort applied to problem structuring, i.e. representation of an initial mess in terms of criteria, alternatives, etc. As much or even most of the effort going into the MCDA process needs to be applied to this divergent process of structuring (in comparison with the convergent process of analysis of these alternatives in terms of the criteria), it follows that a corresponding degree of effort needs to go into ensuring robustness of the structuring phase.

It must be stressed that the structuring and analytical phases are not disjoint. The results of the analysis phase must always be subject to critical questioning, for example:

- *Why is this alternative so poorly ranked*? Perhaps we are missing an important criterion.
- *Why are there no alternatives performing satisfactorily on all criteria*? Perhaps a synthesis of the better aspects of a number of alternatives may lead to a new dominating alternative.

Only when both the structuring and analytical phases are managed in this way, can our MCDA process be viewed as "robust".

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Consultancy Companies

Olympus Consulting

(www.olympus-consulting.com)

Olympus Consulting is a Spanish based consultancy company which offers innovative solutions for strategic decision making both in public and private organizations. The company was found in 2001 by Émerson Corrêa, after four years working in Lisbon with Prof. Carlos Bana e Costa, from the Technical University of Lisbon and from the London School of Economics. Since then we have developed numerous consulting projects in several countries in Europe and Latin America.

Our primary objective at Olympus Consulting is helping our clients to take faster and better decisions based on facts, not on intuitions. To achieve this objective we make use of advanced methodologies supported by a broad use of information technology.

We offer strong professional experience and always work in a deep collaborative way with our clients in order to enhance performance and find real solutions for the strategic challenges facing organizations.

Services provided by Olympus Consulting:

1. Strategic consultancy: strategic plans; business plans; investment decisions; resource allocation; prioritization.

2. Performance evaluation: customer satisfaction, human resources, quality management.

3. Implementation of Business Intelligence solutions for corporate decision making: Balanced Scorecard; Financial and Sales monitoring systems.

4. Evaluation and monitoring of large infrastructure projects.

The use of MCDA at Olympus Consulting:

MCDA techniques and decision conferencing are always present in our projects when we have to support decisions that will have major consequences for our clients. In particular, we have used MACBETH (www.m-macbeth.com) in several consulting projects, in a variety of circumstances.

In our perspective, MCDA in general and MACBETH in particular, helps us structuring complex problems in a very effective way and makes possible take into consideration all information available, independently of its nature (quantitative x qualitative; financial x non-financial; etc.). Furthermore, decision conferencing provides an ideal environment for getting together different players with different views.

Recent Experience:

At Olympus Consulting we recognized the added value of MCDA & Decision Conferencing since we started our activities in 2001. We have used these methodologies in several projects and would like to highlight three of them:

Madrid 2009-2012 Integration Plan.

We are currently working together with Madrid Regional Government in designing the regional strategy on inmigration for the next four years. Our main role is to provide methodological coherence to strategy prioritization and to associated resource allocation decisions.

Valencia 2008-2011 Inmigration Strategic Plan.

In this project we helped Valencia Regional Government designing its strategy related to inmigration in the region. The plan was aproved in May-08 and we are currently implementing the information system the client will use for monitoring the execution of the plan during the four years and designing the evaluation model they will used to assess the impact of the strategic plan in the valencianan society at the end of 2011.

DAMSYS – Defence Awareness Monitoring System

From 2002 to 2005 Olympus Consulting helped the Spanish Institute for Strategic Studies, an agency from the Spanish Ministry of Defence, to develop DAMSYS, a multicriteria tool which is innovative in this field at international level.

DAMSYS provides comprehensive insight into Defence culture in the Spanish Society and compares it to other societies in a broad perspective, since it comprises information from about 50 parameters. Information is updated annually, the first data being from 1997.

DAMSYS will be soon available on the Internet for the academic community, media professionals and the general public, with the aim to encourage debate about a topic of increasing concern in developed societies and to achieve a greater involvement of society in Defence and Security issues.

Software

GRIP: an MCDA method using a set of additive value functions representing a reference preorder and intensities of preference

by

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1. Introduction

In this short paper, we provide a very short presentation of a method called GRIP (Generalized Regression with Intensities of Preference) for ranking a finite set of actions evaluated on multiple criteria (Figueira et al., 2009), along with its software implementation. GRIP builds a set of additive value functions compatible with preference information composed of a partial preorder and required intensities of preference on a subset of actions, called reference actions.

It constructs not only some specific preference relations in the considered set of actions, but it also gives information about intensities of preference for pairs of actions from this set for a given decision maker (DM). The basic concepts of GRIP are the *necessary preference* and *possible preference* (Greco et al., 2008). An alternative *a* is necessarily preferred to another alternative

b, if *a* is preferred to *b* for all additive value functions compatible with the preferences expressed by the DM on a set of referencs actions. An alternative *a* is possibly preferred to another alternative *b*, if *a* is preferred to *b* for at least one additive value function compatible with the preferences expressed by the DM on a set of referencs actions. The necessary preference relation is a partial pre-order (reflexive and transitive binary relation), and the possible preference relation is a strongly complete and negatively transitive binary relation. Necessary and possible relations between intensities of preference are analogously determined with respect to the whole set of criteria or specific single criteria. Distinguishing necessary and possible consequences of preference information on the considered set of actions, GRIP answers questions of robustness analysis (Greco et al., 2008).

The proposed methodology can be seen as an extension of the UTA method based on ordinal regression (Jacquet-Lagrèze and Siskos, 1982, Siskos et al., 2005). GRIP can also be compared to the AHP method (Saaty, 2005), which requires pairwise comparison of all actions and criteria, and yields a priority ranking of actions. As for the preference information being used, GRIP can be compared, moreover, to the MACBETH method (Bana et Costa et al., 2005) which also takes into account a preference order of actions and intensity of preference for pairs of actions.

The preference information used in GRIP does not need, however, to be complete, i.e. the DM is not required to give a complete order, from the best to the worst, of the reference actions. Instead the DM is asked to provide comparisons of only those pairs of reference actions on particular criteria for which his/her judgment is sufficiently certain. This is an important advantage comparing to methods, which, instead, require comparison of all possible pairs of actions on all the considered criteria. Moreover, GRIP works with a set of general additive value functions compatible with the preference information, while other methods use a single and less general value function, such as the weighted sum.

2. GRIP Decision Support Process

GRIP decision support process is composed of five main levels shown in Fig. 1 (see also Figueira et al., 2009):

- Level 1 concerns the input data, i.e., the consistent family of criteria F, and the set of actions A. In addition to the actions to be ranked by GRIP, set A can also contain some fictitious, past or other auxiliary actions, which will enter the set of reference actions A^R in order to facilitate elicitation of preference information by the DM.

- Level 2 is related to the preference information provided by the DM. The set of reference or training actions A^R is defined with the help of the DM. The major piece of information provided by the DM is a partial preorder on A^R, which is composed of holistic pairwise comparisons of actions from A^R, and holistic and/or partial preference information on intensities of preferences for some pairs of actions from A^R. It is worth noting that GRIP can easily handle other kinds of preference information, like local tradeoffs.

- In Level 3, the preference information provided by the DM is formally represented by a set of linear constraints.

- Level 4 concerns the computation phase, where the procedure should check for the existence of at least one value function compatible with the preference information provided by the DM. If there is no such a value function, then the DM is supported to revise his/her preference information.

- When, the preference information is consistent, i.e., there exists at least one value function compatible with such information, in Level 5, the method is producing the following output results:

    1. The necessary preference relation on the set of all the actions in A.
    2. The possible preference relation on the set of all the actions in A.
    3. The necessary relation related to comparison of comprehensive intensities of preferences between pairs of actions in $A \times A$.
    4. The possible relation related to comparison of comprehensive intensities of preferences between pairs of actions in $A \times A$.
    5. The necessary relation related to comparison of intensities of preferences with respect to partial (on each criterion) between pairs of actions in $A \times A$.
    6. The possible relation related to comparison of intensities of preferences with respect to partial (on each criterion) between pairs of actions in $A \times A$.

Of course in practice, there is no need to compute all the above results. Indeed, the most useful output information is provided by the necessary and possible preferences. Other results can be computed on request concerning particular couples of pairs of actions. If the DM feels comfortable and agrees on the conclusions, GRIP stops; otherwise, preference information should be augmented or revised, or the input data should be revised.

Recently, a methodology to identify the "most representative" value function in GRIP has been proposed by Figueira et al. (2008d), without loosing the advantage of taking into account all compatible value functions. This function is also implemented in the GRIP software. The idea is to select among all compatible value functions that one value function which better highlights the necessary preference, by maximizing the difference of evaluations

between actions for which there is a necessary preference. As secondary objective, one can consider minimizing the difference of evaluations between actions for which there is not necessary preference.

GRIP is based on the robust ordinal regression paradigm (Greco et al., 2008b) and has also been applied within interactive multiobjective optimization procedure (Figueira et al., 2009)

The GRIP interaction scheme generalizes the UTA method (Siskos et al., 2005), the UTA^{GMS} method (Greco et al., 2008a) and, in a certain sense, the MACBETH method (Bana et Costa et al., 2005). Indeed, in case of using only the information on the intensities of preferences and checking if there exists a compatible additive value function, we obtain similar results to MACBETH. We do not need, however, to determine the weights, as MACBETH does, and the DM does not need, moreover, to define "good" and "neutral" levels on each criterion, as it it the case in MACBETH.

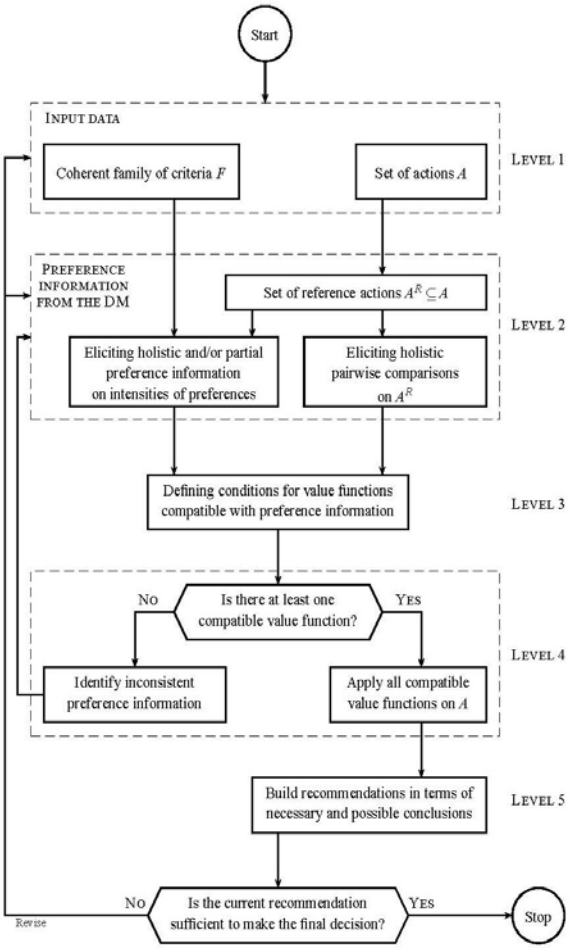


Figure 1: GRIP decision support process

4. Software

Short description of the D2 GRIP plugin.

The GRIP software is written in the Java language as a plugin to the Decision-Deck (D2) platform. It uses GLPK (*GNU Linear Programming Kit*) solver to conclude the truth or falsity of preference relations, the JGraph (*Java Graph visualization library*) to visualize ranking of actions and JFreeChart (*Java Chart library*) to visualize representative utility function and marginal utilities.

Illustrative example.

In the following didactic example, we shall simulate an interaction with a fictitious DM to illustrate the type of interaction proposed in the D2 GRIP plugin.

We consider a problem of ranking 7 students evaluated by a set of 3 criteria (to be maximized). The performances of the students are presented in Table 1.

student	mathematics	physics	literature
s_1	medium	medium	good
s_2	good	good	medium
s_3	medium	good	medium
s_4	medium	medium	medium
s_5	good	good	bad
s_6	medium	bad	good
s_7	bad	medium	good

Table 1. Performance matrix of the set of students

Let as suppose that the DM has chosen the following set of reference actions A^R (see Figure 2):

$$A^R = \{s_1, s_2, s_4, s_5, s_6, s_7\}.$$

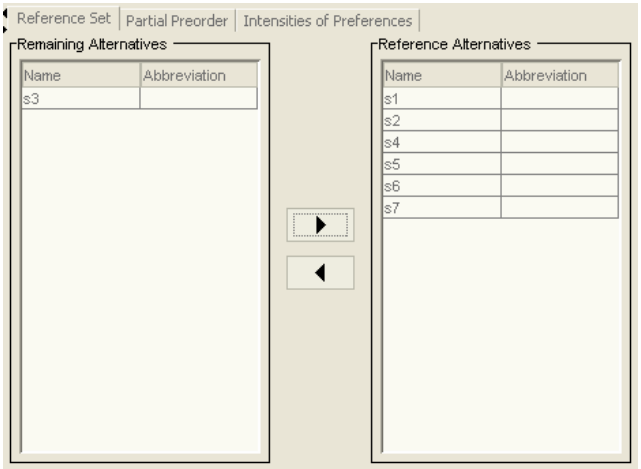


Figure 2: The set of reference actions tab window

Then, we suppose that the DM expresses preference information in terms of pairwise comparisons of actions from A^R (Figure 3) and intensities of preferences (Figures 4 and 5). Each of those windows used to define preference

information is composed of two parts: the right panel presents preference information already defined, the left panel presents additional information (i.e. evaluation of performances, comparison of selected actions) helpful to the DM.

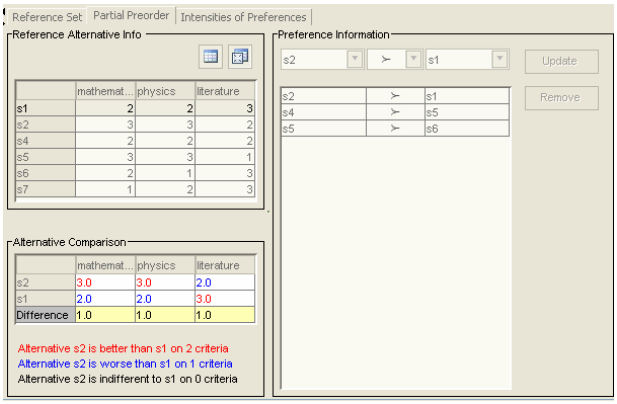


Figure 3. Partial pre-order tab window

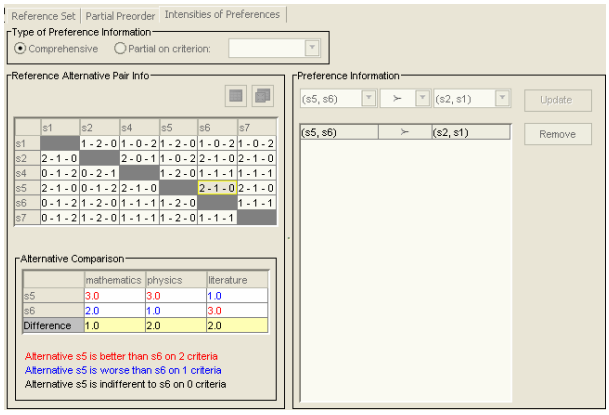


Figure 4. Comprehensive Intensities of Preferences tab window

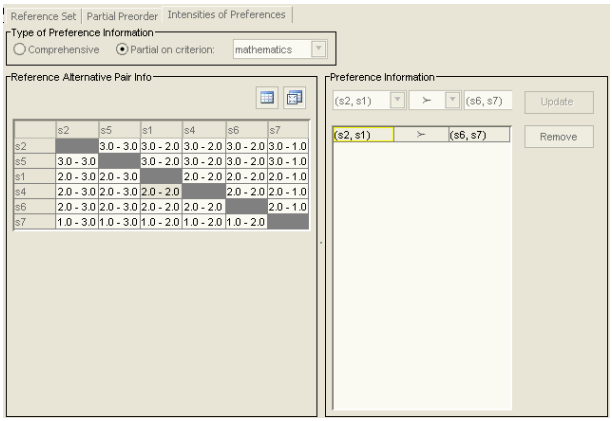


Figure 5. Partial Intensities of Preferences tab window

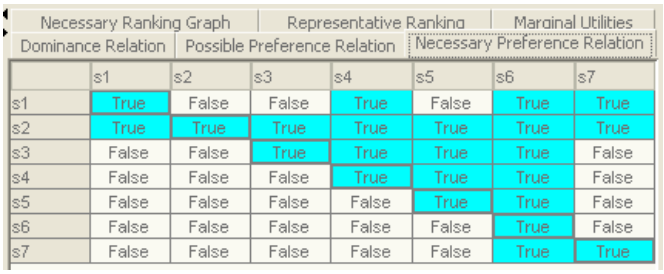
The preference information shown in Figures 3, 4 and 5 corresponds to the following GRIP constraints:

$U(s_2) > U(s_1)$
$U(s_4) > U(s_5)$
$U(s_5) > U(s_6)$

$U(s_5) - U(s_6) > U(s_2) - U(s_1)$
$U_{mathematics}(s_2) - U_{mathematics}(s_1) > U_{mathematic}(s_6) - U_{mathematics}(s_7)$

Considering the provided preference information, we can compute the necessary and possible preference and the necessary and possible relations with respect to comparison of intensities of preference in the whole set of actions. Moreover, we can compute the ranking (being a complete pre-order) given by the most representative value function.

The obtained necessary preference relations can be presented in two forms: as in table of Figure 6, or as in the graph of Figure 7. In this graph, blue nodes correspond to reference actions, actions aggregated in light gray boxes are indifferent, blue edges correspond to pairwise comparisons of reference actions, and black edges mark necessary preference relations.



	s1	s2	s3	s4	s5	s6	s7
s1	True	False	False	True	False	True	True
s2	True	True	True	True	True	True	True
s3	False	False	True	True	True	True	False
s4	False	False	False	True	True	True	False
s5	False	False	False	False	True	True	False
s6	False	False	False	False	False	True	False
s7	False	False	False	False	False	True	True

Figure 6. Necessary Preference Relation tab window

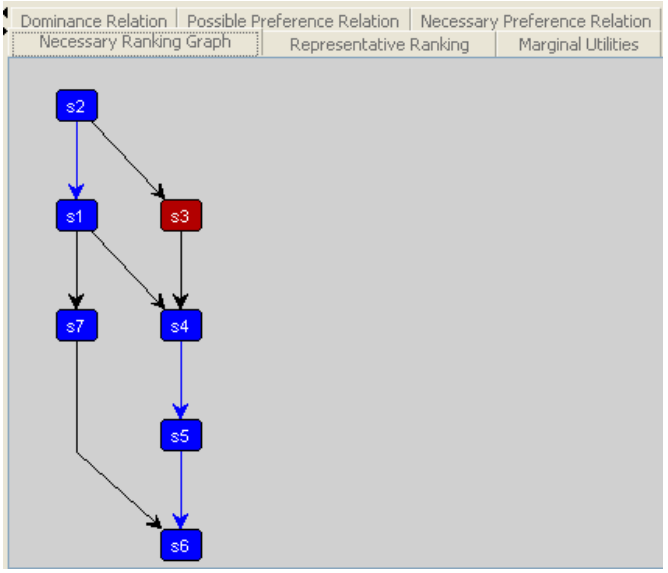


Figure 7. Necessary Relation Graph tab window after the first iteration

Figure 8 presents the complete ranking of actions by a “representative value function”, and Figure 9 shows its marginal components.

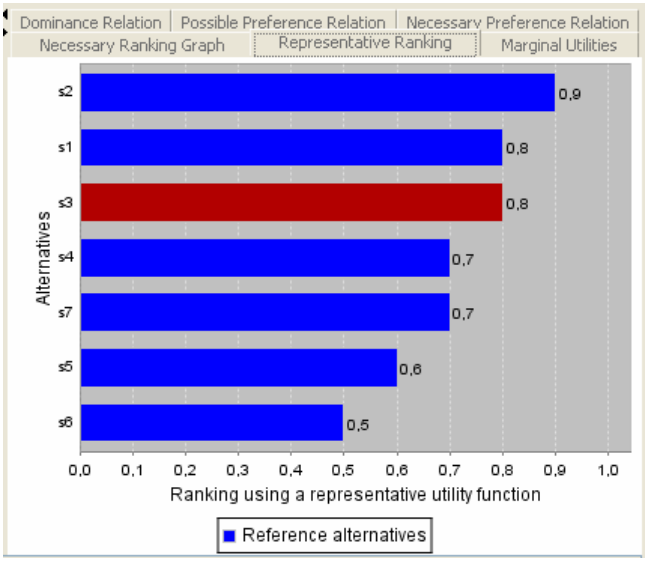


Figure 8. Representative Ranking tab window

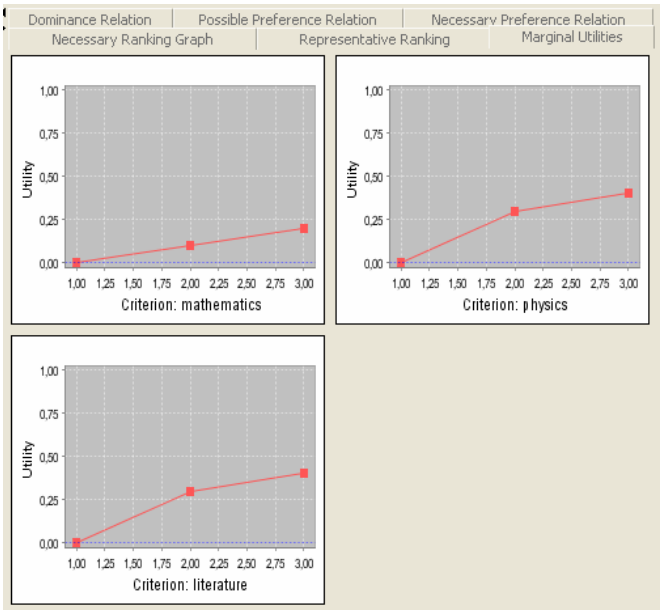


Figure 9. Representative Marginal Value Functions tab window

Let us suppose that in the next iteration the DM adds the following preference information: $s_5 \succ s_7$.

Figure 10 presents the obtained necessary preference relation in the graph form. In this graph, dashed edges mark the differences between the current relation graph and the previous one.

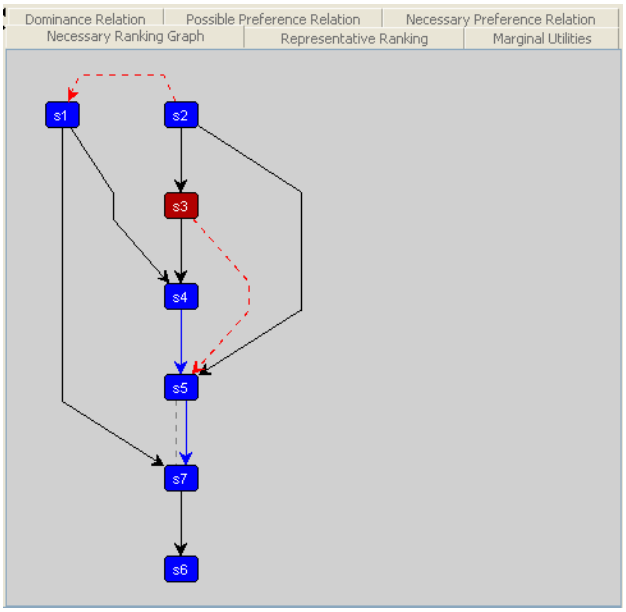


Figure 10. Necessary Relation Graph tab window after the second iteration

If the DM is not convinced by the obtained results (because, for instance, he matures the conclusion that a given alternative *a* is preferred to another alternative *b*, but *a* does not result necessarily preferred to *b*), the DM can introduce new preference information and/or can modify the previous preference information and proceed to a new application of GRIP.

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Persons and Facts

Dear Colleague,

It is my great pleasure to inform you that the Senate of the Technical University of Crete has unanimously decided to award a honorary doctorate degree to Professor Roman Słowiński, member of the Polish Academy of Sciences, dr. h.c. of the Polytechnic Faculty of Mons and of the University of Paris Dauphine, professor at the Poznan University of Technology and in the Systems Research Institute of the Polish Academy of Sciences in Warsaw.

Professor Slowinski has been awarded this honorary doctorate degree for his outstanding scientific contribution in the area of Intelligent Decision Support located at the intersection of Operational Research, Computing Science and Artificial Intelligence.

The award ceremony has been scheduled for Monday, November 10, 2008, at 7PM, at the Hall of the "Chrysostomos" Literary Society of Chania, 83 Khalidon street.

Yours sincerely,
Constantin Zopounidis

About the 68th Meeting

68th MEETING OF THE EURO WORKING GROUP
MULTIPLE CRITERIA DECISION AIDING
Chania, Greece, October 2-3, 2008

The 68th Meeting of the European Working Group Multicriteria Decision Aiding was organized by the Technical University of Crete in Chania, Crete (Greece) during October 2-3, 2008. The chairs of the Meeting were Constantin Zopounidis and Michael Doumpos.

The Meeting was held at the conference center of the Bank of Chania, which provided excellent facilities.

62 participants had registered for the Meeting, and after a few last-minute cancellations there still had over 50 participants representing 17 different countries. The theme of the meeting was "**Robustness in MCDA**", but as usual, all aspects of MCDA were well covered. Out of the 52 submitted papers, 22 were scheduled for presentation in seven sessions during the two days of the Meeting. The scientific program included two 40 minutes. The first was given by Gilberto Montibeller on "**Robustness in strategic decision making**" and the second was given by Horst W. Hamacher on "**Multiple criteria optimization in location theory**". Both full papers and abstracts were printed in the proceedings. For an electronic copy, please contact Michael Doumpos at mdoumpos@dpem.tuc.gr.

The social program included a banquet on Friday evening and an excursion on Saturday. A total of 26 participants joined the excursion which included a visit at the archeological site of Aptera and the village of Georgioupolis, as well as lunch, swimming and peddle boating at the lake of Kournas. More information about the meeting can be found at

http://www.dpem.tuc.gr/fel/mcda68

Constantin Zopounidis (kostas@dpem.tuc.gr)
Michael Doumpos (mdoumpos@dpem.tuc.gr)

FINAL PROGRAMME

Jeudi 2 Octobre Thursday, October 2
09:30-10:30 Inscription / Registration
10:30-11:00 Session d'ouverture / Opening session

Session 1
Président / Chairman: R. Slowinski

11:00-11:30 **B. Roy**: Comment répondre à la préoccupation de robustesse en aide à la décision? Quelques propositions suite à un double constat
11:30-12:00 **M.F. Norese, E. Dalmasso**: How to support decision and guarantee robustness in MCDA when the preference system is not "accessible"?
12:00-12:30 **W.K. Brauers**: Robustness in a selection of contractors for dwellings
12:30-13:00 **J. Figueira, S. Greco, R. Slowinski**: Identifying the "most representative" value function among all compatible value functions in the GRIP Method

Papiers soumis à discussion / Papers submitted for discussion

R.M. Ciobanu: Decision making process in project management: Crises, conflicts, risks and errors **S.M. Grysha, N.S. Gnatenko**: Experience-based decision support as an approach to subjectivity overcoming
N. Hristodoulakis, Y. Siskos: Stochastic UTA: A multicriteria decision support system under uncertainty
W.K. Brauers: Is robustness really robust? Robustness from the point of view of statistics and econometrics
A.M.J. Skulimowski: Cognitive aspects of multicriteria decision making

Session 2
Président / Chairman: V. Mousseau

14:30-15:30 **G. Montibeller**: Robustness in strategic decision making
15:30-16:00 **L. Caklović**: Selfduality in spiritual growth - Conflict resolution
16:00-16:30 **J. Aguarón, J.M. Moreno-Jiménez**: A graph dominance justification of the geometric mean priorization procedure in the analytic hierarchy process

Papiers soumis à discussion / Papers submitted for discussion

M. Huaulme: La creation d'indices composites d'impact de programmes et de politiques publiques: Par des methodes multicriteres de surclassement de synthese
N.F. Matsatsinis, K. Lakiotaki, P. Delias: Evaluating a web instructional tool for agro-tourism business management based on a multi-criteria methodology
F. Lopez, E. Fernández, L.M. Prado, R. Garza: Multicriteria decision support for the assessment of skeletical maduration of children with normal occlusion
M.A. de Vicente y Oliva, J. Manera Bassa, J. Santisteban Moliner: Developing a multicriteria decision aid model to choose the best ways of innovation for the different sectors of Madrid region

Session 3
Président / Chairman: H.W. Hamacher

17:00-17:30 **S. Shmelev, B. Labajos-Rodrigues**: Multidimensional analysis of sustainability at the macro level: The case of Austria
17:30-18:00 **M. Kourempele, G. Mavrotas, S. Rozakis, L. Geronikolou**: A multiobjective linear programming model for energy planning in an autonomous power generation system, Milos island
18:00-18:30 **M.A. Matos**: Studies on operational reserve for power systems - risk evaluation indices and multicriteria analysis

Papiers soumis à discussion / Papers submitted for discussion

P. Karavias, E. Grigoroudis, A. Kyritsi: An aggregation-disaggregation approach for evaluating corporate environmental performance
T. Hedia: La methode multicritere d'aide a la decision participative et gestion durable des nappes souterraines
A. Chevalier, A. Prasetyantoko, R. Rokhim: Foreign ownership and debt maturity choice of listed companies in Indonesia
S. Tsafarakis, E. Grigoroudis, N.F Matsatsinis, P. Delias: Using multicriteria analysis in choice models for simulating consumer behavior

Vendredi 3 Octobre Friday, October 3

Session 4
Président / Chairman: G. Montibeller

09:00-09:30 **Ch. Giannoulis, A. Ishizaka**: UK universities ranking tool with ELECTRE III
09:30-10:00 **K. Kirytopoulos, V. Leopoulos, D. Voulgaridou**: Quantitative vendor evaluation under ISO 9001:2000
10:00-10:30 **N. Bojovic, D. Macvanski, M. Milenkovic**: Organizational design of a railway company using fuzzy ANP

Papiers soumis à discussion / Papers submitted for discussion

S. Damart: Gestion des ressources humaines et apports des méthodologies d'aide multicritère à la décision
E. Orfanoudaki, E. Grigoroudis, C. Zopounidis, A. Tsiafoulis: Developing a strategy evaluation approach for health care organisations

P. Xidonas, G. Mavrotas, D. Askounis, J. Psarras: Portfolio construction and selection in the presence of multiple criteria: An integrated framework
A. Neto, M. Galves, F. Paulucci, G. Quagliato: Problem structuring using cognitive maps: The case of the new bus station in the city of Campinas, Brazil
A. Liadaki, Ch. Gaganis, C. Zopounidis: A multicriteria approach for the evaluation of Greek cooperative banks

Session 5
Président / Chairman: J.R. Figueira

11:00-12:00 **H.W. Hamacher**: Multiple criteria optimization in location theory
12:00-12:30 **E. Fernandez, E. Lopez, S. Bernal, C. Coello, J. Navarro**: Evolutionary multiobjective optimization using an outranking-based dominance generalization
12:30-13:00 **G. Mavrotas, J. Figueira, A. Antoniadis**: The concept of the expanded core for obtaining the exact solution for bi-objective multidimensional knapsack problems

Papiers soumis à discussion / Papers submitted for discussion

I. Kaldo: On some methods for solving large nonlinear optimization problems
C. Mohamed, L. Taïcir, J. Bassem: K-representative points in Pareto frontier
W. Ouerdane, A. Tsoukias: Arguing or deciding? Or both?

Session 6
Président / Chairman: S. Greco

14:30-15:00 **B. Roy**: Vie du groupe et prochaines reunions / Working group matters and next meetings
15:00-15:30 **M. Boujelben, Y. De Smet, A. Frikha, H. Chabchoub**: Building a binary outranking relation in imprecise and multi-experts contexts: The application of evidence theory
15:30-16:00 **P. Xidonas, G. Mavrotas, D. Askounis, J. Psarras**: Equity selection on the Athens Stock Exchange: A multicriteria decision aid approach

Papiers soumis à discussion / Papers submitted for discussion

T. Subrt, H. Brozova: Multidimensional hierarchical approach to multiple criteria evaluation of project proposals
S. Shmelev: Multidimensional analysis of macro sustainability of Russia
P. Delias, N.F. Matsatsinis: Evaluating agent-oriented workflow managament system using a multiple criteria methodology
T. Samdani, J. Gupta: Sentiment index model for IPO under-pricing
M. Doumpos, S. Koutsogiannopoulos, C. Zopounidis: A data envelopment analysis approach for the evaluation of road traffic police efficiency in Greece

Session 7
Président / Chairman: Y. Siskos

16:30-17:00 **V. Mousseau, L. Dias, S. Damart**: Indirect elicitation of MCDA sorting models using valued assignment examples
17:00-17:30 **N. Belacel, F. Al-Obeidat**: Learning fuzzy multicriteria classification method PROAFTN
17:30-18:00 **F. Hela, H. Chabchoub, J.M. Martel**: Une approche de désagrégation des préférences pour la détermination des seuils d'indifférence dans PROMETHEE
18:00-18:30 **K. Florios, G. Mavrotas**: The multi-objective variable selection problem

Papiers soumis à discussion / Papers submitted for discussion

O. Vaarmann: Some methods of parameter identification for multilayer neural networks
E. Fernandez, J. Navarro, S. Bernal, F. Lopez: Multicriteria classification using outranking-based preference relations defined on the universe set
D. Loukas, I. Papadimitriou, G. Drosos: A multivariate data analysis approach to the multicriteria classification problem: the case of the VACOR method
A. Menou, A. Benallou, R. Lahdelma, P. Salminen: Decision support for centralizing cargo at a Moroccan airport hub using stochastic multicriteria acceptability analysis

18:30-19:00 **Fermeture / Closing**

Hellenic Operational Research Society

Technical University of Crete (Dept of Production Engineering and Management)

SEMINAR ON MULTIPLE CRITERIA DECISION AID

October 1, 2008
Chania (Crete), Greece
www.dpem.tuc.gr/fel/seminar

The Technical University of Crete and the Hellenic Operational Research Society organised a Seminar on Multiple Criteria Decision Aid in October 1st, 2008 at Chania, Greece. The organisers of the seminar were Constantin Zopounidis, Nikolaos Matsatsinis, Evangelos Grigoroudis and Michael Doumpos.

This one day seminar was a pre-conference event of the 68th Meeting of the European Working Group MCDA (October 2-3, Chania), as well as a post-conference event of the 6th Meeting of the Greek Working Group MCDA (September 30, Chania).

The seminar was held at the conference hall of the Bank of Chania, which was the main sponsor of this event.

The main objective of the seminar was to provide an introduction to the main principles and practice of MCDA, together with the presentation of an arsenal of methodologies, which are widely used for multicriteria decision making, aiding and support. Starting with the basics of MCDA and preference modelling, the lectures covered several criteria aggregation models (e.g. value function techniques, outranking methods, rule-based models, etc.), model development approaches under the preference disaggregation paradigm, as well as new extensions such as the rough sets theory. Real-world applications and case studies were also discussed.

All lectures were given by eminent scholars working on MCDA. Particularly, five 1-hour lectures were given by Yannis Siskos, Bernard Roy, José Rui Figueira, Roman Słowiński, Alexis Tsoukias, and Michael Doumpos (see below the detailed program of the seminar).

08:30 – 09:30	Registration
09:30 – 10:30	**Aggegation-Disaggegation Approaches** by Yannis Siskos
10:30 – 11:00	Coffee Break
11:00 – 12:00	**Foundations and Main Features of ELECTRE methods** by Bernard Roy and José Rui Figueira
12:00 – 13:00	**Rough Set Approach to MCDA** by Roman Słowiński
13:00 – 14:30	Lunch
14:30 – 15:30	**Preference Modelling** by Alexis Tsoukias
15:30 – 16:00	Coffee Break
16:00 – 17:00	**MCDA Applications in Finance** by Michael Doumpos
17:00 – 17:30	Closing

The seminar was a great success since 46 post-graduate and PhD students were registered. The majority of the participants were from Greece, but there were also participations from France, UK, Ukraine, and Serbia.

Furthermore, the seminar was a unique opportunity for the participants to get a sound and vigorous presentation and analysis of multiple criteria decision support and the existing techniques in this field. The participants had also the opportunity to communicate with experts on MCDA, gaining additional understanding and getting practical and research guidance. Finally, it should be emphasised that this one day seminar was a great opportunity to promote the ideas and principles of MCDA to students and new researchers.

More information about the seminar may be found at http://www.dpem.tuc.gr/fel/seminar, or by contacting Evangelos Grigoroudis at seminar_mcda@ergasya.tuc.gr.

Organising Committee

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Forthcoming Meetings

(This section is prepared by 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*).

The 69th meeting of the European Working Group "Multiple Criteria Decision Aiding" will be held in Brussels, Belgium at the Université Libre de Brussels. Date: April, 2-4, 2009. Organizers: Yves de Smet (yves.de.smet@ulb.ac.be) and Marc Pirlot (Marc.pirlot@fpms.ac.be). Web site: www.mcda69.org. Topic: "MCDA and Classification". Thursday morning is dedicated to PhD students.

The 70th meeting of the European Working Group "Multiple Criteria Decision Aiding" will be held in Moncton, New Brunswick, Canada at The Delta Moncton Hotel. Date: Sepetember, 24-26, 2009. Organizers: Nabil Belacel (Nabil.Belacel@nrc-cnrc.gc.ca) and Georges Corriveau (Georges.Corriveau@nrc-cnrc.gc.ca). Web site: www.mcda70.org. Topic: "MCDA in Health, Environment, and Energy".

Other Meetings

International Symposium on Operational Research, Nov 2 - 6, 2008, Algiers, Algeria; http://www.laid3.com/isor08/

ERIMA'08 - European Symposium on Innovative Management Practices, Nov 6 - 7, 2008, Porto, Portugal; http://www.erima.estia.fr/2008/index.php

International Workshop on Nature Inspired Cooperative Strategies for Optimization (NICSO 2008), Nov 12 - 14, 2008, Puerto de La Cruz, Tenerife, Spain; http://www.gci.org.es/nicso2008

Society for Judgment and Decision Making Annual Meeting, Nov 15 - 17, 2008, Chicago, USA; http://www.sjdm.org/files/programs/2008-cfp.txt

43rd Annual Conference of the Operational Research Society of New Zealand, Nov 24 - 25, 2008, Wellington, New Zealand; http://conference.orsnz.org.nz]

The 9th Asia Pacific Industrial Engineering & Management Systems Conference, Dec 3 - 5, 2008, Bali, Indonesia; http://www.apiems2008.org]

International Conference on Computational Intelligence for Modelling, Control and Automation, Dec 10 - 12, 2008, Vienna, Austria;
http://community.ise.canberra.edu.au/conference/cimca08/

VI ALIO/EURO Conference on Applied Combinatorial Optimization, Dec 15 - 17, 2008, Buenos Aires, Argentina; http://alioeuro2008.dc.uba.ar

INFORMS Computing Society Conference, Charleston, SC, USA, Jan 11 - 13, 2009; http://ics09.meetings.informs.org/

LION - Learning and Intelligent OptimizatioN, Trento, Italy, Jan14 - 18, 2009; http://www.intelligent-optimization.org/LION3

ICMSAO'09 - Third International Conference on Modeling, Simulation, and Applied Optimization, Jan 20 - 22, 2009, Sharjah, United Arab Emirates (UAE); http://www.aus.edu/conferences/icmsao09/index.php

MATHMOD 2009 - 6th Vienna International Conference on Mathematical Modelling, Feb 11 - 13, 2009, Vienna, Austria; http://www.mathmod.at/

The 6th International Industrial Engineering Conference, Feb 18 - 19, 2009, Tehran, Iran; http://www.iiec2009.com]

5th International Conference on Evolutionary Multi-Criterion Optimization, Apr 7 - 10, 2009, Nantes, France; http://www.emo09.org/

9th European Conference on Evolutionary Computation and Metaheuristics in Combinatorial Optimization, Apr 15 – 17, 2009, Tuebingen, Germany; http://evostar.na.icar.cnr.it/index.html

International Network Optimization Conference INOC 2009, April 26 – 29, 2009,
Pisa, Italy; http://www.di.unipi.it/INOC2009/

INFORMS Practice Conference: Applying Science to the Art of Business, Apr 26 - 28, 2009, Phoenix, AZ, USA; http://meetings.informs.org/Practice09/

International Conference on Industrial Engineering and Systems Management, May 13 - 15, 2009, Montreal, Canada; http://symposia.cirrelt.ca/IESM09/en/Home

European Chapter on Combinatorial Optimization ECCO-XXII, May 17-19, 2009, Jerusalem, Israel; http://www.g-scop.inpg.fr/ECCO/index.php?page=3

2009 IEEE Congress on Evolutionary Computation (IEEE CEC 2009), May 18-21, 2009, Trondheim, Norway; http://www.cec-2009.org/

8th World Congress on Structural and Multidisciplinary Optimization, June 1 - 5, 2009, Lisbon, Portugal; http://www.wcsmo8.org/

13th IFAC Symposium on Information Control Problems in Manufacturing, June 3, - 5, 2009, Moscow, Russia; http://incom09.org/

CORS/INFORMS International Toronto 2009, June 14 - 17, 2009, Westin Harbour Castle Toronto, Ontario, Canada; http://meetings.informs.org/Toronto09

23rd European Conference on Operational Research, July 5 - 8, 2009, Bonn, Germany; http://www.euro-2009.de

ISAHP 2009 Symposium - Tenth International Symposium on the Analytic Hierarchy/Network Process, July 29 – Aug 1, 2009, Pittsburgh, USA; http://www.isahp.org/

20th International Symposium on Mathematical Programming, Chicago, USA, Aug 23 - 28, 2009; http://ismp2009.eecs.northwestern.edu/

INFORMS Annual Meeting 2009, Oct 11 - 14, 2009, San Diego, California, USA; http://www.informs.org/

TRISTAN VII - Seventh Triennial Symposium on Transportation Analysis, June 20 - 25, 2010, Tromsø, Norway; http://www.tristan7.org

PCO 2009 Conference., 1st-3rd June 2009, bali, Indonésia, http://www.engedu2.net/

Announcements

Call for Nominations: MCDM Awards

The International Society on Multiple Criteria Decision Making (MCDM) has been presenting awards at each of its meetings since 1992. The next set of awards will be presented at the 20th International Conference on MCDM in Chengdu/Jiuzhaigou, China, June 22-26, 2009 (http://www.mcdm2009.cn/). The Society welcomes nominations for the following awards: 1. MCDM Gold Medal, 2. Edgeworth-Pareto Award, and 3. Georg Cantor Award.

Submit nominations to: Professor Murat Köksalan, Industrial Engineering Department, Middle East Technical University, 06531 Ankara, Turkey or (preferably) by e-mail, koksalan@ie.metu.edu.tr. Contact him for further information.

To assure full consideration:

1. Make the nominations by March 16, 2009.

2. Indicate the name of the nominee, why he or she is worthy of the award, his/her contributions to the field, and anything else that is relevant to the award.

3. Provide a CV of the nominee.

Awardees are expected to attend the conference and give a talk. More information concerning the awards and past awardees may be found on the web site at http://www.mit.jyu.fi/MCDM/intro.html#Awards.

Call for Papers

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

Please see also at the end of this Issue for some call for Papers.

Books

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Multiobjective Optimization Interactive and Evolutionary Approaches

Branke, J.; Deb, K.; Miettinen, K.; Slowinski, R. (Eds.)

2008, XX, 470 p., Softcover
ISBN: 978-3-540-88907-6

About this book

Multiobjective optimization deals with solving problems having not only one, but multiple, often conflicting, criteria. Such problems can arise in practically every field of science, engineering and business, and the need for efficient and reliable solution methods is increasing. The task is challenging due to the fact that, instead of a single optimal solution, multiobjective optimization results in a number of solutions with different trade-offs among criteria, also known as Pareto optimal or efficient solutions. Hence, a decision maker is needed to provide additional preference information and to identify the most satisfactory solution. Depending on the paradigm used, such information may be introduced before, during, or after the optimization process. Clearly, research and application in multiobjective optimization involve expertise in optimization as well as in decision support.

This state-of-the-art survey originates from the International Seminar on Practical Approaches to Multiobjective Optimization, held in Dagstuhl Castle, Germany, in December 2006, which brought together leading experts from various contemporary multiobjective optimization fields, including evolutionary multiobjective optimization (EMO), multiple criteria decision making (MCDM) and multiple criteria decision aiding (MCDA).
This book gives a unique and detailed account of the current status of research and applications in the field of multiobjective optimization. It contains 16 chapters grouped in the following 5 thematic sections: Basics on Multiobjective Optimization; Recent Interactive and Preference-Based Approaches; Visualization of Solutions; Modelling, Implementation and Applications; and Quality Assessment, Learning, and Future Challenges.

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Multiobjective Programming and Goal Programming: Theoretical Results and Practical Applications

Barichard, V.; Ehrgott, M.; Gandibleux, X.; T'Kindt, V. (Eds.)

Series: Lecture Notes in Economics and Mathematical Systems , Vol. 618
2009, XIV, 314 p., Softcover
ISBN: 978-3-540-85645-0

About this book
This book gives the reader an insight into the state of the art in the field of multiobjective (linear, nonlinear and combinatorial) programming, goal programming and multiobjective metaheuristics. The 26 papers describe all relevant trends in this fields of research . They cover a wide range of topics ranging from theoretical investigations to algorithms, dealing with uncertainty, and applications to real world problems such as engineering design, water distribution systems and portfolio selection. The book is based on the papers of the seventh international conference on multiple objective programming and goal programming (MOPGP06).

*** *** ***

Optimization and Multiobjective Control of Time-Discrete Systems: Dynamic Networks and Multilayered Structures

Lozovanu**, Dmitrii,** Pickl**, Stefan**

2009, Approx. 300 p., Hardcover
ISBN: 978-3-540-85024-3

About this book
The study of discrete structures and networks becomes more and more important in decision theory. A relevant topic in modern control theory reflecting this fact is concerned with multiobjective control problems and dynamical games. The monograph presents recent developments and applications in the field of multiobjective control of time-discrete systems with a finite set of states. The dynamics of such systems is described by a directed graph in which each vertex corresponds to a dynamic state and the edges correspond to transitions of the system moving from one state to another. This characterization allows us to formulate the considered control models on special dynamic networks. Suitable algorithms are derived exploiting multilayered structures. Game theoretical properties are characterized. A multilayered game on a network can be used to model a certain trading procedure of emission certificates within Kyoto process. Optimal economic behavior and equilibria can be determined.

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Complex Decision Making: Theory and Practice

Qudrat-Ullah, H.; Spector, J.M.; Davidsen, P.I. (Eds.)

Series: Understanding Complex Systems
2008, XII, 338 p. 132 illus., Hardcover
ISBN: 978-3-540-73664-6

About this book
The increasingly complex environment of today's world, characterized by technological innovation and global communication, generates myriads of possible and actual interactions while limited physical and intellectual resources severely impinge on decision makers, be it in the public or private domains.

At the core of the decision-making process is the need for quality information that allows the decision maker to better assess the impact of decisions in terms of outcomes, nonlinear feedback processes and time delays on the performance of the complex system invoked.

This volume is a timely review on the principles underlying complex decision making, the handling of uncertainties in dynamic envrionments and of the various modeling approaches used.

The book consists of five parts, each composed of several chapters:
I: Complex Decision Making: Concepts, Theories and Empirical Evidence
II: Tools and Techniques for Decision Making in Complex Environments and Systems
III: System Dynamics and Agent-Based Modeling
IV: Methodological Issues
V: Future Directions

*** *** ***

Articles Harvest

(This section is prepared by Juscelino ALMEIDA DIAS)

Agrawal S., B. K. Panigrahi, and M. K. Tiwari (2008). Multiobjective Particle Swarm Algorithm With Fuzzy Clustering for Electrical Power Dispatch. *IEEE Transactions on Evolutionary Computation* 12(5), 529-541.

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Seminars

SÉMINAIRE «MODÉLISATION DES PRÉFÉRENCES
ET AIDE MULTICRITÈRE À LA DÉCISION»

Responsables : Bernard ROY,

Daniel VANDERPOOTEN

(le mardi, à 14.00, en salle P 510)

Prochaines réunions

28 octobre 2007 Conférence de **Christophe Gonzales** (LIP6) :
Modèles graphiques pour les préférences.

25 novembre 2007 Conférence de **Denis Bouyssou** (LAMSADE) :
Doit-on croire le classement de Shangai ?

16 décembre 2007 Discussion des travaux de **Stéphane André** (LAMSADE) :
Evaluation des actions de mécénat : l'apport des méthodes AMCD couplées à une démarche de concertation cadrée.

Dissertations

BOTREAU, Raphaëlle : « Evaluation multicritère du bien-être animal - Exemple des vaches laitières en ferme ». Thèse pour obtenir le grade de Docteur de l'Institut des Sciences et Industries du Vivant et de l'Environnement (Agro Paris Tech), Spécialité : Productions Animales. Thèse soutenue le 12 février 2008.

RÉSUMÈ : Le respect du bien-être des animaux d'élevage fait l'objet d'attentes sociétales de plus en plus fortes. Dans ce contexte, le projet européen Welfare Quality® vise à construire un standard en matière d'évaluation et d'information sur le bien-être animal. Le bien-être est composé de plusieurs dimensions (santé, comportement, absence de stress...) et son évaluation doit donc reposer sur un ensemble de mesures complémentaires. L'objet de la thèse est d'élaborer un modèle d'évaluation globale du bien-être des vaches laitières reflétant l'aspect multidimensionnel du bien-être. Notre modèle suit une approche multicritère. Il repose sur une structure séquentielle dans laquelle plusieurs critères sont construits puis agrégés afin d'obtenir une évaluation globale. Une fois identifiés les problèmes liés à la construction d'un modèle d'évaluation globale du bien-être animal, nous définissons un ensemble de 4 critères (*Alimentation adaptée*, *Logement correct*, *Bonne santé* et *Comportement approprié*) et 12 sous-critères. Pour construire les sous-critères à partir des 44 mesures effectuées en ferme, nous proposons de les évaluer sur la même échelle d'utilité [0,100]. Les données brutes sont alors agrégées en utilisant des méthodes adaptées au nombre de mesures, à leur nature et à leur importance relative (sommes pondérées associées à une fonction d'utilité, méthode lexicographique...). Les sous-critères composant un même critère sont ensuite agrégés en utilisant un méthode permettant de tenir compte du fait que certains sous-critères sont plus importants que d'autres, tout en limitant les compensations entre les sous-critères (intégrale de Choquet). Enfin, l'agrégation des critères pour former une évaluation globale utilise une méthode de comparaison à des profils prédéfinis délimitant quatre catégories de bien-être (correspondant à une problématique de tri ordonné). A chaque étape, le modèle d'évaluation est paramétré sur la base d'avis d'experts, ces experts étant des scientifiques ou des utilisateurs futurs du système d'évaluation. Le système d'évaluation du bien-être qui résultera du projet Welfare Quality® (en 2009) pourra être utilisé à plusieurs fins : étiquetage obligatoire européen, label "bien-être", conseil aux éleveurs recherche (la capacité du modèle à pouvoir expliquer les résultats étant très utile dans ces deux derniers cas). **Mots-clés :** Bien-être animal, Évaluation multicritère, Aide à la décision, Bovins, Élevage.

ABSTRACT : There is an increasing societal concern for the welfare of farm animals. The European project Welfare Quality® aims at developing a standard for the assessment of and information about animal welfare. Welfare is composed of several dimensions (health, behaviour, absence of stress...). Hence, its overall evaluation is based on a set of complementary measures. The objective of this PhD thesis is to develop a model for the overall assessment of the welfare of dairy cows, which respects the multidimensionality of the welfare concept. Our model follows a multicriterion approach. It follows a sequential evaluation process where several criteria are constructed and aggregated into an overall assessment. After identifying the constraints imposed on the construction of an evaluation model of overall welfare, we define a set of 4 criteria (*Good feeding*, *Good housing*, *Good health* and *Appropriate behaviour*) and 12 subcriteria. To construct the subcriteria from the 44 measures observed on farms, we propose to assess them on a common utility scale [0,100]. Raw data are thus aggregated using methods adapted to the number of measures, their nature and their relative importance (weighted sums associated to a utility function, decision trees...). Subcriteria involved in the same criterion are the aggregated using a method which allows to consider that subcriteria are more or less important, while limiting compensations between subcriteria (Choquet integral). Finally, the aggregation of criteria into an overall assessment is based on a comparison to predefined profiles delimiting four categories of welfare (corresponding to an ordered sorting procedure). At each stage, the evaluation model is parameterized on the basis of experts' opinions. The experts are scientists or potential users of the future evaluation system). The evaluation system that will be produced by Welfare Quality® (in 2009) can be used for several purposes: a compulsory European labelling system, a "welfare-friendly" labelling system, advice to farmers or research (with the capacity of the model to explain the results being adequate for these two later purposes). **Keywords:** Animal welfare, Multicriterion evaluation, Decision-aid, Cattle, Farming.

Information about CORS/Optimizatio Days

The Canadian Operational Research Society/Optimization Days 2008 joint conference was held at Université Laval, Quebec City (Canada) on May 12-14. A cluster on Multi-Criteria Decision Aid (MCDA) was organized for this scientific event. Many valuable papers were presented during this well organized conference. The authors of the submitted papers to the MCDA cluster were from eight different countries: Algeria, Canada, Cuba, Italy, Morocco, Spain, Tunisia and United Arab Emirates. Those have submitted papers are: Irène Abi-Zeid, Belaid Aouni, Enrique Ballestero, Jonathan Barzilai, Fouad Ben Abdelaziz, Sarah Ben Amor, Ozan Cakir, Wade D. Cook. Abdelaziz Dammak, Amal Hassaine, Davide La Torre, Rene Abreu Ledon, Taicir Loukil, Jean-Marc Martel, Olfa Meddeb, Mouna Mezghani, Mar Arenas Parra, Blanca Pérez-Gladish, David Pla-Santamaria, Jasmin Tremblay and Hassane Yamnahakki. A tutorial entitled "Decisions, Utility, and Games-re-building the foundations of OR" was given by Professor Jonathan Barzilai where he brought to light multiple fundamental flaws in utility theory (including Barzilai's paradox which is an intrinsic contradiction), game theory (the characteristic function is ill-defined, the use of undefined sums, etc.), measurement theory (where the measurement models of elementary variables such as length and mass are incorrect), and decision theory. The source of these errors was explained and their correction outlined. The presentation (as well as publications, FAQs and inFAQs) is posted at www.scientificmetrics.com.

Professor Belaid Aouni, MCDA Cluster Chair.

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@ist.utl.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.

Groupe de Travail Européen "Aide Multicritère à la Décision" /
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ERRATA (OPINION MAKER SECTION)

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Now, in order to determine the parameters, two artificial alternatives A=(2.6, 50) and B=(3.2, 30) are presented to the DM. Since he prefers B, we change B until we reach an indifference, say A~(3.2, 35). This allows us to build the equation $v(A)=v(3.2, 35)$ and, since $k_1+k_2=1$,

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$$v'(x_1, x_2) = 0.7\, v(x_1, x_2) + 0.15$$

INTERNATIONAL TRANSACTIONS IN OPERATIONAL RESEARCH

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Call for Papers

Special issue on OR approaches dedicated to routing problems in the Internet

The internet has been the subject of an extremely rapid evolution both in terms of increasing traffic volumes and more advanced services, to be supplied at the lowest possible cost and with some degree of quality of service (QoS) satisfaction. This has also been made possible by the development of new technological platforms. An essential element of these trends is the necessity of developing more advanced routing mechanisms capable of guaranteeing, on the one hand, the required QoS levels and, on the other hand, some form of optimization of the available network resources.

The major objective of this special issue of *ITOR* is to gather state-of-art research papers putting in evidence the great OR potentialities in this field. Articles on theoretical, methodological and application aspects will be welcome and the deadline for submissions is 31 December 2008.

Topics for this special issue include (but are not limited to):

- QoS routing models/multi-constrained optimization path problems
- Multipath routing optimization models
- Multicriteria routing models
- New OR tools related to the internet routing challenges

Each paper will be peer-reviewed according to the editorial policy of ITOR (http://www.blackwellpublishing.com), published by the International Federation of Operational Research Societies – IFORS. Papers should be original, unpublished, and not currently under consideration for publication elsewhere. They should be prepared according to the instructions to authors that can be found at the journal homepage.

Authors are strongly encouraged to send their submissions in electronic form (preferably a PDF file). Submissions and other inquiries should be sent directly to any of the Guest Editors in charge of this issue: João Clímaco (jclimaco@inescc.pt) and José Craveirinha (jcrav@deeuc.uc.pt).

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GDN Journal- Call for papers

Special Issue on Multicriteria Analysis in GDSS/NSS

In our current globalised world decision making and negotiating are becoming increasingly important and complex. On the other hand, information and communication technologies, and the associated supplied services are in a permanent evolution and heavily (and positively) impacting decision and negotiation support.. These trends motivate a pace of innovation, integrating new areas of information systems research with new models/methods leading to a fast evolution in Group Decision Support Systems (GDSS) and Negotiating Support Systems (NSS). Furthermore, the multidimensionality of the complex real world problems requires demands in many cases the integration of multicriteria models/methods within the GDSS/NSS paradigms. We should stress, moreover, that Multicriteria Analysis (MA) is, in itself, a diversified field of research, incorporating several streams, all of them relevant for Group Decision and Negotiation: Multiple Objective Mathematical Programming Methods, Multiattribute Utility and Value Theory, Outranking methods, Interactive Procedures, are an integral part of MA.

The main objective of this special issue of the Group Decision and Negotiation Journal (GDN) is to gather state-of art research putting in evidence the relevance of MA in GDSS/NSS. Articles referring to theoretical, methodological and applied aspects will be welcome. The deadline for submissions is 31 March 2009.

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