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# Prioritisation of public investments in social infra-structures using multicriteria value analysis and decision conferencing: A case-study

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**Abstract.** Not-for-profit private organisations that provide social services to children, the elderly and the disabled, apply for financial support to develop or to renew their social infra-structures, through the Portuguese Institute for Social Welfare. In a context of scarce financial resources, the Institute decision-makers felt the need to adopt an improved “rationality” in resource allocation, in order to increase transparency and to ensure that the collective best use is made of a limited budget. This paper describes the socio-technical process followed in building a multicriteria value model, under a decision conferencing framework in which participation and interaction among decision actors were key features in the development of the three main phases of problem structuring, evaluation and prioritisation.

**Keywords:** Multi-criteria value analysis, decision conferencing, public sector, case study, structuring, prioritisation, resource allocation, cognitive mapping, MACBETH.

## **1. Introduction**

### **1.1. The ISS case**

The Portuguese Institute for Social Welfare (ISS, 'Instituto da Segurança Social') manages the national programme for the development of the network of public and private social infra-structures. Each year, the ISS central planning department distributes the budget of the programme by the Centres for Social Welfare (CDSS, 'Centros Distritais de Segurança Social') of the 18 sub-regions in the Portuguese mainland ('Distritos' – see Figure 2), based upon the previous yearly budgetary sub-regional allocations. Not-for-profit private organisations that provide social services to children, the elderly and the disabled, apply to the CDSS for financial support to build new social infra-structures, or to renew or refurbish existing ones. Each CDSS analyses these applications and subsequently proposes to the ISS the sub-regional portfolio of projects to be supported every year.

The legal framework which regulates the ISS programme dates back from the eighties. It establishes that support is conditioned by financial availability, the 'real needs' of each community of users and the existing 'spatial coverage'. However, it has not been common practice to appraise and compare the potential benefits of the projects; since, until recently, applications did not exceed the available budget, the concern for budget expenditure drove the selection process.

Since 2002, the total annual budget for the ISS programme has been cut back by more than 70%, to about 10 million euros per year, as a consequence of the severe financial constraints on public spending. The implied dramatic reduction on the number of projects that could be financed made ISS decision-makers feel the need to deeply redefine the former resource allocation procedure. The difficult task of balancing benefits against costs became a priority, to ensure transparency and efficiency of the public investments.

This paper describes the key phases of the process of designing and constructing a new prioritisation model, so that the collective best use is made of the limited total resource.

### **1.2. The adoption of a socio-technical approach**

The new model should assist the ISS in establishing investment objectives, in appraising the benefits of the projects proposed by the not-for-profit private organisations, and in

selecting the portfolio of projects to be financed annually under the ISS programme. A multi-criteria decision analysis (MCDA) is technically adequate for these purposes.

However, the legal framework mentioned in Section 1.1 does not specify the meaning of the ‘real needs’ of the target population, neither the spatial ‘coverage’ levels, on which priorities should be based upon. To clarify these two key issues, the social component of the modelling process should engage ISS decision-makers and CDSS managers in a structured and coherent way. Their multiple perspectives should be brought to bear in the definition of the evaluation criteria. Moreover, the involvement of the 18 sub-regional authorities, the board of the ISS and its central planning department would be essential to achieve a shared model, common to all the CDSS, thus avoiding unequal treatment caused by the diversity of features among the sub-regions. A decision conferencing process would ensure the engagement of the actors and their alignment to the way forward. The organisation of this social process is addressed in Section 2.

The integration of both components – the technical and the social – resulted in the MCDA socio-technical approach that we proposed to ISS board, to be developed in two main phases: problem structuring (Section 3) and prioritisation (Section 4).

The first objective of problem structuring was the identification of the evaluation criteria (Section 3.1), using cognitive and oval mapping techniques and the Decision Explorer software ([www.banxia.com](http://www.banxia.com)) to facilitate group-work and to help structure the issues (Eden and Ackermann, 1998 and 2001; Eden, 2004). The second structuring objective was to define, for each criterion, a descriptor of performances (Section 3.2); the descriptors would constitute the operational basis for the appraisal, as much as objectively and unambiguously as possible, of the potential benefits which would derive from each one of the projects candidate to financial support through the ISS programme in each year.

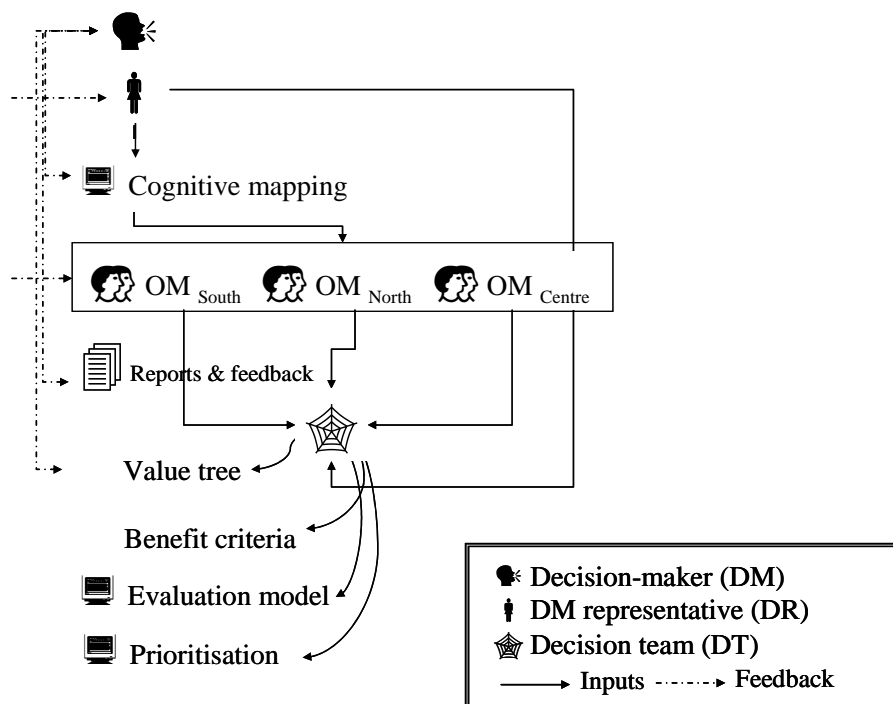
Of course, one thing is a certain level of performance in one dimension another is its value to the community and the extent to which it contributes to the overall benefit of a project. This is the core of the prioritisation phase. Firstly, a multicriteria additive value model would be built (Section 4.1), enabling to convert performances into values and to measure the added benefit of each candidate project. Following the MACBETH approach (Bana e Costa *et al.*, 2004 and 2005; Bana e Costa and Chagas, 2004), value functions would be built and the benefit dimensions weighted, in decision conferences supported by the M-MACBETH software ([www.m-macbeth.com](http://www.m-macbeth.com)). Then, the overall added benefit of each project, computed by an additive aggregation model, would be

divided by its respective cost (that is, the amount of financial support to be granted), enabling to prioritise the candidate projects by decreasing order of their benefit-to-cost ratios (Section 4.2). Indeed, as stated by Phillips and Bana e Costa (2005), ‘the principle that the correct basis for prioritisation, the one that ensures that best value is obtained for the available resource, is risk-adjusted benefit divided by cost’.

## 2. The social process

The social aspects of any process consultation in an organisation play a major role in its success (Schein, 1999). In fact, how things are done is at least as important as what is actually done.

The decision conferencing process of ISS case included individual interviews, workshops and decision conferences, and back-room analyses, from March to July 2004. In designing the process, we adapted the generic framework recommended by Phillips and Bana e Costa (2005) to the specificities of the ISS context, resulting in the framework summed up in the scheme depicted in Figure 1.



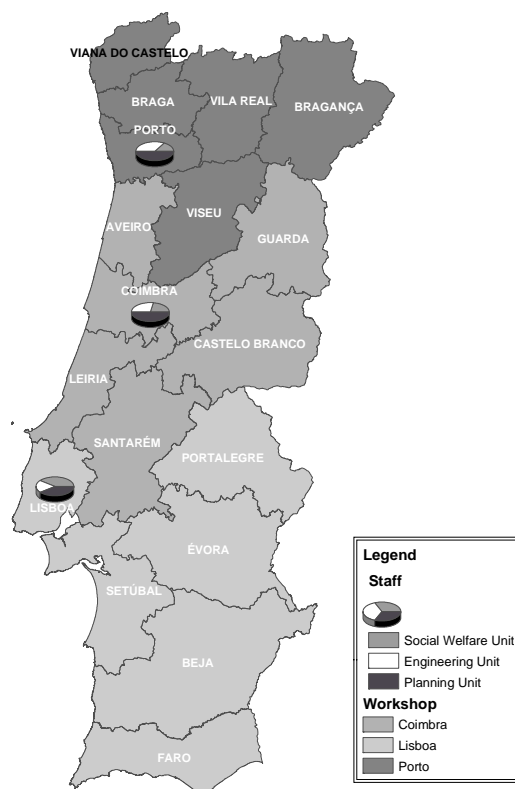
**Figure 1: The socio-technical process.**

At the initial contact with the decision-maker (DM) – the directive board of the ISS – the scope, objectives and the several phases proposed for the socio-technical process (see section 1.2) were explained, debated and, finally, agreed upon, in general. The

director of the central planning department was designated as the decision-maker representative (DR) that should discuss with us the details of the process. In an individual interview with the DR, the directives drawn from the legal framework were the starting point for discussing and cognitive mapping the key issues of the problem, under the DR's perspective.

Then, in another meeting with the DM, the DR map was explored, adjusted and validated after several analyses to its structure and contents. In the second part of this meeting, the importance of an active involvement of CDSS managers, from all of the eighteen sub-regions, in further exploring the dimensions that emerged from the approved cognitive map, was definitely agreed. The number of actors from the sub-regions selected by the DM was about sixty; therefore, our initial idea of carrying out just one structuring workshop was quickly abandoned. Brugha's 'priority pointing procedure' could have been followed and questionnaires of open-ended questions could have been sent by e-mail (Brugha, 2000 and 2004). Lively interaction and debate among CDSS managers were however favoured by the DM, in spite of the risk of an 'explosion of variables that are difficult to shape' (Brugha, 2000). It was expected that the confrontation of multiple perceptions, the sharing of different experiences and the signalling of eventual local constraints would shed light to the final definition of the key dimensions of the problem. It was then decided to carry out three separate oval mapping workshops (OM), to which the initial cognitive map should provide levers for discussion and cognitive convergence for a share family of key evaluation dimensions. The workshops took place in the last week of March 2004, in the cities of Porto (14 participants), Coimbra (14) and Lisboa (12), and were attended by the representatives of the social welfare, engineering and planning units of, respectively, the northern, central and southern CDSS, as shown in Figure 2.

The DR attended the first OM, in Lisbon, and highlighted the importance of the process for the ISS and asked the participants for their commitment. The general theme for the Lisbon OM was 'how to choose the best projects?', but it was changed to 'what should guide the choice of projects?' in the other two workshops, after reflecting with the DR upon lessons learned from the first OM. However, this did not impose any constraint upon the participants, as they explored the lever-dimensions and introduced new ones. A report containing the analysis of the map developed from each OM was written and returned to the participants for feedback.



**Figure 2: The eighteen sub-regions ('distritos') and the regional workshops.**

During May 2004, a new map aggregating the DR and the three OM maps was analysed in four meetings with a decision team (DT) composed of the DR (which also represented the southern OM participants) and representatives of the participants in the northern and central OM workshops. A consensus on the key dimensions that should be taken as the criteria for projects evaluation was achieved, and then a descriptor of performances has been associated to each one of them.

By the end of May, two other decision conferences took place with the DT in order to build the multicriteria value model; the MACBETH approach was followed in building the value functions and weighting the criteria. The DM attended the last decision conference. During June, a sample of projects was evaluated using the MACBETH model developed with the DT, and extensive sensitivity analyses of the model results were performed. Lastly, in July, a final decision conference with the DT and the DM took place in order to discuss alternative prioritisation strategies.

Clear organisational knowledge has derived from all of the decision conferences and workshops, since in all of them the participants were fully engaged in the debate, developed a shared understanding of the issues and a sense of common purpose, and

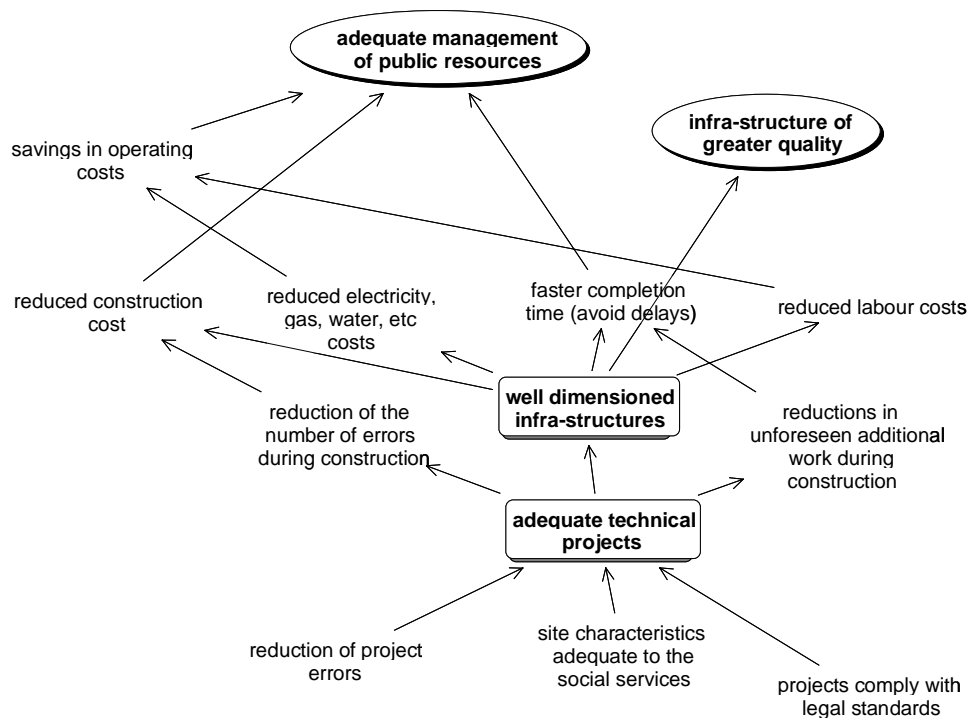


collectively assumed the outcomes as their own while preserving individual perspectives.

### 3. The structuring phase

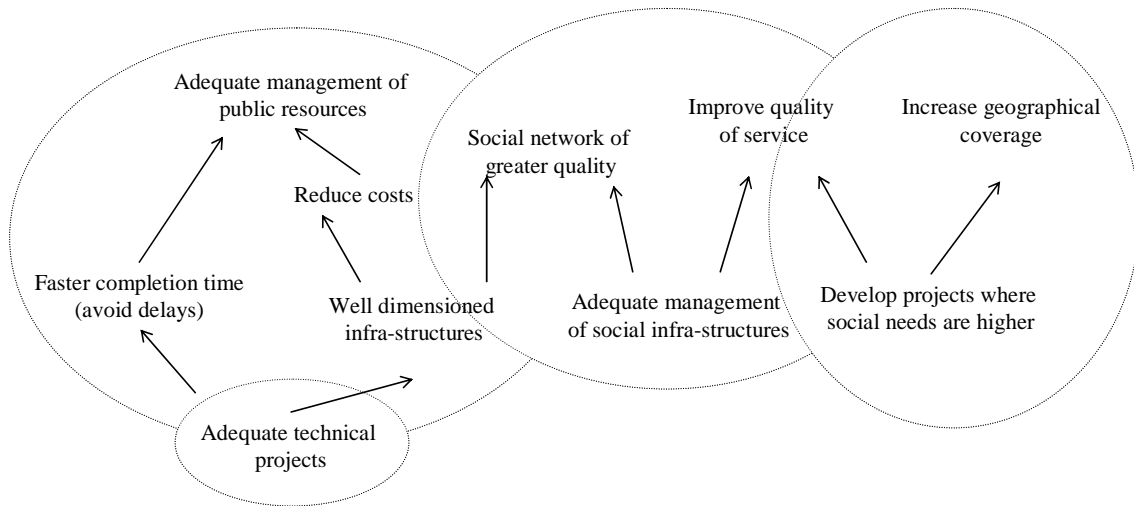
#### 3.3. Identifying the evaluation criteria

The cognitive map which resulted after one and half hour of interview with the DR contained a total of 43 aspects. For illustration, Figure 3 depicts a part of this map, produced with the Decision Explorer software.



**Figure 3: A part of the DR’s cognitive map. Generic concerns are signalled with round frames whereas specific key concerns are signalled by rectangular frames.**

Four main concerns were isolated in order to function as levers in the OM workshops: ‘the extent to which the facilities are well dimensioned’, ‘the extent to which the management of the social facilities is adequate’, ‘the extent to which the technical projects are adequate’, and ‘the extent to which the social needs justifying the projects are real.’ Based on these four aspects, a simplified version of the DR’s cognitive map was developed (Figure 4).



**Figure 4: Simplified version of the DR's cognitive map.**

The oval mapping technique was used to explore the four DR's main concerns during each one of the three OM workshops. In each one of these, those four concerns were posted on the wall, to function at levels for the team work. The rules of the oval mapping process were explained to the participants. After an open discussion, each participant received some oval *post-its* to write his or her own issues (one per oval). The ovals were then posted on the wall, discussed by the group, linked and clustered, resulting in an oval map, as shown in Figure 5. Although the levers were the same and each workshop was conducted in a similar way, the results reached in the three workshops were quite different.

Only 17% of a total of 230 aspects was common to the three OM's and the DR's maps. Consequently, the aggregate map, produced after all the OM workshops, included a total of 190 aspects. Using the cluster analysis functionality offered by the Decision Explorer software, four dimensions of benefit emerged from the aggregate map, besides the financial dimension. Two of those have an operative nature and are associated with the technical project and the management of each the social facility. The other two are more strategic and are related to the social need of facilities and to the quality improvements in the existing ones.



**Figure 5: Snapshots of the oval maps of the regional workshops.**

Figure 6 presents the cluster associated with the ‘improved quality of social facilities’. An adequate management of social facilities is perceived as an issue that may lead to quality improvements through a good service to users. Another argument is related to the material conditions of the building. Heritage rehabilitation is favoured rather than allowing the downgrading of the existing facilities, which may lead to actions on existing infra-structures, such as refurbishing buildings, rather than building new ones. An adequate technical project also influences quality and was present both in the DR model and in every OM map. However, the DT did not consider it an evaluation criterion, but rather a screening one to be verified prior to project appraisal.

Figure 7 summarises the five areas of concern that emerged from the analysis of the aggregated map in subsequent working-sessions with the DT. They were then debated to separate means from ends, several means-ends networks (Keeney, 2002) were built and, after four sessions of intense group work, the DT agree upon the final value tree shown in Figure 8.

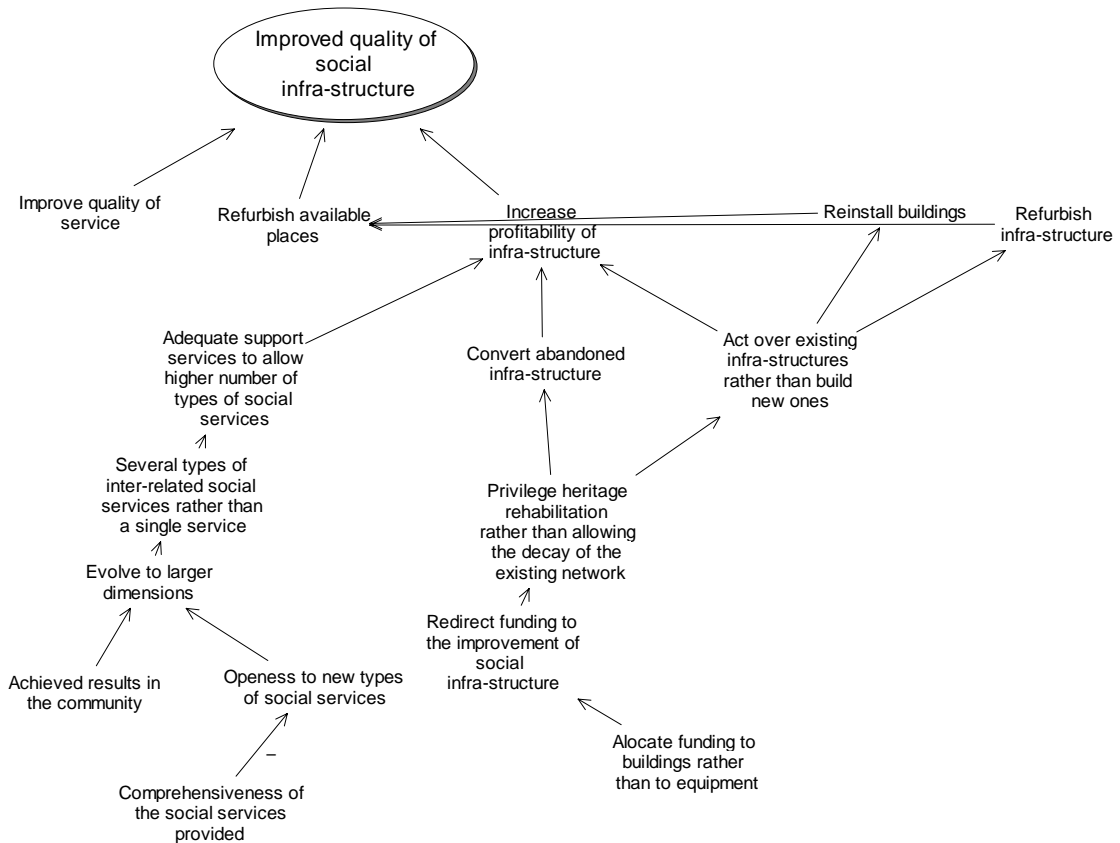


Figure 6: The quality cluster.

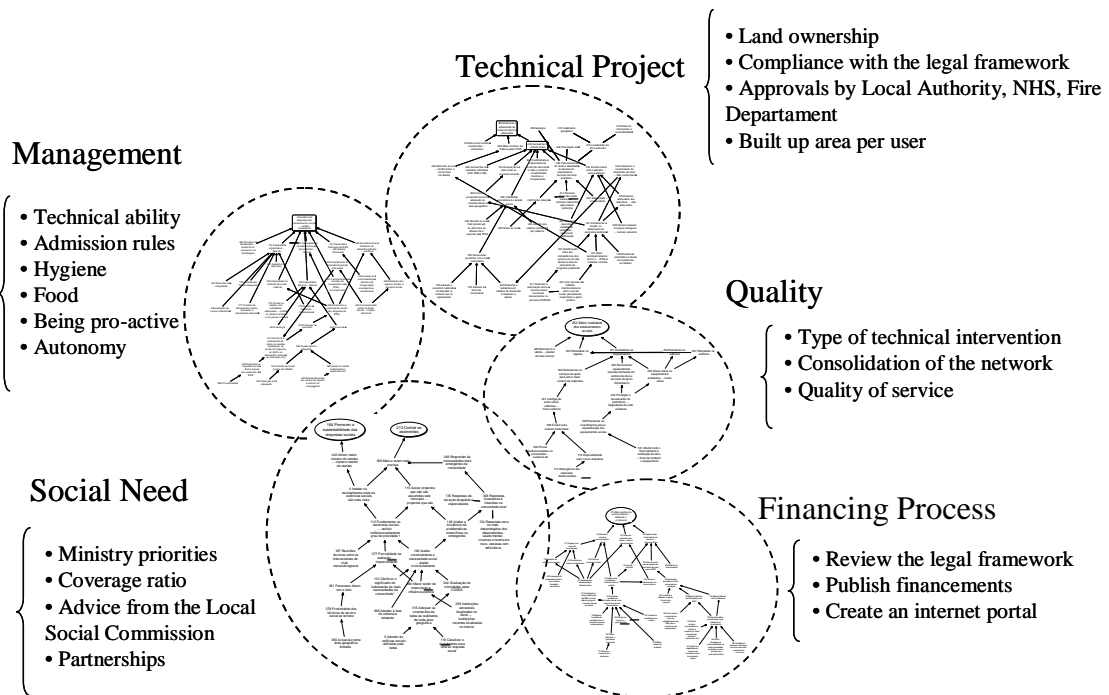
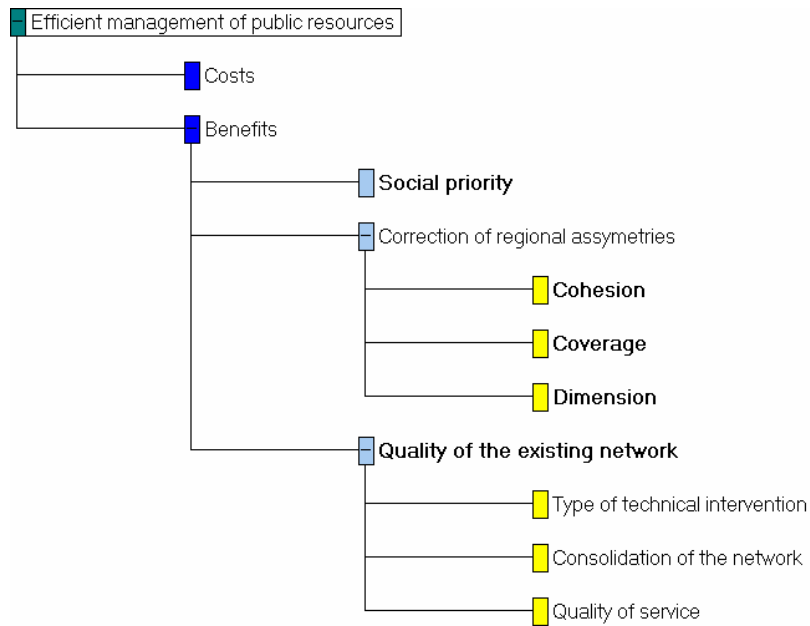


Figure 7: The five key dimensions.



**Figure 8: The final value tree.**

The benefit branch of the value tree focuses mostly on the quality and the social need concerns. In fact, the DT considered the management aspects of each facility to be more of an operative nature, and the group did not reach consensus on appraising projects under these points of view, for they were not deemed to be fundamental. The remaining axes, technical project and financing process mainly included screening criteria, to be verified prior to the prioritisation of the projects. In the end, a decision was taken by the DT that the five benefit dimensions highlighted in bold in the value tree depicted in Figure 8 should be the benefit criteria that allow the evaluation of the added benefit of each project submitted by a non-for-profit organisation for financial support under the ISS programme. They were described as follows:

- ‘Social priority’: the extent to which the project objectives are within the national social policy priorities defined for the sector.
- ‘Cohesion’: the extent to which the project contributes to bridge the gaps in social infra-structures (of all types) between urban developed regions and the rural impoverished or deteriorated urban areas.
- ‘Coverage’: The extent to which the level of spatial coverage by the social infra-structures of the type of the project in its sub-region deviates from the national level of coverage of that type.
- ‘Dimension’: The number of places created or remodelled by the project.
- ‘Quality’: The extent to which the project contributes to the improvement of the quality of the existent network.

In what concerns the cost of project that will be used in project prioritisation, it was decided that the total costs (construction or remodelling cost plus operational and maintenance ones) should not be used, but rather the financial support that would be granted to the project, if selected, through the ISS program.

### 3.2. Developing performance descriptors

A process objective arose since our first meeting with the ISS board: not only the same evaluation criteria should be used, but also an as much clear and objective as possible appraisal of the projects was essential to ensure decision-making transparency and to avoid unequal treatment of projects with similar performances. It should be noted that it is precisely on the achievement of these process objectives that direct scoring systems fail. They mix facts and values into one single measure, making impossible to discern if a score measures a level of performance or the attractiveness of a project. It is therefore wise to start by associating each criterion with a descriptor of performances, that is, a quantitative or qualitative measure of the expected performances of the projects in the criterion.

Each line of Table 1 summarizes the descriptor defined in the DT meetings for each benefit criteria, including the least attractive ('worst') and the most attractive ('best') levels that define its performance range, and two intrinsic references, 'neutral' and 'good', that enable to appraise if a project is an unattractive, simply attractive, or an outstanding one, with respect to the criterion solely.

**Table 1: Descriptors of performances**

Benefit criterion	Performance measure	Descriptor			
		Performance range		Reference levels	
		Worst level	Best level	Neutral	Good
Social Priority	A binary qualitative scale	The project fits only within local priorities	The project fits within national priorities	= Worst	= Best
Cohesion	A binary qualitative scale	Infra-structure in urban developed area	Infra-structure in deteriorated urban or rural impoverished area	= Worst	= Best
Coverage	Coverage index	2	0	1	0.4
Dimension	Number of new and remodelled places	4 places	120 places	4 places	70 places
Quality	A six-level constructed scale (see Table 1)	(See Table 1)			

The deviation of the level of spatial coverage in social infra-structures of the type ( $t$ ) of the project in its sub-region ( $r$ ) from the national level of coverage of that type is measured by a coverage index

$$CI_{r,t} = \frac{c_{r,t}}{P_{a,t}} / \frac{\sum_r c_{r,t}}{\sum_r P_{r,t}}$$

where  $P_{r,t}$  and  $c_{r,t}$  are, respectively, the target population and the capacity installed, in each sub-region  $r$  and for each type of social service  $t$ . Obviously, the best plausible performance in terms of urgency for support would be  $CI_{r,t} = 0$ , a situation in which the social service proposed in the project would not yet exist in its sub-region ( $c_{r,t} = 0$ ), and the neutral performance is  $CI_{r,t} = 1$ , where the sub-regional level of coverage equals the national one.

The procedure recommended by Bana e Costa and Beinat (2005) to develop a multidimensional constructed scale was followed to build a descriptor of ‘quality’ based upon three interrelated features: the type of technical intervention, the consolidation of the existing network and the effect on the quality of service (see Table 2).

Firstly, performance levels were defined for each of those three elementary dimensions. Secondly, all possible combinations of those levels were formed and the unfeasible ones were eliminated. Thirdly, the DT compared the desirability of the feasible combinations and those judged as indifferent were grouped (each group forming a same ‘quality’ performance level); a label was given to each performance level. Finally, the different performance levels were ordered from most to least contribution to the improvement of the material conditions of the existent network, based on their pairwise comparisons performed by the DT. Table 3 describes the resulting six-level qualitative scale of ‘quality’.

**Table 2: Constructing the ‘quality’ descriptor.**

Multi-dimensional profiles										
Componential dimensions and their levels (step 1)										
Refurbishment	Type of technical intervention			Consolidation of the existing network			Quality of service		Analysis of combinations (step 2)	Performance levels (step 3)
	Enlargement	Change of location	New building	Existing service	New service	Both existing and new services	No change	More places		
X				X			X		Best	N1
X				X				X	Good	N2
-					-		-		Unfeasible	
X					X			X	Neutral	N5
-						-	-		Unfeasible	
X						X		X	Feasible	N4
	X			X			X		Best	N1
	X			X				X	Feasible	N3
	-				-		-		Unfeasible	
	X				X			X	Neutral	N5
	-					-	-		Unfeasible	
	X					X		X	Feasible	N4
		X		X			X		Best	N1
		X		X				X	Good	N2
		-			-		-		Unfeasible	
		-			-			-	Unfeasible	
		-				-	-		Unfeasible	
		X				X		X	Feasible	N4
			-	-			-		Unfeasible	
			-	-				-	Unfeasible	
			-		-		-		Unfeasible	
			X		X			X	Worst	N6
			-			-	-		Unfeasible	
			-			-		-	Unfeasible	



**Table 3: The “quality” descriptor.**

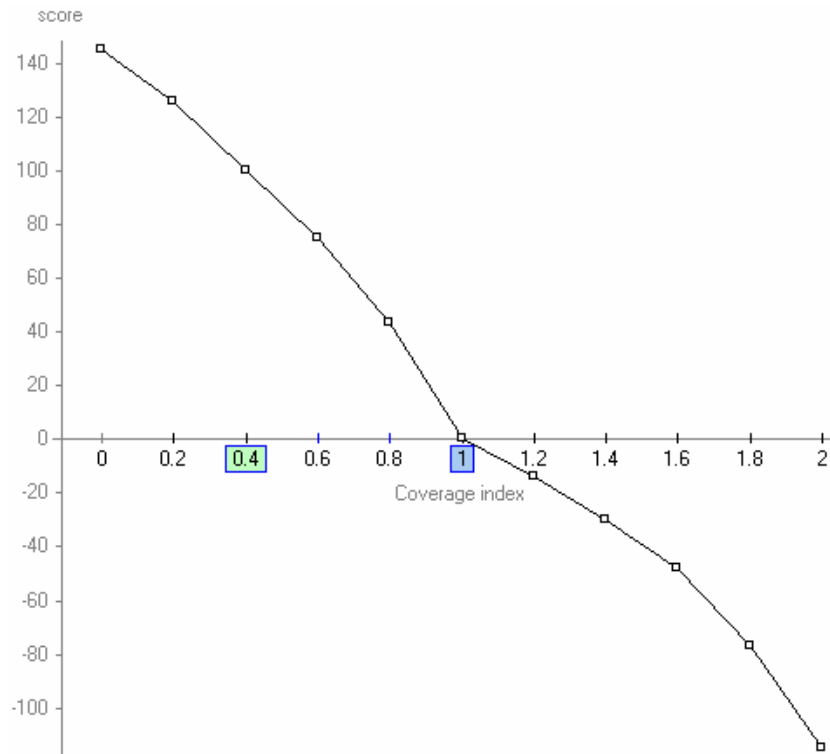
Performance level	Description
Q1	Any type of intervention in an existent infra-structure without change of its type of social service and capacity.
Q2 (good)	Refurbishment or change of the location of an existing infra-structure without change of its type of social service but with increase of its number of places.
Q3	Expansion of an existing infra-structure without change of its type of social service but with increase of its number of places.
Q4	Refurbishment, expansion or change of the location of an existing infra-structure that involves existing and new social services and with increase of its number of places.
Q5 (neutral)	Refurbishment or expansion of an existing infra-structure that involves only a new social service and with increase of its number of places.
Q6	Construction of a new infra-structure.

## 4. The prioritisation phase

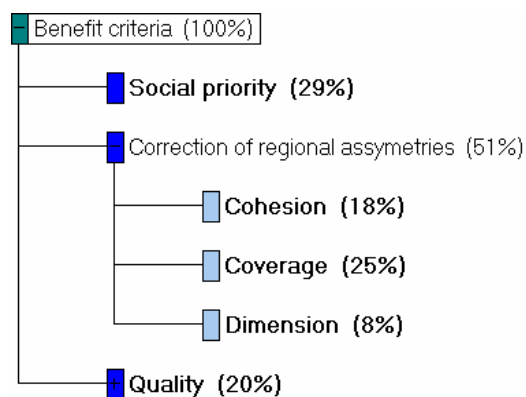
### 4.1. Building the multi-criteria value model

A value function was constructed with the DT in order to enable the quantification of the relative attractiveness of the projects in each benefit criterion. Next, the benefit criteria were weighted. Both decision conferences of the model building process – the value functions one and the weights one – followed the MACBETH approach and were supported by on-the-spot interactive use of the M-MACBETH software. The key distinction between the use of MACBETH and MCDA methods (Belton and Stewart, 2001) is that in the MACBETH process the DT only had to express qualitative judgements about the difference of attractiveness between two elements at a time. These judgements were made either on performance levels or on reference levels, in order to generate either the value function for each criterion or to weight the criteria, respectively.

For reasons of length of this paper, we do not explain in detail this stage of the process, which also included subsequent sensitivity and robustness analysis with the DT of the model results. (The interested reader can consult a detailed explanation of MACBETH process in Fernandes, 2005, or a similar one in Bana e Costa, 2001). For example, the resulting ‘coverage’ value function is depicted in Figure 9. The weights agreed for the benefit criteria are shown (in percentages) in Figure 10.



**Figure 9: The 'coverage' value function.**



**Figure 10: The weights of the benefit criteria (%).**

Meanwhile, it is worthwhile to illustrate the analysis with the DT of the substantive meaning of each value function; from the social point of view, this is necessary to validate its adequacy to the ISS programme context. When considering, for instances, the “coverage” value function (See Figure 9), it should be observed that, as the coverage index (C.I.) of the geographical area (of a project) is closer to the national C.I., its benefit decreases with increasing marginal values of the index. On the contrary, as the C.I. of the geographical area surpasses the national CR, the penalty in benefit rises with increasing marginal values of the index.

Each one of the value functions ( $v_j$ ) will be used to convert any project's performance ( $g_{ij}$ ) on a criterion ( $j$ ) into a score ( $v_j(g_{ij})$ ) that measures its benefit in terms of that criterion alone. The scores of a project ( $i$ ) can then be aggregated additively, using the weights ( $k_j$ ) assigned to the criteria, in order to calculate an overall score that measures the added benefit ( $B_i$ ) of the project ( $i$ ), taking into consideration all the five benefit criteria ( $j, j = 1, \dots, 5$ ):

$$B_i = \sum_{j=1}^5 k_j v_j(g_{ij})$$

Obviously, this is only applicable to the projects that have not been previously rejected by violation of screening criteria.

A set of candidate projects was selected for analysis as follows. Those showing a negative overall benefit are worse than the reference 'neutral' project with neutral performances in all of the criteria and were therefore rejected. The rejection of any project with negative overall benefit is a 'multi-criteria screening criterion' and emphasises the advantage of identifying intrinsic reference levels.

The cost and benefit score of each of the remaining twenty two non-rejected candidate projects – simply referred as projects hereafter – are presented in Table 4, in which the projects are labelled from 1 to 22, from the most beneficial (67.03 benefit units for a cost of 1.311 million euros) to the least beneficial one (only 5.34 benefit units for a cost of 1.722 million euros – the third most expensive project). It should be noted that no project has a benefit score above the reference 'good' project. The cost range varies from 0.182 to 2.969 million euros and 14 projects have costs lower than the average. The total benefit of implementing the 22 projects would be 692.14 benefit units (equivalent to about 7 'good' projects) implying a total investment of almost 19 million euros, which clearly exceeds the annual budget of 10 million euros.

Which projects should then be financed, and which selection strategy should be followed?

**Table 4: The set of projects under analysis.**

Project	Cost	Benefit
1	1.311	67.03
2	1.913	54.77
3	0.421	50.72
4	0.262	48.73
5	2.969	48.09
6	1.340	43.09
7	0.292	42.88
8	1.129	42.52
9	0.385	42.46
10	0.733	42.30
11	0.493	40.63
12	0.322	32.09
13	0.813	24.84
14	0.547	24.18
15	1.148	17.03
16	0.396	13.36
17	0.561	12.24
18	0.359	12.16
19	0.182	11.71
20	0.886	10.15
21	0.599	5.82
22	1.722	5.34
Total	18.783	692.14
Highest	2.969	67.03
Lowest	0.182	5.34
Mean	0.854	31.46

## 4.2. Discussing the prioritisation strategy

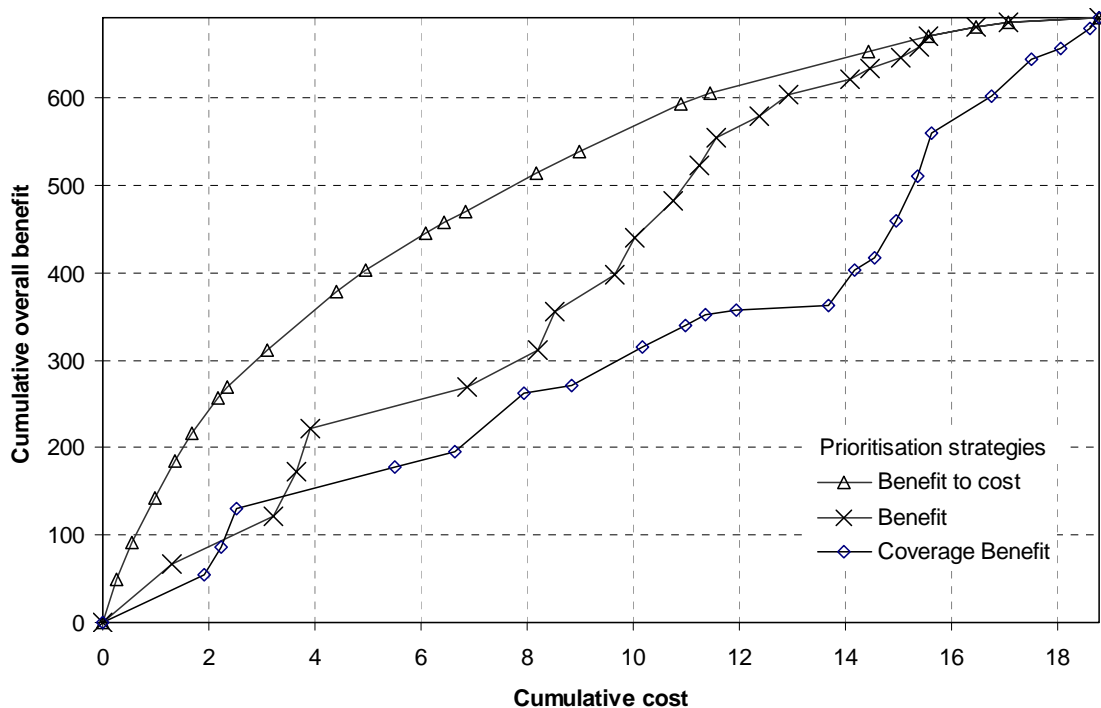
The final decision conference with the DT strategic group took place in July 2004. All the modelling work done so far and the implied intermediate decisions taken, that have implications to resource allocation – the criteria for project appraisal, the multi-criteria value model, and the benefit/cost prioritisation strategy – were reviewed and agreed upon, whatever the CDSS and the type of social service of each project.

At the beginning, the theoretically correct procedure to prioritise projects, in each year, was proposed to the group, following six steps: 1. List the projects; 2. Use the multi-criteria value model to determine the added benefit ( $B_i$ ) that each project ( $i$ ) is expected to create, if financed; 3. Define the cost ( $C_i$ ) of each project, equal to the amount of financial support to be granted, if selected; 4. Calculate the benefit-to-cost ratio ( $r_i = B_i / C_i$ ) of each project; 5. Order the projects from the highest to the lowest benefit-to-cost ratio (corresponding to the upper line shown in Figure 11, in which

cumulative benefits are plotted versus cumulative costs); 6. Go down the list, choosing projects until the available budget is attained.

Phillips and Bana e Costa (2005) state that, in their experience of helping more than 70 organisations with resource allocation over 35 years: ‘Not once have we encountered an organisation that prioritises investments according to this theory’. ISS was not an exception. Benefit divided by cost is uncontroversial in ensuring the best total benefit for the available budget, yet managers prioritise investments on the basis of their benefits only (to which corresponds the intermediate line depicted in Figure 11).

Moreover, some experts of the ISS initially tended to advocate the prioritisation of the candidate projects solely by their ‘coverage’ scores (corresponding to the lower line depicted in Figure 11). It should be noted that 10 projects presented a negative coverage benefit score, but this was not accepted as an additional screening criterion.



**Figure 11: Prioritisation of projects by their benefit-to-cost-ratios, or their multi-criteria benefit, or their ‘coverage’ score only.**

Observing the cumulative overall benefit attained by each of the three prioritisations for a budget of 10 million euros, the ISS decision-makers were easily convinced that the benefit-to-cost ratio procedure is the best for maximising the total benefit. Moreover, it also tends to select more projects.

As said in Section 1.1, the annual budget of the ISS programme has been allocated to the CDSS by the ISS central planning department, based upon the previous yearly budgetary allocations, and each CDSS selected the projects from applicants from its sub-region. Should this decentralised selection procedure be maintained? If yes, each CDSS would then make its own benefit/cost prioritisation, limited to the projects submitted to it. However, the ISS board recognised, since the very first meeting, that this procedure is far from being adequate to achieve the best overall benefit for the entire system, namely when financial resources are scarce (enough to subsidise a few projects only). Therefore, the splitting of the budget by the sub-regions, previously to any project appraisal, should be definitely abandoned and the prioritisation of all of the accepted projects, independently of their regional origin, should be centralised.

## **5. Conclusion**

In developing a decision-aiding intervention like the one described in this paper, it is important to be aware of the myth that it can provide a so-called ‘right’ answer, through an ‘objective’ analysis which will relieve decision-makers from the responsibility of making difficult or complex judgements. In contrast, our intervention aimed at helping decision-makers and other involved actors to learn about issues and problems they are dealing with, as well as about their values and judgments, which have, of course, a subjective nature.

The socio-technical approach that has been followed proved to be adequate to deal with a large number of actors. These have different professional roles within the ISS structure – decision-makers, managers, experts, etc. –, some representing the central office perspective, other the various regional viewpoints. Yet, the participatory process could harmoniously integrate the diversity of ideas and concerns in such a way that a shared understanding of the key issues could emerge, in the form of the set of evaluation criteria and the respective descriptors, common to all the sub-regions and as clear and objective as possible, and a way of moving forward was achieved at the end, as a MCDA model. The model includes a crucial change: the abandonment of the splitting of the budget by the sub-regions, previously to any project appraisal, in favour of a centralized prioritisation strategy of all of the accepted projects, independently of their regional origin.

And, not at all least important, a sense of common purpose has developed across the entire organisation. It has been anticipated that the implementation of those strategic

decisions would have significant organisational impacts. This emphasises how wise it was to have engaged managers and experts from all of the CDSS into the socio-technical process, thus getting their alignment with the new way forward.

The extensive sensitivity and robustness analysis of the model results and the time devoted to discuss and answer participants' 'what-if' questions were crucial to ensure its requisiteness. For example, discussing the relative weights assigned to the benefit criteria, which resulted from complex trade-off judgements, was quite interesting and fruitful. These judgements had been collectively elaborated and agreed upon. Yet, a puzzling question stood out: if 'coverage' was seen by several experts as the most important prioritisation criterion, why then is the 'social priority' criterion the one that resulted with the highest weight? After discussion, it was concluded that this apparent contradiction was actually due to the fact that there is no assignment of the candidate projects to budget categories previously to the selection process. These categories were easily identified; they are the social services for the 'children and youth', the 'children at risk', the 'handicapped' and the 'elderly'. *Ex-ante* budgeting allocation to these four types of infra-structures was not seen to be adequate. Therefore, the concern with avoiding strong asymmetries in their development was crucial. This is precisely what the 'social priority' criterion reflects, and then why its weight is the highest. Indeed, the swing of 'coverage' performance from 'neutral' to 'good', that is, according to Table 1, from fitting only within local policy priorities to fitting within national ones (thus including the asymmetry issue), was considered to provide more added benefit to the entire system than the swing of performance from 'neutral' to 'good' in any other of the remaining criterion, including the 'coverage' criterion which swing from a coverage index of 1 to a coverage index of 0.4 is quite significant.

In the ISS managers view, the process reached its objectives and a decision has been made by the ISS decision-makers to adopt the new model developed, which is currently being implemented progressively.

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