

THE FOUNDING OF INFORMS: A DECISION ANALYSIS PERSPECTIVE

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We provide a decision analysis perspective on the decision making process leading to the merger of The Institute of Management Sciences (TIMS) and the Operations Research Society of America (ORSA) to form the Institute for Operations Research and the Management Sciences (INFORMS). Throughout the merger negotiation era from 1989 until the merger in 1995, discussion regarding a possible merger was framed in an objectives-oriented manner characteristic of decision analysis methods. In addition, as ORSA and TIMS officers, we applied multiobjective decision analysis and financial analysis methods in portions of the planning and negotiation process leading to the formation of INFORMS. The merger process serves as an instructive case study of the uses and limitations of formal decision analysis methods in strategy formulation and implementation.

On January 1, 1995, The Institute of Management Sciences (TIMS) and the Operations Research Society of America (ORSA) merged to form the Institute for Operations Research and the Management Sciences (INFORMS). As INFORMS began, it had over 11,000 members from 90 countries, and a \$4 million annual operating budget supporting 10 professional journals, 33 technical sections, and 55 geographical and student chapters.

The merger of the two largest operations research (OR) societies in the world was a significant strategic decision for the operations research profession. A natural question to ask is, "What role did operations research/management science (MS) techniques play in the process leading to the formation of INFORMS?" We provide our perspective on this question as decision analysts who actively participated in the more than five-year process leading up to the merger. Keller served as Vice President-Finance of TIMS and Kirkwood served as Treasurer of ORSA during portions of this period. In addition, we participated in the quantitative planning activities related to the merger, some of which are discussed below.

A short answer to the question posed above is that systematic decision structuring procedures of a type often associated with the methods of multiobjective decision analysis were used to formulate the merger issues and develop approaches to addressing these issues. In addition, toward the latter stage of the process leading to the formation of INFORMS, more formal multiobjective decision analysis methods were used. However, despite these

activities, a substantial number of people involved in the process did not perceive that OR/MS methods were being used. As the remainder of this article shows, the merger process for TIMS and ORSA serves as an instructive case study of the uses and limitations of OR in strategy formulation and implementation.

1. BACKGROUND

1.1. Founding Era for ORSA and TIMS

ORSA was founded in 1952, and soon after its formation, a group with different but related objectives formed TIMS in 1953 (Salveson 1997). The objectives of ORSA and TIMS as provided in their constitutions are shown in Tables I and II, respectively.

Figure 1 summarizes the ORSA/TIMS merger history in a decision frame timeline. The decision frame (Keeney 1992) consists of the decision context and the associated fundamental objectives. The last column in the figure lists the elements of the decision structure as the decision process evolved.

The founding era of the 1950s and 1960s was characterized by separate and parallel activities, with a focus on the techniques of operations research. A broad-brush distinction between the two societies is that ORSA was more engineering-oriented, more conservative, more theoretical, and covered more military applications, while TIMS was more business-oriented, more innovative, more international, and broader in application focus. However, these stereotypical distinctions had many counterexamples.

Subject classifications: Decision analysis, applications: merger of ORSA and TIMS. Utility/preference, multiattribute: evaluating INFORMS merger options. Professional, OR/MS policy/standards: formation of INFORMS.

Area of review: OR CHRONICLE.

Table I
Objectives of the Operations Research Society of America

Advance Operations Research Through:

- The exchange of information
- The establishment and maintenance of professional standards of competence for work known as operations research
- The improvement of the methods and techniques of operations research
- The encouragement and development of students of operations research
- The useful application of operations research

1.2. Building Cooperation Era

The Building Cooperation Era began in 1973 when a committee was given the task of increasing the effectiveness of ORSA and TIMS by working together, initially on meetings and publications. (At one point, both ORSA and TIMS each had two separate conferences each year.) Cooperation in meetings led to a new pattern of two large joint conferences each year. The Fall meeting was called the ORSA/TIMS Joint National Meeting and the name was reversed to TIMS/ORSA for the Spring meeting. Cooperation in publications led to such joint publications as *OR/MS Today*, *Interfaces*, and *Mathematics of Operations Research*.

During this era, the governance and administration of the two societies remained separate. Each society had its own officer structure (for example, ORSA appointed key operational functionaries as committee chairs, while TIMS elected such key functionaries as VP-Publications) and its own date for changing officers (end of spring meeting for ORSA, September 1 for TIMS). The TIMS office staff was in Providence, RI, and the ORSA office staff was in Baltimore, MD. Different management styles characterized the two organizations: TIMS officers delegated more to the professional staff than did the ORSA officers.

This dual structure became increasingly unwieldy as joint functions increased. The two councils met separately and often multiple sequential votes were needed to reach agreement for budgeting and planning joint activities. While a Joint Council was formed consisting of a subset of

Table II
Objectives of The Institute of Management Sciences

The Objectives of TIMS Were:

- To identify, extend, and unify scientific knowledge contributing to the understanding and practice of management
- To promote the development of the management sciences and the free interchange of information about the practice of management among managers, scientists, students, and practitioners of the management sciences within private and public institutions
- To promote the dissemination of information on such topics to the general public
- To encourage and develop educational programs in the management sciences

the officers and council members of ORSA and TIMS, it had limited decision making authority. There were parallel committees in the two societies for major functions, and during this era combined committees were initiated for some key functions, including meetings and publications. The professional staff had to devote considerable time and effort to coordinating administrative tasks with their geographically and organizationally separate counterparts in the other society office.

1.3. Merger Negotiation Era

The Merger Negotiation Era began in 1989, with the appointment of three task forces to make recommendations for 1) improving cooperation on the financial dimension of joint activities, 2) improving cooperation in the short run, and 3) long-run structural changes.

In the fall of 1989, TIMS and ORSA officers held a joint one-day retreat near Dulles Airport to receive the three task force reports. As then Presidents Don Gross of ORSA and William King of TIMS reported in *OR/MS Today* in December 1989,

“The financial task force pointed out that about 50 percent of the budget of each society represents joint activities—meetings, journals, the employment program, etc . . . [W]e are developing a new common set of financial statements for joint activities . . . [and] have already created a combined Finance Committee and given it authority to make reconciliation of the two budgets in areas that do not involve policy differences . . . By the Fall of 1990 we should have an efficient system that will provide better information on which the two Councils can base decisions.”

“At the New York Joint National Meeting [Fall 1989], the two councils met and made decisions together for the first time. Discussions were joint, with each Council voting separately . . . The universally held perception was that this change had increased the efficiency of decision making in joint activities by an order of magnitude . . . We shall propose that the two Councils continue to use this mode . . . and expand it to include the approval of budgets for joint activities”

“The third task force identified issues that are commonly brought up when the ‘M word’—merger—is discussed. Members presented assessments of these issues in a fashion that enlightened all of us. The net result was that a great deal of resistance to the thoughtful study of structural alternatives for closer cooperation was diminished”

“Among the alternatives that have been discussed are a complete merger with the separate identities of the two societies being lost, a modifying merger in which a new organization would operate the two societies as “wholly owned subsidiaries,” and various forms of federation. One of the options is also to clearly define areas of cooperation and competition while remaining organizationally separate.”

Resulting from the retreat was the appointment of the Joint TIMS/ORSA Committee to Identify and Assess Alternatives for Closer Cooperation Between the Two Societies (henceforth referred to as the Committee on

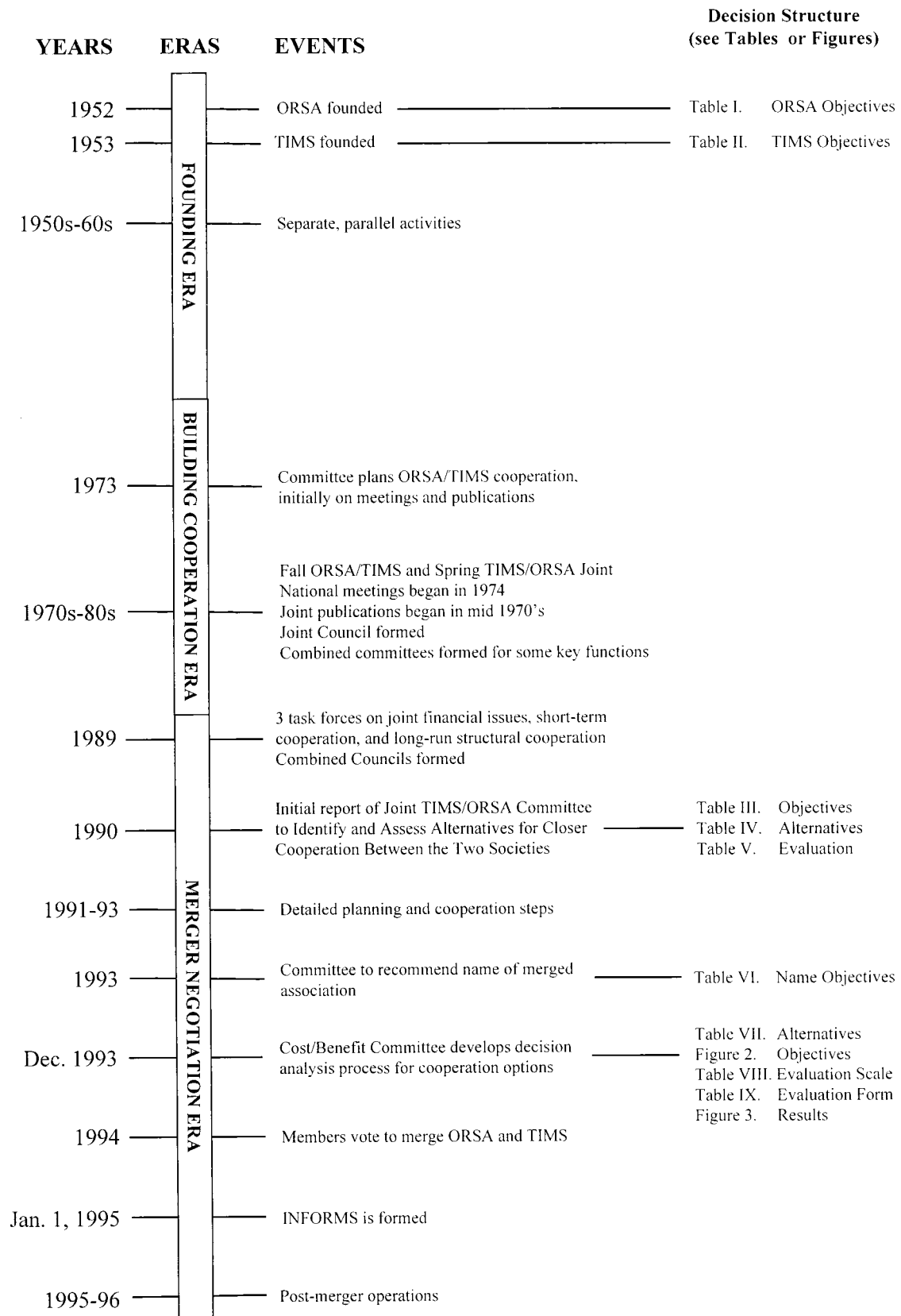


Figure 1. Merger decision frame timeline.

Table III

The Original Set of Objectives Identified by the Joint
TIMS/ORSA Committee on Cooperation

-
1. Improve the efficiency of cooperation between ORSA and TIMS
 - Efficient use of funds
 - Efficient use of time of volunteers
 2. Enhance the quality of ORSA and TIMS activities and services
 - Achieve the missions of the two societies
 - Exploit synergy of mutual strengths
 3. Increase outreach
 - Increase visibility and clout for OR and MS
 - Attract young people to the field
 4. Expand the scope and diversity of the field
 - Increase membership
 - Create strong relationships with other societies, e.g., Math Programming, SIAM, Decision Sciences
-

Cooperation), with John D. C. Little as chair, and members Hugh Bradley, Christine Bullen, and John J. Jarvis. As Gross and King had hoped, the new Combined Councils (that is, the TIMS and ORSA Councils meeting together) continued to meet successfully. (This body was renamed the OR/MS Board in 1991.)

2. INITIAL FORMULATION OF THE "MERGER" ISSUE

At the May 1990 Joint National Meeting in Las Vegas, the Combined Councils met to receive the report of the Committee on Cooperation (Little et al. 1990) and to discuss possible future actions. This report set the framework for the planning process that ultimately led to the merger of TIMS and ORSA.

The initial framing by the Committee on Cooperation is summarized in Table III, showing a set of objectives identified by the committee, and Table IV, showing an initial set of alternatives. Table III shows that there were four top level objectives identified for evaluating alternatives, and each of these had two subobjectives, while Table IV shows that there were five classes of potential alternatives, and two of these classes have multiple potential specific alternatives. Thus, from the start of the deliberations on

possible merger, the issue was structured as a decision problem to select among different potential alternatives with multiple objectives (Keeney and Raiffa 1976, Kirkwood 1997). While the committee was charged with investigating alternatives for closer cooperation between TIMS and ORSA, the alternatives shown in Table IV went beyond this to include even the possibility of less cooperation between the two societies.

This approach of considering different alternatives and assessing them with respect to objectives is characteristic of the operations research problem-solving approach, and is particularly associated with the specific method of decision analysis. It also contrasts with some other organizational planning approaches often seen in similar situations where a committee charged with investigating a situation will develop a single alternative and present it for possible modification by the entire group.

At the Las Vegas meeting, there was considerable discussion by the Combined Councils about the appropriateness of the objectives and alternatives presented by the Committee on Cooperation, as well as that committee's qualitative assessment of the alternatives, which is shown in Table V. While there was a range of views expressed on these questions, there were no objections raised to the basic approach of viewing this as a multiobjective decision problem.

The details presented in Tables III through V were modified over the next three and a half years as additional information was collected and a broader group of ORSA and TIMS members participated in the discussions. However, the basic framework of considering this as a multiobjective decision problem continued to be followed, and this proved to be a noncontroversial way of viewing the situation.

3. QUANTIFYING THE OBJECTIVES OF KEY STAKEHOLDERS

Over the next three and a half years, a number of studies were conducted by ORSA and TIMS volunteers and the business offices for the two societies to investigate operational issues related to the different cooperation/merger

Table IV

The Original Set of Alternatives Developed by the Joint TIMS/ORSA Committee on Cooperation

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1. Separation: Lessening of jointness and cooperation (ORSA and TIMS begin to withdraw from joint activities)
 2. U. N. Model: Association of societies (ORSA and TIMS form an association which other societies might join)
 3. Partnership
 - Status Quo with Planned Enhancements
 - Strengthening the Combined Councils
 - Wholly-Owned Subsidiary (ORSA and TIMS remain independent legal entities, but form a new body that is a separate entity jointly owned by the two societies)
 4. U.S. Model
 - Federation with Two Major Subdivisions (ORSA and TIMS form a legal federation with ORSA and TIMS as subdivisions)
 - Federation with Diversity of Subdivisions (The federation has a variety of major technical subdivisions, possibly including ORSA and TIMS)
 5. Merger: Complete jointness and cooperation (ORSA and TIMS completely merge into one society)
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Table V
Initial Assessment by the Joint TIMS/ORSA Committee on Cooperation of the Various Proposed Alternatives against the Top-Level Objectives

	Improve Efficiency	Enhance Quality	Increase Outreach	Expand Scope
SEPARATION	Gains some, loses more	Gains some, loses substantially more	Worse	Worse
U. N. MODEL	Worse	No effect	Better	Better
PARTNERSHIP				
Status Quo	Better	Unclear	No effect	No effect
Strengthen Council	Better	Unclear	No effect	No effect
Wholly-Owned Subsidiary	Much better	Unclear	No effect	No effect
U.S. MODEL				
Two Subdivisions	Good	Unclear	Good	Limited improvement
Diversity of Subdivisions	Good	Better	Better	Better
MERGER	Better	Unclear	Better	Unclear

alternatives. For example, constitutional and bylaw changes were studied and approved during this period that opened up additional opportunities for cooperation. (Voting rights were extended to Associate Members of ORSA, and the governance structures of both societies were modified by moving more details to the bylaws from the constitutions.) Based on these modified versions of the TIMS and ORSA constitutions and bylaws, a draft set of bylaws and constitution was developed and refined for the proposed merged association.

Over this three and a half year period, extensive work was done to select a name for the new association. A committee was established to investigate this issue and the committee established objectives for the name of the new association, as shown in Table VI. Potential names were solicited from members by an *OR/MS Today* article in 1993.

By mid 1993, the original alternatives shown in Table IV had evolved into the five alternatives described in Table VII. The separation (SEP) alternative included in the original Committee on Cooperation list in Table IV continued to be studied, as did the alternative of continuing with the current status quo (SQ) system of coordination and cooperation. In addition, three merger alternatives were under consideration.

The first of these, “seamless merger” (SM), was to merge the two societies into one, but to do this in a way that was as close to invisible as possible. That is, all existing sub-units of either ORSA or TIMS would continue in their current form, and the name of the merged society would be selected to provide continuity with the TIMS and

ORSA names. This alternative corresponds to the Merger alternative in the original Committee on Cooperation list of alternatives shown in Table IV.

The second merger alternative (M2) was to have ORSA and TIMS continue, but to create a “super organization” above these. This corresponds to the U.S. model with two major subdivisions in the original Committee on Cooperation list. The third merger alternative (M3) was to merge with significant changes in both the organizational and operational structures of the resulting organization. TIMS and ORSA would not continue to exist under this alternative, and in addition, the roles of the sub-units would be considerably expanded. In an early proposal of this merger

Table VII
Description of the Cooperation Alternatives Considered

SEP:	Separation of ORSA and TIMS activities, conferences, etc.
SQ:	Status Quo. Also called partnership with planned enhancements. Current confederation of ORSA and TIMS (with minor changes to bylaws allowed, for example, to allow more autonomy to subgroups).
SM:	Seamless merger, also called M1: Merger with subdivisions as they currently are, with no Society status for sub-units. Use an appropriate name reflective of the current organization and/or field. Suggested possibilities include 1) ORSA/TIMS or TIMS/ORSA, in whichever order the speaker wishes, 2) OR/MS Society, or 3) Institute for Operations Research and Management Sciences (InfOR/MS). Have flexibility of subgroup types, progressive business office merging, and progressive reduction of total officers (essentially conversion of the de facto status to de jure status, with minor changes).
M2:	Also called the U.S. Model with two major subdivisions. Merger with ORSA and TIMS as the two sub-unit Societies.
M3:	Current proposed merger into a single association with sub-unit Societies, but no ORSA or TIMS entities. Merge business offices. Hire OR/MS professional as Executive Officer. Sub-units have representation at Board level.

Table VI
Objectives for Name of Merged Association

- The name of the merged association should:
- Reflect our heritage, at least in the tag line
 - Encourage other professionals to join
 - Be catchy, upbeat, and futuristic
 - Be helpful on closing in on a single name for the association

option, only sub-units with the newly defined “society” designation status would be represented on the governing board, and sub-units could become societies prior to merger, if they were sufficiently mature in organization and activities. This was later changed so all sub-units would have Board-level representation. The M3 option corresponds to the U.S. model with diversity of subdivisions in the original Committee on Cooperation list of alternatives.

Several alternatives in Table IV that were originally considered by the Committee on Cooperation were no longer under active consideration by mid 1993. While no specific quantitative analysis had been used to delete these, the qualitative assessment in Table V shows that these other alternatives are either inferior to one of the remaining alternatives, or they are very similar to one of the remaining alternatives.

3.1. Discussions on the Scope of a Merger

By mid 1993, the leadership of ORSA and TIMS had been focusing on the possibility of a merger for over three years. While such a merger held the possibility of improving operational efficiency through eliminating duplication between the business offices of the two societies, the primary potential advantage that was discussed was the improvement of effectiveness in serving the needs of the OR/MS profession. The interrelations between TIMS and ORSA necessitated by the existing system absorbed considerable effort, and a merger held out the possibility that this effort could be redirected toward advancing the profession, rather than being spent on coordination between ORSA and TIMS.

Some proponents of this view noted that there are a variety of other professional societies with allied interests to ORSA and TIMS, and these individuals proposed that a merged organization should aspire to be more than simply the combination of TIMS and ORSA. Indicative of this position was a working name used at one point for the new organization—the Association for Decision, Management, and Operational Sciences. This name, with its acronym ADMOS, does not carry a sense of continuity with OR, MS, ORSA, or TIMS, but instead suggests a somewhat different mission. And indeed, some proponents of an expansive view of the charter for the new organization suggested that a break with the past, in both name and orientation, would be useful because of their sense that the field was stagnating and becoming too inward looking.

This expansive view of the role for the merged organization, which is represented by alternative M3 in Table VII, visualized an expanded role for the professional society in the larger quantitative analysis community. For example, it was proposed that a merged organization could afford to have an OR professional serve as a paid executive director who could represent the profession on a full time basis in the larger community. While paying for such a person would increase the operational expenses for the society, it was suggested that increased efficiencies resulting from the merger would help pay for this expense.

However, financial analyses conducted in mid 1993 (Kirkwood and Robinson 1993) indicated that this might be an optimistic expectation. These analyses were based on the membership numbers in 1993. At that time, TIMS and ORSA each had approximately 8,250 members, and 2,500 of these were members of both societies. Hence, about 5,750 members in each society were not members of the other. Viewed strictly from the standpoint of services received, the 2,500 joint members only received one additional journal for their membership in the second society. The marginal cost to the society to provide this journal was approximately \$14.00 per year. Since these joint members paid about \$60.00 in dues to the second society, each of the joint members was providing \$46.00 per year for which the societies did not have to provide any additional services. Thus, in essence, the joint members were each providing a subsidy of \$46.00 per year to the people who were members of only one society.

On the other hand, in a merged society, the former joint members would presumably pay the same dues as the former members of only one society, and hence the dues for the former single-society members would have to be raised a significant amount to make up for the subsidy that the joint members had been providing. Whether there would be a significant loss of membership because of this increase was uncertain, and whether there would be significant additional loss of membership if dues were raised further to pay for new initiatives was also uncertain. Thus, the potential elimination of the double dues paid by joint members posed some financial constraints on what functions a merged society could afford.

In addition, as the prospect of a merger became more widely known within the ORSA and TIMS membership, questions were raised by some members about whether this expansive alternative (with uncertain prospects of success) might pose risks to certain stakeholder groups within the societies. In particular, members within the United States federal government and military contractor communities raised questions about the loss of the term “operations research” from the title of the organization. This title is well recognized within those arenas, and the lack of a professional organization with operations research in the title might be viewed negatively by managers and executives with responsibility over operations research functions. Illustrating concern over preserving the heritage of operations research, a group of four members, some of whom were officers, used the Expert Choice software to conduct their own evaluation of the merger options using the Analytic Hierarchy Process developed by Saaty (1994, 1995), which creates a multiattribute preference model under certainty. They augmented the original set of objectives in Table III with objectives to “maintain the operations research heritage” and “maintain balance in election of officers.” This analysis showed that three participants preferred seamless merger and one participant preferred merger option M2, as defined in Table VII.

Representing concern for the loss of the term operations research in the organization's title and for the operations research heritage, the ORSA Military Applications Section and Computer Science Technical Section called for a "cost/benefit" analysis of the merger, and an ad hoc Cost/Benefit Committee was appointed consisting of the Chair of the Military Applications Section Dean Hartley, Vice President–Finance of TIMS Robin Keller, immediate past Treasurer of ORSA Craig Kirkwood, former President of ORSA Robert Machol, and immediate past President of ORSA John Jarvis.

3.2. Framing the Cost/Benefit Analysis as a Multiobjective Decision Analysis

As discussed above, and shown in Tables III and IV, the consideration of options for increased cooperation between ORSA and TIMS had been framed as a multiobjective decision problem for the initial discussions in 1990. Furthermore, an initial qualitative analysis of the strengths and limitations of the various cooperation alternatives with respect to the multiple objectives had been conducted in 1990, as shown in Table V. Thus, Keller, the Chair of the Cost/Benefit Committee, proposed that this qualitative analysis be expanded into a more formal multiobjective value analysis, and the committee accepted this proposal.

Keller further proposed, and the other committee members agreed, that the committee should provide a framework that any interested parties could use to evaluate the various merger options on their own. That is, the committee would not provide an "official" analysis, but rather a "process" that individuals could use to conduct their own analysis incorporating their own personal judgments.

Because the purpose of the analysis structure was to provide a tool that any interested parties could use to do their own analysis, the analysis structure needed to be simple. This argued for a straightforward method for which calculations could be done either by hand or in an electronic spreadsheet.

The committee decided on a decision analysis approach using a weighted-additive value function (Edwards and Barron 1994; Kirkwood 1997, Chapter 4). With this approach, evaluation measures x_1, x_2, \dots, x_n are developed to measure the degree of attainment of each alternative with respect to each evaluation objective. The set of evaluation measures is combined to determine a single index of the overall merit of an alternative using a weighted-additive value function

$$v(x_1, x_2, \dots, x_n) = \sum_{i=1}^n w_i v_i(x_i),$$

where $v(x_1, x_2, \dots, x_n)$ is the overall value for an alternative, w_i is the weight assigned to evaluation objective i , and $v_i(x_i)$ is the single-dimensional value function over evaluation measure x_i . Keeney and Raiffa (1976, Chapter 3) and Kirkwood (1997, Chapter 9) discuss the conditions on preferences implied by using the weighted-additive value function form.

In a strict cost/benefit analysis, the evaluation measures for all objectives are quantified monetarily. In the merger analysis, there were two barriers to monetary quantification: some objectives could not naturally be measured with a monetary scale and for objectives that could in principle be described monetarily, financial information was not always available. In the multiobjective value analysis approach that was used, there was a numerical, but not monetary, scale for each objective. A key feature of the weighted-additive value function form is that it is *compensatory*; that is, it considers tradeoffs among the different objectives. A decrement in the level of attainment of one objective can be compensated for by a corresponding increment in attainment of another objective. The relative tradeoff between one objective and another is reflected by the weights for both objectives and the scaling of the single-dimensional value functions.

An assumption inherent in using this approach was that the uncertainty about what the level of attainment of each objective would be for each alternative did not need to be formally modeled. If an analysis of uncertainty had been desired, a probabilistic analysis with a multiple attribute utility function model could have been used (Keeney and Raiffa 1976, Kirkwood 1997).

Starting with the evaluation objectives specified by the Committee on Cooperation shown in Table III, the Cost/Benefit Committee developed a more detailed set of evaluation objectives. This was reviewed by a larger group of interested parties, which resulted in 54 objectives. (Keller and Ho 1988, 1990 present methods for creatively generating the objectives and other elements of the decision problem structure.) The objectives were then grouped into related categories. Using a bottom-up approach, as described by Buede (1986), the categories were further grouped into sets of categories. This resulted in the 54 objectives being arranged in an *objectives hierarchy* (also called a *value tree*) with five top-level categories and up to four levels, as shown in the Appendix.

Only the top two levels of the objectives hierarchy, shown in tree form in Figure 2, were used for further quantitative analysis, so that the persons using the analysis structure could complete their assessments relatively quickly. Examination of this hierarchy shows that there are 14 lowest-level objectives for which evaluation measures are needed. Since the intent was that any interested individuals could carry out the value analysis themselves, the evaluation measure scales used for each of these objectives needed to be simple and easy to apply. Thus, the committee decided that it would be appropriate to define a single evaluation measure scale that could be used for each of the 14 evaluation objectives; the scale developed is shown in Table VIII.

This scale was defined from -2 to $+2$ to focus on how both an average member and the more actively involved members of ORSA and TIMS would view the performance of the different alternatives with respect to the 14 evaluation objectives. The scale measures the extent to

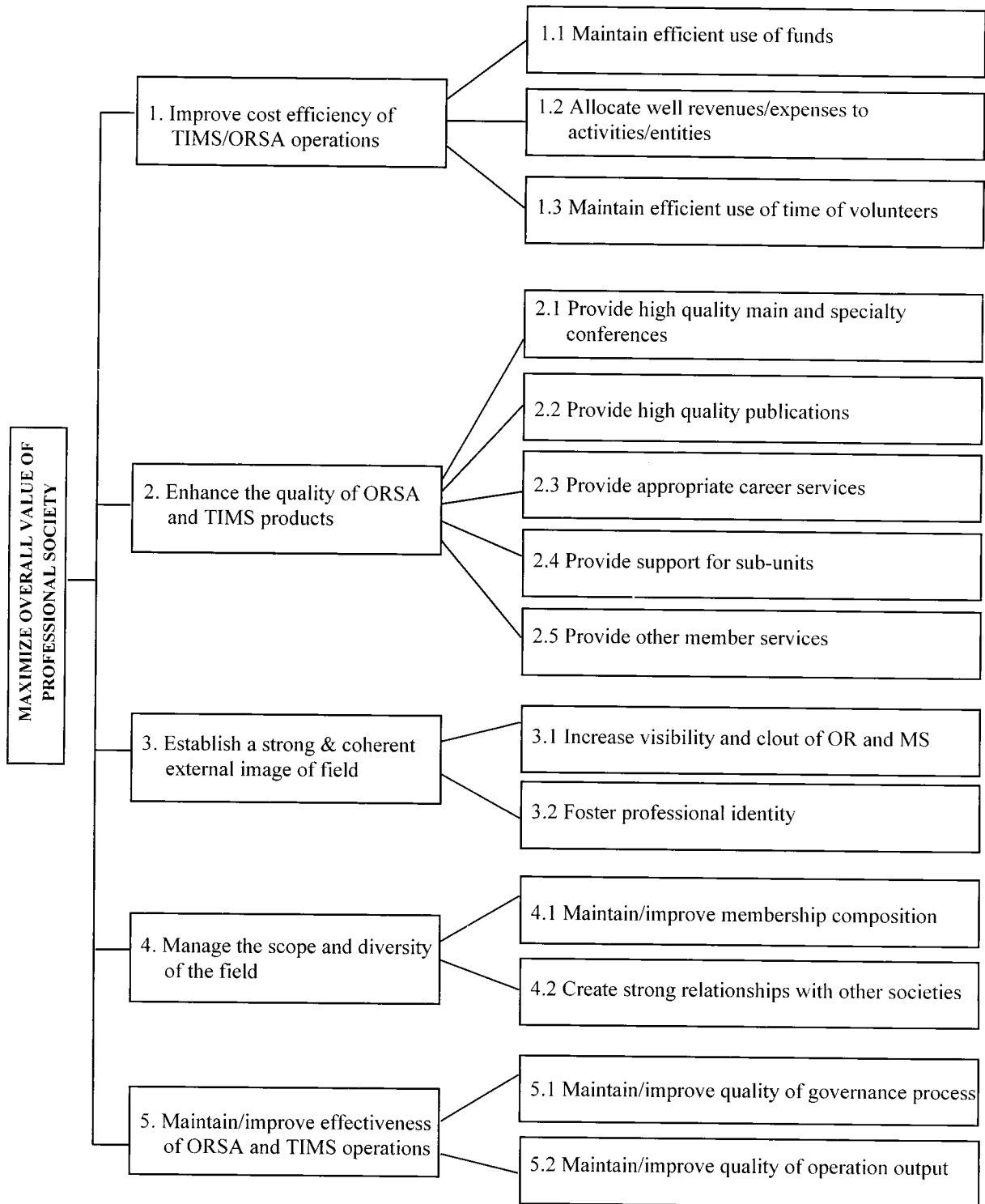


Figure 2. Description of the final objectives used by the cost/benefit committee.

which each of these two groups would notice a negative or positive difference from the current situation (which was scaled to be equal to 0) with respect to a particular evaluation objective.

Since different stakeholders might assign different tradeoffs among the 14 lowest-level objectives, the equation presented above allows for differing weights on each

objective. By convention, the weights w_i were each set between zero and one, with their sum equal to one.

One way to determine the weights for the objectives is to elicit "swing weights." The process is as follows: Imagine a hypothetical alternative that has every objective at its worst level. Assume that this alternative could be improved by increasing performance with respect to only one

Table VIII

Description of the Evaluation Measure Scale Used in the Decision Analysis

2:	It is clear to the average member that there is better achievement with respect to this evaluation consideration than at present.
1:	While this is not obvious to the average member, it is clear to those actively involved in the governance of the organization that there is better achievement with respect to this evaluation consideration than at present.
0:	Little or no difference from the present situation in the degree of achievement with respect to this evaluation consideration.
-1:	While this is not obvious to the average member, it is clear to those actively involved in the governance of the organization that there is worse achievement with respect to this evaluation consideration than at present.
-2:	It is clear to the average member that there is worse achievement with respect to this evaluation consideration than at present.

objective, and consider how much increment in value would be gained by increasing (“swinging”) any one of the objectives from its worst to its best level (that is, from -2 to +2 on the scale in Table VIII). Select the objective for which the increment in value would be greatest. This objective must have the largest weight.

Among the remaining objectives, select the one that would yield the next greatest increment in value if increased from its worst to its best level. Assess this value increment as a proportion of the value increment gained by swinging the objective with the greatest weight from its worst to its best level. The weight for this second objective must be this same proportion of the weight for the first

objective. Continue this process for all the remaining objectives. The weights are then normalized to sum to one.

For example, suppose there are three objectives, where A has the greatest weight, B has 90 percent as great a weight as A, and C has 10 percent as great a weight as A. Normalizing the weights to sum to 1 results in a weight for A equal to $100/(100 + 90 + 10) = 0.50$, a weight for B equal to 0.45, and a weight for C equal to 0.05.

Although any user of this evaluation process could assign single-dimensional value functions as he or she desired, the committee suggested a simple procedure where each evaluation measure x_i (scaled from -2 to +2) was used as the corresponding single dimensional value function $v_i(x_i)$, that is, $v_i(x_i) = x_i$. With this approach, the resulting overall value for an alternative using the evaluation measure scale in Table VIII would be between -2 and +2. Hence, this overall value could be interpreted using the -2 to +2 scale. For example, if the overall value for an alternative were calculated to be 1.1, then this means that the alternative is judged, overall, to have an impact slightly better than the impact defined as a 1 in the Table VIII scale. Also, an improvement of 1 unit from -2 to -1 would be interpreted as the same amount of improvement as any other 1 unit increase, such as from 1 to 2.

3.3. Results of Implementing the Decision Analysis Procedure

The Cost/Benefit Committee prepared an evaluation package consisting of 1) a draft version of an evaluation form similar to that shown in Table IX, 2) the list of alternatives in Table VII, 3) the objectives list in Figure 2 (including the expanded definitions in the Appendix), and 4) the evaluation measure scale in Table VIII. Some committee members and other interested individuals completed the

Table IX

Form for Evaluation of ORSA/TIMS Cooperation Alternatives

Evaluation Considerations	Judged Weight	Cooperation Alternative				
		SEP	SQ	SM	M2	M3
1. Improve cost efficiency of TIMS/ORSA operations						
1.1 Maintain efficient use of funds						
1.2 Allocate well revenues/expenses to activities/entities						
1.3 Maintain efficient use of time of volunteers						
2. Enhance the quality of ORSA and TIMS products						
2.1 Provide high quality main and specialty conferences						
2.2 Provide high quality publications						
2.3 Provide appropriate career services						
2.4 Provide support for sub-units						
2.5 Provide other member services						
3. Establish a strong and coherent external image of field						
3.1 Increase visibility and clout of OR and MS						
3.2 Foster professional identity						
4. Manage the scope and diversity of the field						
4.1 Maintain/improve membership composition						
4.2 Create strong relationships with other societies						
5. Maintain/improve effectiveness of ORSA and TIMS operations						
5.1 Maintain/improve quality of governance process						
5.2 Maintain/improve quality of operation output						

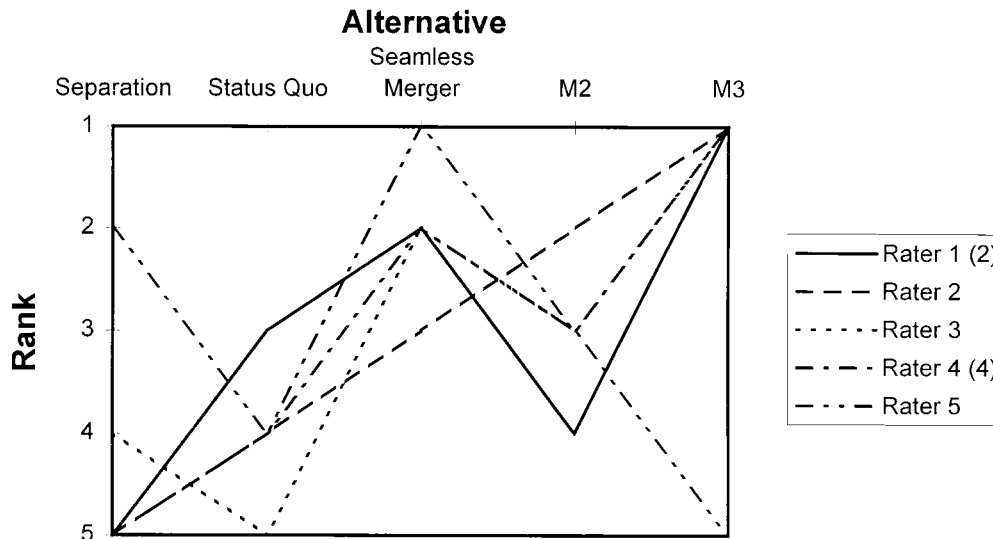


Figure 3. Ranking results for members of the cost/benefit and strategic planning committees.

form and suggested improvements. (Some committee members did not fill out the form, and instead prepared written comments with their perspectives.) Then the revised package was distributed to the members of the ORSA and TIMS Councils for their personal use, as well as to other interested individuals.

The evaluation results for the Cost/Benefit and Strategic Planning Committee members and others who filled out the form provided valuable perspective on the differing views of various stakeholders. Figure 3 shows ranking results for nine members of the Cost/Benefit and Strategic Planning Committees. In this figure, the different individuals are indicated as "Rater 1," "Rater 2," etc. Note that two individuals had identical rankings, as indicated by the "2" in parentheses following the "Rater 1" legend entry, and four other individuals had different identical rankings, as indicated by the "4" in parentheses following the "Rater 4" legend entry. The other three Rater entries were expressed by one individual each. The five different alternatives from Table VII are shown across the top of Figure 3, and the ranks determined for each of these are shown on the vertical scale, where a "1" represents the highest ranked alternative, and a "5" represents the lowest ranked alternative.

Figure 3 shows that eight out of nine of the raters ranked the M3 alternative highest; however, one rater ranked this alternative as worst. This result points out the interest among many of the individuals involved in the merger discussions in a "radical" merger alternative, but also shows the concerns discussed above among some other people regarding this alternative. Note, however, that the individual who rated M3 as worst had the seamless merger (SM) alternative ranked as first, and all except one of the other individuals ranked this alternative as second.

In addition, although not shown in this figure, even among those who were most supportive of merger, many ended up with their preferred alternative having an overall score around 1. Thus, using the evaluation measure scale

definition in Table VIII, even those who were optimistic about the potential for a merger thought that the impact of such a merger would be seen mostly by those actively involved in the governance of the organization and not by the average member. A more detailed examination of the inputs to the analysis showed that the reason for this was that the respondents believed that the organizational structure does not impact many of the 14 evaluation objectives listed in Figure 2; that is, the organizational structure is not directly relevant to many of the issues facing the OR/MS profession.

3.4. Impact of the Decision Analysis

The Cost/Benefit Committee submitted a report to the Strategic Planning Committee (Hartley et al. 1994) prior to a meeting of the ORSA and TIMS Councils held in Dallas in January 1994, and the report was discussed at that meeting. The Cost/Benefit Committee also recommended that 1) the evaluation form be distributed to a selected group of opinion leaders prior to the Dallas meeting, 2) after the meeting, several opinion leaders be asked to prepare short position papers for the OR news magazine *OR/MS Today*, and 3) these papers be published along with the evaluation form for use by the general memberships of TIMS and ORSA.

It became clear during the course of the initial evaluations that almost all the participants who filled in the evaluation form viewed the seamless merger (SM) alternative as among the top options, and that no other option was consistently ranked so high. Although the form was not published in *OR/MS Today*, the Cost/Benefit Committee was directed to make the form available to any interested parties.

At the Dallas meeting, the Strategic Planning Committee presented a merger proposal that demonstrated substantial continuity with ORSA and TIMS, along the lines of the SM alternative in Table VII, while providing the organizational flexibility to move after the merger toward a

different type of organization more like the M3 alternative. No Society status was proposed for sub-units, but they were given Board representation and provided with the organizational flexibility to become Societies in the future. Over 100 names were considered for the new society, and the final proposed name was the Institute for Operations Research and the Management Sciences (with the acronym INFORMS), which provided substantial continuity with the ORSA and TIMS names.

The ORSA and TIMS Councils accepted the merger proposal, and, following detailed planning at the Spring Joint National Meeting in Boston, voted to submit the proposal to a mail ballot of all members. At the Boston meeting, opponents of the merger mounted a final effort with an anti-merger information booth and lapel pins that were tea bags labeled "DUMP INFORMS" in a reference to the Boston Tea Party. (See Gass 1994 and Hartley 1994 for discussions of arguments against merger.)

In the summer of 1994, the merger proposal was approved overwhelmingly by the membership (with 91.2% of TIMS voters and 84.8% of ORSA voters in favor), and the merger took place on January 1, 1995.

4. SHORT-TERM IMPACTS OF THE MERGER

The ultimate impact of the decision to form INFORMS can only be evaluated after enough time has passed for initiatives of the new society to bear fruit. In this section, we briefly discuss initial impacts of the merger during the first two years of the new society.

ORSA and TIMS were separate societies for over 40 years, and it is not surprising that there were some short-term difficulties in merging their operations. The short-term impacts of the merger or other contemporaneous trends in the profession can be examined by looking at what happened with respect to the five main objectives categories from Figure 2. The first objective is to improve cost efficiency of operations. There were sizable costs of transition, both for closing down ORSA and TIMS, and for creating INFORMS. In the first two years of INFORMS, there were also decreases in membership and thus decreases in dues and subscription revenue. Most of the unbudgeted expenses were due to the reorganization of the two business offices and realignments of staffs. (The two offices in Maryland and Rhode Island were retained, since critical expertise was located in each location.)

The second objective listed in Figure 2 is to enhance the quality of products and services. A number of existing ventures were expanded and new ventures were initiated, including a new operations management journal, a new forum for OR education, expanded services for middle and high school students and teachers, and a paperless electronic journal for operations research. In addition, INFORMS Online was launched on the World Wide Web (<http://www.informs.org/>) containing such things as conference programs, the membership directory, a job placement service, and forthcoming papers in publications.

The third objective shown in Figure 2 is to establish a strong and coherent external image of the field. The new paid staff position of Executive Director was created after the merger to work towards this objective.

The fourth objective in Figure 2 is to manage the scope and diversity of the field. This includes, among other sub-goals, expanding international collaborations and attracting future generations. The new role of Vice President–International Activities is to be the INFORMS Board officer overseeing international collaborations.

The fifth objective in Figure 2 is to improve effectiveness of operations. With the new single set of officers and unified management of business operations, the governance and administrative processes required that fewer people from the Board and staff be involved in each functional area decision. However, there were substantial operations and decision-making delays during the first year of INFORMS operations.

Following the merger, the office staff was reorganized, with changes in allocation of responsibilities between the Providence and Baltimore offices. The Providence office moved once and the Baltimore office moved twice during 1995–96. A major computer system upgrade had been postponed during the merger discussions, and the old system proved to be inadequate to handle the merged operation. Thus, a new computer system was phased in at the same time the other organizational changes occurred. As a result, there were delays in printing publications and in processing members' dues and subscriptions. Several specialists were hired to cover marketing, public relations, and information technology.

5. LESSONS ABOUT DECISION ANALYSIS FOR STRATEGY DEVELOPMENT

We have described how decision analysis thinking was used throughout the ORSA/TIMS merger discussions. The initial formulation of the problem was as a selection among multiple alternatives with multiple objectives. However, there was little movement beyond this initial qualitative formulation to actually "do some numbers" until over three years later, when financial analysis and multiobjective value analysis were undertaken.

When, three and a half years later, the multiobjective value analysis described here was conducted, it quickly clarified a number of key issues related to this decision. It showed that there was a substantial difference of judgment about some key impacts of a merger, but that even with this difference of judgment there was a merger option that had broad support. For the analysis, the decision was framed as a choice among cooperation alternatives in comparison with the status quo. In retrospect, some have commented to us that this framing of the decision (by comparing merger options with the status quo) failed to reveal that even without merger many changes in structure and staffing would have evolved.

We wonder if earlier use of this quantitative decision analysis could have helped bring an earlier resolution to the discussions, perhaps with less disruption during the transition to a new organization because of the shorter period of uncertainty about the decision. Some have commented to us that by the time of the quantitative decision analysis many “minds were already made up” in favor of merger. Thus, they question whether the analysis could provide one of the major benefits of decision analysis or cost-benefit analysis: careful focus on values and objectives to aid option generation (see Keeney 1992). At the time of the decision analysis, some appear to have viewed it as a marketing and negotiation tool, rather than an option generation tool.

However, one can also plausibly argue that the long time period was needed to allow everyone involved to become used to the idea of a merger. While an earlier merger might have reduced some of the operational difficulties related to the transition, there might have been more controversy among the membership. The long merger discussions allowed members who were not officers to become aware of the possible merger and its ramifications. Members had a substantial amount of time to discuss merger possibilities at meetings and in the news magazine, *OR/MS Today*. Although the councils did not bring into meetings a “tiger” or “red” team to argue against merger, the long time period allowed the side opposed to merger to organize sessions and articles responding to the pro-merger arguments.

By the final merger votes, most people in the field and related arenas, such as deans of university schools with operations research faculty, were aware of the merger. However, for the business office staffs, the long period was filled with uncertainty about whether a business office might be closed, with resulting layoffs.

The ambivalent conclusion above about whether an earlier resolution of the merger process would have been better or worse echoes comments made by Kirkwood (1990) about the difficulty of reaching clear conclusions about the impact of quantitative analysis on strategic decisions. He comments that “with strategic decisions, it is often difficult to determine retrospectively whether a selected alternative was correct.” Eilon (1989) notes “decision making at the top is a messy business cast against a background of incoherent objectives, ambiguous constraints and unspecified agenda. These are not features . . . that are amenable for incorporation into a crisp decision model.”

The deliberations about the ORSA/TIMS merger had the features listed by Eilon, but nevertheless the analysis discussed above helped to clarify the issues and helped provide a merger alternative that was overwhelmingly approved by the membership of both ORSA and TIMS. It remains an open question whether doing this, or another, analysis earlier in the process would have led to a different result.

APPENDIX: EVALUATION OBJECTIVES

1. Improve cost efficiency of TIMS/ORSA operations
 - 1.1. Maintain efficient use of funds

- Exploit economies of scale in business offices. Balance dues rate and fees-for-services (conference registration, job placement, . . .). Remove doubled dues paid by joint members.
- 1.2. Allocate well revenues/expenses to activities/entities
- 1.3. Maintain efficient use of time of volunteers
2. Enhance the quality of ORSA and TIMS products
 - 2.1. Enhance high-quality main and specialty conferences
 - Provide quality program. Manage balance between academic/practitioner. Provide opportunity for diversity of presentations. Set fair cost to members.
 - 2.2. Provide high-quality publications
 - Maintain successful editorial oversight/control. Maintain/increase circulation. Maintain reputation of journals (e.g., for tenure). Improve readability of technical journals. Provide outlet for applied OR/MS papers. Provide forum for professional communications. Maintain fair subscription costs.
 - 2.3. Provide appropriate career services
 - Support degree and continuing education. Facilitate networking. Provide successful job placement services. Increase job opportunities. Stimulate research/applications directions.
 - 2.4. Provide support for sub-units
 - Provide start-up financial support for sub-units. Maintain loose/tight management of sub-units. Provide business office support for sub-units. Support sub-unit tracks in main conferences. Support sub-unit specialty conferences/journals. Retain current/potential sub-units.
 - 2.5. Provide other member services
 - Take lead in use of information technology. Improve quality of transactions with offices. Outreach to affiliate with related professional activities. Provide improved support for practitioners. Provide improved support for lone practitioners. Provide improved support for academics.
3. Establish a strong and coherent external image of field
 - 3.1. Increase visibility and clout of OR and MS
 - Clarify image of OR/MS and ORSA and TIMS. Make name and activities known to popular press. Support development and retention of OR/MS units in business, universities, and agencies. Improve liaison role with professional societies, government agencies, foundations, academic institutions, and business.
 - 3.2. Foster professional identity
 - Closeness of job title match to name of organization(s). Maintain OR/MS and ORSA/TIMS name recognition. Make membership signal professional identity.
4. Manage the scope and diversity of the field
 - 4.1. Maintain/improve membership composition
 - Maintain/increase number of members. (Retain current members. Attract young people to the field. Attract nonmembers who fit our mission.)

Manage diversity of members. (Foster international memberships. Strike balance between business/engineering. Support institutional members—Roundtable.)

- 4.2. Create strong relationships with other societies
5. Maintain/improve effectiveness of ORSA and TIMS operations
 - 5.1. Maintain/improve quality of governance process
 - Streamline governance structure. Improve sub-units' representation at Board level. Speed up decision-making process.
 - 5.2. Maintain/improve quality of operation output
 - Focus collective resources on important activities. Decrease overlap in business offices' responsibilities. Decrease overlap in activities, sub-units, etc. Avoid inconvenience due to changes in operations.

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