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JSORT SUPPORT TO TEAM-BASED PROBLEM SOLVING

by

L.W. Taylor

SEPTEMBER 1996

OTTAWA, CANADA

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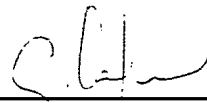
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OTTAWA, ONTARIO

SEPTEMBER 1996

ABSTRACT

The Joint Staff Operational Research Team's (JSORT) mission is to provide immediate and independent Operational Research advice and analysis to assist the Joint Staff plan and support the Canadian Forces' International missions. As part of this service, members of the JSORT can participate on Study Teams providing tools and techniques to facilitate analysis and decision making. This capability was demonstrated by the author as part of the Strategic Movement Assessment Study Team during the Spring and Summer of 1996. Mathematical modelling services were provided during the problem definition stage. Facilitation services using a structured brainstorming technique were provided to generate potential solution options. A qualitative analysis technique was developed to screen the solutions to obtain a short list and a multi-criteria decision aid was provided for detailed analysis of the remaining options. In September 1996, the Strategic Movement Assessment Team Leader will present three options to the Chief of Defence Staff for decision. If other Joint Staff Officers are interested in utilizing these tools and techniques in their studies or require decision support and analysis using any other Operational Research methods, the JSORT is at your service.

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JSORT SUPPORT TO TEAM-BASED PROBLEM SOLVING

INTRODUCTION

1. The Joint Staff Operational Research Team (JSORT) has training and experience applying team-based problem solving techniques (see Refs. 1 and 2). These techniques were used by the Strategic Movement Assessment Study Team during the Spring and Summer of 1996 which culminated in a Service Paper that was presented to the Chief of Defence Staff in September 1996. The detailed results of the Strategic Movement Assessment Study can not be provided in this document because they are still being reviewed by senior leadership. However, the type of support provided to this team by the JSORT can be documented as an example of how our services could be employed by future Joint Staff Team Leaders.

PROBLEM DEFINITION

2. The first step in any problem solving exercise is problem definition. A problem can be defined as a situation in which “what is” is significantly different from “what should be”. In the Strategic Movement Assessment Study, a great deal of time was spent identifying the current capability. This was compared to the stated policy objectives in the Defence White Paper and the requirements of its supporting Operational Plans. The JSORT provided mathematical models for estimating the time requirements for air and sea deployment for any size contingency force anywhere in the World (see Ref. 3). Although the data collection process is a very important step in problem solving, the Team did not wish to be delayed by extensive “data deficiencies”. Based on a preliminary assessment of the situation using realistic estimates of the requirement, the problem was identified in two parts. This use of mathematical models to assist in the problem definition stage is typical of the support that the JSORT can provide.

POTENTIAL SOLUTION GENERATION

3. After the problems were stated to all of the team members' satisfaction, the JSORT member facilitated a structured brainstorming session (see Ref. 1) to generate potential solutions. This process was both efficient and effective. It involved three steps:

- a. Discussion of the problem statement;
- b. Silent idea writing of potential solutions by individual team members; and
- c. Round-robin recording of solution description statements on a flip chart without discussion.

There is an optional fourth step to take an anonymous vote to prioritize the solutions but this was not required for the Strategic Movement Assessment. This process allows a great deal of creativity without any significant confrontation. Every member gets equal opportunity to participate and each idea gets equal consideration. The JSORT is available to facilitate this type of structured brainstorming session for the Joint Staff or train Joint Staff Officers on the methodology if desired.

4. The Strategic Movement Assessment Study Team Members were very satisfied with the results of this structured brainstorming exercise because 20 potential solutions were identified. Among the 20 potential solutions, there was an extensive range in their cost and policy implications. However, none of the potential solutions were discounted at this time.

5. The JSORT believes that the generation of multiple potential solutions is essential to effective problem solving. Too many times, Staff Officers limit themselves in their studies to only a few potential solution options because they introduce unnecessary constraints on the problem. This can lead to incomplete analysis and sub-optimal results. This structured brainstorming technique taps into the latent creative capabilities of the team members to generate a wide range of options for consideration by Senior Management.

GROUPING POTENTIAL SOLUTIONS

6. It was necessary to group the potential solutions and thereby reduce the complexity of the evaluation process. Some solution options were recommended for action independently because they were new initiatives which enabled growth and improvement at minimal cost. The remaining solutions were grouped into three categories: policy changes, cooperative programs, and acquisition programs. These groups needed to be considered separately because they had very different characteristics.

PRELIMINARY ASSESSMENT OF PROS AND CONS

7. It was necessary to conduct a preliminary assessment of each solution option to try to limit the amount of detailed analysis required later. This was done using an Idea Writing Process and a round-table method of collecting subjective judgements which we call "Pros and Cons" analysis. The "Pros" of an option were first examined by the team. If there were insufficient "Pros", the option was removed from further consideration. If there were sufficient "Pros", then the "Cons" of the option were examined. This "parallel thinking" (see Ref. 4) allowed for a fair comparison but avoided any unnecessary arguments amongst the team members. After these subjective judgements had been recorded by the JSORT member, a vote was taken on whether this option should be given further consideration in a more detailed analysis. A simple majority was all that was necessary to keep this option on the table.

DETAILED ASSESSMENT OF THE SHORT LIST

8. The detailed assessment of the options required an examination of their Benefits, Costs and Risks. We began by brainstorming and came up with 20 criteria but we later found that this could be reduced to four major benefit criteria, two major cost criteria and two major risk criteria. The process of evaluating each option by each criteria on a 0-10 scale was intensive. Therefore, it was done by a sub-committee. The JSORT member assisted with the collection of data and the manipulation of the EXCEL spreadsheet (see Ref. 2) to implement the computations. However, eventually the Team Leader was able to use the spreadsheet himself and produce graphical results for presentation to the committee. A meeting was conducted with the entire committee to evaluate the results of this Benefits, Costs and Risks Analysis. The results were presented using an overhead display of the computer screen so

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that the Chairman could modify the spreadsheet as necessary based on a consensus of the team members.

9. It was realized that some options had high cost and high benefit while others were low cost and low benefit. However, a few of the options were dominated. The dominated options could be removed from further consideration because in each case there was another option that was better in all respects (benefits, costs and risks). This reduced the list of potential options considerably.

10. The JSORT believes that this kind of systematic analysis of the options using consistent evaluation criteria is absolutely necessary for an effective study. All of the options must be examined using the same set of criteria to allow for a fair comparison. The breakdown of the analysis into Benefits, Costs and Risks covers the major categories of criteria for most Canadian Forces decisions. However, the determination of the "best" option is not easy when benefits, costs and risks must be "traded off". For example, one option might be high benefit and low risk but high cost. While another option might be high benefit, low cost but high risk. There is a great deal of room to exercise military judgement in coming up with a recommendation on the "best" option. However, this tool allows for a careful analysis of all aspects of the decision.

COMBINING THE POTENTIAL SOLUTIONS

11. As noted in the Problem Definition section, the team identified a problem with two parts. Therefore, we could not restrict ourselves to looking for one and only one potential solution. We looked for natural combinations of the solutions. This is a common strategy for risk avoidance and is something that is often overlooked by Staff Officers who look for "easy" answers. However, the possibility of combining options is seldom overlooked by Senior Management who can see the "bigger picture". The team provided three natural combinations of the solutions for consideration by Senior Leadership and these will be presented to the Chief of Defence Staff in September 1996.

12. The JSORT will be available to assist the Joint Staff Officers tasked with implementing the chosen solution using other tools and techniques from the field of Operational Research as required.

CONCLUDING REMARKS

13. The Strategic Movement Assessment was an ideal opportunity to exploit the team-based problem solving techniques being developed by the JSORT. We developed mathematical models of the operational environment to help define the problem. We facilitated the generation of multiple solution options using our structured brainstorming technique to enhance creativity. We assisted in the conduct of a preliminary assessment of the options using a "Pros and Cons" technique that exploits the capability of "parallel thinking". Finally, we provided an EXCEL spreadsheet tool to conduct the detailed Benefits, Costs and Risks analysis necessary to come up with a short list to present to Senior Leadership.

14. The JSORT will continue to investigate decision support tools for potential use by the Joint Staff. However, we already have a significant capability to support Joint Staff teams with problem solving tools and techniques. If Joint Staff Officers would like to use or learn more about these techniques, the JSORT is prepared to provide training, facilitation services or participate as members of problem solving teams.

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