Problems of Policy Implementation in Distributed Decision Systems

Paul Slovic

Decision Research/A Branch of Perceptronics, Inc.

1201 Oak Street

Eugene, Oregon 97401

In R. Weissinger-Baylon & J. March (Eds.), Political-military decision making. New York: Pitman, in press.

Problems of Policy Implementation in Distributed Decision Systems

Wise policies, effectively implemented, are essential to the successful functioning of any complex organization. We can think of policy as being defined at the executive or command level and communicated throughout the organizational hierarchy in order to guide the decisions that must be taken at all levels. In the business world, for example, executive policies may establish the company philosphy regarding price, quality, and quantity. In the military world, policy may specify the appropriate weight to be given to achievement of some strategic objective relative to the risks to life, equipment, and political alliances that military action may place in jeopardy. In the technological world, policies are often framed within the context of a general analytic model such as cost/benefit or decision analysis. Quantitative tradeoff functions or utility curves may be derived to represent, in precise terms, "executive policy."

Once policy is established, implementation becomes a major concern. Will lower-level staff understand how to implement it? Will they want to implement it? Will the executives themselves be consistent across situations in their policy views. The answers to these questions will undoubtedly depend upon a number of interacting factors, including the nature of the general model or policy, the specific decision task, the presence of competing goals within the organization, and the time interval between the setting of a policy and its implementation.

Problems in Translating General Policies into Specific Decisions

Some general policies may be easily propagated across organizational levels. Consider, for example, a large department store whose executives desire to position the store at a particular niche with regard to price and quality (e.g., a notch below top quality and a notch below top price). Because this is a fairly predictable environment with repeatable, well-defined decision tasks and a standard nomenclature, it should be relatively easy for the buyers in each department to put such a policy into practice when they purchase wholesale goods for the store's showrooms.

In other cases, where the criteria for satisfying a policy are less well defined and the decision situations are unique and complex, implementation may be much more problematic. Policy makers may not have an adequate understanding of the variety of specific decisions that will be made "in the field," and they may not have anticipated what their policies imply in those situations. I suspect that risk policies fall into this problem category.

This suspicion gains support from studies such as one in which my colleagues and I asked people to consider the general policy toward loss of life that they believed appropriate to guide decision making in civil defense emergencies (Fischhoff, Slovic, & Lichtenstein, 1980). Policies were framed in terms of disutility or social cost functions defined over N, the number of lives that might be lost in a mishap. Three specific policies were presented for examination (see Figure 1). The instructions provided elaborate rationales in support of each function. Curve 1, the linear form, represents the view that every

life lost is equally costly to society. Curve 2, the exponentially increasing function, represents the view that large losses of life are disproportionately serious; for example, that the loss of twenty lives is more than twice as bad as the loss of ten lives. Curve 3 represents a reduced sensitivity to large losses of life; for example, the loss of twenty lives is less than twice as bad as the loss of ten lives. Subjects were asked to study each curve and its rationale and then to indicate the one that they favored most and least.

Insert Figure 1 about here

In addition to making "executive level" evaluations of these general policies, the same subjects were asked to consider a specific decision problem that might be faced by a local official in a civil defense emergency. The problem, shown in Figure 2, posed a choice between two options involving the loss of life. While, on average, the expected loss of life was the same for both options, they differed considerably in the range of possible outcomes. Option A would lead to either 5 or 95 lives lost; option B would lead to either 40 or 60 lives lost.

More than half of the subjects preferred Curve 2 in the policy setting task and chose option A in the decision task. However, Option A indicates a risk-seeking attitude toward loss of life, whereas Curve 2 represents risk aversion. Choice of Option A would be consistent with Curve 3, which was the least favored policy.

When confronted with the inconsistency in their responses, most

subjects refused to change. They claimed to see no connection between the two tasks. Most appeared to be relying on some variant of the following justification offered for choosing Option A: "It would be immoral to allow the loss of forty lives or more when Option A presents a good chance of coming out of the situation with almost no loss of life." This perspective was evoked by the structure of the choice problem but not by the task of evaluating the three general policies toward loss of life.

Insert Figure 2 about here

This study, along with other results not cited here (Slovic, Fischhoff, & Lichtenstein, 1982), demonstrates that our policies are shaped by contextual factors. In this case, the specific decision triggered a rationale for choice that was simply not apparent in the evaluation of the general policy functions.

In the study reported here, the same people took on the role of policy evaluators and policy implementers and, even then, did not implement the preferred general policy. In a complex system, where the policy setters and field staff are different individuals, in distant relationships to one another, it is even more likely that general policies will be judged inappropriate by decision makers in the field or by others who may be called upon later to evaluate those policies in the light of hindsight (Fischhoff, 1982).

One implication of this work for distributed decision-making systems is that the process of generating general policies must be

designed to anticipate the myriad of specific decision contexts in which the policy will be applied. One might argue that the various rationales that may be elicited by those specific decisions should be used to shape the general policy. If these rationales are inconsistent, either this inconsistency must be resolved or the general policy will have to be modified to make it compatible with a more complex perspective. In some cases, no general policy may be appropriate to guide all of the specific decisions that will emerge. In such cases, automation of decision making on the basis of a pre-programmed general policy may be unwise.

Research is needed to provide insight into this aspect of distributed decision making. We need to determine the kinds of tasks and models that may be most susceptible to this problem and to develop ways of constructing, communicating, and implementing policies so as to minimize adverse consequences.

Plans, Time, and Distributed Decision Making

Decisions in complex systems are not only distributed across and between organizational levels. They are also distributed over time. Some delay between the time at which a decision is made and the time at which it is executed is inevitable, due to the difficulties of communicating to all involved parties and mobilizing forces and resources for action.

A second category of delay is likely to be of greater duration and significance for policy implementation. This is delay that is deliberately introduced in the process of planning. The essence of planning is anticipating important future decision problems and

prescribing courses of action to take should they actually occur. In principle, planning far in advance should allow a more leisurely and thoughtful analysis, with better utilization of experts and decision aids than would be possible in the "heat of the moment." The success of such efforts depends on the planner's ability to imagine in advance how various decision situations will appear, should they come about. If the actual situations and plans do not resemble their earlier images, then the preplanned decisions based on those images may no longer seem appropriate. In such cases, the decision maker must decide on short notice whether to adhere to the plan, or to come up with a new plan on the spot. An obvious danger in developing a new strategy occurs when conditions do, in fact, materialize as planned but, for various reasons, they are judged to be otherwise; in this case the action that seems best may deviate from the original plan.

What are the pitfalls of making planning decisions in advance? Can we trust our plans made in advance to be better than those made on the spur of the moment? How are our judgments and decisions likely to be influenced by our attempts to imagine and anticipate what the future will look like?

I believe that research in psychology and behavioral decision theory can help answer these questions. Yet, to my knowledge, such research has rarely been brought to bear on these issues. I shall briefly outline the directions such work might take, examining the possible effects of temporal distance (and the hypotheticality that is often associated with it) on the construction and implementation of plans.

Some hypotheses. The "best laid plans" may later seem inappropriate for several reasons. One such reason is failing to anticipate the impact that certain kinds of information will have on one's perception or diagnosis of the situation. For example, Fischhoff (1978) demonstrated that people will anticipate using certain kinds of information to solve an inferential problem, but will actually ignore that information when it is received. Apparently, when people consider such information in the planning stage, they are able to see its relevance. However, its informational implications are ignored when it appears in context of other more salient cues.

Another potential source of difficulty is that the goals, utilities, or criteria that underlie our policies may change systematically between the time our plans are made and the time they must be implemented. There are a number of factors that might induce systematic changes:

(a) Hypotheticality. One possibility is that the hypothetical nature of the planning process may systematically alter or distort preferences. Support for this hypothesis comes from a study (Slovic, 1969) in which I found that persons choosing among gambles "as if they really were to play them" attempted to maximize gains, whereas persons who really did have to play those gambles were more concerned about minimizing losses. Recently we have observed that persons introspecting about the relative importance of rescuing people in trouble vs. preventing such troubles in the first place express the belief that both efforts deserve equal resources. In reality, rescue typically commands much greater resources than prevention.

(b) Intervening gains or losses. Many anecdotal reports and some experimental results indicate that changes in one's status (wealth, power, strategic advantage, etc.) will change one's preferences among courses of action. For example, losses appear to encourage risk taking (McGlothlin, 1956), whereas gains appear to make people more conservative (Isen, Nygren, & Ashby, 1985).

(c) Differential approach and avoidance gradients. According to the classic approach-avoidance model of conflict (Miller, 1944), the strength of avoidance tendencies increases more rapidly with nearness (in time or space) to a goal than does the strength of the approach tendency. This is illustrated in Figure 3. In planning terms, this implies that as we move from planning exercises, remote in time and space, toward the "real operation," the perceived risks of a course of action may gain in prominence, relative to the perceived benefits.

Insert Figure 3 about here

This model has important implications for planning efforts. One is that the planner's preferences may shift significantly between the time plans are made and the time they are put into action, even in the absence of new information. For example, what one stands to gain from a course of action may weigh more heavily in one's future plans, while what one stands to lose may loom larger as the time for action draws near. Similar shifts may occur for probabilities as well; the probability of loss may seem less salient in the future than in the present. Moreover, the strengths of our preferences may vacillate over

time. We may feel more sure of our preferences about actions to be taken in the distant future than we would about imminent actions.

These predictions are, of course, dependent upon the adequacy of Miller's conflict resolution theory as a model of future planning. At first glance the model seems intuitively plausible, and its predictions have been confirmed in several small experimental studies (Bjorkman, 1984; Jones & Johnson, 1973; Wright & Weitz, 1977). However, further empirical study is needed to determine to what extent Miller's theory applies to planning. Sizeable temporal effects, if found, would have profound implications for the planning process. An understanding of these effects would be essential for the design of policies that would appear as appropriate at the time of decision as when they were first formulated.

Acknowledgment

Support for this work was provided by the Office of Naval Research under Contract No. N00014-85-C-0041 to Perceptronics, Inc., "Behavioral Aspects of Distributed Decision Making." Baruch Fischhoff provided helpful comments on an earlier draft of this manuscript.

References

Bjorkman, M. (1984). Decision making, risk taking and psychological time: Review of empirical findings and psychological theory. Scandanavian Journal of Psychology, 5, 31-49.

Fischhoff, B., Slovic, P., & Lichtenstein, S. (1980). Knowing what you want: Measuring labile values. In T. Wallsten (Ed.), Cognitive processes in choice and decision behavior. Hillsdale, NJ: Erlbaum.

Fischhoff, B. (1978). The impact of information: Hypothetical and actual (Decision Research Report 77-13). Eugene, OR: Decision Research.

Fischhoff, B. (1982). For those condemned to study the past: Heuristics and biases in hindsight. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), Judgment under uncertainty: Heuristics and biases. New York: Cambridge University Press.

Isen, A. M., Nygren, T. G., & Ashby, F. G. (1985). The influence of positive affect on the subjective utility of gains and losses: It's not worth the risk. Paper presented at the Annual Meeting of the Psychonomic Society, Boston, MA.

Jones, E. E., & Johnson, C. A. (1973). Delay of consequences and the riskiness of decisions. Journal of Personality, 41, 613-637.

Miller, N. E. (1944). Experimental studies of conflict. In J. M. Hunt (Ed.), Personality and the behavioral disorders: Vol. 1 (pp. 431-465). New York: Ronald Press.

Slovic, P. (1969). Differential effects of real vs. hypothetical payoffs upon choices among gambles. Journal of Experimental

Psychology, 79, 139-145.

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1982). Response mode, framing, and information processing effects in risk assessment. In R. M. Hogarth (Ed.), New directions for methodology of social and behavioral science: The framing of questions and the consistency of response. San Francisco: Jossey-Bass, 21-36.

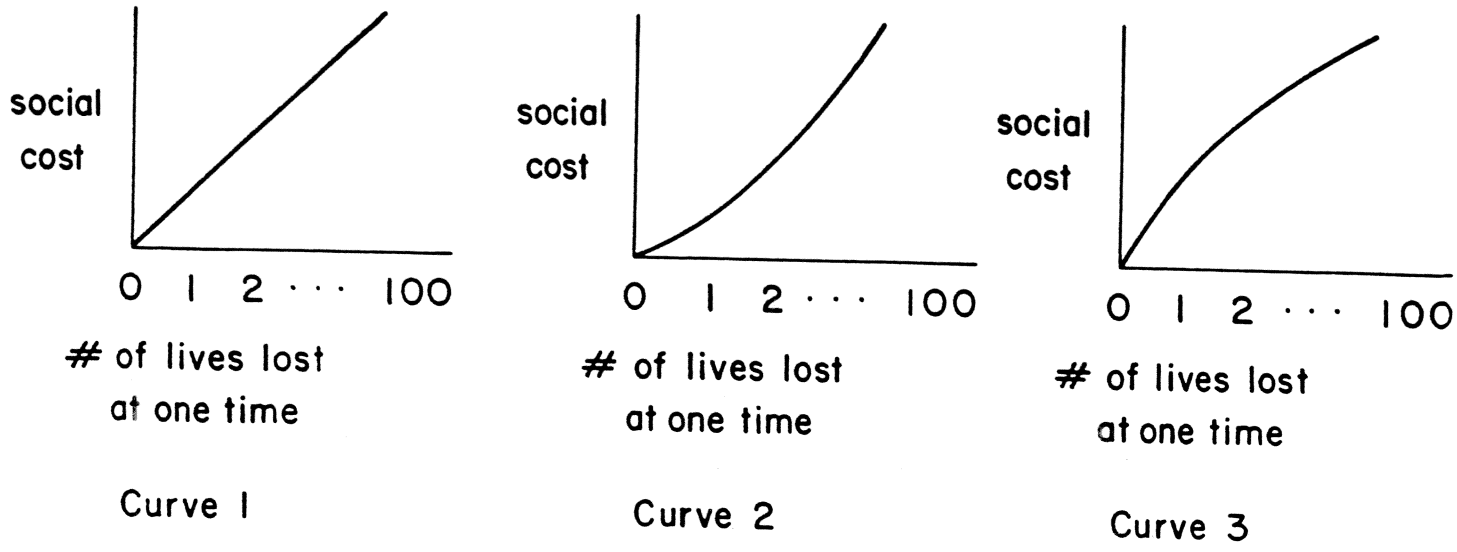
Wright, P. L., & Weitz, B. (1977). Time horizon effects on product evaluation strategies. Journal of Marketing Research, 14, 429-443.

Figure Captions

Figure 1. Three policies regarding the seriousness of multiple-fatality events.

Figure 2. An emergency-response decision.

Figure 3. Differential slopes of approach and avoidance gradients.



*Subjects were asked to rank the three proposals in order of preference.

Figure 1. Three policies regarding the seriousness of multiple-fatality events.

A committee in a large metropolitan area met recently to discuss contingency plans in the event of various emergencies. One emergency threat under consideration posed two options, both involving some loss of life. These are described below. Read them and indicate your opinion about the relative merits of each.

Option A carries with it a .5 probability of containing the threat with a loss of 5 lives and a .5 probability of losing 95 lives. It is like taking the gamble: .5 lose 5 lives, .5 lose 95 lives.

Option B carries with it a .5 probability of containing the threat with a loss of 40 lives and a .5 probability of losing 60 lives. It is like taking the gamble: .5 lose 40 lives, .5 lose 60 lives.

Which option would you select? Option A ____ Option B ____

Figure 2. An emergency-response decision.

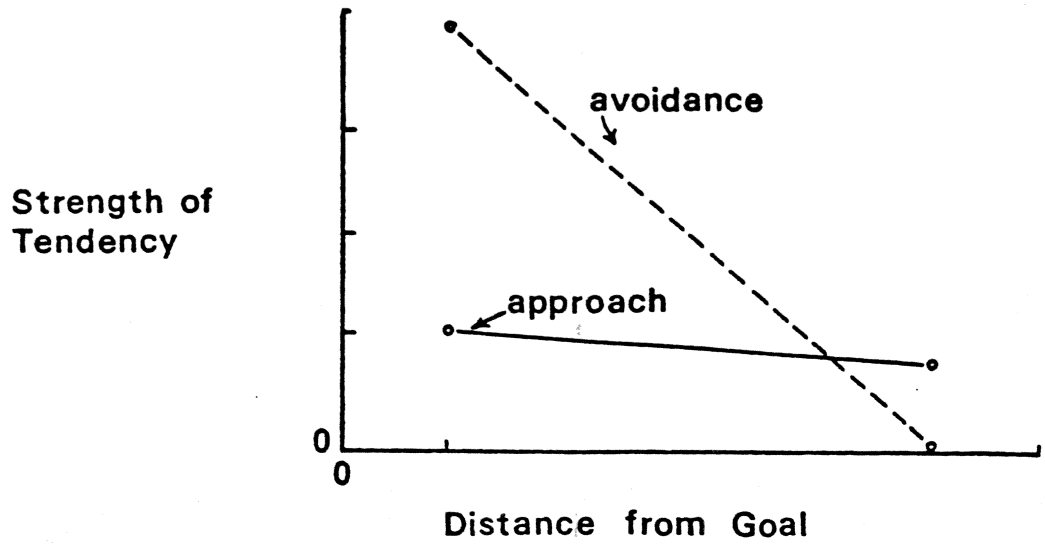


Figure 3. Differential slopes of approach and avoidance gradients.