

IMPORTANT HARD PROBLEMS IN
PUBLIC POLICY ANALYSIS

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I. BACKGROUND

In September 1986, Warren Walker received a letter from the new Program Director for the Decision and Management Science (DMS) Program at the National Science Foundation. The letter read, in part:

At the recent meeting of the advisory panel for the Decision and Management Sciences Program, the panel expressed a desire to stimulate submissions of proposals on truly important and fundamental DMS-related problems. One particularly exciting idea that emerged was to make a bold attempt at identifying the important hard problems (IHPs) within the multi disciplines of DMS whose solutions (or progress toward their solution, structuring or better understanding) would be considered of great value to researchers and practitioners within DMS and related fields.

We would greatly appreciate having your thoughts on important hard problems which, if they were to be solved or if a quantum jump was achieved in their understanding, would make a fundamental difference to the knowledge base and applications of the decision and management sciences.

With the support and encouragement of David Lyon, Rand's Vice-President for Domestic Research, a half-day brainstorming session was held on October 22, 1986. The authors of this paper were the attendees at that meeting. The paper is a synthesis and distillation of the proceedings of the meeting.

The IHPs that we have identified are all related to the performance of a policy analysis study in the public sector, but most of them apply equally well to the private sector decisionmaking process. We define policy analysis to be analysis that assists decisionmakers in developing and understanding policy choices in an uncertain environment.

We have divided our IHPs into three categories:

1. IHPs relating to specific steps in the policy analysis process.
2. IHPs relating to the overall policymaking process.
3. IHPs relating to the decision paradigm.

II. IHPs RELATING TO SPECIFIC STEPS IN THE POLICY ANALYSIS PROCESS

Scenarios

The scenario is the perceived environment within which the policy will have to operate. It provides the external (exogenous) factors governing the policy's significance and operation. The choice of the scenario has a great impact upon the relevance and validity of the policy analysis and any resulting decision (it sets up the framing of the problem and its analysis). Unfortunately, it is also the least well examined and least disciplined part of most studies.

IHP: Develop a general procedure, which might be called a "Calculus of Scenarios," to determine if a given scenario is complete and consistent.

IHP: Develop a structured or systematic approach for generating scenarios so that the available set of scenarios adequately spans the set of environments that can reasonably be anticipated.

Generation of Alternatives

If a policy is not specified as an alternative, it cannot be evaluated. If it is not evaluated, there is no way of knowing just how good (or bad) it may be. The "best" policy may not be chosen by the analysis because it was never suggested as an alternative.

IHP: Develop a general procedure to generate a range of alternative policies that span the set of "good" policies.

Screening

In most policy analysis studies there are a large number of alternative policies that should be considered, and the impact of each needs to be assessed in terms of a large number of consequences. There is generally neither the budget nor the time to examine all of the consequences of all of the alternatives.

IHP: Develop a general procedure to screen out unpromising alternatives so that the consequences of a small number of promising alternatives can subsequently be examined in detail.

Model Uncertainty

An analyst making a prediction about the future is faced by uncertainty that can be attributed to two main sources (besides uncertainties in the scenario):

- Uncertainty about the accuracy of the model ("between-model uncertainty")
- Stochastic variability in the world being modeled ("within-model uncertainty")

Many policy studies assume that the model used is the "correct" representation of reality and concentrate on stochastic variability. This approach does not account for between-model uncertainty and may produce estimates of prediction error that are far too small.

IHP: Develop techniques to handle the uncertainty among models so that predictions from several can be combined to produce better predictions and better assessments of the accuracy of those predictions.

Sensitivity Analysis

It is important to investigate the sensitivity of the consequences predicted by any model to the uncertainties or errors in the choices of important variables or assumptions. Sensitivity analysis helps to make explicit the types and degrees of uncertainty that exist in the outcome and to identify the dominant and controlling factors. In further analysis, more attention can be paid to those factors or assumptions that have the most effect on the decision.

IHP: Develop method to systematically determine the most important sensitivity analyses to perform.

Model Balance

It is costly and impractical to model in detail all aspects of the system being analyzed. Therefore, the model design process must include some consideration of the tradeoffs between including more aspects of the system (breadth) and the detail with which each aspect is modeled (depth).

IHP: How to balance breadth and depth in the model design process.

Verification and Validation of Models

Model validation examines the correspondence of the model and its outputs to perceived reality. To be useful and believable, a model should be validated. There are currently few general guidelines or accepted procedures for model validation.

IHP: Formulate a general strategy for the validation of models.

III. IHPs RELATING TO THE POLICYMAKING PROCESS

The policymaking process generally involves several different groups of people--for example, policymakers, "experts," and lay people. Most research to date has focused on the policymaker and his decisionmaking process. Work needs to be done now to ensure that the needs and values of other groups are considered in the process; i.e., to explicitly consider differences in values of the constituencies represented by public policymakers.

Moreover, there might be times when the best "scientific data" available strongly conflict with the popular beliefs of policymakers' constituencies, so different decisions would be made depending on the weights given to science vs. opinion.

In addition, some people will be directly affected by a new policy and some indirectly affected (e.g., a health policy might have little impact on this generation, but a big impact on the next generation; a waste

dump might have a big impact on those living nearby and little impact on those living far away).

IHP: Identify the process the policymaker should use to choose a policy, given differences in social values.

IHP: Account for the differing reactions of those directly affected by a policy and the rest of society.

IHP: Find out what each group wants to know in order to reach a decision on its position.

IHP: Perform the analysis so that each group is able to reach a conclusion that is consistent with its values.

IHP: Present information to each group so that each is able to reach a conclusion that is consistent with its values.

IV. IHPs RELATING TO THE DECISION PARADIGM

Policymakers make their decisions based on a vision of the world that is under their control (or subject to their policies). The source of their vision is inside their minds, in complex sets of ideas or concepts that might be called decision paradigms. The vision includes not only the problem that requires solution, but also the individual policymaker's perception of the values of the society for whom the decision is being made. (A decision paradigm might then be defined as a vision of the world that is the defacto conceptual basis for a policymaker's decisions.)

Since how a problem is framed largely determines its solution, it is important to make the decision paradigm explicit and to learn when particular paradigms work better and worse.

IHP: Develop means to elicit a policymaker's decision paradigm.

IHP: Develop means to choose an appropriate decision paradigm in a given situation (e.g., research might show that different paradigms work better in different situations.)

IHP: Determine when paradigm shifts are needed and how to get the shifts to happen.

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