PUBLIC POLICY MAKING PROBLEMS INVOLVING SCIENCE AND ECHNOLOGY

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Policy makers in general are confronted by many complex problems whose solutions rest inherently on scientific knowledge or technical insight. Since most policy makers have little or no background in science or technology, this puts a considerable premium on the clarity, veracity and reliability of advice and information that Policy makers and other non-experts receive from various issuers. Such advice and information must be as free as practicable from certain inherent flaws to which any issuer may be susceptible. These include:
1. Distortions or biases may occur due to self-serving aims.
2. Facts may be only partially revealed, or released in an untimely manner, or deliberately withheld in order to achieve purposes contrary to, or to influence, or to distort public policy, thereby contravening the pure scientific objectivity function to which the issuer is generally bound.
3. Advice may be based on ignorance, or uncertainty, or errors in judgment.

By themselves, these flaws already present obstacles to realistic and objective policy making but they may be further exacerbated by the existence of secrecy rules under which some issuers operate, particularly scientific/technological agencies providing specific services. In such cases, the agency often has possession of all the pertinent facts and information to the exclusion of nearly everyone else. In processes involving science/technology-based policy making, the following structure often exists (a concrete example is parenthetically indicated):

1. There is a ***provider*** of a scientific service (example: national scientific laboratories, such as Livermore or Los Alamos National Laboratories).
2. There is a ***recipient*** of the scientific service (example: the Department of Energy, an agency of the federal government).
3. There is a set of ***policy makers*** (example: the Congress and the Executive branch of the federal government).
4. There is a ***manager*** of the provider (example: a public university such as the University of California).
5 There is a ***dominion entity*** to which the manager is accountable (example: the state of California which delegates managerial authority to the University of California as a public trust).

The ***recipient*** and ***policy makers*** have a right to know with assurance, and the ***provider, manager,*** and ***dominion entity*** have a responsibility to assure, that all ensuing advice and information have the characteristics of integrity, objectivity, veracity, and reliability.

There is a structure that can sustain this desirable state as well as provide a safeguard against the above-named flaws, particularly in situations where secrecy rules are in effect. The structure is an independent, external review board of experts that regularly scrutinizes the operations of, and the advice and information issued by, the provider. Such a board must have access to all pertinent facts controlled by the provider in order to ascertain the integrity of the operations of the provider as well as the reliability, veracity, and scientific objectivity of the advice and information issued by the provider. Moreover, the board must have independent authority to issue its analyses and critiques to Policy makers and the public.

It is the responsibility of the ***dominion entity*** to create such a board or to direct the ***manager*** to do so subject to requirements imposed by the ***dominion entity***. Likewise, it is the responsibility of the ***Policy makers*** and the ***recipient*** to create such boards as well.

There are other aspects of science/public-policy issues. These are given in the following list.
1. The purpose for an "independent review board of experts" is to protect the public interest in matters that involve science and technology. The above named bodies in 1 to 5, other science advisers, and the general public must explore ways to improve the quality, veracity and timeliness of scientific advice and information provided to decision makers.
2. A major challenge is how to blend technical and nontechnical considerations into the final decision(s) — how to act, for example, when scientific information is uncertain or there are large areas of scientific ignorance or wide disagreements among apparently equally respectable experts both as to the characterization and the implication of the data for political or other societal action.

3. Here are some questions of interest to scientists and Policy makers:

(a) How should knowledge be packaged in a form that is most useful to those faced with the task of using this knowledge in the making and implementation of policy decisions?

(b) What guidance should scientists reasonably expect from Policy makers as they try to establish their research agendas in such a way as to be relevant to policy?

(c) What guidance would scientists prefer and what kind would they consider inappropriate as, for example, compromising their independence as scientists?

(d) What kinds of answers can Policy makers reasonably expect from scientists without attempting to push them to conclusions that simply cannot be extracted from existing data, given the current state of knowledge in the relevant technical fields?

(e) How do the findings of research get onto the agenda of Policy makers, and what role should science and research play in establishing priorities among policy issues that should command the attention of the public and decision makers?

(f) What is the dividing line between keeping research relevant to policy and distorting the scientific process through excessive responsiveness to current policy needs or institutional and power structures?

4. The more that the results of science are explicitly designed to function as tools in the policy process, the more that knowledge is shaped by its intended function, and hence, the greater the danger that not only the form, but also the substance of scientific truth will be distorted to fit policy preferences, not just policy needs.

5. Ideally, policy decisions should be prompted by "compelling scientific evidence". Unfortunately, this is the exception rather than the rule, for all too often, technical uncertainty makes policy problems. Although uncertainty or ignorance exists only at the "margins" of science, it is at these margins that most public policy problems involving science occur. One reason for this is that the consequences of the application of technology frequently carry us into domains where there exist no systematic or codified body of knowledge on which policy can be based. Yet, the possible consequences of what we do not know do not allow us the luxury of suspending judgment pending the acquisition of more data and better theory, as would be the case in ordinary science (example: hazardous waste management of toxic and radioactive materials).

6. It is highly important for policy purposes to make a distinction between ignorance and uncertainty. Uncertainty is an absence of knowledge within a "completely articulated structure", a definite intellectual framework. It is simply a recognized gap in a systematic body of knowledge. Ignorance, on the other hand, involves knowledge whose very existence may be unsuspected. There is knowledge that, for all practical purposes, nobody knows exists, not even to look for it, never mind knowing where to look for it. There is also ignorance that is contextual: the knowledge actually exists but the people — Policy makers and experts — who are in a position to apply the knowledge are unaware of its existence and the few people who have mastered the knowledge are not aware of its public significance.

7. Even when experts strive to be impartial, policy preferences nevertheless significantly influence the interpretation of data and evidence when uncertainties are present.

8. Adversary forms concerned with technology policy issues should address all questions relevant to a choice among policy options, political and ethical as well as scientific and technological. One possible adversary form is the adversarial hearing with expert advocates appearing together to present their own views and to cross-examine each other. With respect to technical disputes, adversary forms may be suited to map areas of disagreement as well as areas of consensus.

9. With respect to the problem of the burden of proof in decisions concerning technology that involves uncertainties, the burden of proof may be upon those who are opposed to a particular technology (**"Let the buyer beware"**) or upon those promoting it (**"Let the seller beware"**). It is more and more the case that promoters share the burden of proof (example: modern day environmental protection requirements to which promoters must conform).

Reference:

Science for Public Policy, edited by H. Brooks & C. L. Cooper, Pergamon Press, 1987. ###