The Importance of Nonobjective Judgments in Environmental Impact Assessments

Lawrence E. Susskind and Louise Dunlap

Lawrence Susskind is senior editor of the ENVIRONMENTAL IMPACT ASSESSMENT REVIEW and Associate Professor of Urban Studies and Planning at the Massachusetts Institute of Technology. He is the author (with Lawrence Bacow and Michael Wheeler) of the forthcoming Resolving Environmental Regulatory Disputes, prepared for the U.S. Environmental Protection Agency. Louise Dunlap teaches writing at MIT and is a member of the MIT Writing Program.

The practice of environmental impact assessment (EIA) is shaped in large part by the values and beliefs of the professionals involved. Values—or nonobjective personal judgments of merit or worth—influence the choices made at all junctures of an impact assessment. Personal or nonobjective considerations affect outcomes more than is usually recognized. We intend to describe some of the value choices...
typically encountered in EIA and to analyze the ways in which planners and engineers typically handle them—sometimes well, sometimes not so well. We think it is important for impact assessment practitioners to become more aware of the value considerations that shape seemingly technical decisions and to develop conscious strategies for dealing with them.

Our data come from four EIA case studies: (1) sludge disposal in South Paris, Maine; (2) sewer in North Branford, Connecticut; (3) relocation of the northern segment of Boston's central highway artery; and (4) relocation of a mass transit line in Boston's Southwest Corridor. Case summaries are presented with each of the case discussions in this article, and three of the cases appear in full later in the issue. We also draw on the environmental impact assessment literature.

The case studies were prepared by graduate students in the Department of Urban Studies and Planning at the Massachusetts Institute of Technology. The cases were selected because they were recent, the active participants in the EIA process were accessible, and the projects involved were relatively controversial. Each case is built upon interviews probing the key actors' perceptions of decisions made during the assessment process. Through the interviews, we sought to discover how the professional teams had been chosen and how they had developed their work plans. We asked about such things as public participation, precision of data, and concerns about uncertainty. We asked what the actors had learned from their experience with these particular assessments. Through indirect questioning, we hoped to pinpoint key value considerations, whether these were conscious and explicit or not. We have inferred values from actions and choices.

The preparation of each case study involved interviews with six to ten individuals. Most of the interviews were at least one hour long. Some of the interviewees were members of government agencies and citizen groups; most were engineers and planners from the teams selected to carry out the impact assessments and write the environmental impact statements (EISs).

We have identified seven key steps or aspects of the EIA process that appear to be shaped in large part by the value judgments of individual participants: (1) the choice of professional team members; (2) the organization of the work plan; (3) approaches to coping with uncertainty; (4) attitudes toward mitigation; (5) approaches to public participation; (6) the use of data for and the style of forecasting; and (7) attitudes toward the role of the EIS in planning and decision making. While some of these seven can be pinned to decisions made at particular stages of the EIA process, others are linked to attitudes that pervade the entire endeavor.

Our four case studies illustrate how particular value considerations tend to be handled and tend to influence outcomes. A final section of the article discusses the implications of our findings for the training of EIA practitioners.
We offer the case examples, and particularly the revealing quotations from the actors involved, as illustrations rather than as definitive proof that values play a particular role in the EIA process. Our primary purpose is to heighten the sensitivity of planners and engineers involved in the preparation of impact assessments. We hope to uncover a range of nontechnical considerations that are often hidden and to encourage EIA practitioners to develop more conscious strategies for handling value judgments honestly and effectively.

CHOOSING THE TEAM

Our South Paris, Maine, case* illustrates particularly well how choices made in the selection of the team can have repercussions throughout the assessment process and affect outcomes. Considered a "disaster" by team members, this case involved a series of disputes and delays that ended with the preparation of an EIS, the findings of which have been completely ignored by the client. Much of the "disaster" can be understood by looking at the choices made in selecting the team.

Three kinds of choices are ordinarily involved in putting a team together. Typically, the technical capacity of the team is matched with the apparent scope of the project, and a team leader with management capacity is selected. Less typically, team members may be selected because of their previous experience with similar places, problems, or clients. Even less typically, team members may be chosen for their ability to work together. How each of these three choices is handled depends on how the client's mandate is interpreted by the EIA contractor.

A team is usually chosen to fit the problem as perceived and defined by the client. But what if the client's definition is hazy or later proves to be inaccurate? EIA practitioners make a key choice in deciding how to interpret a client's mandate.

In the South Paris case, the U.S. Environmental Protection Agency (EPA) originally defined the problem narrowly and technically. It asked that the EIS "identify the optimum method of sludge disposal for South Paris, that is the most cost effective alternative with acceptable environmental impacts." The word-of-mouth mandate was narrower: the EPA wanted data on the properties of the effluent likely to be discharged from the new wastewater treatment plant and on the geology and soil conditions of potential dumping sites. The EPA apparently felt that the controversy leading to the EIS had arisen mainly because of the absence of these data. Although the EPA's written mandate stressed the importance of active involvement of citizens, this objective received little emphasis. The EPA representatives interviewed did not see the controversy as politically charged. The political nature of the EIS became apparent to all, however, when the team was about to publish the draft EIS. At this point, the Maine Department of Environmental Protection (DEP) contested the team's recommendations. Joined by other parties involved, DEP rejected the

*See page 338 for summary of case.
CASE SUMMARY

Sludge in South Paris, Maine

In 1977 the U.S. Environmental Protection Agency (EPA) commissioned the EIC Corporation of Newton, Massachusetts, to assess disputed sludge disposal sites in South Paris, a small manufacturing center in rural Maine. A new EPA-funded municipal wastewater treatment plant had begun to function two years previously with only a temporary sludge disposal permit and ensuing attempts to find a permanent landfill site had stirred controversy. Although the plant received 90% of its wastewater from a local tannery, it had been designed to handle only residential wastes. Sludge was therefore unusually liquid and high in toxic chromium.

The EIS considered two disposal sites: one 8 miles from the treatment plant in an upland residential area and the other on property where tannery wastes had already been dumped for 20 years. It gave brief consideration to three alternatives to landfill. Major impacts anticipated were chromium contamination of both surface streams and a regional underground aquifer, and the expense of further treatment. The controversy among government agencies and residents, which had brought on the EIS in the first place, intensified during the assessment. The state Department of Environmental Protection (DEP) and the regional Paris Utility District continued to be concerned with water quality as well as their respective power. These agencies challenged the EIS at several stages. Residents were perturbed over damage to neighborhoods, streams, and wildlife; inadequate attention to sludge treatment alternatives; and the power of the DEP.

Although the EIS was completed in 1979, it was shelved by the EPA which had, in the meantime, commissioned a planning study to consider longer-range solutions, such as new treatment techniques and other disposal options for the South Paris sludge. This study, also controversial, was still in draft at the time of our research and is likely to require a second EIS.
data in the draft EIS, causing a full year's delay and the eventual abandonment of the team's work.

The EPA's view of the problem changed during the period the EIS was being prepared. It had originally mandated a study of sludge disposal options to find "the most cost effective alternative with acceptable environmental impacts." Two years later, the EPA was ready to consider sludge treatment alternatives, which the parties to the controversy had demanded and for which new techniques had recently emerged. As the situation evolved, the EPA's definition of the problem broadened; what was seen at the outset as a mere technical problem (i.e., disposing of chromium-laden sludge) became a political situation involving choices among both dumping and chrome-recovery treatment alternatives.

As the scope of the EIS changes, the relevance of the criteria initially used to select the assessment team is diminished. Unfortunately, it is not possible to maintain a completely fluid team membership. Thus, a judgment has to be made at the outset about the probable scope of the EIS. The capabilities of the team must match this estimate of the scope. This matching process is likely to be constrained by the overall availability of the staff, the prior experience of the available staff, and the ability of the appropriate staff members to work together. None of these is really a technical consideration, yet each has an important effect on the content, style, and acceptability of the final EIS.

Matching the Team with the Problem

The firm selected to prepare the South Paris EIS accepted its client's short-range and nonpolitical view of the problem at face value. The EIC Corporation, selected by EPA for its competence in chemical and groundwater analysis, selected a team with expertise that matched the technical dimensions of the problem as given: a chemist, an engineer, and two geologists (one local to Maine). The team leader, in addition to chemical expertise, also had a Master of Business Administration degree, suggesting managerial decision-making experience. No members had experience with the new technical alternatives to sludge trenching that were being developed in the late 1970s, but the team's methods in chemical and groundwater analysis were (in their words) "good science," "state of the art," and it was the impact and effectiveness of landfill sites (not long-range alternative techniques) that the EPA had asked them to assess. Despite the written mention of public participation, no team member specialized in politics, i.e., negotiation or conflict resolution. The team apparently interpreted its mission as purely technical (e.g., to provide data on groundwater contamination missing from previous studies).

It is difficult to reconstruct the repercussions of the decision to include only technical members on the team, since those interviewed after the experience had not changed their view of the original prob-
"What I had to say was fact. The townies didn't want to hear it. . . . I told them, 'Kids, this is the way it is,' and they didn't want to know."

EIA team member, South Paris case

lem. Our interviewer reports a number of cynical laughs and a lot of head shaking when he tried to explore what team members thought could have been handled differently. Even the team leader, who, with his business degree, had presumably studied the complexities of human behavior, seemed to feel that the team's failure to win acceptance for its findings was due to "circumstances" beyond its control. "It was impossible to overcome their innate objections to our proposals," he said. "Their objections weren't based on any rational view of the findings." What the team perceived as "purely political" opposition from the DEP may have been due to its own inability to communicate in a hostile setting. Had the team included someone skilled in negotiation or at least more experienced in handling a politically charged situation, it might have been able to present its data (some of which contradicted the findings of previous investigations) in such a way that those involved in the controversy could accept it. But there was no one on the team who was able to convince the affected parties that "good data" and "rational, logical, and objective analysis" would solve their problems. Instead, the presentation of findings to the public seems to have been confrontational as we infer from the following account: "What I had to say," a team member told us, "was fact. The townies didn't want to hear it. . . . I told them, 'Kids, this is the way it is,' and they didn't want to know." Had there been someone on the team who could bridge the gap between the technicians and the "townies," other team members might have come to understand the thinking of their opponents. They might also have developed an understanding of, and strategies for, handling political as well as technical problems.

Matching Attitudes and Experiences

While the expertise of team members was matched with the technical scope (as perceived) of the problem, there was no attempt to match team members' attitudes and experiences with those of the Maine agencies and residents with whom the team would be dealing. In other EIA cases, team members are often chosen for their past experience with particular clients or regulations or for their familiarity with a particular locality or type of problem. For example, the engineer in one case we studied had worked on several other community sewer disputes. This gave him insight into the political aspects of his team's
task. In South Paris, however, team members seemed to pride themselves on their outsiders’ objectivity. While they maintained a neutrality about their scientific data, they showed little appreciation for local feelings of urgency over drinking water quality and environmental aesthetics. “The fact that there was a lot of chromium in the water didn’t bother me much. But then, I don’t have to drink the stuff,” quipped a team member in one of our interviews. The team’s “neutrality” may have prevented them from responding to an important nontechnical dimension of the problem: the fearful attitudes of the people for whose protection the study was ultimately being conducted.

“This interdisciplinary approach is for bullshitters. It makes no sense. What can I tell a chemist about his work?”

EIA team member, South Paris case

Team Interaction

None of the South Paris EIA team members had any particular interest or experience in interactive teamwork. Neither the manager nor the members of the EIA team approached their work as a collaborative task. Our interviewer felt that the consulting group did not operate as a team in setting priorities. Only the manager knew how team decisions were being made. Team members performed their assignments independently. One member called this a “traditional team structure,” implying that this was as it should have been. “This interdisciplinary approach is for bullshitters,” he added. “It makes no sense. What can I tell a chemist about his work?” Clearly, group values favored individual rather than collaborative efforts within the group. Outside the group, the same norm translated into little interaction with other parties to the controversy. Had the team interacted more often with other parties, one of the members might have learned earlier of the DEP’s crippling objections to the disposal site favored by the team, rather than making this discovery after the draft EIS was virtually completed. Even in its few scheduled public hearings, the group’s style was not interactive. Team members did not participate. Findings were instead presented by the project supervisor who was not a working member of the team, but the president of the EIC Corporation.

In short, the EIA process, which was initially seen by both client and team as a technical analysis of cost effectiveness and water quality, turned out to have such extreme political dimensions that the team’s work was contested and eventually scrapped. “The EIS was a disaster,” the manager told our interviewer. This firm no longer does EISs.

In choosing to accept a narrow mandate at face value, the EIC
Corporation selected team members whose expertise fit all but the political dimensions of the problem, whose attitudes toward scientific detachment did not help them see how local people perceived the situation, and whose noninteractive style limited their ability to share their expertise with the community. The value choices made in selecting team members emphasized individuality and neutrality in the pursuit of a technical solution. This made it very difficult for the team to respond to the political situation that developed.

DEVELOPING THE WORK PLAN

Specific work-plan decisions are often made without self-conscious consideration of the implications of allocating time and money in various ways. A team must make decisions on the following: (1) how to set geographical boundaries and time limits on impacts to be considered; (2) how many alternatives to examine and how thoroughly to examine them; and (3) how to structure the work period (typically products and events are planned to keep the client in touch with the team’s progress). All reflect judgments that must be made by the team members and their client.

Our South Paris case provides a helpful illustration of the way nonobjective judgments shape key decisions. As we have seen, the South Paris EIA team took the EPA’s narrow initial mandate to study the technical aspects of disposal options very literally. Its work plan reflected this decision.

Setting Boundaries

While the geographical boundaries set for purposes of the EIA process were relatively wide (the contamination of groundwater in the entire region of Paris, Maine, was at stake) the time frame set for the project was very narrow. Rather than deal with the long-range implications of alternative disposal and treatment options, the study emphasized finding an appropriate site for disposal of the sludge that had been building up for the two years following the completion of the treatment plant constructed by the EPA in 1975. Neither the EPA nor the EIA team appeared concerned that the treatment plant had not been designed to deal with the chromium in South Paris’ industrial wastes. These decisions led to the problematic outcome. The dynamics of the situation—local agency interests, resident interests, rapidly developing environmental technologies, and the year-by-year build-up of sludge, which that had nearly filled the tannery site by the time the EIS was completed—broadened the South Paris time frame for all the actors, precipitating a demand for a study to consider long-range options.

There are no intrinsically correct geographical boundaries for purposes of analyzing impacts. The same is true with regard to specifying a time frame for purposes of analysis. Boundary setting involves value judgments, that is, choices about the relative advantage of
extending boundaries (which increases the cost and complexity of analysis) versus narrowing them (which sacrifices the comprehensiveness of the analysis).

Narrowing the Range of Alternatives

The EIA team in the South Paris case had to make a decision about how many landfill sites to consider and how thoroughly to analyze each. Of the six sites studied by the Paris Utility District (PUD) in planning the treatment plant originally, the EIA team limited its study to two, the minimum required by law. It also allotted a small portion of time to cost analysis of sludge conditioning and incineration techniques. The first alternative was Ryerson Hill, the upland residential site previously recommended by the PUD and the DEP. The suggestion of the Ryerson Hill site had sparked the controversy leading to the EIS. This site had previously been criticized for the cost and inconvenience of hauling sludge eight miles from the treatment facility; damage to wildlife and “pristine” streams in the area; and the expense and unproven technology needed to lower the water table to prevent leaching of chromium into the groundwater. The second site, known as the A.C. Lawrence site, on tannery property, had already been used to dump untreated tannery wastes for 20 years and had been receiving wastes from the treatment plant for 2 years under a temporary EPA permit.

The EIA team decided that only the tannery site would be examined through the analysis of new data. The previous research by the PUD on the Ryerson Hill site (contested by residents) was merely to be reviewed. The tannery site was to be studied by core drilling to test for migration of chromium from the 20 year depositing of sludge and by water quality testing near the site and in the nearby Little Androscoggin River.

The choice of only two alternatives contributed directly to what more than one interviewee termed the “stalemate” of the South Paris EIS. One of the two sites (Ryerson Hill) was politically charged to begin with. The DEP and the PUD felt their data on the Ryerson site had been rejected (because, as a PUD spokesman speculated, the federal EPA favored the tannery site). The PUD felt “backed into a corner.” The DEP also found the tannery alternative unacceptable. Had alternatives other than these two embattled ones been considered, there might have been a way out of the stalemate.

Structuring the Work Program

In structuring its work program, the EIA team had made another choice that contributed to the stalemate. Perhaps because the team sensed the client wanted a quick technical solution, it planned few events or publications. Its major analytical work was completed prior to its first public workshop to air the draft EIS, its first publication. There was no flexibility in the work plan to deal with the politics that
erupted. In the work plan, workshops had been scheduled mainly as occasions at which the president of the EIC Corporation could present findings to the public. The findings were not meant to be subject to substantial revision. When the DEP's independent geologist found that the team's negative evidence for a hydrologic barrier "leaves room for doubt where no doubt should exist," the team did not readress the problem but simply revised its statement to present conclusions without a "formal recommendation." As the project manager saw it, the "informal recommendation . . . was by and large accepted by the local people." The structure of these workshops made it impossible for the team to be responsive to the criticisms of residents, whose input was acknowledged only by including their letters in an appendix to the final EIS. (Ironically, one of these letters from the lay public contained specific information about a new treatment alternative being considered elsewhere.) In large part, because of its work plan, the South Paris EIA team had no mechanism for responding to criticism levelled by either government agencies or the public.

Caught between its limited alternatives and its inflexible work plan, in a situation no one had envisioned, the EIA team could think of nothing else but to submit its data and wait for its rejection.

**COPING WITH UNCERTAINTY**

Decisions made early in the South Paris case had repercussions at later stages. An EIA team's basic attitude toward uncertainty is constantly put to the test. The South Paris team took a safe position whenever the data were inconclusive. "There were all these uncertainties floating around," the project manager said of the decision not to explore unproven sludge treatment options, "and we chose to be certain." By contrast, the North Branford, Connecticut, case* illustrates what happens when a team accepts the risks associated with imposing a rational order on shifting and uncertain data.

Typically, an EIA team must conform to various kinds of uncertainty: (1) it must decide whether the available information is valid; (2) it must determine whether or not to proceed if the latest forecasts or forecasting techniques are imprecise; and (3) it must decide whether to make recommendations if there is a probability that inappropriate recommendations do more harm than good. In North Branford, the EIA team from the Anderson-Nichols firm, hired by EPA to assess the impacts of a proposed sewer system, handled each of these choices with a high tolerance for uncertainty.

On the basis of two years of involvement with an acknowledged political controversy over sewer ing in North Branford, the EPA called for a study of four issues: (1) the need for full sewer ing as opposed to group and individual septic options; (2) the change in community character likely to be caused by induced growth; (3) the additional costs to individual households associated with alternative waste disposal systems; and (4) possible indirect water quality impacts likely to be

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*See page 546 for summary of case.
caused by induced growth. The EPA felt these issues, each involving uncertain data, had not been fully explored when the original sewer system was planned. To answer these four questions, the EIA team had to make numerous assumptions, many quite controversial, demonstrating a willingness to move ahead even though the validity of available data, the fuzziness of forecasts, and the risks associated with incorrect conclusions might have stymied another team.

"From a pure scientific standpoint our information was lacking."

EIA team water quality specialist, North Branford case

Judging the Validity of Information

In its attitudes toward data sources, conflicting information, and scientific reliability of its findings, the North Branford EIA team actually found a use for uncertainty. Due in part to budget limitations ($75,000) and in part to the desire for wide public participation, the team's data had of necessity to be a composite of existing sources. The Anderson-Nichols team collected information from local professionals and (in many inventive ways) from area residents whose experience with their own septic systems the team considered especially valuable. It compared this collected information with its own surveys and tests. As members put it, the team "didn't rely on one source." "From a pure scientific standpoint, our information was lacking," acknowledged the water quality specialist. However complemented by other sources of information uncovered by the team, "it was fairly scientific."

Both the reliance on multiple sources and the emphasis on citizen input raised questions about the reliability of the data. The team not only tolerated this uncertainty but made a point of openly acknowledging it: in public workshops (as well as in the final EIS), they frequently stated they were relying on guesstimates and subjective projections. Team members felt that expressing doubts about the validity of information helped their credibility with the public (which they attributed to an image of impartiality) and also helped elicit still more information. Because of the open-minded and participatory nature of the EIA process in North Branford, the team's open acknowledgement of uncertainty may have helped achieve the positive community reaction to the final EIS. The EIA team suggested that there was no need for a full sewer system, but proposed differentiated, area-specific solutions acceptable to a wide variety of constituents including the EPA and residents hopelessly polarized by the original sewer proposal.

Relying on Models

Again because of its citizen-based information sources and its limited
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In the fall of 1977, the U.S. Environmental Protection Agency (EPA) hired the firm of Anderson-Nichols to prepare an EIS for the proposed sewer system in North Branford, Connecticut. The project, which had become intensely controversial during its initial six-year planning period, proposed a full sewer system to transport wastewater from two relatively undeveloped sections of North Branford to treatment facilities in adjacent towns. The alternatives to be considered by the EIS were to take into account EPA sewer-funding guidelines issued since the inception of the plan. In addition to full sewer ing, the team considered combining limited sewer ing with community and on-site septic systems, according to the needs of each residential area. It concerned itself with impacts on water resources, natural systems, human resources, funding, and implementation. Residents of affected areas and town politicians were deeply divided over likely and acceptable costs (especially those not clarified in an earlier assessment by the town engineers who had designed the original system).

Prosewer and antisewer factions were deeply entrenched in town politics. In 1979, the final EIS resolved the controversy by recommending changes worked out through interaction with the public. The proposed central sewer system was replaced with area-specific solutions including on-site and community septic systems (for some of which further design studies were recommended) and a smaller sewer system (using 12" rather than 20" pipe) for one residential area. An unusual feature of the North Branford EIS was the emphasis on public participation, which had been requested by the EPA in a series of unusually well-defined guidelines.
"Often models are held up as perfect. They aren’t and we should say so.”

EIA team engineer, North Branford case

budget, the team did not make much use of sophisticated forecasting models. In fact, the head engineer, as well as others, expressed a distrust of models: “Often models are held up as perfect. They aren’t, and we should say so.” They perceived models as costly and not always accurate in responding to changing conditions. While tests and projections were important sources of information, especially in evaluating water contamination and community growth, the team did not rely only on the certainty of models. This attitude provided more leeway for less certain public input. Team members agreed that the data they gathered was sometimes scientifically subjective, but argued that their assessment attitude remained essentially “objective.” (There is an interesting contrast between their use of this latter term and that of the South Paris team). The North Branford EIA team members felt they could evaluate any alternative open-mindedly, because they had no vested interest in a particular outcome.

Attitudes Toward Risk
The EIA team was content to rely on existing data and citizen input. For a rather modest sum, the team developed projections and analyses that were not based on very much new data or on extensive systematic testing. Its recommendations, therefore, were built on a rather fragile base. Yet, the team proceeded to make an unequivocal recommendation against a full plan sewer system. While we have little information on the specific attitudes toward risk of the individuals involved, it appears that they were either willing to take substantial risks (not so likely) or felt that even if the basis for their recommendations were wrong, the costs of being wrong were not so high as to be dangerous (more likely).

ATTITUDES TOWARD MITIGATION
Given its attitude toward uncertainty in the assessment process, it is not surprising that the North Branford EIA team should have pursued a flexible and adaptive strategy regarding mitigation. Value considerations regarding mitigation typically center around the following choices: (1) Does the study consider only ways to mitigate the adverse impacts of the most desired alternatives or does it also consider altering the ranking of desired time? (2) Does the team make its own judgments about the acceptability of impacts or does it turn over its findings and encourage its client to judge what mitigation is necessary? (3) Does the team concern itself at all with altering the perceptions of adverse
impacts? (4) Might it consider compensation as a form of mitigation? In handling all these considerations, the North Branford team seemed again to be following its client's cues.

Mitigating Impacts or Changing the Plan
The North Branford work plan reflected the team's original intention to go beyond a simple review of the proposed full sewering system to consider small-scale, localized alternatives based on a reassessment of need. The EPA mandate had asked for an evaluation of need. The EPA required documentation of need for (expensive) full sewering systems and offered funding for formerly ineligible septic systems. The team's four stage work plan reconsidered need in step one. In step two, it identified new alternative solutions. In tune with the implications of EPA's funding guidelines, team members favored less monolithic solutions. "In my experience," the engineer told us, "sewers are generally not cost effective. If you can do without it, there is no need to sewer." This attitude ran counter to the attitudes of the original planners of North Branford's proposed sewer system. The new solutions decentralized the project by neighborhoods into a combination of on-site and community septic systems, with limited sewering in only one area of town. The changes recommended in the North Branford sewering plan resolved the local controversies over costs and growth that had dogged the original plan.

Judging What Impacts Need Mitigation
In keeping with its objective negotiating stance, the North Branford team did not make decisions about what costs and water quality impacts should be acceptable to North Branford residents. Rather it sought to lay out a wide variety of impacts for each wastewater alternative in each neighborhood. A chart in the final EIS summarized three sets of variables: (1) alternatives to (and including) full sewering; (2) residential locations; and (3) impacts. The chart ranked the impacts of the wastewater alternatives in three areas of town. Seventeen separate social, economic, and environmental impacts were considered. Even the prosewer faction agreed that the projected costs (which had not been made fully explicit in earlier plans) were of concern. The Anderson-Nichols team allowed (and helped) the client to specify those impacts needing mitigation.

Altering Perceptions of Impact
One function of the team's public participation efforts was to educate the public about unrecognized impacts of the proposed sewer system. During the period of controversial planning prior to the EIS, North Branford residents had been divided for and against sewering with the prosewer faction also favoring the growth that sewering might induce. Sewer proponents did not realize there might be other sound alternatives. Neither had they realized the extent of visible supportive
development that a full-fledged sewer system would require. The EIS process changed residents' perceptions of both waste disposal solutions and the aesthetic implications of growth. Most importantly, the EIA process changed residents' understanding of costs. The team found that the original study had underestimated full sewering costs to individual homeowners by excluding costs that would be covered through tax assessments. The residents and politicians who had initially favored the induced growth associated with sewering (feeling that change in community character would be balanced by increases in jobs and taxes) saw the matter differently when they realized how much the sewer option would cost them individually. ("When people saw the costs, they usually pushed for on-site solutions," we were told.) The resolution of the political controversy over sewering in North Branford seems to have come when residents' perceptions of the desirability of growth were moderated by their realization that the slow growth choices would be less costly.

**Compensation as Mitigation**

In some EIA cases we know of, engineers and planners have used the prospect of compensation to alter the perceptions of impacts associated with certain projects. If the adverse effects can be mitigated, that is probably preferable. If they cannot be, attitudes toward adverse impacts can be altered by directly compensating those affected.

Even though the North Branford EIA team never considered compensating residents directly for the adverse effects caused by growth, aspects of compensation affected the outcome. When residents realized they could cut their own costs, they were more willing to accept what they originally considered unappealing impacts.

In large part because it had set out to examine the need for (and not just the impacts of) sewering, and to do so in a politicized situation, the EIA team was able to do what its client seems to have wanted: to come up with a less expensive alternative to full sewering that was more popular with residents and that would have fewer impacts on the natural and social environments.

**APPROACHES TO PUBLIC PARTICIPATION**

By the time the plan to relocate the northern section of Boston's Central Artery* was ready for an EIS, it was clear that the EIA process would have to include a very effective public participation component in order to cope with the political overtones of the proposal.

The plan to improve Boston's notoriously inconvenient and outmoded downtown artery had been generated in the wake of a major struggle between the public and highway construction interests. In the late 1960s, citizen groups had organized to protect their neighborhoods from a proposed inner belt linked to the extension of Interstate 95. Their protest forced the governor to set a moratorium on urban highway construction. His successor, however, believed

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*See page 351 for summary of case.
that it would be possible to use federal transportation grants to improve neighborhoods bisected by the noisy elevated highway (the Central Artery). Construction and engineering interests “chomping at the bit” over the moratorium, hoped that if the infamous Central Artery could be rebuilt, “people would understand that highways were really wonderful things, and would stop fighting them.” A citizen group—the Sierra Club—studying “the urban environment,” had also seen the elevated artery as a major problem; it was a member of this group who first proposed the plan for depressing the northern segment of the artery.

All the interests involved saw the northern segment of the Central Artery as the one highway project that had a chance of being built in the still strongly antihighway atmosphere of the late 1970s. Still, it was felt that, without the continued support of all the interests involved, even this project would be doomed. The EIA team chosen therefore included professionals skilled in citizen participation, although it was headed by an engineer from the Massachusetts Department of Public Works (DPW). Several team members, planners from the state’s Central Transportation Planning Staff (CTPS), had already worked on the planning stages with the Charlestown community and were trusted there. These planners were personally committed to the idea of public participation as a result of their professional training and previous social or environmental activism. One member of the EIA team was specifically assigned to community liaison activities and the team’s work plan featured weekly interactive public meetings.

Because the potential political consequences were so great, the Central Artery EIS illustrates a very careful and self-conscious handling of key choices regarding the role, shape, and extent of public participation. In general, we can think of these choices as attaching to the following four decisions that an EIA team must make: (1) Is public participation a necessary part of the EIS process or merely a formal obligation? (2) Should the team take active steps to seek out participants from the community or should it involve only those who come forward on their own? (3) Is it the team’s responsibility to educate the lay public so that participants can develop an informed point of view? (4) What does the team see as the role of public participation? To identify problems or to help discover solutions? In all four of these decisions, the Central Artery EIA team took the public’s and its own responsibility to ensure a high quality of participation quite seriously. Team members we interviewed answered our questions very articulately, as though they had given thought to this matter all along.

Necessity or Obligation
There was not a single member of the EIA team who did not view the public’s part in the EIA process as a necessity. However, team
In 1977, Massachusetts’ secretary of transportation, a political appointee, called for an EIS for a project planned during his first two years in office: improvements for the northernmost segment of Boston’s Central Transportation Artery. The EIS team was drawn from agencies that had worked on the proposal in the planning stages, including engineers from the state’s Department of Public Works and planners from the Central Transportation Planning Staff. The proposal had evolved from earlier, more grandiose plans to depress and update the entire Central Artery, which cuts through the center of Boston and is notoriously unsafe, unsightly, and inconvenient. Plans called for the relocation of a major interchange, replacement of a roadway plagued with one of the state’s highest accident rates, and depression of an extensive elevated structure that would open up waterfront and developable real estate in the Charlestown section of the city.

The EIS considered two alternatives to the proposed relocation: (1) repair the existing structures; and (2) repair the existing structures and realign and resurface affected streets. In a period when citizen protest had already paralyzed urban highway construction by obliging the previous governor to declare a moratorium, many saw the improvements to the artery as the one highway project with enough public appeal to proceed. The following interest groups were involved in the EIA process: city and state engineers and construction interests thwarted by the highway moratorium, the secretary of transportation, the Charlestown community, and the Sierra Club (which had first proposed the route under consideration). Most of these actors were eager to improve the “urban environment” (broadly defined to encompass social and historical features). In addition to high accident rates, rush hour bottlenecks, and air and noise pollution, the actors involved were concerned with (1) getting something built; (2) timely conclusion of the project; (3) achieving community goals through the allocation of federal transportation money; (4) ensuring local citizens a voice in their own destiny; and (5) making the historic Boston waterfront more accessible.

A final EIS recommending the reconstruction was accepted by the U.S. Environmental Protection Agency in June 1979 with the proviso that alignments and other street level impacts be worked out with the community before final construction. This work is still going on.
Soliciting Public Involvement

When a team sees public participation as a necessity, it is likely to work hard to achieve the highest possible quality of participation. This includes identifying and soliciting the involvement of key participants. Pre-EIA planning for the northern section of the Central Artery had involved the development of a citizen network. Advertising in local newspapers, workshops, and meetings had all been used. The community liaison member of the EIA team, however, considered these approaches too passive and "spent a month seeking people out." He asked the manager at the Charlestown Little City Hall "who should be involved, and went from there. Each person I would talk to would give me five more names." These tactics are comparable to the other inventive ways of making contact by which the North Branford team located participants for its workshops. When a team involves only those participants who come forward on their own, it may be overlooking a valuable resource or even a potential obstacle. The EIA process in South Paris, for example, took such a passive approach to involving participants that only those immediately threatened by the dump site had the incentive to come forward. When a new site was later added for consideration, a whole new group of people came forward—less to participate than to protest.

Educating the Participants

A team may also take responsibility for the quality of public participation by choosing to educate the lay public, to make technical knowledge accessible so participants can make informed decisions. In keeping with its philosophy and the earlier planning effort, the Central Artery EIA team worked hard to translate engineering con-
“Engineering is straightforward and common sensical when it is talked about in ‘people English’ rather than bureaucratic English.”

EIA team planner, Boston Central Artery case

ccepts and vocabulary.

While the engineers on the team felt they didn’t “know how to communicate their ideas to the public,” the planners assumed that “citizens can understand what engineers do. All they have to do is rework the needlessly complicated graphs and formulas and come up with ideas that the citizens can understand and critique.” The engineers liked the way the planners took the engineers’ drawings and slide show and “spruced them up” to show both the final plan and the phases of construction. These visuals and a model of the Charlestown community after construction were used to develop a language for communicating engineering concepts. In their interactive team meetings, the planners learned the engineers’ language: “By working with engineers on a weekly basis, I began to learn the ins and outs of road construction,” one said. “I felt that I could understand what they did.” With this understanding, planners translate ideas for the public: “Engineering is straightforward and common sensical when it is talked about in ‘people English’ rather than bureaucratic English.”

Role of Public Participation

An EIS team can rely on public participation for different kinds of degrees of input: where participation is seen as necessary to the process, the public may be called on to help identify problems or even to suggest solutions. Citizen identification of essential sewering needs in the North Branford case is one example. On the other hand, as in South Paris, where participation was seen as merely an obligatory step in the process, the public may only be expected to review, and perhaps approve, proposals. As we have seen, the South Paris team overlooked a citizen’s suggestion for a specific sludge treatment technique, which later became a central consideration in the design study instituted after the failure of the EIS.

While the Central Artery EIA team considered public participation a necessity and took responsibility for seeking out and informing participants, there were personal differences of opinion among team members about the role the public ought to play in decision making. Those whose personal philosophies supported citizen involvement generally expected the public to take an active role in decision making. On the other hand, those who felt the public’s role necessary for strategic rather than philosophical reasons, expected
public approval rather than citizen problem solving. Along with this expectation was one engineer's perception that community participation had no real effect on the process. "We used participation," he told us, "to get the community to the point where they could understand that we made the right decision. No, they didn't change the plan a bit." At times this engineers' language suggested a manipulative approach: he thought the public participation component of the EIA "impressed" the public and "sold" the idea. This was not the perception of the planners, however, one of whom told us, "That Charlestown is very smart and they know when they are being used."

It had been a Charlestown resident member of a citizen's environmental group (the Sierra Club) who had proposed the underground design of the northern section of the artery that the team was now evaluating. This community member, an architect, says his design was at first rejected by engineers who "glanced at it and said it wouldn't work." However, a friendly engineer, contacted through a local community planner, rescued it by doing calculations and presenting it successfully to the others. The EIA team engineer who so devalued the role of public participation said of the plan later, "We would have thought of it anyway. It was the best idea."

Despite the personal attitudes of some individual members, the EIA team as a whole took active steps to solicit and inform participants. Choosing to handle participation as it did had several outcomes. First, while the Charlestown community often objected to particular issues raised at public meetings, enough trust was generated that the project as a whole was never contested. The engineers' fears of public protest did not materialize. Second, in large part due to the responsibility with which the team fostered participation, highway engineers and community members (so long at odds in the Boston area) began to understand and respect each other. Because the project allowed the engineers for the first time to work with citizens who were supportive and responsive, they "realized that citizens were sincere" and that communication was possible. "If we [engineers] don't walk in with our minds made up but make an effort to listen to them, they won't fight us." Citizens, on the other hand, realized, as one planner put it, that engineers care about more than "build, build, build." The engineers in the group were "very sensitive about the effects that this would have on the community." We infer two-way learning from this account of the participation process by one of the Charlestown citizens: "In the beginning they [the engineers] came in here talking about curves and weaves and by the end they were talking about vistas and developable land—they must have learned something."

DATA AND FORECASTING

EIA teams are faced with numerous decisions about how to handle data and forecasting. Here, where one would think technical rules-of-trade would dominate, nonobjective choices are perhaps more impor-
tant than technical choices in a team's decision making. For example, before technical guidelines can be applied, a team must decide what sources of data are appropriate. Are new data necessary, or can forecasts be made using data from other cases or places? In addition, how precise do forecasts of impacts need to be? And how should the team handle the obvious difficulty of measuring physical impacts, than balancing them against less quantifiable socioeconomic impacts? How a team handles such decisions depends on the situation at hand as well as the personal values of team members.

The Central Artery EIA team's decisions about data and forecasting paralleled its decisions about public participation: in part because the team was composed of members of two state agencies, there was a strong commitment to getting the project built. The climate of highway controversy in Boston and the limited (elections-focused) time frame of the project's initiators made the speed of the EIA a priority. At the same time, the EIA process continued to define the project in broad terms, giving high priority to the less easily measurable social and environmental effects of the transportation proposal. Its concern with speed and broad environmental priorities affected the team's approach to data gathering and forecasting.

Data Sources

The Central Artery EIA team had no need to consider data from other locations. It did, however, rely almost completely on data from another time. Because team members had access to traffic, accident, and noise data already accumulated by various state and city agencies, they felt no need for new numbers. (The connection to existing data sources had been one reason for the appointment of CTPS members to the EIA team in the first place: the CTPS was seen as "an ongoing operation to provide numbers to the various transportation agencies.") Even in the earlier planning stages, some of the data had been reused from previous projects. The team's priority on speed influenced its decision to use old data: "If we had wanted new numbers, we would have had to wait a year for them to come in." Because the EPA found its existing air quality data insufficient, the team chose to forecast with "a brand new model that could do the monitoring in a month as opposed to the three to four months required by others."

Precision of Forecasts

In determining the standards of precision for forecasting, the team was influenced not only by time pressures and the momentum of previous investigations but also by its broad definition of the "Central Artery problem." Because no one considered this merely a problem of air quality, noise level, or traffic flow, there was a willingness to place more emphasis on perceptions of social, political, economic and environmental impacts. (The tendency to see the problem as a
“All you had to do was look at it [the artery] to know that it was an insult to the Charlestown community. It cut the neighborhood in half with a dirty, noisy structure. We didn’t need models to tell us this.”

EIA team engineer, Boston Central Artery case

social or an environmental one was so strong that an engineer in the group told us, “I had to constantly remind people that this was a transportation project and without the transportation part, we didn’t have the money and the goodies that made this project so attractive.” All realized the need to use traffic and air quality models to project the effects of the relocated artery, but team members tended to demphasize numerical precision in their personal decision making, “We cited the fact that the artery had the highest accident rate in the state and that by improving the road we would reduce this, but all you had to do was to drive the road to know that it was an awful road—all you had to do was look out your window to see what it did to the city. I didn’t need numbers to understand this.” Team members of every persuasion had remarkably similar reactions to our interview questions on precision. A second engineer told us “all you had to do was look at it [the artery] to know that it was an insult to the Charlestown community. It cut the neighborhood in half with a dirty, noisy structure. We didn’t need models to tell us this.” While the team put together enough precise data on physical impacts to satisfy the EPA, team members tended to see these data as superfluous.

In measuring socioeconomic impacts, the team also chose to do the statutory minimum. It documented physical impacts and indicated socioeconomic benefits, but with the EPA’s permission, it avoided doing a traditional cost-benefit analysis because it felt precision in such an analysis would not make sense. “We didn’t want to get trapped by assigning a number value to a human life and adding these lives saved to the amount of time an average person would save in travel each day and then project this over 20 years and come up with a number that magically equalled one hundred million dollars.” This reductio ad absurdum of rationality in precise comparative measurement shows an underlying attitude widely held in the team. As the same member said, “I also have a gut feeling that you can’t assign a number value to a human life or [decide] how much saving four homes is worth.” The Central Artery EIA team “got by” with less precision and a greater reliance on preexisting data than usual. It’s EIS was completed within the time frame it set out, and implementation continues to proceed at the slow pace currently set
by essentially unchanged Boston politics.

ROLE OF THE EIS IN THE PLANNING PROCESS

Underlying all six of the issues we've discussed is this question: how do EIA practitioners see the relationship between the EIA process and the larger planning process? Is the EIA process perceived as completely separate from the planning of a project or is it interconnected? If the two processes are related, in what way and to what extent does the EIS play a role in planning? We can see three questions arising for practitioners: (1) Do you view the EIA process as happening after planning or concurrently with it? (2) Do you see the EIA process as addressing the basic problem behind the proposed action or as merely evaluating alternative solutions already generated? (3) Is there a difference between the people who do planning and those who are best able to do EISs? Put another way, must EIA practitioners be independent specialists or should they integrate the two functions of planning and impact assessment?

Perhaps the most typical stance adopted by EIA practitioners is illustrated by our South Paris case. Here the EIS was seen as peripheral to the planning process. The South Paris EIA team saw themselves as independent specialists brought in after the planning to evaluate what had been planned by others. The team therefore concerned itself with a limited set of sludge disposal alternatives rather than with the broader problem of the sludge itself. Their efforts resulted in "disaster" when their client realized that the problem was far broader than had been defined. The North Branford EIA team, on the other hand, saw itself as readdressing the basic problem—the need for sewering. Its efforts brought forth an essentially new plan. An even more intimate connection between planning and impact assessment existed in Boston's Central Artery case: because some of the EIA team members were the same people who had conceived the plan, they saw themselves continuing to work for its implementation in the EIA phase.

Our final case, Boston's Orange Transit Line, illustrates a situation in which EIA functions were even more deeply and problematically embedded in the planning process and where the actors involved seemed particularly aware of this relationship.

EIS Seen as After or Concurrent with Plan

From the very inception of the plan to relocate the public transit line along Boston's Southwest Corridor, planning and impact assessment were seen as concurrent functions. The original transportation study for Boston's Southwest Corridor was expected to serve as both plan and EIS. Begun in the early 1970s, this study, the first of three EISs for the project, already had a complicated history. Boston transportation planners as far back as 1948 had intended to supplement the city's outer belt with an inner belt and to provide access to the inner

* See page 359 for summary of case.
city by extending outlying interstate routes into the center along several transportation corridors. The Southwest Corridor, which already carried the tracks of the Penn Central Railway through the inner city neighborhoods of the South End, Roxbury, and Jamaica Plain, was to provide the connector for Interstate 95 to the south. In the early 1960s the Massachusetts Bay Transportation Authority (MBTA) planners also designated the corridor as the best route for relocating the Orange Line, an outmoded turn-of-the-century elevated structure, which they had promised to extend to the suburbs. By 1971, a 100-yard strip of land adjacent to the railroad right-of-way had been cleared to accommodate their plans. However, organized public opposition to highway construction had become strong enough to temporarily halt road building. In 1971, before he had declared his moratorium on urban highway construction and before the full development of Federal EIS legislation, the governor of Massachusetts established the Boston Transportation Planning Review (BTPR) charged with the task of studying each of the transportation corridors, both transit and highway.

While the combination of planning and EIA functions was acceptable enough to win federal funding for the BTPR, the results continued to be problematic. The BTPR study, completed in 1972, recommended the moratorium on highways, but planned to relocate the Orange Line and find uses for the previously cleared land. The study was rejected by the U.S. Department of Transportation (DOT) as an EIS because it did not, as one actor put it, "go into enough detail about transit alternatives." Meanwhile the BTPR had set up an agency to coordinate development in the Southwest Corridor. The Southwest Corridor Office (SWCO), staffed by planners, but no engineers, decided to reshape the EIS using the original BTPR data. "It meant that we would save several years' time, and we felt that all the basic decisions had been made." When this second attempt, too, was rejected, the BTPR and SWCO engaged a consulting firm, which included engineers as well as an architect with a real estate background, to work with them on a third EIS.

The first two EIS attempts had been unusual in that planning and impact assessment had been done concurrently and by the same people. No one we interviewed, however, saw this overlap as a cause to reject the EISs. Rather, perceived difficulties seemed to lie in the other ambiguities of this transitional situation: the guidelines for EISs were new and changing. "It was really a case of DOT sticking to the letter rather than the spirit of the law." Also, the proposal cut confusingly into many jurisdictions. "This is not a typical urban mass transit project in which you are only dealing with UMTA. Because of rail right-of-ways, we had to deal with the Federal Railroad Administration. Because of the highway money, we had to deal with the Federal Highway Administration." (The plan also called for housing, parks, a community college, use of local labor, and training of local high school students.) It was in part the original dilemma of
## CASE SUMMARY

*Orange Line Transit in Boston’s Southwest Corridor*

In the early 1970s, an EIS was undertaken to evaluate the proposed relocation of one of Boston’s public transit lines (the Orange Line) along the Southwest Corridor railroad, where a 100-yard strip of land had been cleared for an eight-lane interstate connector the construction of which was blocked by the state’s urban highway moratorium. This was the third attempt at an EIS for a project discussed as far back as 1948. The first EIS, completed by the Boston Transportation Planning Review upon the announcement of the highway moratorium, had been rejected by the U.S. Department of Transportation (DOT) for lack of detail. A subagency, the Southwest Corridor Office, had attempted a second EIS with the same fate. The third EIA team included a consulting firm as well as representatives of both original agencies.

Only several years later, the transportation agencies involved no longer planned to run the Orange Line along the median of the highway or to extend it to the suburbs (as originally intended). The line was to run at grade along the railroad right-of-way through three major Boston neighborhoods. The land use and development options created by the proposed transit line made the project “a major development opportunity,” involving housing, a community college, parks, and job training for local residents. Major impacts anticipated included noise and safety problems, the effects of land use on the community, and the impacts of new street alignments on surface traffic.

Previous controversies over the use of highway money for mass transit construction still engaged the Massachusetts Bay Transportation Authority, suburban commuters, and the postmoratorium antihighway movement. Controversy continued among diverse residents of city neighborhoods affected by the land clearance or likely to be affected by new uses, street alignments, or the proximity of the rail line itself. The third Orange Line EIS suggested detailed street alignments and a new rail line profile to the satisfaction of the community and was accepted by the DOT in 1978. Work on the project is now about half completed.
“There was a bad feeling on the part of the highway guys within the federal government because they felt that they were going to get a highway EIS and it turned out to be a transit EIS. They said that if this is going to be a transit EIS, we are going to have to make you go back and look at a lot more.

Head, Southwest Corridor Office, Orange Line case

the project—highway vs. transit—that the head of the SWCO saw as the downfall of the first two attempts: “There was a bad feeling on the part of the highway guys within the federal government because they felt that they were going to get a highway EIS and it turned out to be a transit EIS. They said that if this is going to be a transit EIS, we are going to have to make you go back and look at a lot more.”

While the third EIS attempt differed in including team members who were not heavily invested in the original studies, the philosophy of the project as a whole remained clear and explicit: in the view of the participants the planning and EIS functions of the study were inextricably linked. As the BTPR head told us, “Doing an EIS is just another version of doing good planning. If one looks at the NEPA regs, they insist that you look at a lot more than environmental factors; they make you look at social factors, too. Thinking about how to do a good EIS is just a smaller way of thinking about how to do good planning.” The SWCO head saw an even more profound connection in bringing EIS funding to bear on planning: “There were a lot of issues where we needed to spend a lot of money and to employ a lot of people to look at problems. If you have to give a name to this kind of scoping, you might as well call it an EIS.”

“There were a lot of issues where we needed to spend a lot of money and to employ a lot of people to look at problems. If you have to give a name to this kind of scoping, you might as well call it an EIS.”

Head, Southwest Corridor Office, Orange Line case

Addressing Basic Problems or Proposed Alternatives

Despite the SWCO head’s notion that “all the basic decisions had been made,” the Orange Line plan continued to change throughout
all three EISs.

The first EIS planning study had worked from the MBTA's prior transit plans, which had developed in the 1960s far beyond the stage of problem definition. Although it did redefine only the MBTA's assumptions, the BTPR accepted most of the MBTA's earlier definitions of the problem without question. The BTPR never challenged the MBTA assumption that turn-of-the-century el's should be removed and that federal highway money should be used for transit. "The idea that the relocated Orange Line was going forward was a working assumption from the start of the BTPR." However, the BTPR did redefine a third assumption of the MBTA, that mass transit should be extended to the suburbs. As the head of the BTPR told us, higher costs and a need to preserve commuter rail played a role along with "this hidden agenda issue which was that people from the suburbs did not want to take mass transit through Roxbury [the city's major black neighborhood] if it was going to make any stops."

With the legacy of challenging some basic assumptions in a plan while choosing to ignore others, the third EIA team left the basic assumptions of the project as they stood and focused their planning energy on details. They used the EIA process to "work out some of the unresolved problems like surface street alignments and the question of should it be above or underground." Details on the controversial profile of the rail line in the South End section of the city were worked out in the weekly community meetings, which had continued after the original BTPR study. Compromising between the original notion of tracks at grade and the South End community's request for underground tracks (which would have doubled the cost), the team came up with a 20-foot deep profile, decked over where noise and safety would be problems. One engineer noted: "By doing this in the course of the EIS, we were also able to build a park above the tracks so the EIS not only allowed us to resolve the noise issue, it also gave us the chance to provide the community with amenities."

Most team members we interviewed were pleased with these contributions and agreed that "the EIS did change the product." However, the consulting firm head saw the EIS as "80 percent complete filler." "We spent millions of dollars on a document that didn't change a thing." Others saw problems in attributing the changed plan to an effective public participation component. An engineer felt that participation dragged over such a long period of time had not had the impact it might have had. A citizen felt that planners only listened to and educated the antihighway citizens with which they agreed. Regardless of what produced the changes or who on the team saw them as significant, the third Orange Line EIS produced an improved relocation plan, which was accepted by the DOT and is now halfway through construction.
Integration of Planning and EIA Personnel

There were some differences in perception among the members of the third Orange Line EIA team. These differences correlated with each team member's specialization and function: those BTPR and SWCO members (mostly planners) who had been involved in the project since 1971 tended to place greater positive emphasis on the EIS as a planning document than the consultants (mostly engineers) brought on from a private firm for the third EIS only.

This difference raises the final question about the planning function of an EIS. Are EIA personnel different from planning personnel or are the same people deemed capable of performing both functions? The typical view is that an EIA team ought to include independent specialists with expertise and functions different from those of planners. The Orange Line EIA process began with the very opposite view since its original teams (from BTPR and SWCO) were neither independent in function nor technically specialized. When the first two EISs were rejected for lack of "detail on transit alternatives," the group moved toward a compromise view in composing its third team.

The third EIA team, then, involved outside specialists as well as members of the two agencies that had begun the planning effort. Both agencies maintained an ongoing commitment to their planning and implementation functions. The primary loyalty of the SWCO group (made up of several antihighway people and a philosophy professor, to which an engineer was added only during the third EIS) was to the community and the completion of the Orange Line project. Some of the consultants were especially distressed with the expense of the public participation component.

"These decisions were shoved down my throat and I take no responsibility for them."

Same EIA team engineer, Orange Line case

Some of their responses showed another difference among team members: the difference in specialization between planners/architects and engineers. One of the engineers (from the consulting firm) praised the choice of an architect urban designer with a real estate background as head of the third EIS effort, which, in his view, "needed a risk-taker." Though he considered the EIA "a hard engineering problem," he felt that "engineers just don't know how to stand out on a limb and take chances. They are too rational." Yet this same engineer felt architects and planners did not take his expert views seriously enough. The plan's tight-turned street intersections, which the architects wanted, seemed unsound to him as an engineer:
"These decisions were shoved down my throat and I take no responsibility for them." Thus, although the third EIA team did integrate staff with long-term involvement with outside specialists, and did integrate planning specialists with engineers, the alliance was not particularly cohesive.

Part of the difficulty with the first and second EISs was the lack of engineering expertise ("not enough detail on transit alternatives"). The more integrated third team wrote a more successful EIS. In the Orange Line case, however, this does not so much imply that planners were not specialized enough in engineering to write an EIS as it suggests that more engineering specialists might have been productively involved in the planning process. The expertise and commitment of both planners and engineers were needed for both the planning and the EIA functions of this group, and, when this need was acknowledged, the project flourished.

The Orange Line case provides some particularly instructive illustrations—partly because it began with so dramatic a reversal of the traditional separation of planning and assessment. The case is also instructive because its long history of early failures shows the actors learning from and becoming more aware of key choices and value judgments.

**HANDLING VALUE JUDGMENTS IN PRACTICE**

Our findings show EIA practitioners making nonobjective judgments in a wide range of situations. At times particular choices led to "disaster"; at other times the same choices appeared to lead to a successful outcome. The outcome of the South Paris team's decision to accept its client's definition of the problem, for example, contrasts sharply with the North Branford team's similar decision. Differences in outcome result not so much from a "right" choice or series of choices as from choices in which value judgments are in keeping with the complexities of the situation. The choice just mentioned worked well in North Branford because in that case, the client's view of the problem was well-founded and enabled the team to deal well with other nonobjective dimensions of the situation.

Since there are no right value judgments and since nonobjective choices are inevitable, what are some of the ways practitioners can handle such considerations effectively? The first alternative is obvious: become more aware of the choices as choices. Knowing that a choice has been made enables one to change that choice. Had the South Paris group realized that it had chosen a narrow view of the problem and that its team membership and work plan had resulted from this basic choice, it might have maintained more control over the outcomes by changing its definition of the problem, its team members, or its work plan at any time. Yet members continued to believe that their objective posture and traditional work plan were the only possible responses. To hide from the nonobjective elements...
of our most rational pursuits is to make ourselves victims of them. Impact assessment professionals must take this into account.

In addition to becoming more aware of choices, two other strategies are possible. One is to make hidden value judgments explicit so that they can be discussed with others. For instance the head of the Southwest Corridor Office in our Orange Line case made several key judgments in deciding that his staff of planners and professors (all antihighway activists) could rewrite the first EIS without the expertise of an engineer. If he had verbalized and discussed his underlying view that the task at hand was not a technical one, rather than merely thinking that such a strategy would work because “all the basic decisions had been made,” others’ reactions might have helped him realize that the EIS was sure to “lack detail on transit.” Putting nonobjective concerns into words and consulting with a wide range of people regarding their validity does not relieve practitioners of responsibility, but it may help them develop a clearer perspective on the choices and value judgments that they do make.

Finally, nonobjective judgments may also be handled in a more formal way. In addition to acknowledging, verbalizing, and discussing them, practitioners can insist on an official agreement about how to treat key nonobjective, nontechnical choices. Judgments involving the definition of the problem, the scope of costs, allocation of work hours, strategies for public participation, precision of data, etc., may be talked through with the client and written into formal contracts or agreements. Such a strategy will force the client and others to become more aware of their own underlying values. More importantly, it will oblige other actors to share responsibility for the value judgments that are made and for their consequences.

IMPLICATIONS FOR THE TRAINING OF EIA PRACTITIONERS

Values are so personal that professionals rarely discuss them. We usually become aware of each other’s values through productive clashes with people whose judgments differ from our own. An EIA process often provokes such productive clashes. Our interviews revealed that many of the professionals involved in the EIAs we studied became more aware of their own values in the process. One engineer (who had previously worked only with other engineers) appreciated working on the Boston Central Artery project with planners, architects, and lawyers who had different viewpoints: “Through these experiences, I realized that there were more important questions than the grade of the road.” An Orange Line engineer told us, “I lacked . . . the sense of connecting things to people, working with designers gave me some of this sense.” Planners often said they had learned specific engineering skills. “More importantly,” one added, he had “learned how to pay attention to detail
and to look at the big picture at the same time." Such interactions may also serve to help dispel bias. One planner found his stereotype of engineers "untrue": "They were very sensitive about the effects that this project would have on the community."

Properly undertaken, the EIA process can stimulate awareness of (or change) values. A Central Artery engineer learned from experience with responsive citizens that he could trust the participation process: "If we don't walk in with our minds made up . . . they won't fight us." The project manager of the Anderson-Nichols team, whose firm handles many EISs, feels this work has affected his firm's values: "Because of our EIS experience, our assessments are much more objective than a lot of others. . . I think the exposure the company had to the EIS process had a feedback on the assessments we're putting out. . . There's an interaction . . . [with] our other projects."

Since it is usually not possible to provide the experience of working on a real EIA during the period that professional engineers and planners are in school, we must find other ways to help future practitioners become more sensitive to the important role that non-objective judgments play in the EIS process.

Case studies like ours can be read and discussed from many different perspectives. It is not so important that values and choices be labeled or analyzed in any particular way. Rather, what is important is that students recognize the operational impact of value judgments. (The South Paris Case is a "natural" for establishing that nonobjective judgments constantly affect the most technical-seeming decisions.) A traditional case discussion method—in which reductive explanation of failure or success are rejected and all possible interpretations are investigated—can help future practitioners probe how a different set of values might have affected outcomes differently.

Cases can also be used as the basis for gaming. Students can benefit enormously from role playing the behavior of particular actors in specific case situations. (For instance, it might be useful to play-act a Central Artery team meeting with the community to discuss whether the impacts of surface street alignments should be omitted from the EIS). The ideal cases for role playing are those in which many different personal and professional viewpoints are involved and choices are not at all obvious. To sharpen interdisciplinary differences in view, it might be possible to try gaming with students from several schools or departments; engineering, planning, and architecture students might play their professional counterparts in the Central Artery case, for example. Or roles might be reversed or scrambled. The most useful, pedagogically, are those that provide enough detail so that students are able to relate to the attitudes and views of the characters they are playing without having to ad-lib or invent essentials. The most important goal of gaming exercises is for students to understand their own values by contrasting theirs with the values of the characters they are playing and of the others with whom they interact in class.
A variation on the gaming technique is to focus on professionals' communication with nonprofessionals, for it is in this transaction that values are most typically revealed. It's illuminating to watch professional engineers and planners explain a project straightforwardly to nonprofessionals (in what a Central Artery team member called "people English"). Students might be asked to evaluate simulated presentations (presented on videotape for ease of analysis). Students rarely have difficulty discerning the values of the professionals involved.

Analyses of cases, gaming exercises, and careful appraisals of simulations are all means to an end. EIA practitioners must be taught to recognize the importance of nonobjective judgments in their work. Students must understand the consequences that subjective choices can have in any given situation. They must be shown that different value judgments would yield a different outcome in the same case. More specifically, future practitioners ought to be taught that (1) EIA practitioners often give advice and make judgments that are not based solely on technical training; (2) all technical judgments have a range of value judgments embedded in them; and (3) some technical judgments are more constrained by value choices than others. It is a mistake for practitioners to pretend that nonobjective judgments play no part in their work. Rather, each practitioner should develop a "personal theory of practice"—an approach to accepting responsibility for non-objective judgments and helping clients understand when and how such judgments shape professional behavior and advice.