The Decision-Identification Tree: A New EIS Scoping Tool

C. H. Eccleston

Date Published
April 1997

To Be Presented at
22nd Annual Conference
National Association of Environmental Professionals
Orlando, Florida
May 1997

To Be Published In
Journal of Impact Assessment/Environmental Professional

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

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THE DECISION-IDENTIFICATION TREE

A NEW NEPA SCOPING TOOL

Charles H. Eccleston

Environmental Compliance Planning and NEPA Services,
Rust Federal Services of Hanford Inc., Richland Washington

ABSTRACT

No single methodology has been developed or universally accepted for determining the scope of an Environmental Impact Statement (EIS). Most typically, the scope is determined by first identifying actions and facilities to be analyzed. Yet, agencies sometimes complete an EIS, only to discover that the scope does not adequately address decisions that need to be made. Such discrepancies can often be traced to disconnects between the scoping process and the actual decisionmaking that follows. A new tool, for use in a value engineering setting, provides an effective methodology for improving the EIS scoping process. Application of this tool is not limited to National Environmental Policy Act (NEPA) scoping efforts. This tool, could in fact, be used to map potential decisionpoints for a range of diverse planning applications and exercises.

INTRODUCTION

Be it a prehistoric flint-striker for sparking fires, a torque wrench for repairing an automotive engine, or a computer model for simulating groundwater contaminant transport, tool making is one of the principal traits distinguishing humans from other creatures. The importance of tools in the modern world cannot be over emphasized. Progress witnessed in most disciplines, the sciences in particular, greatly depends on advancements in developing tools of the trade. While many environmental disciplines have benefited from development of tools, implementation of the *National Environmental Policy Act (NEPA)* of 1969 has lagged noticeably. Rigorous tools, techniques, and state-of-the-art methodologies must be developed and adopted if NEPA is to achieve its full potential.

NATIONAL ENVIRONMENTAL POLICY ACT

NEPA establishes the basic national policy for protection of the environment.¹ Congress created NEPA to ensure that environmental factors are properly considered during the early planning process, before federal agencies make a final decision to proceed with a proposed action. Under NEPA, an Environmental Impact Statement (EIS) must be prepared for all federal actions significantly affecting the quality of the human environment. In 1978, the Council on Environmental Quality (CEQ) issued regulations for implementing NEPA.²

IMPROVING THE SCOPING PROCESS

First and foremost, an EIS is a planning tool for assessing impacts so that environmental considerations can be factored into the agency's decisionmaking process. An element essential to its success involves a requirement to conduct a public scoping process to identify the range of actions, alternatives, and impacts that will be addressed.³ While no single approach is universally accepted, the scope of an EIS is most commonly determined by first identifying actions and/or facilities that will be analyzed. Yet, it is not uncommon to find that an EIS has been completed, only to discover that it does not adequately address decisions that eventually need to be made. Such discrepancies can often be traced to disconnects between scoping and the actual decisionmaking process that follows. Compounding this problem is the lack of rigorous tools and techniques for effectively conducting scoping. Clearly, a need exists for developing new tools and techniques to assist practitioners in assessing the potential scope. An approach, specifically designed to do so, is introduced in the following section. Application of this approach is not limited to NEPA scoping efforts. Indeed, a general-purpose methodology is introduced that can be applied to a diverse range of environmental planning applications, problems, and exercises.

DECISION-BASED SCOPING

As witnessed earlier, no EIS can adequately support subsequent decisionmaking if decisions that may eventually need to be considered are not correctly anticipated. Not surprisingly, the utility of an EIS is proportional to its ability to support future decisionmaking. Consistent with its commitment to environmental excellence, the U.S. Department of Energy's Hanford Site has explored new approaches for assessing the scope of potential EISs during the early planning process. This paper discusses one such approach in which selected Value Engineering (VE) techniques used as a rigorous mechanism for managing NEPA scoping efforts. Such approaches hold the key to reducing cost and increase both efficiency and effectiveness of the NEPA planning process.

Under this approach, a prescoping workshop is conducted, focusing on identifying potential decisions that might eventually need to be considered. As described in this paper, a new approach, referred to as *Decision-Based Scoping* is described, which is in marked contrast to the way most scoping efforts are conducted. Under the Decision-Based Scoping, emphasis is placed on first identifying potential *decisions* that eventually may need to be considered by decisionmakers. Once potential decisions are identified, the scope of actions and alternatives, naturally follow. Potential environmental impacts can then be identified, once agreement is reached on the scope of actions and reasonable alternatives.

In some cases, identifying potential decisionpoints that may need to be considered during the future decisionmaking process can be deceptively complicated. This paper describes a new tool, referred to as a *Decision Identification Tree (DIT)*, which was developed in conjunction with the Decision-Based Scoping approach to assist practitioners in identifying such decisionpoints. Use of this tool appears well suited for scoping large or complex EISs and programmatic EISs, particularly where many potential decisionpoints are involved, or where decisionpoints are not

clearly obvious.

APPLYING VALUE ENGINEERING PRINCIPLES IN NEPA SCOPING

To illustrate this approach, consider the following example which could apply to the operations of various. Given today's strict environmental requirements, many agencies are faced with managing complex waste operations. Suppose that an agency has a need to modernize and possibly expand its waste management operations at one of its installations. A decision is made to prepare an EIS to support decisions regarding the future of the waste management operations. Because of the magnitude and complexity of operations, a degree of uncertainty surrounds the course of future actions that the agency may eventually want to pursue. A Decision Based Scoping approach is implemented in an effort to identify future courses of action and decisions that may eventually need to be made.

Consistent with a Decision Based Scoping approach, a facilitated, interdisciplinary, prescoping workshop is conducted to assist planners in the early identification of the potential scope. To support this effort, a DIT is constructed to identify potential waste management decisions that may need to be considered by the decisionmaker. Figure 1 provides a simplified example of a DIT for such a program.

Prior to constructing the DIT, a facilitated exercise is performed to identify factors that might affect future decisionmaking. A VE facilitator records each of these factors on a master flip chart. Depending on the circumstances, Table 1 provides a list of factors, identified by participants, that might affect future decisionmaking. As described in the next section, a DIT is then constructed to identify potential decisions that the EIS should be designed to support.

DECISION IDENTIFICATION TREE

Before describing the DIT, a word of caution is in order. Both CEQ's NEPA regulations and case law clearly indicate that a final decision regarding a course of action not be made until the NEPA process is completed. Making a final determination, before completing the NEPA process, can provide sufficient grounds for successfully challenging an agency's decision. Consistent with this requirement, the DIT *is not intended to be used in determining the actual outcome of a given decision*. Quite the contrary. The purpose of the DIT is to *identify* potential points that may need to be *considered* by the agency and for which the EIS must be constructed to support.

Accordingly, participants must be educated to understand that the DIT is to be used in '*mapping*' the array of potential decisions that may need to be *considered*, and *not* to determine a particular outcome or course of action. This being the case, experience indicates that the facilitator or a NEPA specialist will need to periodically intervene to remind workshop participants that the DIT is designed to identify, *not* to determine, specific outcomes.

Figure 1. Example of a Decision Identification Tree.

Table 1. Example of Potential Factors that Might Affect Future Decisionmaking.

Project schedule
Funding
Public input
Potential Land use
Consistency with previous decisions
Available technology
State and federal regulations and regulatory decisions
Worker and public safety issues
Availability of a waste disposal facility.
Infrastructure factors

RULES AND NOMENCLATURE USED IN CONSTRUCTING THE DIT

Because the concept of the DIT is new, a consistent nomenclature and a set of rules need to be established for constructing the DIT. As proposed in this paper, the box to the left of the vertical dashed line on Figure 1, denotes potential factors or decisionpoints, that are outside the scope and control of the EIS decisionmaking process. Such factors or uncertainties are important to capture, as these might influence potential decisions, which are mapped to the right of the dashed line. Conversely, potential decisionpoints to the right of the vertical dashed line, represent those that are potentially within the authority or domain of the decisionmaker, and which the EIS should be constructed to support. Factors identified earlier in the prescoping process (Table 1) may assist the group in identifying potential decisionpoints which may effect the scope of the DIT. This example supposes that a programmatic EIS has been prepared and that a high-level decision has been made, restricting the transportation of certain types of dangerous waste. A go/no-go decision by a private firm to construct a waste treatment facility, capable of handling much of this waste, is also beyond the agency's control.

As used in this example, the scope of the EIS involves management of two principal waste types: (1) Dangerous Solid Waste (DSW), (2) Dangerous Liquid Waste (DLW). As indicated in Figure 1, the horizontal axis of the DIT is referred to as the 'Will-Axis', because this line denotes potential decisions points designated in terms of the following question: *"Will or might decisionmakers be faced with having to consider and make decisions with respect to the following course of action?"* Specific decisionpoints that *might* need to be considered are encapsulated in solid-bordered diamonds along the Will-Axis. All decisionpoints along the Will-

Axis are associated with a question mark to reinforce the fact that the DIT only identifies potential decisionpoints that will/might need to be *considered*.

Highest-level decisions are denoted on the left side of the Will-Axis, proceeding progressively toward lowest-level (i.e., less important) decisions, as one moves to the right. The term 'highest-level' denotes fundamental decisions of most importance or decisions having the largest repercussions in terms of the agency's decisionmaking process. Decisionpoints denoted along the Will-Axis are completely or largely independent from one another; thus, a decision to pursue a given course of action does not necessarily trigger subsequent, which lie to the right, along the Will-Axis.

During the agency's decisionmaking process, a decision to pursue a given course of action often triggers or spawns subsequent, lower-level considerations (i.e., dependent decisionpoints). Accordingly, the DIT builds downward along the vertical axis, indicating circumstances where a choice to pursue a given decision would trigger or spawn the need to consider subsequent lower-level decisionpoints. Where one decisionpoint triggers subsequent considerations, the triggered decisionpoints are mapped downward, from most important to least important, along the vertical axis. For this reason, the vertical axis is referred to as the "What-Axis," because it denotes the question: *"What types of decisions will or might decisionmakers be faced with having to consider if a decision were made to pursue the preceding course of action?"* Grouping potential decisionpoints within a box, along the What-Axis, indicates that such decisionpoints are of equivalent precedence (i.e., decisionpoints are equivalent in importance).

CONSTRUCTING THE DECISION IDENTIFICATION TREE

The first step in constructing the DIT involves determining an appropriate configuration. The structure of the tree is a function of the scope of potential actions and issues. Because each DIT is unique, professional judgment must be exercised in determining the most appropriate configuration.

A skeleton tree consisting of two horizontal Will-Axes, corresponding to the two distinct waste streams, is drawn. Figure 1 shows a simplified version of a DIT for a waste management EIS. The two Will-Axes are of equal precedence; potential decisionmaking for the topmost Will-Axis is not necessarily any more important than that for the bottommost. A brain storming session is now conducted, to identify major decisions that *might* need to be *considered* by a decisionmaker for each of the two waste streams. These potential decisions are written onto Post-its® and affixed to a flip chart. These decisionpoints provide the basis for constructing the DIT.

Next, the facilitator challenges the group to identify the most fundamental (highest-level) decision that might have to be considered. Tools such as the Nominal Group Technique (NGT), can be used to identify, consolidate, sort, and prioritize such decisionpoints.⁴ As applied to this problem, the principal steps in this process are outlined in Table 2. Factors identified earlier (Table 1) can assist the group in reaching a consensus.

Table 2. Summary of the Nominal Group Technique

Step 1: Generate Decisionpoints

The facilitator asks group members to write down the important decisions that they believe need to be made. Each participant writes these decisionpoints on a note card.

Step 2: Record Decisionpoints

Ideas generated in Step 1 are recorded in a round-robin fashion. This process continues until all items have been recorded. Next, to prevent confusion, the facilitator asks each participant to briefly explain the items submitted.

Step 3: Polling

The potentially long list of decisionpoints must be narrowed down to capture the most important decisions. Many methods exist for accomplishing this task. One common method is to have each participant write down a specified number of decisionpoints which are considered most important. These techniques are tabulated by the facilitator. A second round is then conducted to prioritize the final list of decisionpoints.

Using the waste management example, we begin by examining the DSW waste stream. This example assumes that a decision regarding future acceptance of offsite DSW is identified as the most fundamental decision that the agency might be faced with having to consider. Accordingly, "Accept offsite DSW?" is added as the first element (diamond shaped decision box) along the Will-Axis of the DSW axis (Figure 1).

Once the highest-level decision has been identified, the group begins identifying successively lower-level decisionpoints (along the What-Axis) that could be triggered *if* a decision were made to accept offsite waste. Assuming a decision is made to accept offsite DSW, the highest-level decision that could be triggered, involves determining the extent to which waste would be accepted. In this example, decisionmakers would consider accepting waste, on either a restricted regional basis, or from across the nation. This decisionpoint is reflected by the arrow labeled "Yes" that descends vertically downward to a logical "or" gate. The gate is indicated by the word "or" enclosed by a circle. The "or" gate divides into two paths which are denoted by the diamonds marked "Regional?" and "National?" Next, the agency would need to make a decision regarding potential treatment of the offsite waste. Various treatment technologies would need to be evaluated (See box labeled "Treatment technology") if a decision is eventually made to treat the offsite waste.

Two potential decisionmaking paths, labeled "Storage" and "Disposal" branch off the diamond labeled "treatment." A decision to pursue onsite storage or disposal options could spawn further

considerations. For example, if a decision is eventually made to store the offsite waste, this decision could spawn considerations regarding the need to expand existing storage facilities. Similarly, if a decision is made to pursue the disposal option, additional considerations such as expansion and eventual closure of the disposal facilities would need to be reviewed. These options are shown placed together within a single box, indicating equivalent precedence. Additional considerations (not shown) might involve packaging and monitoring. Professional judgment must be exercised in determining the level of detail to which such decisionmaking is mapped.

The reader should note that the What-Axis can actually be viewed as *mapping potential courses of action (i.e., options or alternatives) that might be triggered, based on the outcome of decisionpoints mapped along the Will-Axis*. More to the point, the DIT provides a methodology for *mapping alternative courses of action (What-Axis) as a function of fundamental decisionpoints (Will-Axis)*.

Once decisionpoints along the What-Axis have been mapped, this process is repeated, starting back along the top of the Will-Axis. In this example, a decision regarding disposal of onsite waste is considered by the group to be the next highest-level decisionpoint that would need to be contemplated for the DSW (see diamond labeled "Disposition of onsite DSW?"). A decision to proceed with long-term disposition of DSW would trigger a series of subsequent considerations. In this example, decisionmakers would be faced with having to decide between three subdecisions (i.e., alternatives): (1) transporting the waste to an offsite facility for disposal, (2) long-term storage, or (3) onsite disposal of the DSW. This decision path is reflected by the arrow labeled "Yes," descending vertically downward to the diamonds marked "Offsite disposal," "Long-term storage," and "Disposal onsite." Each of these decisions would lead to further consideration regarding various treatment technologies that would need to be evaluated (See boxes labeled "Treatment technology") if a decision is eventually made to treat the offsite waste. A decision to transport the waste offsite for disposal would spawn decisions about the method of transportation, while storage or onsite disposal would trigger considerations regarding expansion and eventual closure of the onsite disposal facilities.

On completing the DSW waste stream, a similar process is conducted to map potential decisionmaking for the DLW stream. If offsite DLW is accepted, decision would need to be made regarding acceptance of either national or regional sources as well as potential treatment. If a decision is made to store the waste, then the agency would need to consider construction of new tanks. Conversely, if a disposal option is pursued, decisionmakers would need to consider processes for safely disposing of this waste.

Similarly, the process is repeated for the next highest-level decisionpoint along the DLW axis (See diamond labeled "Disposition of onsite DLW?"). A decision to dispose of DLW would trigger a series of lower-level considerations. In this example, decisionmakers would be faced with having to decide between retrieving and processing waste currently contained in onsite storage tanks, or pursuing in-situ stabilization of the waste. If a decision were made to retrieve and process the DLW, the decisionmaker would be confronted with having to choose between complete or partial retrieval. If partial retrieval were chosen, decisions would need to be made regarding the need to

stabilize the remaining waste. As indicated in the figure, these decisions would in turn trigger subsequent actions regarding interim storage, disposal processes, and eventual tank closure.

As experience might suggest, such exercises actually proceeded in a less systematic manner than described here. At times, the mapping process may be convoluted and iterative, proceeded in several directions at once. However, properly conducted, the group should reach a consensus regarding a final decisionmaking configuration.

COMPLETING THE DECISION BASED SCOPING PROCESS

After completing the DIT, a reality check should be performed to ensure that the decisionmaking map is consistent with the underlying need for taking action. Care must also be exercised to ensure that decisionmaking points have not arbitrarily restricted reasonable alternatives. Connected actions that would be triggered by pursuing a potential course of action should be noted. The decisionmaking map should be reviewed with the decisionmaker. The EIS manager is responsible for ensuring that the subsequent analysis adequately reflects the scope of decisionpoints agreed upon.

The decisionmaker should thoroughly understand the latitude of decisionmaking ability that will be available based on the scope depicted in the DIT. If the agency wishes to reduce the cost of the EIS by restricting such scope, the DIT provides an effective instrument for illustrating the amount of decisionmaking ability that would be lost as a function of the reduced scope, and vice versa. If used during a prescoping effort, it should be noted that the results are preliminary and subject to change based on comments received from the public scoping process that follows.

Once agreement is obtained on the scope of potential decisionmaking, the effort turns to the task of identifying the scope of facilities, operations, activities, and specific alternatives that need to be evaluated. Potentially significant impacts can be identified after agreement has been reached on the scope of action and reasonable alternatives that need to be evaluated.

FINALIZING THE PRELIMINARY SCOPING PROCESS

After the prescoping workshop has been completed, a formal *prescoping meeting* is held to review the results of the prescoping workshop, and obtain final consensus on the preliminary scope. The prescoping meeting should include representatives from a diverse array of technical disciplines. At DOE's Hanford Site, the DIT in conjunction with the related VE exercises has been successfully used in identifying principal issues and actions to be considered in subsequent NEPA analyses. Consequently, consensus can be quickly achieved regarding the preliminary scope of actions. Initial experience has indicated that the DIT, in conjunction with the VE workshop, had been very effective in identifying what would otherwise be a rather enigmatic set of potential issues and actions.

Although difficult to quantify, this approach should result in long-term cost savings. Application

of systematic tools and methodologies reduces the risk that unforeseen issues or actions that will later arise. Cost savings can be realized since unnecessary actions, which might otherwise be rolled into the scope, have been eliminated. The risk of subsequent schedule delays is also reduced. Finally, by accurately identifying the range of actions ripe for decision, a more thorough analysis and planning effort can be conducted, which fosters more informed decisionmaking.

It is important to note, that at this stage, the scope is preliminary and may evolve, as comments are received from the formal public scoping process. Still, this is an effective tool for providing decisionmakers with an early indication of the scope, which will be useful in planning the public scoping process, identifying agency consultations, preparing cost estimates and schedules, and developing preliminary engineering and environmental support studies. This tool is also valuable for ensuring the final scope will support decisions that may eventually need to be considered.

CONCLUSIONS

Used in conjunction with related VE exercises, the DIT provided an effective tool for identifying the range of decisions, and consequently potential actions, for later analysis. Application of this approach is not limited to NEPA scoping efforts. As a general-purpose methodology, this approach can be applied to a diverse range of environmental planning applications, problems, and exercises.

The DIT is perhaps best viewed as a tool for mapping alternatives or alternative courses of action (What-Axis), as a function of their respective decisionpoints (Will-Axis). Decision Based Scoping in conjunction with the DIT provides a powerful and a rigorous methodology for identifying the preliminary scope of potential decisions and alternatives.

Application of this approach is especially well suited for identifying the scope of potential decisions and actions that need to be considered in large or complex EISs, and programmatic EISs, in particular. This is especially true in cases where many potential decisionpoints could be involved, for decisionpoints that might otherwise go unnoticed, and where the agency is unsure about the specific nature of decisions that might need to be considered. By reducing risks associated with uncertainty, this approach will result in long-term cost savings. The DIT also provides an effective tool for minimizing discrepancies between the scope of the analysis and later decisionmaking.

In actual use, the mapping exercise is an iterative and evolving process. Forethought and preparatory work, especially with respect to choosing a configuration for the skeleton tree, are elements essential to its success. A successful outcome requires the professional talents of an experienced facilitator and a practitioner skilled in the NEPA process. The facilitator or NEPA specialist must be prepared to periodically step in and remind participants that the exercise is designed to identify, *not to determine*, potential decisionmaking points. The EIS manager is responsible for ensuring that the subsequent analysis adequately reflects the scope of decisionpoints that been agreed upon.

Many of the conventions used in constructing the DIT were developed on the 'fly'. As with any new approach, this tool can be expected to evolve as practitioners gain experience. Thus, this approach is presented with the expectation that practitioners will actively seek to build on the methodology and nomenclature presented herein.

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1. The National Environmental Policy Act of 1969, 42 U.S.C., Section 102
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