

PLANNING FOR DISCOURSE

A MANUAL FOR THE DIAGNOSIS
PLANNING AND MANAGEMENT
OF GROUP PARTICIPATION
PROCESSES BASED UPON
THE USE OF ISSUE
ANALYSIS MEASURES

JANUARY 1978

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KINGMAN BUILDING
FORT BELVOIR, VIRGINIA 22060

PLANNING FOR DISCOURSE

A Manual for the Diagnosis, Planning
and Management of Group Participation Processes
Based upon the Use of Issue Analysis Measures

A Report Submitted to:

U.S. Army Engineer Institute for Water Resources
Kingman Building
Fort Belvoir, Virginia 22060

by

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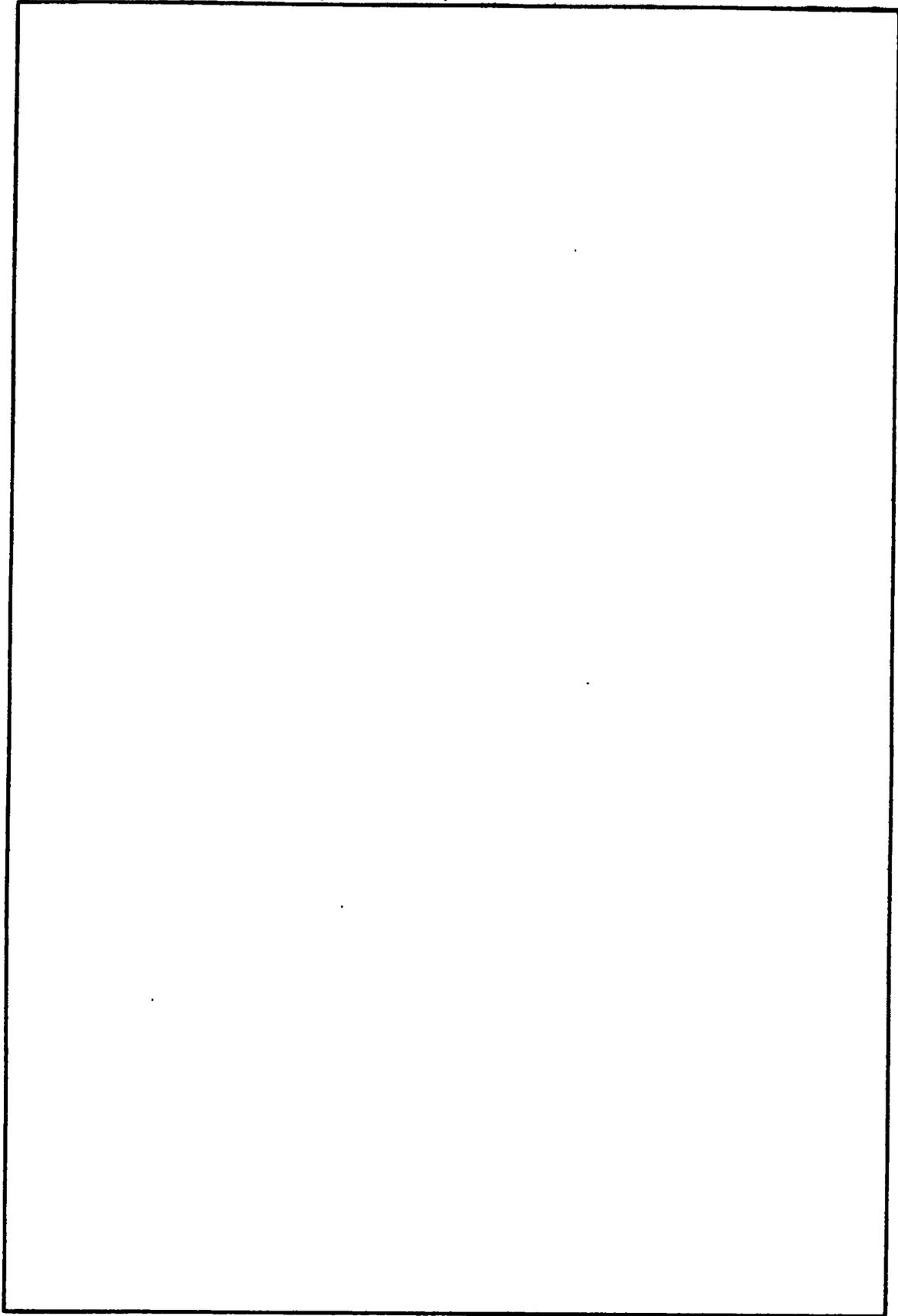
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TABLE OF CONTENTS

I.	Introduction: Issue Analysis--The Basis for this Manual. . .	.1
II.	Plan of the Manual. . . . .	.6
III.	Discourse Features Defined. . . . .	.8
IV.	Sample Analysis to Illustrate Discourse Features. . . . .	.14
V.	Process Impact Tables . . . . .	.19
VI.	Appendicies . . . . .	.38
	A. Management of Discourse. . . . .	.38
	B. Logic. . . . .	.47
	C. Glossary of Issue Analysis Terms . . . . .	.48
	D. Bibliography of Issue Analysis . . . . .	.49
	E. Annotated Introductory Bibliography of Logic and Conceptual Analysis. . . . .	.50

LIST OF FIGURES

Figure 1: Example Issue Tree: Nuclear Power Policy After
Three Rounds3

Figure 2: Example Issue Tree: Nuclear Power Policy After
Four Rounds4

Figure 3: Example Issue Tree: Nuclear Power Policy Schematic
After Five Rounds5

LIST OF EXHIBITS

Exhibit 1: Sample Issue Tree.15
Exhibit 2: Generalized Issue Tree16
Exhibit 3: Analysis of Traverse and Participation17
Exhibit 4: Sample Analysis.18

LIST OF TABLES

Table I	: Effect of Group Size on Discourse Quality. . . . .	.22
Table II	: Effects of Expertise Level on Discourse. . . . .	.23
Table III:	Effects of Perspective Spread on Public Participation. . . . .	.25
Table IV	: Effects of Variability of Discourse Population . . .	.27
Table V	: Interchange Format . . . . .	.30
Table VI	: Effect of Control on Discourse Features. . . . .	.33
Table VII:	Effects of Purpose on Discourse. . . . .	.36

PREFACE

Are your public meetings worth the effort? How do you know you have run a good meeting? What, in fact, is the best way to run a meeting?

Effective use of this manual will require a commitment of effort, but is is a commitment that will pay off in greater understanding and better meetings. Remember, almost everyone enjoys a good meeting, but no one likes a bad one.

This manual is a tool for you to use to answer these questions and to plan and evaluate your public meetings so as to maximize their effectiveness and minimize their cost. We have used issue analysis to establish a framework for you to use in choosing between alternative meeting plans; this framework will enable you to reduce waste by making your public meetings work more smoothly and productively.

I. INTRODUCTION

Issue Analysis--The Basis for this Manual

Several years ago we became concerned that the public was not aware of the complexity of the many environmental and energy related issues that were then being raised. To try a new approach toward solving the problem of complex public issues, we "atomized" an issue by taking every single statement we could find on that topic and then attempting to fit all of these statements together into a coherent whole.

The results were startling; we found to our surprise that these statements, several thousand in all, fit together into a simple scheme. The issue in question, while very complex, turned out to have a relatively clear underlying structure that presented a logical pattern.

Moreover, once we grasped this structure, it was easy to see how one main issue (in this case, auto energy use) divided itself, on the basis of certain key questions, into several major subissues. Each subissue divided into sub-subissues, which in turn subdivided, etc. Because the resulting hierarchical structure is called a "tree" by mathematicians, we called our discovery an issue tree.

Since that first discovery, a large number of issue trees have been constructed, all revealing variations of the same basic underlying form--the tree. We also have experimented extensively with using issue trees to improve communication and understanding where complex questions were involved. We call this work "issue analysis."

This work was carried out initially under a grant to Carnegie Mellon University from the Carnegie Corporation of New York. We then tested practical applications with a number of urban planning firms, as well as several public agencies.

Issue analysis is an outgrowth of the disciplines of logic and conceptual analysis (see Appendix B and E). The issue tree reveals the discourse's important structural features, those closely related to its efficiency and effectiveness. Because the entire discourse is laid out before him, the issue analyst can spot problems, such as misunderstandings, conceptual confusions, and unresolved issues. Often these can then be fed back into the discourse process for resolution (see Appendix A).

The technique of issue analysis is based upon the fundamental but not widely recognized fact that controversies and issues have a hierarchical internal logical structure. Public controversies, in fact, are often problem-solving exercises, working out many different aspects of a problem at once.

Figures 1, 2, and 3 illustrate the branching growth of a controversy: the safety of present-day nuclear power generation. In Figure 1, three objections (first-level problems) are within the circles; the squares connected to the circles represent objections to each first-level problem. Figures 2 and 3 show further branching. From the first three objections, the entire controversy has grown until there are over 2,000 significant subissues, and it is still growing.

Figure 1

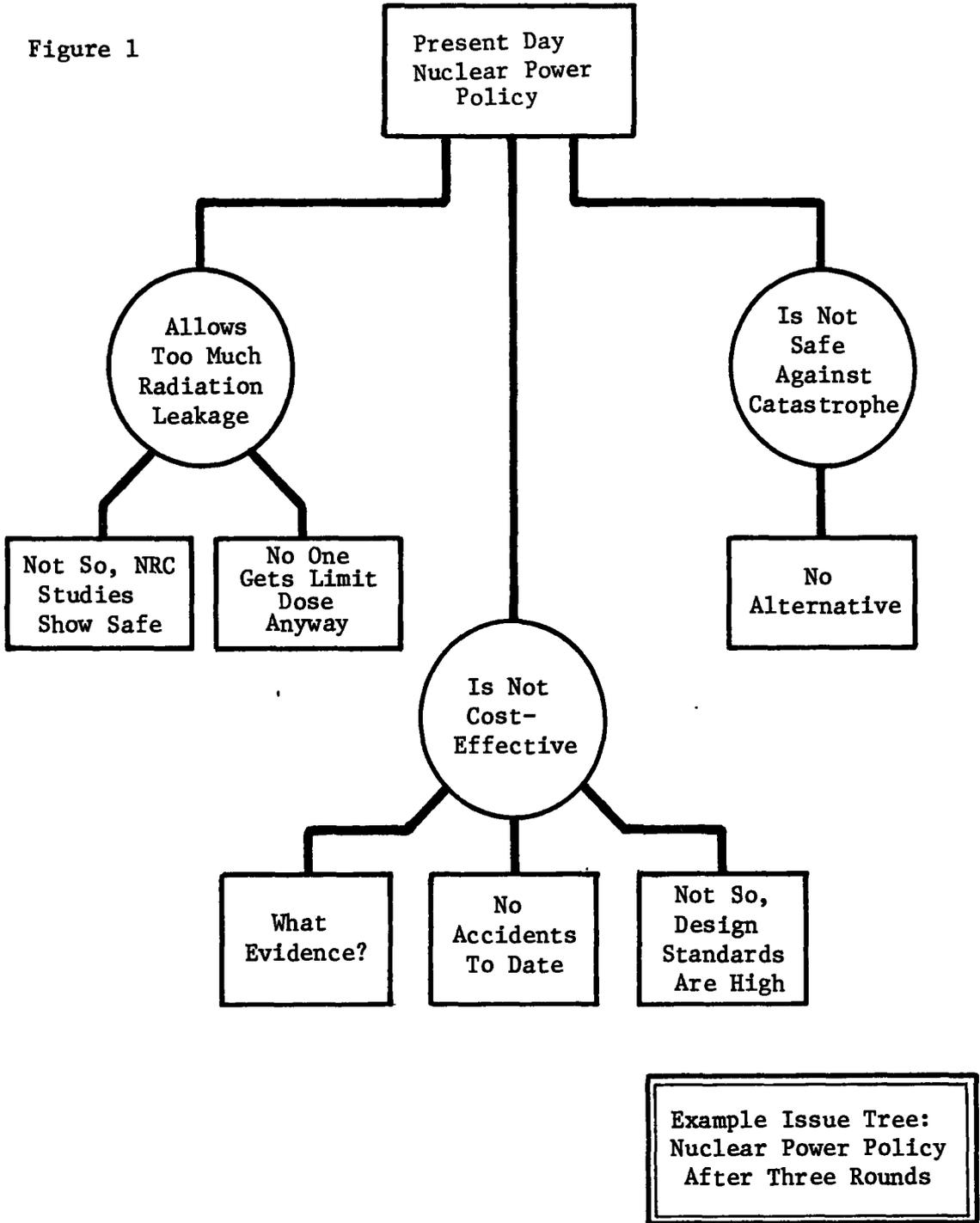
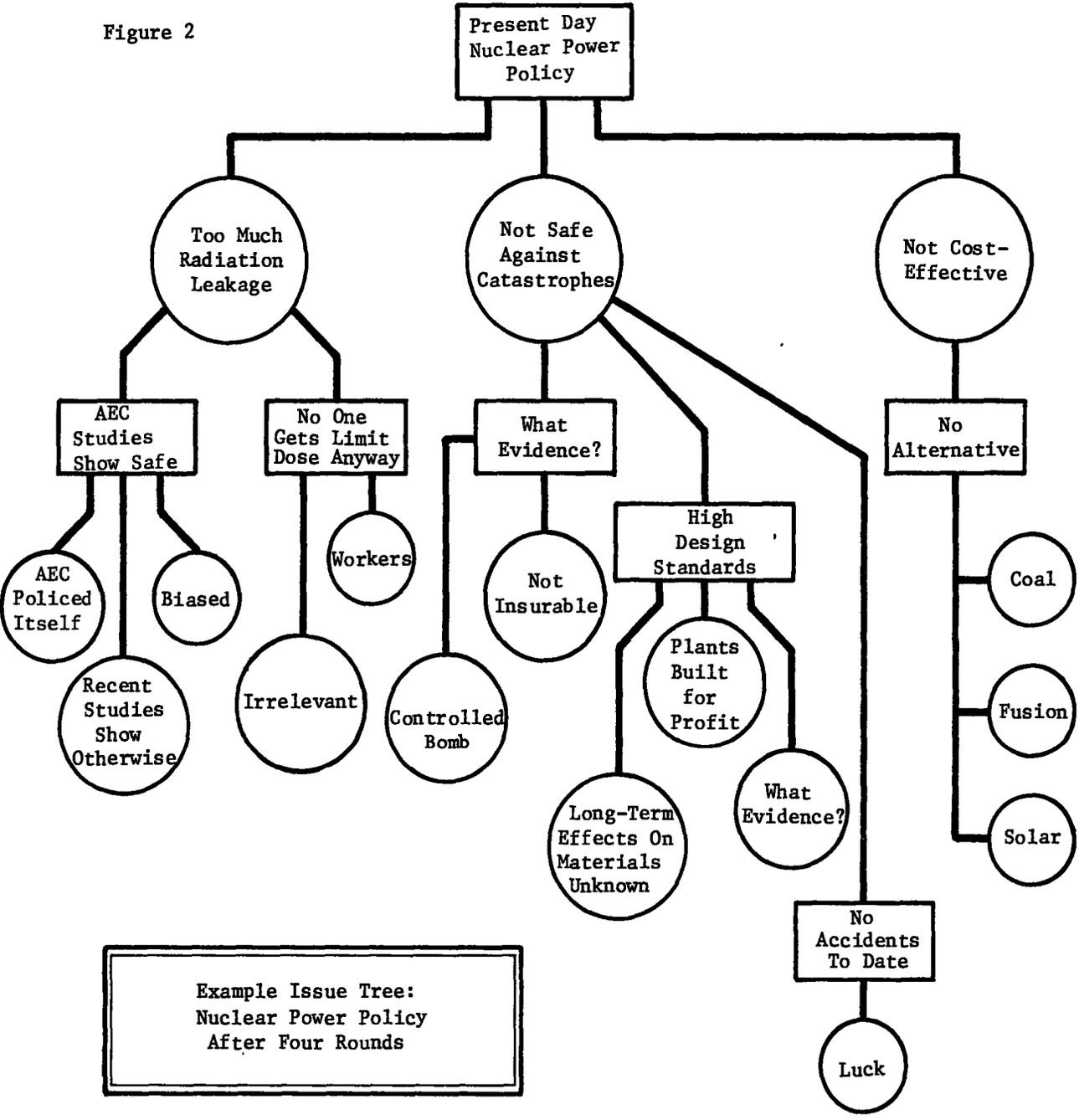


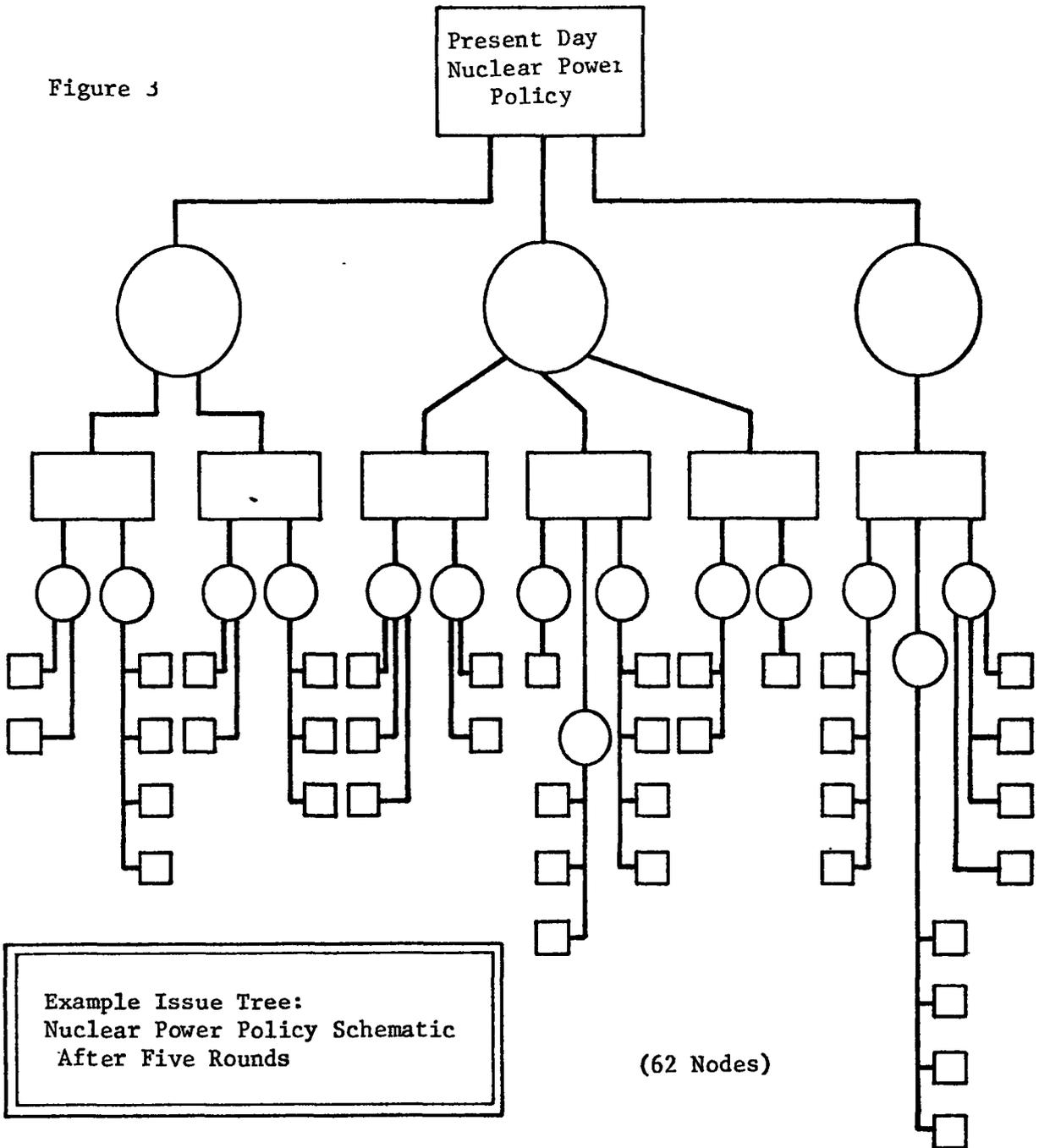
Figure 2



Example Issue Tree:
Nuclear Power Policy
After Four Rounds

Note that even though the issue becomes intricate, it does not become formless. Rather, it retains its hierarchical form.

Figure 3



Issue analysis is applicable wherever various courses of action are being considered and where a large number of factors are involved in evaluating these courses of action. While Figures 1, 2 and 3 illustrate the growth of a controversy, this is by no means the limit of the method. Controversies, if they are responsibly developed, are merely the working out among a number of parties with various points of view and items of information of those steps which any planner must explore when a new course of action is being considered. For this reason, issue analysis offers broad application in planning and decision-making, as well as in those areas, such as policy science, which seek to describe and to understand controversy.

II. PLAN OF THE MANUAL

What follows is not a manual on issue analysis. Rather, it is an attempt to make the fruits of issue analysis available to planners and managers who may not have the opportunity or need to master the intricacies of issue analysis itself. This manual is basically just a set of tables which, like engineering tables, are to be used to estimate values for significant parameters. The parameters in this case are issue analysis measures which reflect the quality of any given discourse. A glance at the sample analysis (Chapter IV) and a Process Impact Table (Chapter V) should make clear what the manual is about.

Discourse*

Discourse is group reasoning or group thinking or problem solving. Like thinking or breathing, it is something we do all the time--every conversation, class, or convention comes into being as discourse.

This manual is designed to help you understand discourse by analyzing it from two perspectives: as a process where ideas get worked out and as a system of ideas that gets worked out by the process. These are what logicians call process and product. We look at discourse as a process and as a product of that process, and, most of all, at the way in which the process affects the product.

Most discourse processes involve considerable waste and confusion. We routinely use only about 10% of the ideas presented in any given discussion because the logical structure of discourse is too complex. In a series of meetings, redundancy may be as high as 60 or 80 % by the third meeting. Misunderstandings and conceptual confusion arise, often because not enough questions are asked or examples given.

This manual first defines 17 Discourse Features (the structural product of discourse). Seven tables then relate these features to 25 Process Features (features of discourse processes).

The Process Impact Tables show how a variation in process features is likely to affect each of the discourse features. Since all 17 are closely related to discourse quality, the tables may be used in these ways:

*Portions of this section are adapted from "Treeing the Issues," Water Spectrum, (Winter 1975-76).

- to anticipate discourse problems likely to result from the use of a given process;
- to design a problem-minimizing process;
- to help diagnose ongoing discourse problems.

REMINDER TO MANUAL USERS

1. The Process Impact Tables show only relative impacts likely to occur through variations in individual process categories, e.g., form of control, group size, etc. Absolute impacts cannot be shown because these will vary from case to case and could only be determined by issue analysis. Remember that you may have to modify your use of the tables to allow for features of your particular case. For example, Table VI (Control) assumes that when control is exercised, digressions decrease, but for a group whose leader encourages digression, table use will have to be modified. Predicting combined impacts of combinations of process features is difficult without a mathematical impact model, but issue analysis is too new and the data too slender to support such a model. Consequently, one must assume that when two process features pull a discourse feature value in opposite ways, the resulting value will be between the values predicted for each process feature acting alone.

2. While the tables should give insight, even to an inexperienced user, into the nature of discourse and into what is happening in a particular discourse, some of the features cannot be accurately observed without issue analysis. This is particularly true of Depth, Thoroughness, and Bias; and somewhat true of Red-avoid, Tan-avoid, and the Q and E-rates. Thus, while the tables are certainly useful for planning or diagnosis, they do not substitute for formal testing.

3. Issue analysis is neither an issue resolver nor a decision-maker. As a graphic aid to the working out of alternatives, it is valuable, but without sound judgment, useless. Neither is it so easy as it may first appear; like operations research or computer programming, issue analysis requires a certain talent for understanding the underlying logic of a human activity. Remember that it is an aid, not an answer.

III. DISCOURSE FEATURES DEFINED

Extended definitions of the 17 key discourse features are below. We have used the technical vocabulary of issue analysis where necessary, but we have also tried to say enough in ordinary language to convey the concept in question. Keep in mind that practice will be required in order to see these features occurring in actual discourses. But once you can see them, discourse will never appear the same to you.

Structural Features

Participation is the extent to which point making is spread among the participants. A point is any assertion or question. A simple way to measure participation is by the standard deviation from the average number of points per person. In this case, a high participation value would mean a low standard deviation and vice versa. Obviously, participation measures the extent to which some participants do not participate, while others dominate. More sophisticated sorts of participation analysis are also possible. For example, one could determine that certain participants prefer certain subissues, or certain levels. Some people like to give examples; others prefer to respond to certain questions such as "how?" or "why?". The presence or absence of such tendencies and their distribution can be very important in diagnosing discourse. However, the sense of "participation" used in the Process Impact Tables is simply that of even distribution of points among participants.

Depth is measured by the average length of a line of thought. A depth of five to seven points is typical, though this usually drops to three to five when fatigue sets in. Lack of depth in a subissue often signals either list making or, if most of the points are questions, conceptual facts.

Detail usually increases down any given line of reasoning so that great depth is often a sign of going into too much detail. Unfortunately, it is much easier to continue down a path than to come back up into the tree and branch out again, so we typically develop depth at the expense of thoroughness. When a single point problem solution is desired, however, emphasizing depth may be the proper strategy. (This case is typically assumed in the scholarly literature on problem solving and artificial intelligence [see Appendix B for a reference or two]).

Thoroughness of addressment is measured by the rate of branching of lines of thought pertaining to that issue. Branching requires pursuing a line of thought, then going back and beginning a new line at an intermediate point in the old line.

Branching is difficult without some way of preserving reference points. This is why we use scratch pads in meetings, for example, and minutes when a topic is going to be discussed more than once. Without such devices a branch-rate of 1.2 is typical. With very good point-preserving media, the rate approaches 4.0 or even more, indicating that only a few of the paths are hit upon in the initial free discussion of an issue.

Brevity is simply the average number of points made per participation input. High brevity means small individual inputs.

We tend to make too many points at a time by mistakenly believing that this achieves clarity. More often it distracts our listeners by diluting our chief point with subsidiary points. Then, when the group's response takes off from a subsidiary point, the main point is lost because few points have more than one branch.

We have found it a useful exercise in brevity to sometimes impose a 10-word limit on individual inputs. We call this the 10-word game. Most points can be made in 10 words or less; if not, then a question or two will get the point out. A more extreme version, the 5-word game, taxes most persons' point-making ability, but provides a good insight into what brevity means.

Red-avoid stands for redundancy avoidance and is measured by the ratio of nonredundant points to total points.

Redundancy is a huge problem for large groups, for groups meeting periodically to consider a single issue, and for multi-group processes. We have observed sequences of meetings where as many as 85 percent of the points made had already been made in prior meetings.

This kind of redundancy is often necessary in order to rebuild the old lines of thought so that a few new lines can be added. Naturally, point-preserving media may mitigate this problem, but it is still often necessary to rebuild the existing system of ideas "on the table," as it were, so everyone has the same framework in mind.

Tan-avoid stands for tangent avoidance and is measured by the ratio of nontangential points to total points.

Tangency is defined in issue analysis as a line of thought which proceeds so far from the main issue that it is no longer relevant. Tangents are often subtle because each step in the line may be interesting and reasonable; yet, the net result is a tangent. Going into too much detail on a minor item in an issue is a common form of tangent, so is prematurely haggling about how something will be done or who shall do it.

Part of the tangency's subtlety lies in whether a given line is a tangent or not, depending both upon timing and the final form of the tree. It is not tangential to take a line of thought to a level of detail to which it will have to be taken in due course, provided that to do so at that time is not disruptive.

Interchange is the extent to which everyone responds to everyone else's points. Low interchange means that some participants are not responding to certain other participants, so that some perspectives are not being brought into direct contact.

Interchange could be measured variously and it is not clear which might be theoretically most significant. One simple way is to take the standard deviation from the mean number of responses to each participant, for each participant, sum these, subtract from the total number of responses and divide by the same.

Balance is to the extent to which points are allocated evenly (or appropriately) between issues. It is measured by the closeness of actual point allocation to an even distribution or to some other specified norm.

Poor balance is common in group discourse. Its most common manifestations are rushing through the latter part of an agenda, failing to complete a predefined task, or missing a deadline. While poor balance may be easy to spot, it is often difficult to diagnose its cause. This might be excessive depth, digressions, redundancy, thoroughness, or a combination of these.

Q-rate is the ratio of question points to total points. A high Q-rate indicates active development of issues' perspectives is good, provided the questions are useful and are not terminal points.

It is usual in computing the Q-rate to include only actually stated questions, not the unstated ones which often tie successive statements together. Expressed as a percentage, a Q-rate of 10 to 20 percent is healthy. Of course, there are all kinds of questions and many analyses can be performed to determine the kinds of questions being asked or answered, and who is doing what. For example, the how rate, the why rate and the unanswered question rate would typically be quite useful.

O-rate is the ratio of objection points to total points. A high O-rate indicates that the various perspectives are present and are actively combined, provided the objections are not terminal points. A low O-rate indicates a one-sided discussion. Like the Q-rate, an O-rate of 10 to 20 percent is healthy, but the O-rate may be as low as zero for a lecture, a textbook, or a whitewash.

E-rate is the ratio of points used to present an example to total points. A high E-rate is usually necessary for understanding and to avoid overabstraction.

We often discuss general principles in the form of examples because they are easier to deal with. Here, however, the analyst must be careful to distinguish those points made to develop the example from those made to discuss the principle. Indeed, failure to do this is a common source of confusion in discourse: we wind up arguing about the example instead of the unstated point which that example was meant to introduce.

Dig-avoid stands for "digression avoidance" and is measured by the ratio of nondigressive points to total points. A digression is a subtree (or cluster of points) that is unrelated to the issue under discussion.

Stories, jokes and shoptalk are common forms of digression. Because digressions are a relatively sharp break from the logic of the discourse, unlike tangents, they are usually quite recognizable.

General Features

The following discourse features are termed general rather than structural features. They represent general evaluations of discourse based intuitively upon the other features together with analysis of the process as a whole. They convey the issue analyst's general opinion of the way things are going.

Bias-avoid stands for bias avoidance. Bias is the preponderance of a few kinds of lines of thought at the expense of the other relevant lines. There is no simple way to measure bias-avoid precisely, though it is often easy to estimate qualitatively.

For example, engineers planning policy might be expected to tend to consider hardware solutions for each issue, while political scientists might spend too much time worrying about power relationships. Economists might tend to follow lines leading to their own speciality, perhaps to optimization or cost-benefit analysis.

We must be careful here to distinguish bringing one's special expertise to bear on a problem, which is fine, from forcing a problem to bear upon one's expertise, which is bias.

Spotting bias may be easy, as when one hears a nontechnical problem being solved in some discipline's technical language. But more often, bias is subtler; it may reveal itself only when a new perspective is

brought to the issues and instantly points out seemingly obvious lines of thought that were not taken because of groups' predelectations. Sometimes this sort of comparative method is the only way to identify bias. Indeed, this phenomenon is one of the best practical arguments for public participation--the public always brings a new perspective to public issue.

Accuracy and Effectiveness

An accurate process is one in which the product or result is that which was intended, even though this produce need not necessarily be effective. Accuracy must not be confused with effectiveness; the former refers to the kind or category of product, while the latter refers to the quality of the product, whether or not it is that intended.

For example, a discourse process intended to result in modular practitioner-oriented curriculum packages would not be accurate if the results were not modular or not practitioner oriented. However, the process might still be effective in the sense that the curriculum packages actually developed were very good. Conversely, the process might be accurate in that the packages developed were both modular and practitioner oriented, but not so effective because the packages were of poor quality.

When diagnosing discourse processes, the distinction between accuracy and effectiveness cannot be overstressed. Government programs, for example, are too often judged on effectiveness but not accuracy; if something is happening, then everything is okay, even if it is not what was supposed to happen. In industry, particularly, in executive policy making, the opposite is often so--as long as the boss gets what he wants it does not matter whether it really does any good; effectiveness is sacrificed for accuracy.

Efficiency includes avoiding spurious or wasted points through digressions, tangents, redundancy. It also includes not wasting time on detail by overdetailing or because of bias. In its subtlest form, inefficiency might even include failing to utilize ideas developed elsewhere in the discourse.

Efficiency is an enormous problem in any discourse of more than a few hours. The idea structures erected in discourse are as complex as any edifice ever build by man; yet, we build these structures with only the crudest sorts of aids--notes, cumbersome transcripts, and minutes.

The development of a government program or a new industrial product involves between 100,000 and 1,000,000 points of discourse. How well do we manage such discourses? How efficient are they? How accurate, balanced or biased? Clearly, there is more to the planning and management of discourse than merely setting agenda and running meetings.

Earnestness. There is a proper degree of seriousness or earnestness for any group activity. This does not mean lack of humor or good will, but rather a cooperative spirit and a willingness to see the work through. Many factors can deplete earnestness; some of the most common are fatigue, boredom, frustration, mistrust, and skepticism.

IV. SAMPLE ANALYSIS TO ILLUSTRATE DISCOURSE FEATURES

Exhibits 1 thru 4 present a sample issue analysis to illustrate the discourse features just defined. Exhibit 1 is an issue tree of a hypothetical discussion of a report that is going to be prepared. The issue is whether or not to include a discussion of policy formulation in that report.*

In Exhibit 2, the issue tree has been generalized to show the category in which each point falls. These categories show the relation each point has to the point to which it is responding, such as whether it is an objection, a question, etc. Identifying these relationships is part of the science of logic.

Generalization enables you to compute the Q-, O-, and E-rates as shown. A tangent and a digression have also been identified in Exhibit 2, therefore tan-avoid and dig-avoid can also be computed.

In Exhibit 3 the source of each point is illustrated, together with the traverse, or order in which points are made. This order is necessary to compute participation, interchange and red-avoid. Note that only depth, thoroughness and balance can all be computed from the simple issue tree shown in Exhibit 1.

Exhibit 4 gives the computations for this example, and evaluates the results. Working through these computations will help you grasp both the definitions of discourse features and the scientific basis of issue analysis.

*You do not have to be able to draw an issue tree to use this manual. However, you need to keep in mind that the discourse features are all based on the issue tree measures shown in this example. This manual is like an engineering manual that helps you estimate parameters when refined testing and measurement are not warranted.

EXHIBIT 1

SAMPLE ISSUE TREE

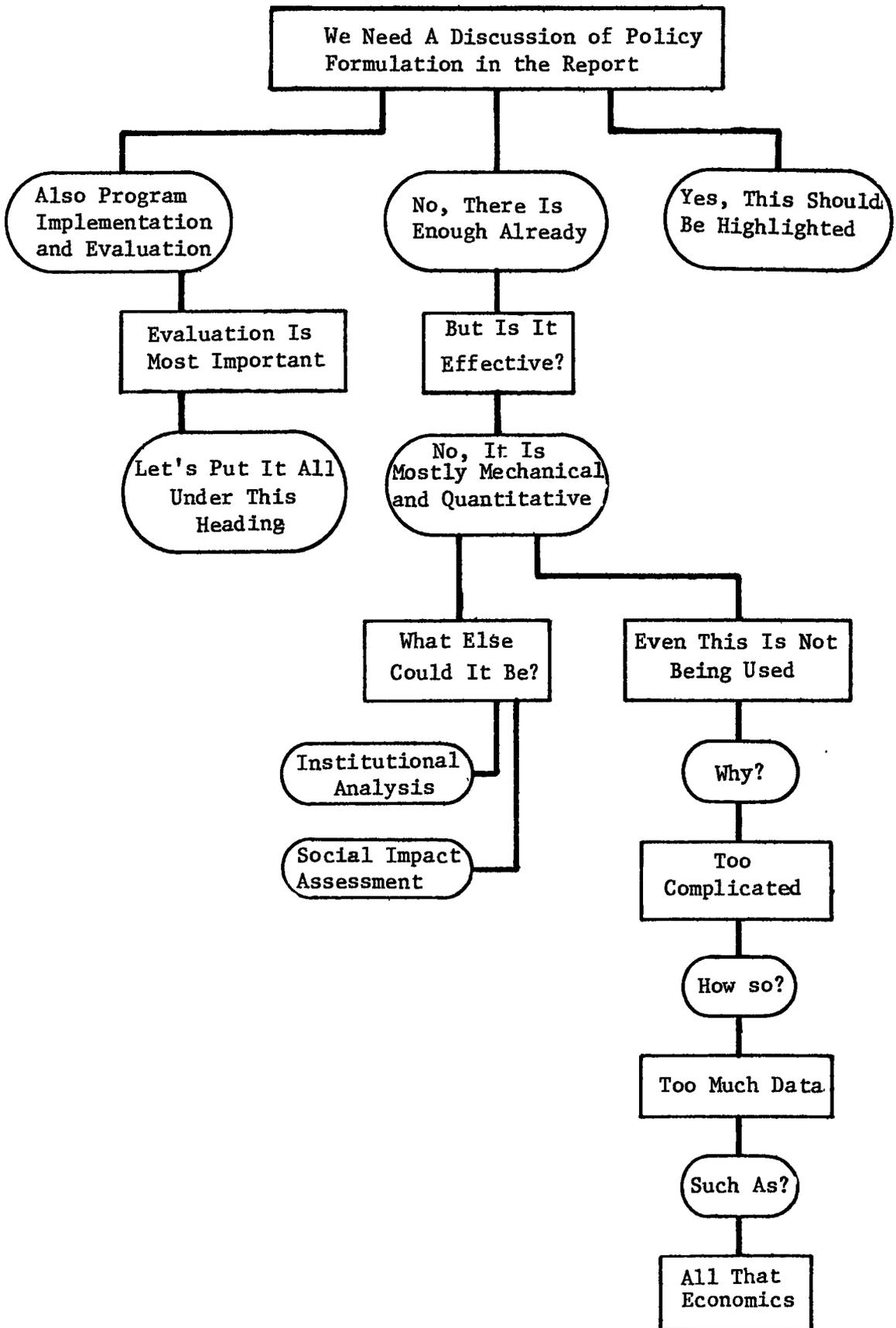


EXHIBIT 2

GENERALIZED ISSUE TREE

RANCH	=	$\frac{19}{14}$	=	1.36
RATE	=	$\frac{14}{14}$	=	1.00
DEPTH	=	$\frac{32}{6}$	=	5.33

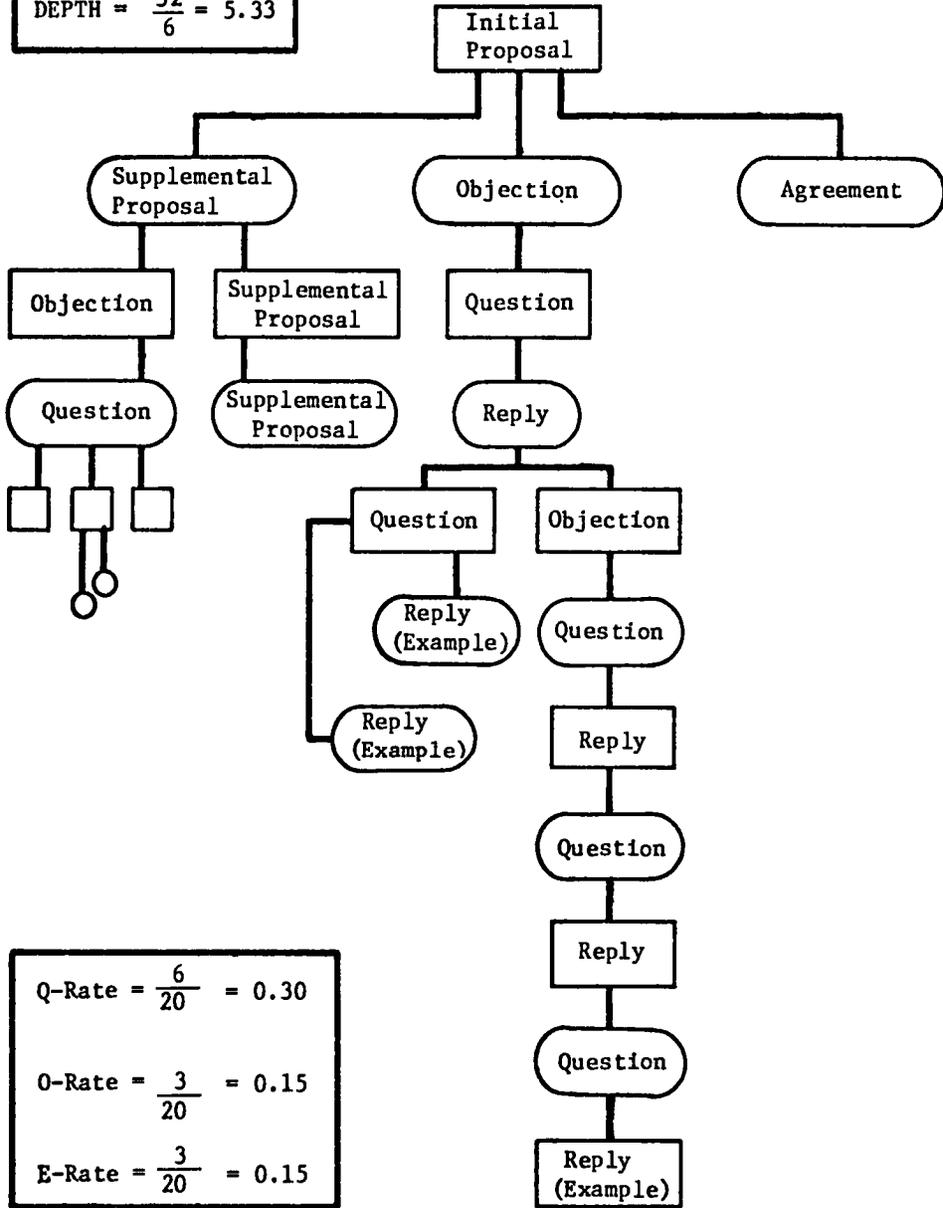


EXHIBIT 3

ANALYSIS OF TRAVERSE
AND PARTICIPATION

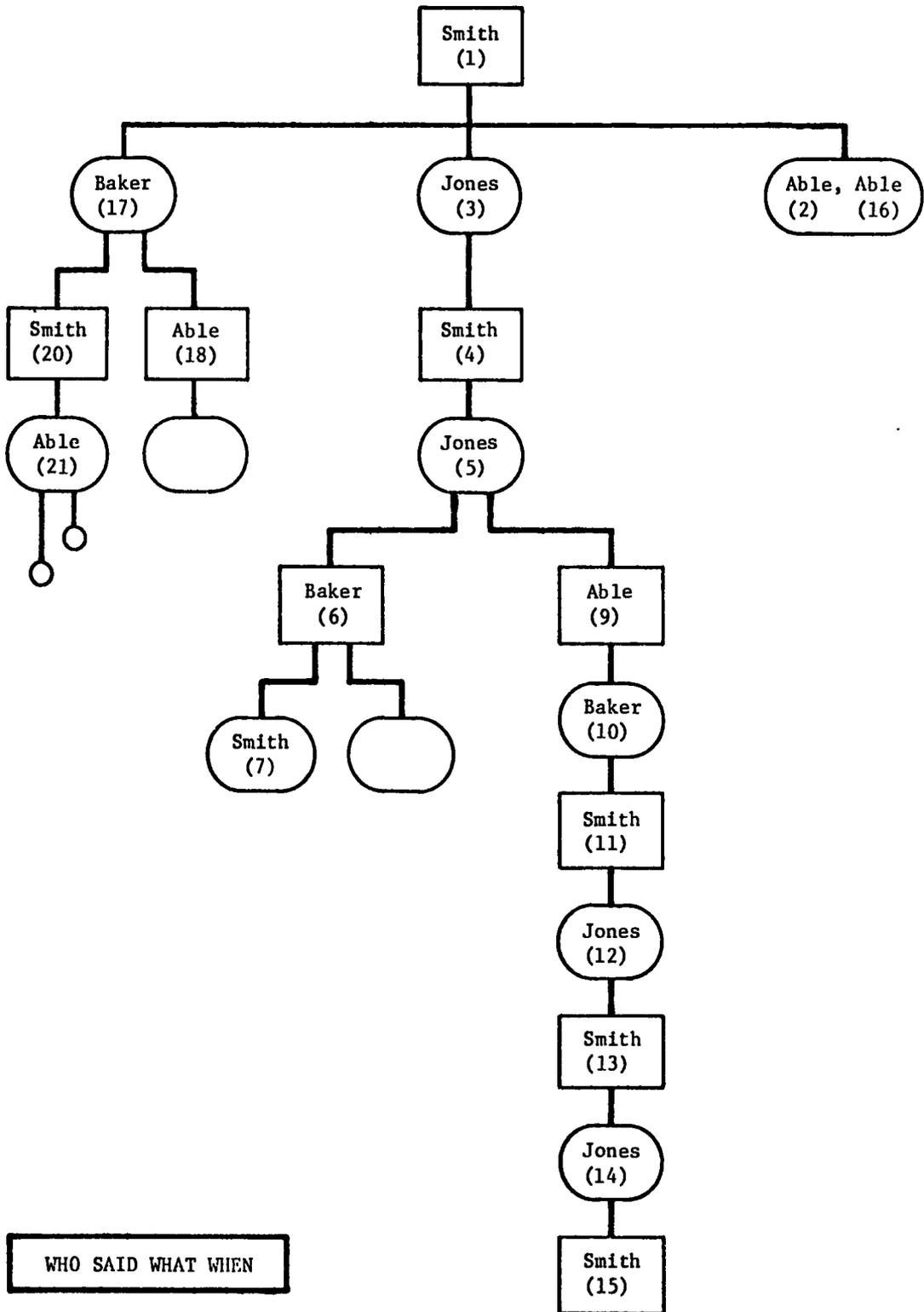


EXHIBIT 4

SAMPLE ANALYSIS

1. Participation. There are 21 points made, an average of 5.25 per person. Participation varies from 8 points for Smith to 3 for Baker; this deviation is large, with Smith dominating, so there is a participation problem.

2. Depth = $\frac{32}{6} = 5.33$, which is on the low side of typical.

3. Thoroughness. The branch rate is $\frac{19}{14} = 1.36$, which is typical.

4. Brevity. Brevity is $\frac{21}{19} = 1.11$, which is very high, because only Smith's 7 and 8 and Able's 18 and 19 show more than one point made per input.

5. Red-avoid. Red-avoid is $\frac{20}{21} = 0.95$. This is very high because only Able's #16 is redundant.

6. Tan-avoid. Tan-avoid is $\frac{14}{21} = 0.67$ if we take #9 as the beginning of the tangent. This is low; i.e., there is a tangency problem.

7. Interchange. This is pretty poor because Jones only responds to Smith and Smith never responds to Able.

8. Balance. Balance is poor, due to the digression at #21 and the #9 thru 15 tangent.

9. Q-rate = $\frac{6}{20} = 0.30$, which is a little high. In fact, both the tangent and the digression are driven by questions. Note that redundant points only count once in Q-, O-, and E-rates.

10. O-rate = $\frac{3}{20} = 0.15$. This is pretty good. There is a good spread of opinion, except the objections are weakly placed because one starts a tangent (#9) and the other (#20) elicits a digression.

11. E-rate = $\frac{3}{20} = 0.15$. This is good; note how the examples help keep things clear.

12. Dig-avoid. Digression points are usually counted for this measure only, not for Red-avoid, E, rate, etc. Dig-avoid = $\frac{19}{26} = 0.73$. This is fair.

13. General features. The example is too small for any assessment of bias-avoid, accuracy, effectiveness or earnestness. As far as efficiency goes though, it looks pretty low due to the tangent and digression.

V. PROCESS IMPACT TABLES

The following tables summarize likely impacts of process features on discourse features. Obviously the process effects the product: group size, range of perspectives, control, etc. All profoundly effect the way reasoning unfolds in a discussion. These tables are to be used to anticipate impacts, or diagnose them, and to evaluate process alternatives. Just as engineering tables are used to analyze and design a physical system, these tables are to be used to analyze and design discourse processes for optimum performance.

Group Size

Group size profoundly effects discourse quality. It is obvious that a few people can exchange ideas with less difficulty than 36 or more people. As group size increases so does the need for planning and management. The tables below are designed to aid discourse planning and management by showing how discourse features will be affected by various process features.

Explanation of Table I Values

Small Group: Full participation, short speeches, personal atmosphere, tolerance of digressions and two-person discussions lead to high brevity, depth, interchange, participation, Q- and E-rates, but low Tan-avoid and Dig-avoid.

Discussing issues until understood leads to high Red-avoid, low balance. Limited number of perspectives leads to low thoroughness and bias-avoid. Maintaining accuracy is easy, hence, high; efficiency low; effectiveness medium because of efficiency, balance and bias problems.

Medium-size Group: As group size increases, the discourse feature values gradually change to their opposites, except thoroughness, tan-avoid, dig-avoid, and the general discourse features of efficiency and effectiveness. Thoroughness peaks then drops off as increasing group size leads to speech making. Increasing group size generates peer pressure against digressions, but speech making returns.

Large Group: Speech making and the general reduction of discourse feature values cause efficiency and effectiveness to drop off. Only balance, dig-avoid and bias-avoid improve steadily with increasing group size.

As simple a factor as group size has a profound impact upon the discourse quality. Almost everyone enjoys conversation, but as the group size approaches five or six, difficulties arise. Some people stop talking; others talk too much, and there is a struggle for attention. By the time the group grows to 10, the issues of discourse management become critical. Expand this number of 15, and few people will get to make their points unless a formal leader is chosen and a clear agenda acknowledged. Beyond 30 persons, it is simply impossible for more than a fraction to speak at all. Now management techniques and careful planning are required if useful communication is to occur.

Discourse requires tracing out lines of thought in a complex hierarchical array; that is, it requires traversing on the issue tree. Because no two persons will follow the same lines on a given issue, as the number of participants increases the problem of setting a coherent discussion increases dramatically. This is where discourse planning and management come in. Good management is the good execution of a good plan without which any discourse will become chaotic if more than half a dozen people are involved. Good planning means recognizing the problems, understanding the alternatives and choosing wisely. The tables below are designed to facilitate good planning and management of discourse by making clear how discourse features will be affected by various process features. Once these effects are understood, it becomes possible to anticipate problems and to formulate alternative processes to overcome these problems.

In a small group, everyone talks some; speeches are short and the climate is personal. Inefficiencies such as digressions will be tolerated, as will be two-person discussions. Thus, brevity, depth, interchange and participation will be high, as will Q-, O-, and E-rates; but tan-avoid and dig-avoid will be low. Because issues will be discussed until understood, red-avoid will be high, but balance low. Because the number of perspectives is limited, thoroughness and bias-avoid will be low.

All in all, accuracy will be easy to maintain, hence high; efficiency low, and effectiveness only medium because of the efficiency, balance and bias problems. It is unclear what effect, if any, group size has upon earnestness.

As group size increases, the discourse feature values gradually change to their opposites, except thoroughness, tan-avoid, dig-avoid, and the general discourse features of efficiency and effectiveness. Thoroughness peaks with a medium-sized group and then drops off as increasing group size leads to speech making. Speech making occurs because in a large group one can never be sure of getting the floor again, so one attempts to say everything at once. This is why participation, depth, brevity, interchange and the Q-, O-, and E-rates all drop

off as group size increases. Increasing group size also generates strong peer pressure against tangents and digressions, so both drop off. But tangents, which are more subtle than digressions, return with speech making in the form of going into too much detail.

Speech making, together with the general reduction of discourse feature values, cause both efficiency and effectiveness to drop off for truly large groups. Only balance, dig-avoid and bias avoid improve steadily with increasing group population.

Level of Expertise

Public participation entails experts and nonexperts interacting. This idea was originally based on democratic principles; now experience suggest additional reasons for public participation. Building consensus is one of these and many participation processes are justified on this basis. But above consensus building, public participation yields valuable sometimes even critical, insights into a proposed action's secondary consequences.

A participation process is a kind of sampling procedure which may be less rigorous than a professional poll, but is more flexible and searching. Industry, too, is coming to realize the benefit of secondary impact analysis through participation in planning by those most likely to be affected.

Even though mixing experts and nonexperts is good planning policy, there are marked trade-offs between various discourse features when these groups are compared. Thus, whether a group convening for a given reason should be mixed is a major decision in discourse planning.

Explanation of Table II Values

Nonexpert: This group's great need for issue clarification results in high brevity, tan-avoid and E-rate. Sharing the same expertise level leads to high participation and accuracy. This level is the most efficient, but lack of knowledge makes it the least effective.

Mixed: Discourse feature values shift to reflect the features of discourse between diverse perspectives. Participation becomes low because some nonexperts are cowed while some experts are bored. Despite this, "perspective swapping" yields high thoroughness, brevity, interchange, and Q-rate. Balance and dig-avoid are high, but the need to state important points in two different ways yields high redundancy and a low E-rate. Two perspectives yield low accuracy and only medium efficiency, but the highest effectiveness of the three levels.

TABLE I

EFFECT OF GROUP SIZE ON DISCOURSE QUALITY

	<u>Number of Persons in Group</u>		
	<u>Small</u> 2 - 10	<u>Medium</u> 10 - 30	<u>Large</u> Over 30
Participation	H	M	L
Depth	H	M	L
Thoroughness	L	H	L
Brevity	H	M	L
Red-avoid	H	M	L
Tan-avoid	L	H	L
Interchange	H	M	L
Balance	L	M	H
Q-rate	H	M	L
O-rate	H	M	L
E-rate	H	M	L
Dig-avoid	L	H	H
Bias-avoid	L	M	H
Accuracy	H	M	L
Efficiency	L	H	L
Effectiveness	M	H	L
Earnestness	---	Unknown, if any	---

Key: H - High
L - Low
M - Medium

TABLE II

EFFECTS OF EXPERTISE LEVEL ON DISCOURSE

	<u>Nonexpert</u>	<u>Mixed</u>	<u>Expert</u>
Participation	H	L	H
Depth	L	M	H
Thoroughness	L	H	M
Brevity	H	H	L
Red-avoid	M	L	H
Tan-avoid	H	H	L
Interchange	M	H	L
Balance	M	H	L
Q-rate	L	H	M
O-rate	L	M	H
E-rate	H	L	M
Dig-avoid	M	H	L
Bias-avoid	M	H	L
Accuracy	H	L	H
Efficiency	H	M	L
Earnestness	---	Unknown, if any	---
Effectiveness	L	H	M

Key: H - High
L - Low
M - Medium

Experts: Because of knowledge of and practice in talking about the issue, experts talk longer. This results in low interchange and high redundancy. Conversely, they will all talk so that even though participation and depth are high, digression is also high. Their frequent objections lead to low tan-and bias-avoid. Although their efficiency is low, their common interpretation of issues yields high accuracy.

Spread of Perspectives

Varied perspectives are essential for a good public participation product but they produce special problems for the discourse planner. Different perspectives create different opinions which may cause participants to talk past one another. Working agreement, even on goals, may be unattainable; discourse tends to degenerate into sloganeering, and the potential for total breakdown is always there.

It is no wonder, then, that many planners shy away from bringing truly diverse perspectives together. Yet, if the difficulties can be anticipated and overcome, bringing diverse viewpoints to an issue is the most productive way to address it. Table III shows that diverse perspectives are handled best by a spread rather than just opposites, if effectiveness is the goal. Unfortunately, because there are, as always, complex trade-offs between process features, the planner must carefully consider what is wanted.

Explanation of Table III Values

Single Perspective - A single or a narrow spread of perspective
Narrow Spread creates complacency reinforced by sloganeering, hence low tan-avoid. General agreement leads to low Q- and O-rates, hence low depth. Bias leads discussion into accepted channels.

Wide Spread - By removing consistent support from polar perspectives a wide spread reduces the sense of conflict. Slogans no longer serve; efforts shift from objections toward issue clarification. Thoroughness, balance and Q-rate are high; balance low. Varying opinions lead to low tan-avoid, but the sense of serious disagreement results in high dig-avoid. Although a wide spread contributes to the saying the same thing many ways, it eliminates the point repetition characteristic of polar debates. Thus, redundancy as a whole is greatly reduced. Because a wide spread obscures the goal, accuracy is low, but efficiency and effectiveness high.

TABLE III

EFFECTS OF PERSPECTIVE SPREAD ON PUBLIC PARTICIPATION

	<u>Single to Narrow Spread</u>	<u>Wide Spread</u>	<u>Polar Spread</u>
Participation	H	M	L
Depth	L	M	H
Thoroughness	M	H	L
Brevity	H	M	L
Red-avoid	L	H	L
Tan-avoid	L	L	L
Interchange	H	M	L
Balance	L	H	L
Q-rate	L	H	M
O-rate	L	M	H
E-rate	H	M	L
Dig-avoid	L	H	H
Bias-avoid	L	H	L
Accuracy	H	L	M
Efficiency	L	H	M
Earnestness	L	M	H
Effectiveness	L	H	M

Key: H - High
 L - Low
 M - Medium

Polar Perspectives - Lengthy disagreements result in low participation, brevity, and thoroughness, but high depth and O-rate. Speechmaking becomes common and slogans change from commonplaces to rallying cries joined by slogans of attack. Thus red-avoid and interchange are low. Lack of common perspective results in low E-rate and only medium accuracy. Stressing differences results in low bias-avoid. Polar perspectives yield higher efficiency and effectiveness and much higher earnestness than a single perspective. But a wide spread is best for achieving efficiency and effectiveness.

Variability

Variability means the extent to which the identity of discourse participants varies over time. Sometimes, as with a task force or advisory committee, a series of meetings on a given issue will be attended by an essentially stable group population. At the other extreme, sometimes of necessity, a series of groups with no common membership may be used to deal with some problem. For example: a congressional committee staff drafts a piece of legislation; Congress debates and passes the bill; an executive agency executive committee formulates policy to implement the resulting law, and a regional agency group decides how to implement that policy at the working level.

The transitional group is one in which the members are replaced a few at a time. The US Senate is transitional in this sense by law while the House of Representatives is not, though it has always been transitional in fact.

Explanation of Table IV

- | | |
|--------------|--|
| Stable | - This is almost the opposite of the multigroup. It has high participation, depth, red-avoid, interchange balance, and O-rate. Due mostly to familiarity and boredom, it has low Q-rate, dig-avoid and bias-avoid; and only medium efficiency, effectiveness and earnestness. |
| Transitional | - Whether this form resembles the stable or multigroup more depends upon the form and rate of transition. Many of the values are medium, in itself a strength in many applications. High thoroughness and E-rate stem from rediscussion of issues which accompanies participant transition. The trade-off is that explanations and synopses tend to be long, resulting in low brevity and interchange. |

TABLE IV

EFFECTS OF VARIABILITY OF DISCOURSE POPULATION

	<u>Stable Group</u>	<u>Transition Group</u>	<u>Multigroup</u>
Participation	H	M	L
Depth	H	M	L
Thoroughness	M	H	L
Brevity	M	L	H
Red-avoid	H	M	L
Tan-avoid	M	L	H
Interchange	H	L	M
Balance	H	M	L
Q-rate	L	M	H
O-rate	H	M	L
E-rate	M	H	L
Dig-avoid	L	M	H
Bias-avoid	L	M	H
Accuracy	H	M	L
Efficiency	M	H	L
Effectiveness	M	H	L
Earnestness	M	L	H

Key: H - High
L - Low
M - Medium

Newcomers searching for clarification precipitate tangents; also, because they must often accept consensus they do not grasp earnestness is low. But efficiency and effectiveness are higher than for the other two forms.

Multigroup - This process is identical to the stable group process except for two features: average attendance time per participant is considerably less; all groups after the first must absorb a previously generated body of discourse.

This may be transferred by notes, a briefing, etc. but transfer is time consuming and usually only partial.

A useful point for the planner to remember is that he should provide for informal transfer of discourse from participants to newcomers. This should be done early in the session.

Brief attendance in multigroups results in low participation, depth, and thoroughness. Brevity is high.

Limited familiarity with issues results in low O- and E-rates. Conversely, this limitation leads to high tan- and dig-avoid.

One problem of discourse transfer leads to a high Q-rate, and low accuracy and red-avoid. The transfer process makes balance low but bias-avoid high because the issue gets several reasonably fresh looks.

Interchange Format

Varying degrees of formality may be used to control discourse interchange. Some of these, such as choice of speaker, choice of issue, and cloture, are leadership features dealt with in Table VI. Others, however, are independent of the degree of control vested in the group leader. These, interchange format features, apply with the way in which interchanges are sequenced.

To analyze this we have chosen two extreme forms and a middle ground, each of which is used widely. The extreme forms are, on the one hand, open discussion where interchange of points may occur at any time and, on the other hand, the MPQ form where multiple-presentations are followed by a single, so-called question period where interchange can occur. The

middle ground is the PQ-PQ form where a question period follows each presentation. It should be clear from the explanation given below that the factors which determine the trade-offs between the three interchange format forms are quite complex, making it difficult to 'design away' the short-comings of the respective forms. Nevertheless, we feel that significant improvements are possible through creative planning.

Explanation of Table V

The strengths of discussion versus formal presentation stem from its informality. So do its weaknesses. In an informal atmosphere participation and interchange are both high, hence so is thoroughness. Depth, however, is relatively low because people making presentations tend to go too deep. Familiarity makes the O- and E-rates high for discussion, which is good, but it also encourages digressions and tangents, so tan-avoid and dig-avoid are both low, and, as a result, efficiency is low too. Bias-avoid is higher for discussion than for presentation, because more perspectives are involved, but this same multiplicity of viewpoints makes accuracy low. Earnestness is also low because informality and familiarity tend to produce nonchalance.

Within the framework of formal presentation the PQ-PQ form is most widely used. MPQ is typically reserved for presenting a number of closely related perspectives. This reflects that the chief advantage of the MPQ form is that points made during the question period may relate to several presentations at once. Moreover, dialogue between presentors is also possible, and indeed one of the most common uses of the MPQ form is in the so-called panel discussion.

It is because of this common discussion of all points presented that depth is high for the MPQ form. On the other hand, people tend to forget the points made in early presentations, or to work out issues raised in their own minds. As a result, participation, interchange, O-rate and dig-avoid are all low. Brevity is also low, not only because presentations are speeches but because points made during the question period must be related back to the presentations. This can be laborious.

On the other hand, the MPQ form minimizes redundancy and tangents, two of the chief problems of the other two forms. This makes the MPQ form the most efficient, while the lack of repeated discussion periods also makes it the most accurate. Unfortunately, the lack of participation causes boredom and frustration which make both earnestness and effectiveness low.

The PQ-PQ form is the middle ground in this process category, for it combines the discipline's logic of formal presentation with periodic free discussion. Moreover, successive presentations can benefit from points made during previous question periods. If this occurs, it significantly

TABLE V
INTERCHANGE FORMAT

	<u>MP-Q</u>	<u>PQ-PQ</u>	<u>Discussion</u>
Participation	L	M	H
Depth	H	M	L
Thoroughness	M	L	H
Brevity	L	M	H
Red-avoid	H	L	M
Tan-avoid	H	M	L
Interchange	L	M	H
Balance	M	H	L
Q-rate	M	H	L
O-rate	L	M	H
E-rate	M	L	H
Dig-avoid	L	H	L
Bias-avoid	M	L	H
Accuracy	H	M	L
Efficiency	H	M	L
Earnestness	L	H	L
Effectiveness	L	H	M

Key: MP-Q: Multiple-Presentation, Question Period
PQ-PQ: Presentation, Question; Presentation, Question . . .

H - High
L - Low
M - Medium

increases the effectiveness of the PQ-PQ process. However, this form necessarily presents the most fragmented development of the issues. Often what obtains is merely a set of well-developed but only vaguely related ideas, because the PQ-PQ form lacks a mechanism for integrating the presentations. The usual task of having a moderator or some other person summarize the discourse at the end is really not very effective, because it is not a group-endangered summary.

The foregoing should make it clear why the PQ-PQ form is ranked lowest in thoroughness, red-avoid and E-rate. Examples only work where a general understanding has been established and this one does not get with the PQ-PQ form. Rather, attempts to related successive presentations to a common issue framework require, and hence produce, redundancy. Consider, as an extreme example the person who ask the same question of each presenter.

On the other hand, the fact that each presentation is discussed in turn causes the Q-rate to be high. And because presenters can hear the points put to their predecessors and modify their presentations accordingly, balance is a strong point of the PQ-PQ form. Bias avoidance is not high, however, because the bulk of the points made are still made by the presenters, and these can not be rounded out because of the sequential form. However, because it is a middle ground between endless speeches and endless discussion, the PQ-PQ form has the highest effectiveness and earnestness, while its accuracy and efficiency are medium. It is less efficient and accurate than MPQ, but more so than discussion.

Control

Many aspects of leadership influence group discourse, most of them too subtle for issue analysis but some so fundamental that their influence is obvious. We have chosen two, control over speaking and control over the issue addressed, as being most basic.

We begin with the free-for-all since even this is seldom really leaderless and an immense literature exists on group dynamics, informal leadership, etc. But informal and formal leadership are still significantly different. Whenever group size exceeds six, some control over who speaks when and some sort of agenda become necessary, and introducing controls significantly offsets the discourse feature values. When group size reaches more than 20 or 30, speech making becomes a major problem. Then leadership must be able to cut off speech and/or topic if discourse is to be managed at all. Again, this form of control dramatically alters the discourse process.

Group size is not the only reason for invoking speech and/or issue control. A decision maker discussing a problem with subordinates may need to closely control the issues to relate the discussion to broader concerns of which his subordinates are unaware.

Thus it should be clear that the leadership features discussed below profoundly affect the discourse process. Anyone planning or managing discourse must carefully consider them, regardless of group size.

Explanation of Table VI

Table VI values assume that leadership effectively exercises its powers. Value variation derives from this power's effect on discourse not from variation in leadership quality.

- Start-speech
- Participation, high; Brevity, low; Depth, medium; but Q- and O-rates high because participants can express ideas more fully.
- Despite increased redundancy, efficiency is high. All other values medium. This is why start-speech is the most common form of formal group leadership.
- Start- & Stop-speech
- Brevity, interchange, efficiency, high; but Q-, O-, E-rates, depth, low making this leadership form one of the least effective overall.
- Start-issue
- Increased depth, redundancy and digression because of the group's being able to return to an old issue as often as it chooses. Start-issue improves brevity, O- and E-rates, and particularly the Q-rate over those for stop-start speech. Consequently, effectiveness improves but earnestness decreases.
- Stop-start Issue
- In an issue-controlled session special interests tend to dominate each issue. Depth, thoroughness, brevity, Q-, O- and E-rates and bias-avoid all tend to be low. Thus, effectiveness low but accuracy high. Red-avoid, dig-avoid, balance and earnestness, high. This leadership form is most often used for executive decision-making meetings.

TABLE VI

EFFECT OF CONTROL ON DISCOURSE FEATURES

	<u>Start- Speech</u>	<u>Start- & Stop- Speech</u>	<u>Start- Issue</u>	<u>Start- & Stop- Issue</u>	<u>Free Discussion</u>
Participation	H	H	L	L	M
Depth	M	L	M	L	H
Thoroughness	M	H	M	L	L
Brevity	L	H	M	L	M
Red-avoid	L	H	M	H	L
Tan-avoid	M	H	L	M	L
Interchange	M	H	L	L	M
Balance	M	M	H	H	L
Q-rate	H	L	H	L	M
O-rate	H	L	M	L	M
E-rate	M	L	M	L	H
Dig-avoid	M	H	L	H	L
Bias-avoid	M	L	M	L	H
Accuracy	M	M	H	H	L
Efficiency	H	H	M	M	L
Effectiveness	M	L	M	L	H
Earnestness	M	H	M	H	L

Key: H - High
L - Low
M - Medium

Free discussion

- This form has been discussed in relation to several other process features, particularly interchange format, Table V. It is the most relaxed and wandering form of discourse hence the least accurate, efficient and earnest compared to the other leadership forms. Its strength is effectiveness stemming from a high degree of understanding via a high E-rate, medium O-rate, participation and interchange and to high bias-avoid. It is probably the best format for creativity.

Purpose

The purpose of a discourse greatly affects the way it proceeds. A classroom does not sound like a meeting, and one can usually tell immediately upon hearing a conversation whether decision making, negotiation or just general conversation is occurring. We have analyzed these purposes in Table VII, calling them presentation, communication, decision making, negotiation and special purpose.

Special purpose discourse here means discourse where one sort of move will dominate. Common examples are below:

<u>Special Purpose</u>	<u>Dominant Moves</u>
1. Problem Identification	What is the problem?
2. Specification of Alternatives	What is the alternative?
3. Team Building	What can you do?
4. Resource Allocation	What do you need?
5. Assignment of Responsibility	Who will do this?
6. Investigation	Who did that?
7. Evaluation	How was this done?

Within the theoretical framework of issue analysis the five purposes considered in Table VII differ primarily as to whether the traverse is controlled, whether the participants agree to the purpose of the traverse, and whether these purposes are simple or complex.✓

The traverse is the sequence of moves by which the tree of discourse is evolved, or 'traversed.' A "simple purpose" is difficult to define, but it means, roughly, a purpose that can be characterized in terms of the structural concepts of issue analysis. For example, all of the above special purpose discourses are single purpose because each involved primarily a traverse dominated by one kind of move. We also take presentation to be a simple-purpose discourse because there is a predefined tree to be traversed. But, because neither of these conditions holds for communication, decision making or negotiation, these are all complex purposes.

The distribution of these three qualities; control of traverse, complexity of purpose and agreement on purpose, are shown below;

	<u>Control</u>	<u>Complexity</u>	<u>Agreement</u>
Presentation	Controlled	Simple	Single
Communication	Free	Complex	None
Decision Making	Free	Complex	Single
Negotiation	Free	Complex	Two Sides
Special Purpose	Free	Simple	Single

This distribution of qualities will help to explain the impacts shown in Table VII.

Explanation of Table VII

In presentation most points are made by one person, so participation and interchange are low. Left to themselves, people tend to go deep rather than branch, so depth is high and thoroughness low. Obviously, brevity is also low. Red-avoid tan-avoid and dig-avoid are all high because one person controls the traverse. This also makes for good balance. Bias-avoid is better than the special purpose discourses or negotiation, because one person controls the traverse, presentation is more biased than communication or negotiation.

What this means is that presentation, including teaching or training, is efficient and accurate but not very effective, again because one person plans and controls the traverse. Earnestness is only medium because while presentation may be interesting, it can also be boring.

The strengths of communication are thoroughness, interchange and bias-avoid, all caused by the free flow of discourse. Tradeoffs stemming from the same cause are poor tan-avoid, balance, and dig-avoid. Lack of purpose makes for a low O-rate. The net result is low accuracy, efficiency and earnestness but high effectiveness. This is the sort of discourse that characterizes cocktail parties and advisory committees which have no decision-making authority. The amount accomplished is typically small, but may be quite good.

Decision making and negotiation are serious purposes which call forth high participation. In decision making this participation combined with high brevity also makes for high interchange and a good Q-rate, while seriousness causes attention to balance. Terseness often makes depth low and causes confusion leading to redundancy. Moreover, redundancy is also used as a device to emphasize a point, since speech making is ruled out.

TABLE VII
EFFECTS OF PURPOSE ON DISCOURSE

	<u>Presenta- tion</u>	<u>Communi- cation</u>	<u>Decision Making</u>	<u>Negotia- tion</u>	<u>Special Purpose</u>
Participation	L	M	H	H	L
Depth	H	M	L	H	H
Thoroughness	L	H	M	M	L
Brevity	L	M	H	M	H
Red-avoid	H	M	L	L	H
Tan-avoid	H	L	M	M	L
Interchange	L	H	H	M	H
Balance	H	L	H	M	M
Q-rate	H	M	H	L	H
O-rate	L	L	M	H	L
E-rate	L	M	M	H	H
Dig-avoid	H	L	M	H	L
Bias-avoid	M	H	M	L	L
Accuracy	H	L	H	M	M
Efficiency	H	L	M	M	M
Earnestness	M	L	H	H	L
Effectiveness	L	H	H	M	M

Key: H - High
L - Low
M - Medium

Negotiation differs for decision making in that at least two opposed purposes are operating. It thus resembles the case of polar perspective discussed under Table III. Negotiation involves speech making and argumentation, so depth is high while thoroughness is only medium, and red-avoid is low. Brevity is only medium and this causes interchange to be only medium. The O-rate is high because of disagreement: the Q-rate is low for the same reason. The E-rate is high because negotiations try to avoid statement of general principles, preferring to use examples which are often simpler. Indeed, this use of examples is one of the chief sources of confusion in negotiations, because the specific properties of the example and the several principles which it illustrates.

Decision making and negotiation both feature high earnestness. In addition having a single purpose makes decision making highly effective and accurate, while negotiation's built-in conflict makes it only medium in these categories. Each is only medium in efficiency due to problems with redundancy, and to some extent, tangents.

The problem with special purpose discourses is their one-sidedness. This makes for low participation and thoroughness, few objections, and problems with tangents and digressions. On the other hand, because of their narrow focus, brevity and interchange are good, as are the Q- and E-rates. Special purpose discourses tend to become exercises in list building, so the O-rate is low. This simplicity helps avoid redundancy, but encourages bias, because groups tend to adopt repetitive, boring approaches to the issue. As a result earnestness is low, while accuracy, efficiency and effectiveness are only medium. In short, special purpose discourse processes have both the advantages and the disadvantages of routine --they must be properly combined with other process features, such as expertise, if their shortcomings are to be overcome.

APPENDIX A

MANAGEMENT OF DISCOURSE*

The idea behind issue analysis is that complex reasoning that is, reasoning that requires more than a few hours of effort, always involves identifying and following out many lines of thought. Just like exploring a river basin, there are a great number of tributary ideas that must be searched out before a discourse is completed. Moreover, to push this analogy a little, one often cannot tell when standing at a fork just which branches are most important, so as anyone who has done a lot of group thinking knows, you spend a lot of time in the swamps.

Issue analysis as a discourse management tool is designed to help you get out of the swamps. It does this by providing an issue tree map of the developing lines of thought so that when thinking gives out on one line it is possible to "go over the ridge" and pick up another.

For example, what we call interactive issue analysis is used to allocate attention efficiently during a group discussion. By letting a group interact with the evolving tree of their own ideas it is possible to sustain hours or even days of reasoning on a single topic. It is also possible to bring people into the middle of a piece of reasoning and let them grasp, by looking at the tree, just what has been explored so far. It is even possible to stop a discussion for a month and pick it up again with all the reasoning intact.

For example, working out an issue as large as the impact of a public works project requires many months of complex reasoning. Often, many disciplines, interest groups, contractors, and publics are involved in identifying and working out likely impacts, and in formulating alternative issues and decision options. The following examples only begin to touch the magnitude of the problem of the efficient management of complex discourse:

(1) Using an issue tree one can roughly quantify various features of a piece of discourse, such as the amount of redundancy, time spent in digressions, relative attention given to various issues, thoroughness, depth, etc. We often break reasoning down to a level of detail where people are making 100 to 150 points per hour. At this level, the typical rate of branching for an open discussion is about 1.2 branches per node. When an issue tree is used interactively, this rate increases to between 4.0 and 5.0 branches per node. This means that fewer than one-third of the significant lines of thought are typically identified in free discussion.

*Adapted from Wojick, David E., "Seeing What You Think: Issue Analysis, Assessment and Rational Management," Proceedings of the Corps of Engineers Social Scientist Conference, Memphis, 1976.

(2) We once tracked a committee which met three times at intervals of one month, to formulate a policy. Because of the long time span, a lot of reasoning had to be repeated just to get to new points. The second meeting saw a 50% redundancy rate while in the third meeting only 15% of the points made were new; 85% were redundant. Most of this redundancy was simply waste—waste of time and waste of valuable human resources, caused by the complexity of discourse.

Efficiency, comprehensiveness and thoroughness are the management goals of any discourse. The complexity of the reasoning which must go into any good discourse makes these goals hard to achieve. Taxonomies, agendas, checklists and other tools are often used to try to simplify the reasoning, sometimes to good effect. But another approach, which in the long run we must all adopt, is to learn to manage the complexity itself. This "discourse management", if I may call it that, is what issue analysis tries to facilitate, simply by keeping track of the lines of thought.

The problem of discourse management is that up until now there has been no way except intuition to break an issue down into discrete units which can be dealt with one at a time. As a result, attention either jumps back and forth or settles on a few issues, and many important considerations are missed. Issue analysis continuously refines the issued into discrete units, hierarchally arranged, so that attention can be systematically allocated. In this way, important considerations are not overlooked, and each issue receives proper attention.

How can issue trees be used to make discourse more efficient, and what effort is involved: I believe that small-scale, rapid turn-around applications would probably be most cost effective, such as:

1. Using an issue tree to design a good scope of work for a project and as a basis for AE negotiations. This approach should significantly improve AE coordination. Depending upon the complexity of the project and the degree of detail, the effort required could be as little as two days of interactive issue analysis.

2. Rapidly pulling together an in-house study for a small project; the tree makes possible a comprehensive and balanced approach to the smallest project. This approach is particularly efficient because the tree becomes the outline for the report. Effort level could be as little as one or two weeks.

3. When putting together a court case involving complex technical issues, an issue tree can be quite helpful. Product liability defense is one of the most successful applications of issue analysis to date. Even a small tree of 200-300 points, which can be built in a few hours, often makes clear just what the technical issues are.

4. Designing and implementing a plan of study, a regional development account, an institutional analysis, a re-authorization study, etc. The criterion for using issue analysis should be the extent to which the study departs from traditional handbook procedures. The more exploration is involved, the more issue analysis will be cost effective.

5. Public participation and conflict resolution. Issue analysis has been used on several occasions to enable people with conflicting interests and opinions to reason together. The issue tree approach enables each party to be sure his or her points have been made. But it also forces each party to understand and recognize the points of the other side.

What usually happens when an issue tree is used is that people stop arguing with one another and turn their attention to getting their points on the tree. This tends to greatly reduce the emotional level of the discussion, as people find themselves reasoning with the tree. A kind of consensus atmosphere builds up and it is often possible to reach a general decision on the issues. If not, at least people can usually agree that everyone's position is fairly represented and genuine.

Of course, some people react negatively to this sort of structured process. This is particularly true of people who resist compromise or who resent any appearance of discipline or authority.

All in all, the results so far have been quite encouraging. Most people seem genuinely to want to be reasonable but are forced to be difficult because they lack a systematic approach to complex issues.

If you are faced with a complex issue which warrants careful thought, then an issue analysis may be what you need. Issue analysis provides a comprehensive, systematic and efficient approach to complexity. In addition, it is effective as a public participation and interdisciplinary study procedure. Because of its efficiency, issue analysis is inexpensive compared to traditional study techniques.

Any agency or organization doing a significant amount of discourse should have an in-house analysis capability. Issue analysis is like computer use; it needs to be approached at two levels. Each person must understand how to read an issue tree and tree out his or her own ideas. It takes about a week to learn this much. In addition, if the best benefits of issue analysis are to be realized, one needs a proficient analyst. A proficient analyst is one who can tree out someone else's ideas; an applied logician. Becoming proficient at issue analysis is no different from learning any technical skill, it just takes a few weeks of training and a few months of practice. A really proficient issue analyst can tree out a discussion as fast as it occurs, though one does not need to be this fast to realize the benefits of issue analysis.

Having an issue analyst on hand means that you can interact quickly and efficiently with anyone who has a contribution to make or who needs to be informed. Reasoning can be presented instead of bare conclusions. You can know exactly how much ground you have covered, and why. All of these things should go a long way toward making any discourse effort better, more defensible and more enjoyable.

USES OF ISSUE TREES

Issue trees may be used for a variety of purposes, some simple, some complex. Each use has its own requirements, both operational and in terms of cost. Perhaps the simplest use is as a recording or picturing device whereby the lines of thought in a given discussion or piece of writing are laid out in their underlying logical order. We call this the transcript use. A simple example of the transcript use would be the tracing out of a contract to see precisely what requirements it contains. The resulting issue tree would be a logical, as opposed to verbal, transcript of the contract.

The transcript use of an issue is a middle-effort application in that it requires a considerable amount of one-person labor to produce the tree. Similar applications are possible working from a taped discussion, or, if necessary, from a discussion itself. Examples of this would be the treeing out of the testimony of witnesses during a trial in order to develop a stronger case. Or the treeing of a conference in order to keep track of the reasons why certain things have been decided upon.

We can identify other simple applications of issue trees, and their associated efforts, according to our experience so far:

1. Basic Analysis. This consists of preparing a transcript issue tree for a single meeting or session with some follow-up to edit the tree, redraw it into usable form, and summarize such things as the issues that were identified, unresolved issues, confusions, etc. Normally some background reading is required in order to familiarize the analyst with the concepts being employed. For a one-hour meeting, a total effort of one day would probably be sufficient. For a one-day meeting between three and four days would be required depending upon the extent to which conclusions are to be drawn and final materials prepared.

2. An Extended Issue Analysis. A single discussion, whether it lasts for an hour or a day, will almost never thoroughly identify issues, even at the highest level. As a rule of thumb, we estimate under normal circumstances about 90% of the first-level issues, between 50 and 75% of the second-level issues, and usually not more than 10 or 15% of the third-level issues will be identified. Since the detailed nature of a problem and correspondingly a precise idea as to its solution seldom appear before the third level, it is often necessary to extend discussion beyond a single day. To fill out a tree beyond the third level and pick up, on a hit-or-miss basis, points to the fifth or sixth level requires an average of between 10 and 15 days of additional effort. This is a typical small project.

Because of the geometric increase of the number of points at each level, an analysis which aims to be complete or even relatively thorough at the sixth level requires several man-months of diligent effort. While preparation costs do not go up proportionately for this kind of detailed analysis, the development of final materials will usually increase considerably. This depends, of course, to a great extent upon how much of the total tree must be reproduced in final form.

3. Program or Project Management. An initial issue analysis of a major problem usually results in the evolution, as part of the analysis, of a plan for problem solution. Unless one is very lucky, the solution to a large problem is going to be a large project or program of some sort, involving hundreds or thousands of hours of effort. The issue tree which was developed as part of the problem analysis will already contain both the rationale for and the initial conceptualization of the project. In order to turn this data base into a useful project management device, it is only necessary that the main lines of thought and action, identified on the initial issue tree, be kept track of or treed out as the project develops. Used in this way, the issue tree provides a continuous or ongoing overview of project efforts. It enables the project manager to make work load assignments and to balance diverse activities so that the problem is attacked systematically. Likewise, the tree will serve as a natural medium for explaining project activities and reporting project progress.

Tree-building efforts in this case will vary depending upon the degree of detail to which the project is going to be tracked. A simple update of the tree two or three times during the duration may be sufficient for some purposes. On the other hand, where large sums are involved or a particularly difficult or uncertain problem is being confronted, one might want to make the issue tree the basis for daily decision making.

4. Project Evaluation, Assessment and Trouble-shooting. This use is really just project management carried on as it too often is--after a project is already well underway. It is easy for a large project or a program involving many people to become somewhat diffused as time goes on. This is especially true if groups participating in the project are not in routine communication with one another. It need not be the case that a situation prevails where each person involved has some sense that something is wrong but these senses differ. What one does in this situation is simply to tree out the issue of the status of the project, involving all concerned if possible.

We have found that often in this circumstance the problem lies with no certain person or group, but rather in incompatibilities which have evolved between the activities of various groups. This lack of fit between the activities of distant groups which are not in constant communication with one another is easy enough to understand; it is equally easy to see how a comprehensive, systematic overview, such as an issue analysis provided, is often useful in identifying such lack of fit. Because this trouble-shooting use of issue trees is basically just a special kind of issue analysis, the efforts involved are similar; that is, a few days, a few weeks, or a few months, depending upon the level of detail.

THE TEMPLATE USE

The uses of issue trees listed above have their utility in the improvement of some costly activity or another by facilitating making the best decision. The template use of issue trees is different in that in addition to leading to better problem solutions, it aims to making these solutions occur more quickly, thus offering a direct saving in reasoning time and effort. The magnitude of such savings can be enormous when one considers that more than 50% of today's population is involved in nonmanual effort, and when one considers the yearly numbers of group and committee meetings. The template uses, for there really are a variety of them, are all aimed at reducing the time and effort required for reasoning by providing an initial logical framework for systematically attacking the problem at hand.

The basic idea is that many meetings and many problem situations are, at some level of generality, about exactly the same thing. There are, for example, thousands upon thousands of meetings in the United States each year which are called to decide whether or not to contract for a given item of work. The specific details of the item in question will vary from case to case, but down to the third level or so, the issues are always the same. There are a relatively small number of lines of thought which form the top of the tree and which must be traversed in any contracting issue. Certainly in some cases some lines will be more significant than others, but in almost all cases, every one of the lines will be important enough to follow out to some degree and ought to be noticed from the beginning. The same is true for impact assessment, economic analysis, etc.

Likewise, each time one introduces a new employee into a given organization, it will be necessary to reason out a number of lines of thought in order to introduce him or her into the complexities of the organization. After the first few levels, the specifics that need to be gone into will be a function of the specific role that that person is to play, but the top of the tree is always the same. An issue tree template is simply the top of the tree, which may be used over and over again in a specific context.

An issue tree template is thus like a checklist or agenda with two significant improvements. First of all it has a tree structure and so replicates the natural structure of the reasoning which it is to support, and, secondly, the content of the issue tree template is a representation of the reasoning which actually occurs in these situations rather than some one person's conception of what that reasoning ought to be. In other words, the issue tree template is both systematic and scientific.

Because it is both systematic and scientific, the issue tree template can also claim to be comprehensive and efficient. Its efficiency derives from the fact that one does not have to spend time figuring out what lines of thought ought to be pursued, nor does one lose time in retracing steps or getting back into the basic issue. In addition, there is a much better chance for a balanced discussion wherein time is not wasted at too great a level of detail, or through digression or tangents, as is often the case when the overall issue cannot be clearly pictured.

What about creativity? Doesn't the use of an issue tree template stifle the serendipity which is so essential to the creative process? The answer is twofold. First of all, it is certainly the case that if an issue tree template is used, it ought never to become an iron framework to which all else must bend. We recommend, for example, that structured discussion be interrupted periodically for periods of free thinking during which ideas which may not clearly fit into the template may be voiced. As a matter of fact, when specific periods are set aside for this type of brainstorming or creative thought, it is much easier to elicit the kind of speculation that one is looking for.

Our second answer to the worry about creativity is somewhat less romantic. The plain fact of that matter seems to be that in most cases, for most issues, working out the problems is not a matter of flashes of creative insights; rather, it is simply a matter of getting all the facts laid out on the table and drawing together the expert perspectives which are available. In other words, it is a matter of simply working through the issue. For most issues, then, we feel that the use of an issue tree template, because it enables reasoning to occur in a systematic, comprehensive, and efficient way, will provide the best results.

Two of the most obvious uses of issue tree templates have already been alluded to. The first is the semi-repetitive decision, such as a decision to sub-contract, to allocate a large amount of funds, to effect a merger, to adopt a new product line, to implement a new program or innovation, etc. Any kind of decision which can be categorized in these general terms is susceptible to guidance by means of an issue tree template. Secondly, there are those uses where no decision is to be made at all but rather where a fairly complicated body of knowledge is to be transferred as efficiently as possible. Training, in all its forms, falls under this heading.

How much time can actually be saved by the use of an issue tree template? While our experiments have only begun, we believe that up to 25% and sometimes as much as 50% of the effort of a group meeting is directed toward developing the general level issues and keeping track of the place of a discussion within these issues. In addition, depending upon the characteristics of the group, there may be a good deal of time given over to digression, tangents, and redundant points. Thus, we feel that the use of an issue tree template will normally save between 20 and 30% of discussion time and may save a great deal more. This is in addition to the improvement of the quality of reasoning which the use of a systematic approach provides.

The effort involved in the use of an issue tree template is of two sorts. First of all, the template must actually be produced. This requires the development of an issue tree which is relatively complete to at least the third, and preferably the fifth or sixth level. Thus, it requires between two weeks and several months of effort. In addition, there is the implementation effort which primarily involves learning how to read an issue tree and learning how to use it as the framework for discussion. In part, this implementation is merely a matter of practice, but some initial formal instruction will be required. It takes an hour or less to learn how to read an issue tree, and about a day to learn how to use one.

This cost compares quite favorably with the cost of more common training and decision-making aids which are not nearly so systematic or comprehensive and which do not make use of the underlying logical structure of the issues in question.

Of course the issue tree template idea presumes that the things that are discussed are the things that ought to be discussed, but this is not really the weakness that it might seem. In the first place, developing the template makes clear to the organization involved just what its reasoning typically is and has been. It is then possible to identify lines of thought which have not been followed out but which ought to be. This is really a kind of interactive spin-off of the template use. But secondly, is it not reasonable to assume that the people who are the source for the reasoning which is involved in a given decision are precisely those people who are most expert in making that decision? This is just another case of the fact that the issue analyst does not presume to reason better than the people analyzed, but only aims to make it possible for them to reason better.

Use of the issue tree template has potential to save truly enormous amounts of money in today's world. Once the initial cost of developing the template has been borne, the savings become continuous in terms of increased efficiency of decision-making process. We estimate on the basis of observation of many groups that as much as 25% or even 50% of the time taken up in decision-making discussions is used to identify and keep track of the main lines of thought which are being developed. This time includes, for example, the repetition of thoughts which is often necessary in order to begin a new line of thought in the middle of an old one. This also includes the time lost through backtracking and confusion which often accompanies the reaching of an end of a line of thought as we attempt to get back on the subject.

PRESENTATION OR COMMUNICATION USE

In addition to being used to attack a new issue and to provide support for semirepetitive decision making, issue trees may be used as a basis for communicating a complex body of information, whether new or not. Thus, for example, if one is to make a presentation of a complex idea, an issue tree is very useful both for presentation and a display.

One can be sure, for example, that one has covered one's ground. If the tree is displayed, the audience can understand at all times where the speaker is and where he is going. This helps to avoid premature and extraneous questions and, in general the worry as to whether the idea will get across. Also, when the tree is displayed during the presentation, it is much easier for respondents to address particular points which interest them. In this way, there is developed a general sense that everything has been covered and is understood. For the purposes of organizing a presentation, an hour or a day of issue analysis may be sufficient. If the tree is to be used in presentation, however, then essentially a template is being built, and more time must be taken so that completeness is achieved.

Another use of issue trees for purposes of communications is issue tree minutes. Many complex problems require group discussion over long periods of time involving a number of successive meetings. As the number of meetings increases, the problem of recollection of prior reasoning and redundancy may become acute. We have observed sequences of meetings wherein as many as 85% of the points made in a later meeting had already been made in prior meetings. Such repetition is a very great waste of time. Using issue trees as minutes in such situations is similar to the project management application discussed above.

THE SCOPE OF ISSUE ANALYSIS

Many people are puzzled by the seeming endless variety of uses which issue trees are claimed to have. How can a single mode of analysis be applicable to corporate energy policy planning on the one hand and conducting a public meeting concerning the placement of sewers on the other--the technique seems almost too general to be useful. The answer is simply that issue trees are nothing more than a way of laying our ideas out on paper. The technique is not specific to any particular topic that we may be reasoning or thinking about; it relates only to the thinking itself.

APPENDIX B

LOGIC

Logic is the science of reasoning and the observations upon group reasoning contained in this manual are part of applied logic. Historically, logic as a discipline has concentrated for the most part upon the activity of drawing conclusions from premises, called "inference."

Inference has to do with drawing conclusions from evidence or premises. This is a very important part of reasoning- but inference is far from being the whole of reasoning. Asking questions, raising objections, clarifying meanings, giving examples--each of these activities is a vital part of good reasoning, in its broadest sense.

There are at least two reasons why logic has concentrated on the study of inference. First, inference is the focal point of reasoning; it is the cashing in of accumulated thinking and discussion in the form of conclusions. Inference is the star of reasoning: once the conclusions are drawn, the rest can be forgotten.

Second, inference is relatively simple in its outline. Thus it admits of formal analysis and scientific study. Many of the basic forms of inference were first identified and catalogued by Aristotle or by the stoic philosophers. The theory of inference was a high art in St. Thomas' time. It became established as part of mathematics through the work of Bertrand Russell, Boole, and others around the turn of the century.

These have been spectacular achievements in human understanding, but they also show that inference is relatively simple compared to those features of reasoning or discourse for which there are no theories. The logic of questions for example, has only recently been studied, and a general theory still escapes us. The logic of objections or examples, has to our knowledge never been attempted prior to our own work, which is very elementary.

This manual takes an engineering approach to reasoning, that is, it aims at analysis and design, not theory. But the user should keep in mind that a science of discourse waits to be developed, as a branch of logic, based upon the observation of discourse features. For those who want to pursue this science a course of study in logic is recommended.

APPENDIX C

GLOSSARY OF ISSUE ANALYSIS TERMS

ISSUE TREE - A diagram, specifically a connected graph, which relates points according to their being responses to one another.

RESPONSE - The relation which obtains between two points, as follows: An answer is a response to a question; an objection is a response to the point objected, and a reply to an objection is a response to an objection.

MOVE - The act of making a response.

BRANCH - The issue tree representation of a move.

POINT - A question, answer, objection, reply, proposal or initial statement.

PATH - A sequence of connected branches.

NODE - The issue tree representation of a point.

FORK - Two or more branches on the same node.

DISCOURSE - The activity of making moves by one or more persons. An issue tree represents the logical structure of a discours.

DISCOURSE PROCESS - Any process whereby discourse occurs, such as a discussion, meeting, speech, conference, presentation or class.

DISCOURSE PROCESS FEATURE - A property of a discourse process, such as the number of people involved, the spread of perspective, etc. (see page 19).

DISCOURSE FEATURE - A property of a discourse or, by extension, a property of the issue tree of a discourse, such as the average path length, rate of branching, example rate, etc. (see page 8).

TRAVERSE - The order in which the points in a tree are made.

TRAVERSING - Making the points in a given tree in a given order. Two discussions may traverse the same tree in different ways.

TRAVERSING PROBLEM - The problem of choosing the best traverse for a given situation. For example, how to present one's ideas in a presentation or report.

ISSUE ANALYSIS - The use of issue trees to:

1. Facilitate discourse.
2. Assess discourse.
3. Analyze the subject matter of discourse.

APPENDIX D

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APPENDIX E

AN ANNOTATED INTRODUCTORY BIBLIOGRAPHY OF LOGIC AND CONCEPTUAL ANALYSIS

Issue analysis attempts to provide a framework wherein a general theory or science of human reasoning becomes possible. It is an infant science, of course, and its form is far from clear. But it is clear already that this science has the power to reveal a great deal about reasoning which has heretofore been unknown and unsuspected. The fact that all reasoning has an underlying tree-like structure composed of discrete elements opens the door to a host of new investigations and techniques for the improvement of reasoning.

The measures and features of group reasoning are just a starting point. In the long run, it is up to you to make these ideas work, to live up to their potential.

There are very few human activities which do not involve reasoning to some degree. It is for this reason that logic, before it became a branch of pure mathematics, was considered an essential part of any education. Perhaps it can be so again.

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