Decision Tree: Good Tool For Analysis

BY PAUL F. PRESTIA*

Useful way to look at complex situation prospectively, perspectively, or revisit during negotiation

Option and risk evaluation is an essential part of any rational decision-making process. That process may be intuitive, in which case the option and risk analysis may be subsumed. When the decision to be made involves a business-related dispute, the options and risks typically comprehend a complex of interrelated business and legal contingencies. Objective analysis of these contingencies is often prudent, either to confirm intuitive determinations, or to assist in the decision-making process.

Decisaion Tree Analysis (DTA), particularly spread sheet-implemented DTA, is a powerful tool for objectively analyzing interrelated contingencies and alternative outcomes. Coincidentially, it is also highly effective as a planning tool and as a communications tool.

Examples presented below will illustrate these points and will also show how, with the facility of computer spreadsheet implementation, DTA can be extended to cumulative probability analysis.

These examples deal with hypothetical situations involving a license negotiation (with litigation as the alternative) and a decision to be made in the course of a more formal alternative (non-judicial) dispute resolution process.

Option and Risk Evaluation

The spectrum of ways a dispute can be settled extends from negotiation (possibly leading to a license or to some mutually acceptable business arrangement, typically involving some estimates of uncertain costs and benefits) to litigation (typically involving substantial cost, delay, and numerous uncertainties; the uncertainties including not only the ultimate outcome, but also the extent of the cost and delay).

The complex of uncertainties to be considered in this milieu can be mind boggling. Even if the number of significant uncertainties to be considered is small, the effect of the interrelationship of these few on various possible outcomes is often a matter of great uncertainty in itself. Ideally, one tries to identify at least the most significant of these uncertainties, and to assess the probabilities of various possible outcomes that may result from them. Often, the outcomes of a specific uncertainty (whether an arbitrator will allow extensive discovery on a specific point, for example) is not an ultimate outcome, but must be linked serially with other uncertainties, and their associated probabilities, before any ultimate outcome is reached.

DTA is an excellent tool for developing and interrelating (or linking) these uncertainties, and the associated outcomes and probability estimates to evaluate options and to derive the probability of various possible ultimate outcomes. Graphically, each significant uncertainty is represented as a branching point of a tree, the branches representing possible outcomes of that uncertainty. Mathematically, outcome values and probabilities are processed to determine option values (with the evaluations of ultimate outcomes discounted by intervening probabilities) and overall probabilities of various possible outcomes (or cumulative probabilities of all outcomes above or below a certain value).

At a minimum, DTA can be used to determine (or to confirm) the best and worst available alternative outcomes, for any given option.

Taking into account the resulting assessment of option values and outcome probabilities, DTA may also be used, by way of further example, to help select a particular dispute resolution procedure or course of action. More commonly, it would be expected to assist in choosing a negotiating position most likely to lead to a preferred outcome or settlement. In this sense, DTA is a valuable decision-making tool.

Spreadsheet-implemented Decision Tree Analysis provides a more user-friendly form of DTA. An important and convenient feature of this implementation is the instantaneous recalculation of tree variables to consider "what-if" questions and to facilitate the assessment of Cumulative Probability, i.e. the over-all probability that the ultimate outcome actually realized will be above or below a selected value.

DTA As Communications Tool

As indicated above, a complex set of unknowns is graphically linked and mathematically analyzed in DTA so that rational assessments may be made of the likelihood of various outcomes, the impact on outcomes of different choices and intermediate events, and the relative values of different choices (i.e. "option values").

These assessments, *and the underlying analyses by which they are made*, can be used not only as a basis for decision-making, but also for communicating at least quasi-quantitative evaluations of option values, risks and probabilities of outcomes. Even more importantly, the underlying analyses can be dis-

*Ratner & Prestia, Valley Forge, Pennsylvania.

cussed and manipulated to evaluate alternatives and to test different hypotheses, ultimately to enhance the confidence level in the resulting assessments.

A prime example of the need for effective communication is the advice a lawyer must give to a client about to undertake a new business venture involving possible patent infringement. The client may consider alternatives including a different business plan, licensing, and litigation. To do so it must have a realistic appraisal of the likelihood that litigation would lead to a conclusion that the patent is valid or invalid, infringed or not infringed. Reflecting the inherent uncertainty of the litigation process, that appraisal is best presented in terms of probabilities. In the words of The Court of Appeals For The Federal Circuit, "An honest opinion is more likely to speak of probabilities than certainties." (*Read v. Portec*, 970 F.2d 828, 23 USPQ2d 1426, note 9 (Fed Cir., 1992)).

Using both the graphical and the mathematical aspects of DTA, these "probabilities" can be derived, at least quasi-quantitatively, analyzed for discussion and possibly for consensus building, and communicated effectively.

DECISION NODE

Figure 1

UNCERTAIN EVENT NODE

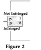

Figure 2

Uncertain events having a significant bearing on possible ultimate outcomes are treated serially. Sometimes, but not always, this serial representation also reflects the time sequence in which these uncertain events will occur. When the nodes and branches of all of the significant uncertain events (likely to influence and/or lead to a number of possible alternative ultimate outcomes) are linked, the resulting graphical representation is the Decision Tree.

For example, consider a prospective defendant's (licensee's) view of a license or litigate decision, at the inception of the dispute resolution process. The litigate choice may lead to a number of ultimate outcomes. The most readily identifiable uncertain events likely to influence those outcomes are determinations of:

- Patent validity (whether or not the patent will be found invalid),
- Patent infringement (whether or not the patent will be found to have been infringed), and
- Willfulness (whether or not, if infringement is found, the infringement will be found to have been willful).

The resulting Decision Tree is shown in Figure 3.

LICENSE V. LITIGATE, FROM VIEW OF LICENSEE

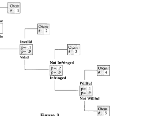

Figure 3

Assigning probabilities to the uncertainty node outcomes (as shown in Figure 3) and values to the various possible ultimate outcomes enables the mathematical analyses of the Decision Tree process. Individual nodes are evaluated by summing the products, for each possible node outcome, of its probability times its outcome value. For the Willful/Not Willful Outcomes (Otcms #4 and 5) of Figure 3, this node variation is illustrated in Figure 4, in which node outcome values are shown as "Costs" (to Defendant). As a matter of convention, in Figure 4 and in all of the decision trees to be illustrated, calculated values are shown in shaded areas and input values in unshaded areas.

In the license-versus-litigate tree of Figure 3, assume these input values to be:

License cost = $3.0 MM
Probability of Invalidity = 10%
Probability of Non-infringement (assuming validity) = 20%
Cost of litigation = $700,000
Possible damage award (assuming validity and non-willful infringement) = $1.5 MM
Possible damage award with willfulness = $4.5 MM

As shown in Figure 5, these values, and the resulting Litigate and License Values can then be shown on the Tree itself. Essentially, all ultimate outcome values are discounted by their intervening probabilities (moving from right to left as the tree is conventionally shown), back to the original option or decision branches of the tree. Conversely, the probability of each ultimate outcome can be calculated, moving from left to right, by multiplying all intervening probabilities

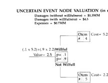

Figure 4

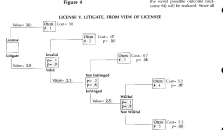

Figure 5

leading to that outcome. These calculations are the basis of the mathematical portion of DTA.

The node values corresponding to the Decision branches (License or Litigate) represent a calculated quantification of the value of the alternative decision choices, i.e., the "value" of the option. In the example above, the License option has a value (negative, to the potential defendant) of $3 MM, the license price. The Litigate option has a value of $2 MM. Additional intelligence can be gleaned by further analyses of these numbers.

For example, it is often useful to summarize all the relevant input and output values in a table, such as Table 1 (below), which can be linked to the tree itself if a spreadsheet program is used.

Then the sensitivity of the derived values to different input values can be tabulated (as in Table 2, below) by inserting a range of input values for the input to be tested (Invalidity Probability in this example) and recording the resultant output value of interest (Litigate Option Value in this case).

The utility of a spreadsheet program in DTA is further demonstrated by the facile conversion of the data of Table 2 into graph form, Figure 6.

As shown in both Table 2 and Figure 6, in this example the Litigate Option Value is relatively insensitive to Invalidity Probability.

Still other intelligence to be derived from the Figure 5 Decision Tree is the probability of specific outcomes if the litigate option is chosen. The prospective licensee must recognize that the litigation option involves only a 7% risk that the worst possible outcome (outcome #4) will be realized. Since all other outcomes involve a cost of less than the $3MM license price, there is a 93% chance (the Cumulative Probability) that the litigate choice will lead to an ultimate cost less than the license cost. Moreover, the prospective licensee can recognize a total, or cumulative, probability of 28% (the sum of the probabilities of outcome #2 and outcome #3) that it will realize its best possible alternative, an outcome cost of only $700,000. All of these probabilities will be of particular interest to a decision-maker with specific sen-

FIGURE 5 OUTCOME COSTS, PROBABILITIES AND LITIGATE OPTION VALUES

	Cost (Input)	Probability (Output)
Otcm 2	0.7	.10
Otcm 3	0.7	.18
Otcm 4	5.2	.07
Otcm 5	2.2	.65

	Probability (Input)
Invalidity	.1
Non-infringement	.2
Willfulness	.1
Option Value	2.0

Table 1

INVALIDITY PROBABILITY VS OPTION VALUE

Invalidity Probability	0	0.1	0.25	0.5
Litigate Option Value	2.14	2.00	1.78	1.42

Table 2

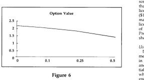

Figure 6

sitivities (risk aversion or resource conservation, for example) or intuitive preferences)i.e. gambling instincts).

USING DTA FOR A NEGOTIATION COUNTERPOINT

Theoretically, for the prospective defendant whose situation is illustrated in Figure 5, the Litigate option is preferable for any License price above $2 million (the Litigate Option Value). DTA can also be used to demonstrate to the prospective licensor/plaintiff that the price is too high. Simply showing all of the same values (but subtracting litigation expenses rather than adding them to Outcome costs) will demonstrate to the licensor the possible cost of a lost litigation, and the probability (28%, the cumulative probability of the two worst possible outcomes, Outcomes 2 and 3, for licensor) that that cost is at risk. On this basis, the value of the Litigate Option for the licensor is calculated to be $1 MM. It can be argued that any license price above $1 MM should therefore be preferable to litigation for the licensor.

A more important consideration may be the likelihood that one successful license begets more. Hypothetically, if we assume that a successful license in the situation under study will create a 30% likelihood that an equivalent amount of license income will be generated by additional licenses, the License Option of the Figure 5 tree for licensor would then be branched to reflect this possibility, as in Figure 7. Even taking into account the typical licensor's more optimistic evaluation of the probabilities of infringement and willfulness (90%, and 30%, in Figure 7, as compared to 80% and 10% in Figure 5, the licensee's Decision Tree), the licensor's view then shows a Litigate Option Value of $1.4 MM, and a License Option Value of $3.9 MM. (Note that, for licensor, the cost in Outcome #4 (Willful Infringement) assumes an award of attorneys' fees, while the cost of the "Not Willful" Outcome (#5) assumes that licensor will be required to absorb its attorneys' fees.)

Since, from the Figure 7 Decision Tree, it can be argued that any License Option Value above $1.4 MM would be preferable for licensor, it quickly becomes apparent that (other factors notwithstanding) licensor's minimum license price ($1.4 MM) is well below licensee's maximum price of $2 MM from the licensee's assessment of the value of the litigate option (Figure 5). Presumably, a middle ground should be found for settlement.

Using DTA for Sensitivity Analysis

DTA permits still another assessment. The analysis may indicate (as in the Decision Trees of Figures 5 and 7) that the single most influential factor (i.e. the input variable to which the Option Values show the greatest sensitivity) is, for example, the probability of a finding of willfulness. In that case, it is immediately apparent that it is important to have a relatively high confidence level in the assessment of the probability of willfulness. If different individuals differ significantly in their assessment of this probability, their assessment of the Litigate Option will also differ significantly. Conversely, coming to a common understanding on the point of the likelihood of willfulness (perhaps with the help of a third party or further study) greatly enhances the possibility of a common understanding as to the Litigate Option value. Whether this common understanding is between counsel and client, co-counsel, or opposing parties and counsel, the value of

LICENSE V. LITIGATE, FROM VIEW OF LICENSOR

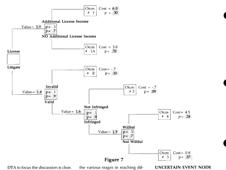

Figure 7

DTA to focus the discussion is clear.

COMPLICATED DECISION TREES ARE READILY HANDLED WITHIN A SPREADSHEET PROGRAM

While decision trees with limited numbers of outcomes and input variables are useful, typical situations often require more complicated trees. Uncertain Event Nodes may defy simplification into only two possible outcomes. A trial outcome, for example, even from the distant vantage at the inception of a dispute, may require consideration of more than two distinct outcomes (no liability, liability without willfulness, and liability with willfulness). Or it may be useful to use DTA to analyze mathematically other variables, such as time and net cost (taking into account the variable expense encountered along the various stages in reaching different outcomes). The tree elements for these possibilities, as used in a spreadsheet program, are shown in Figures 8 and 9.

These elements are used, for example, in the Arbitrate versus Litigate tree of Figure 10 in which two significant outcome-influencing uncertainties are analyzed for the Arbitrate Option (limited versus unlimited discovery in the arbitration process and the three-way outcome of the final liability holding) while three such outcome-influencing uncertainties are analyzed for the Litigate Option (namely, a prospective defendant's summary judgment motion, with and without a fee award, the general verdict/-special verdict choice which the court would eventually make, and the three-way liability holding possibility). Time and Expense increments (dT and dE, respectively)

UNCERTAIN EVENT NODE
3 Outcomes

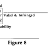

Figure 8

are also associated, where appropriate, as input variables for certain of the branches in the tree of Figure 10. Totals of increments of time and expense are then calculated for each ultimate outcome by summarizing those increments along the branch path leading to each outcome and factoring that

OUTCOME EVALUATION
Additional Variables

Figure 9

total into net outcome cost (or return in the case of a licensor).

Cumulative Probability Evaluation

Another useful analytical product of DTA is a quantification of Cumulative Probability, that is the probability that, considering all possible outcomes, a particular variable, such as cost or time will be above or below some limit. Determination of Cumulative Probability is greatly facilitated by spreadsheet implemented DTA.

By way of example, the Cumulative Probability of Net Cost, in the Arbitrate Option of Figure 10, is determined by the analysis shown in Tables 3A, 3B and 3C. All Arbitrate Outcomes are tabulated in Table 3A. In Table 3B, these outcome values are sorted by net cost (nC) and in Table 3C, successive probabilities for each outcome are added to the previous cumulative total and tabulated with the successive outcome net costs. Table 3C indicates that, for the Arbitrate Option, there is a 43% cumulative probability that the prospective plaintiff will have a loss of greater than $200,000. At the same time, there is a 22% (100% less 78%) chance of a positive return of greater than $1.2 million. Such information could be highly pertinent to a decision-maker whose risk aversion or gambling instincts can now be exercised more realistically.

By similar analyses, as shown in Tables 4A, 4B and 4C, one can also determine the cumulative probabilities for various levels of net cost for the Litigate Option in Figure 10.

GENERAL COMMENTARY ON DTA, SOME PROBLEMS AND A SOLUTION

As these examples demonstrate, given the myriad types of situations and questions which may arise in the course of a dispute, how DTA is applied to specific facts differs in almost every case. Necessarily, only a limited number of uncertain events and possible options or outcomes can be considered. Thus, an important part of the analysis is to resolve the multiplicity of these variables, which are present in any situation, into a tree which treats only those unknowns likely to have the greatest influence on outcomes and in which only a limited number of outcomes (usually two or three, preferably two) are postulated for each decision or uncertain event node. This is usually difficult, but not impossible.

But this is only one of the difficulties that may limit the use of DTA. Another is the requirement of quantitatively estimating probabilities of the outcomes from various uncertain events.

The most basic premise of DTA is that it requires a quantitative assessment of probabilities and costs (or benefits). The complex of uncertainties involved in dispute management and resolution seems, to many, to defy such assessment. Those "many" often include experienced litigators (both inside and outside counsel).

Undoubtedly, the assessment of probabilities and costs (or benefits) for all of the uncertain causation factors and possible outcomes in even a modestly complicated Decision Tree is a daunting task. Undoubtedly also, DTA's notwithstanding, this explains why assessments of the possible outcomes of an arbitration or litigation are often in purely qualitative terms, e.g., "We feel it is highly likely that Product X will be found not to infringe Patent Y and/or that the patent will be found invalid." The possible discrepancy between how such an assessment is intended by the person giving it and how it is perceived by the person receiving that message can be enormous.

For that reason alone, quantitative probability evaluations should be part of any dispute resolution appraisal. That they may be difficult to make, or subject to a wide variance depending on other variables, should be part of the message. Otherwise, the person receiving the message has been shortchanged. If this logic isn't persuasive of the desirability of probability evaluations, then the Federal Circuit's suggestion in the *Portec* case quoted above (that an honest opinion is more likely to speak of probabilities) should certainly give pause to anyone who would do otherwise.

The conclusion, that these quantitive evaluations should be made (even though they may be only quasi-quantitative), is reached independent of any consideration of DTA. Thus, the criticism that DTA requires such evaluations, in circumstances which necessarily imply more certainty than can reasonably be expected, is not valid.

Such evaluations should be made in any event. DTA merely uses them to collate and project other intelligence from them.

◄ Objectivity Essential ►

It is, of course, essential that the necessary assessments or evaluations be as objective as possible. This, in turn, entails consideration of possible sources of subjective effects. Bias (is the "litigator-evaluator" over-anxious to litigate?), inexperience (does the evaluator have the necessary facts?), primacy (is the "treasurer-evaluator" overly concerned with capital conservation and avoidance of possible capital loss?), and recency (has the "executive-evaluator" had recent jury success thus subjectively tending toward a high probability of a favorable prospective verdict?) are typical of the possible sources of non-objective assessments of probabilities and costs (or benefits). It is always important to ferret out these possible sources of non-objectivity, but it is even more important to do so when those assessments are factored into a Decision Tree and become part of a mathematical analysis

Another criticism of DTA is that, given the softness and uncertainty of the assessments on which it is based, the resultant uncertainty of DTA-derived information is subject to uncertainty that is proportionately greater than that of the underlying assessments. To an extent, this

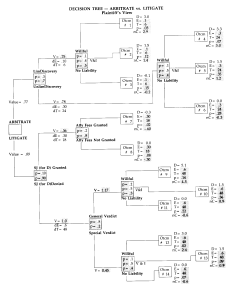
DECISION TREE — ARBITRATE vs. LITIGATE
Plaintiff's View
ARBITRATE
LITIGATE
Value = .77
Value = .89
LimDiscovery
p= .3
p= .7
UnlimDiscovery
V= .75
dE= .10
dT= 6
V= .78
dE= .30
dT= 24
Willful
p= .1
p= .4
p= .5
V&I
No Liability
Otcm # 1
D= 3.0
E= .1
T= 6
p= .03
nC= 2.9
Otcm # 2
D= 1.5
E= .1
T= 6
p= .12
nC= 1.4
Otcm # 3
D= -0.1
E= .1
T= 6
p= .15
nC= -0.2
Willful
p= .1
p= .5
p= .4
V&I
No Liability
Otcm # 4
D= 3.3
E= .3
T= 24
p= .07
nC= 3.0
Otcm # 5
D= 1.5
E= .3
T= 24
p= .35
nC= 1.2
Otcm # 6
D= 0.0
E= .3
T= 24
p= .28
nC= -0.3
SJ (for D) Granted
p= .10
p= .90
SJ (for D)Denied
V= -.36
dE= .30
dT= 18
Atty Fees Granted
p= .2
p= .8
Atty Fees Not Granted
Otcm # 7
D= -0.3
E= .30
T= 18
p= .02
nC= -.60
Otcm # 8
D= 0.0
E= .30
T= 18
p= .08
nC= -.30
V= 1.0
dE= .6
dT= 48
General Verdict
p= .8
p= .2
Special Verdict
V= 1.17
Willful
p= .2
p= .5
p= .3
V&I
No Liability
Otcm # 9
D= 5.1
E= .6
T= 48
p= .14
nC= 4.5
Otcm # 10
D= 1.5
E= .6
T= 48
p= .36
nC= 0.9
Otcm # 11
D= 0.0
E= .6
T= 48
p= .22
nC= -0.6
V= 0.45
Willful
p= .1
p= .5
p= .4
V & I
No Liability
Otcm # 12
D= 3.0
E= .6
T= 48
p= .02
nC= 2.4
Otcm # 13
D= 1.5
E= .6
T= 48
p= .09
nC= 0.9
Otcm # 14
D= 0.0
E= .6
T= 48
p= .07
nC= -0.6

Figure 10

CUMULATIVE PROBABILITY
VS
NET COST
FOR FIGURE 10 ARBITRATE OUTCOMES

Arbitrate Outcomes	1	2	3	4	5	6
D=	3	1.5	−0.1	3.3	1.5	0
E=	0.1	0.1	0.1	0.3	0.3	0.3
T=	6	6	6	24	24	24
p=	0.03	0.12	0.15	0.07	0.35	0.28
nC=	2.9	1.4	−0.2	3	1.2	−0.3

Table 3A

Arbitrate Outcomes sorted by nC	6	3	5	2	1	4
D=	0	−0.1	1.5	1.5	3	3.3
E=	0.3	0.1	0.3	0.1	0.1	0.3
T=	24	6	24	6	6	24
p=	0.28	0.15	0.35	0.12	0.03	0.07
nC=	−0.3	−0.2	1.2	1.4	2.9	3

Table 3B

Cumulative Probability vs. nC For Arbitrate Outcomes

Cumulative p=	28%	43%	78%	90%	93%	100%
nC=	−0.3	−0.2	1.2	1.4	2.9	3

Table 3C

CUMULATIVE PROBABILITY
VS
NET COST
FOR FIGURE 10 LITIGATE OUTCOMES

Litigate Outcomes	7	8	9	10	11	12	14
D=	−0.3	0	5.1	1.5	0	3	0
E=	0.3	0.3	0.6	0.6	0.6	0.6	0.6
T=	18	18	48	48	48	48	48
p=	0.02	0.08	0.14	0.36	0.22	0.018	0.072
nC=	−0.6	−0.3	4.5	−0.9	-0.6	2.4	-0.6

Table 4A

Litigate Outcomes Sorted By nC	7	11	14	8	10	13	9
D=	−0.3	0	0	0	1.5	1.5	5.1
E=	0.3	0.6	0.6	0.3	0.6	0.6	0.6
T=	18	48	48	18	48	48	48
p=	0.02	0.22	0.07	0.08	0.36	0.09	0.144
nC=	−0.6	−0.6	−0.6	−0.3	0.9	0.9	4.5

Table 4B

Cumulative Probability vs. nC

Cumulative Probability	2%	24%	31%	39%	75%	84%	100%
nC=	−0.6	−0.6	−0.6	−0.3	0.9	0.9	4.5

Table 4C

criticism is valid.

Nevertheless, DTA-derived information is indicative of possibilities and probabilities, probably more so and with better effectiveness for planning and communication, than any other analytical tool of its kind. To be sure, the uncertainty inherent in DTA-derived information must be communicated and discussed, along with that information itself. Interestingly enough, this has the potential for making the DTA-derived information more, and not less, useful; it forcibly focuses consideration on the unknowns in the situation and on the possible effects of those unknowns.

Still another impediment to more widespread use of DTA is the inherent awkwardness of the procedure. Typically, upon first exposure to DTA, the reaction is highly favorably because it seems to impose an analytic discipline on otherwise impregnably complex situations. Apart from a few "experts," however, one suspects DTA is generally used only in relatively simple situations.

To a great extent, the reason for this is most likely the fact that DTA is less likely to be needed in simple situations, whereas in even moderately complex situations, the number of nodes and branches, and the related number of arithmetic functions to be performed, quickly becomes burdensome. Even if one struggles through the procedure once, the difficulty inherent in modifying the tree structure or re-computing arithmetic functions to account for differing views, "what-if" questions, and changes in the situation under study, make the procedure awkward, at best.

Complexity, in the application of DTA to real world situations, is clearly a major problem. The answer, to no one's surprise, is the computer; in turn leading, not to Nirvana, but to another question: How to apply the power of the computer to Decision Tree Analysis?

DECISION TREES AND SPREADSHEETS, A NATURAL MATCH?

Dedicated software has been demonstrated but is not thought to be in widespread use. Another, and more readily available solution, is a spreadsheet program.

As already demonstrated in the figures, tables and charts above, DTA can be conveniently implemented in a spreadsheet program, such as the Excel® spreadsheet program by Microsoft.

The graphic of the Decision Tree comprises cell outlines and borders, embellished with explanatory shading and legends.

For the DTA arithmetic functions, input variables are located at appropriate cells in or near related graphic elements of the Decision Tree. Intermediate and final output variables are calculated by embedding appropriate mathematical functions in cells located near related graphic elements of the Tree.

Output variables are therefore immediately calculated when an input variable is changed.

For other purposes, tables of input and output variables can also be constructed and dynamically linked to values shown as part of the tree. Such tables can be used, in turn, to construct charts which may also be dynamically linked to the underlying variables. All of these functions are easily within the capability of a program such as Excel, and all have been used in constructing the trees, tables and graph shown above.

Still other uses of the inherent capability of a spreadsheet program can be readily appreciated. For example, in complex situations, certain values on one Decision Tree may in turn be derived from a second Decision Tree. In Excel, this can be easily accommodated by linking the relevant value inputs, in the first Decision Tree, to the output values in the second Tree.

CONCLUSION

Decision Tree Analysis provides a systematic approach to planning, a tool for discussion and an aid in evaluating outcomes and probabilities. Primarily, it is a way of looking at a complex situation both perspectively and prospectively so as to make decisions and to revisit related decisions as a situation progresses. It is useful in all of these respects, as applied in general to any negotiation process and, in particular, to dispute resolution and dispute resolution management, to help resolve business differences in a business-like way.

Litigation is seldom planned or executed in a business-like way. DTA may be a tool to facilitate litigation planning and decision-making. More importantly, DTA should be especially useful in conjunction with the systematic, efficient use of Alterative Dispute Resolution procedures. The facility of an ordinary spreadsheet program, such as Excel, in building and analyzing Decision Trees, greatly enhances these possibilities.