

# Alternatives

TO THE HIGH COST OF LITIGATION

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## ADR Tools

### Beyond Decision Trees: Determining Aggregate Probabilities of Time, Cost, and Outcomes

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Evaluating litigation and settlement options and strategies, and counseling corporate decision makers in choosing the most beneficial steps, can challenge the most sophisticated corporate counsel.

Decision Tree Analysis has become a popular and well-known support tool that facilitates making complex decisions. In addition to its use in commercial settings and economics

departments, for example, “DTA” works well in the legal environment.

But despite the benefits of conventional DTA, it fails to answer several important questions often asked by senior management in making an informed decision.

Augmented Option Analysis, described fully below, is an enhanced analytical tool. It provides information over and above that of conventional DTA.

This tool integrates factors such as interim cost and elapsed time for possible options, with conventional DTA. And it also aggregates the probabilities of all possible ultimate outcomes to provide a more complete picture of the risk/reward possibilities associated with any option.

For example, when evaluating whether to pursue an option such as litigation or licensing/settlement, a decision maker may benefit from information about the costs and time associated with pursuing such an option.

Likewise, when evaluating the probability of obtaining an ultimate outcome—e.g., damage awards—a decision maker may benefit from knowing the aggregate possibilities of achieving various amounts of damages, as

well as the aggregate of the time and cost to achieve each award.

Both DTA and the enhanced analytical tool described here require informed estimates of both the critical parameters that may affect the outcome of the options under consideration, as well as the probabilities related to those parameters.

The end result of a decision tree analysis often merely confirms suspicions or predispositions of various outcomes. But the real value to corporate decision makers of DTA or Augmented Option Analysis may not occur just from observing the outcomes.

Rather, it is more likely to come from the thought processes that go into the analysis, and the opportunity the analytical process provides to advocates and other contributors to the decision-making process, such as clients, and damages experts, to discuss competing views of the relevant parameters and probabilities.

Without overstating the point, the value in the thought processes depends heavily on having competent information from experienced contributors regarding (1) the options to consider (e.g., litigation or licensing/settlement); (2) the parameters that might affect those options; (3) uncertain events to examine for the options considered, such as



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respond with the proposal, in serious and extraordinary circumstances, the judge also can exclude the recovery of costs incurred by the winning party.

**Confidentiality**—The mediator and anyone else who works within the mediation provider organization has a duty of confidentiality and may not be called to testify. Statements made or information acquired during the procedure may not be used in court.

**Mediation provider organization registration in the Register**—Mediation procedures can be handled only by public agencies and private organizations registered with the Ministry of Justice. The requirements and procedures for registration are governed by special ministerial decrees. Members of the bar association, the chambers of commerce or other professional associations—the latter are reviewed based on competence—can form organizations to be

entered, upon simple request, in the Register as mediation organizations.

**Mediators**—The mediation procedure can only be conducted by mediators who are listed in the Register, and who have attended and passed a special training provided by training institutions that are accredited by the Italian Ministry of Justice. ■

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the probability of achieving favorable or unfavorable results in filing motions to compel or for summary judgment; and (4) the sequence of the uncertain events. Even assuming the use of competent information in the analysis, the quantified probabilities calculated in the analytical process must be qualified by the uncertainty of the underlying estimates.

### DECISION TREE ANALYSIS

In its simplest form, DTA graphically illustrates branches or paths of sequential uncertain events leading to possible outcomes for chosen options. Estimating probabilities for the possible outcomes at each of the intervening uncertain events—represented in the figures on the next four pages as nodes with alternative outcomes in the sequential paths—enables calculation of the cumulative probability for each possible ultimate outcome. Typically, a decision tree graphic depicts numerous probable outcomes for two or more alternative options.

In a patent infringement case, for example, a prospective plaintiff may be faced with the options of accepting a settlement offer (e.g., back damages or a license) or litigating in the hopes of obtaining a much larger damage award. As shown in Figure 1, an example of the litigation option in a patent case may have the following four sequential stages, each involving critical uncertain events:

- discovery;
- claim construction;

- summary judgment of infringement; and,
- trial/post-trial events (such as post-trial motions, appeal, remand).

As illustrated in Figure 1 on page 96, the critical uncertain events at each stage, except the last, trial/post trial, are viewed as

## Beyond the Trees

**The ADR tools:** Decision trees, which lay out possibilities that help predict the future of your litigation.

**What's new:** The authors' 'Augmented Option Analysis' integrates more factors into the tree, particularly regarding time and costs.

**The benefit:** The process itself provides better negotiations in addition to better decisions.

having two possible outcomes—favorable or unfavorable. For purposes of this example, the trial/post trial outcome stage, which could be viewed as two or more sequential stages, has three possible outcomes, favorable, unfavorable, and intermediate. The small “p” indicates the probability of the path as determined and projected by the contributors to the DTA (e.g., outside counsel, in-house counsel, a mediator or an early neutral evaluator).

The column headed “Dollar Outcome” in Figure 1 represents dollar value estimates for each of the possible ultimate outcomes.

The Figure 1 column headed “Ultimate Probability” represents the ultimate probabilities for each of those outcomes, based on the estimated probabilities of sequential events leading to that outcome.

The overall probability for each ultimate outcome consists of the product of all of the probabilities of the outcomes of the intermediate uncertain events leading to that ultimate outcome. In this case, the DTA illustrates 24 possible ultimate outcomes with dollar values ranging from -\$3 million—the negative representing an adverse award of attorneys' fees—to +\$47 million (see the “Dollar Outcome” column), and overall probabilities for those outcomes, ranging from 0% to 19.6% (see the “Ultimate Probability” column). After eliminating the outcomes with a 0% ultimate probability, the result is 19 possible outcomes with the same dollar range (i.e. -\$3 million to \$47 million) and with ultimate probabilities ranging from 0% to .5%, and up to 19.6%.

This litigation option may then be compared to the license/settlement option shown on the first line in Figure 1 and labeled “License/Settlement?” The license/settlement option has a presumed present value of \$10 million, that presumably is 100% certain.

### AUGMENTED OPTION ANALYSIS

Although conventional DTA has proven useful for assessing the probabilities of possible litigation outcomes in the litigation/settlement environment, it commonly presents decision makers with information such as (1) a multitude of possible results, and (2) the individual probabilities of each, as shown in Figure 1.

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To more fully assess their options and inform their decisions, decision makers might benefit from considering additional information such as the costs and times for pursuing the options under consideration. Another benefit might come from aggregating the probabilities of multiple similar results (for example, with reference to the Figure 1 data, adding the ultimate probabilities related to similar dollar outcome amounts) to determine the total probability of results within a range.

Deriving that additional information is the objective of the Augmented Option Analysis described here. This article describes each aspect of the augmentation, and additional factors such as time and cost, and aggregating probabilities.

The application of the aggregation methodologies described here involve relatively simple mathematical manipulation of figures

typically included in conventional decision tree analysis.

As a practical matter, using these methods in the context of a real negotiation or mediation environment necessarily requires a facility for quickly and repetitively performing this manipulation as different scenarios or estimates are addressed. These methodologies have been developed and implemented with Microsoft Excel software.

**AGGREGATING PROBABILITIES**

DTA can be augmented by aggregating probabilities of ultimate outcomes, here exemplified by dollar values, over the range of variables for all of the possible outcomes.

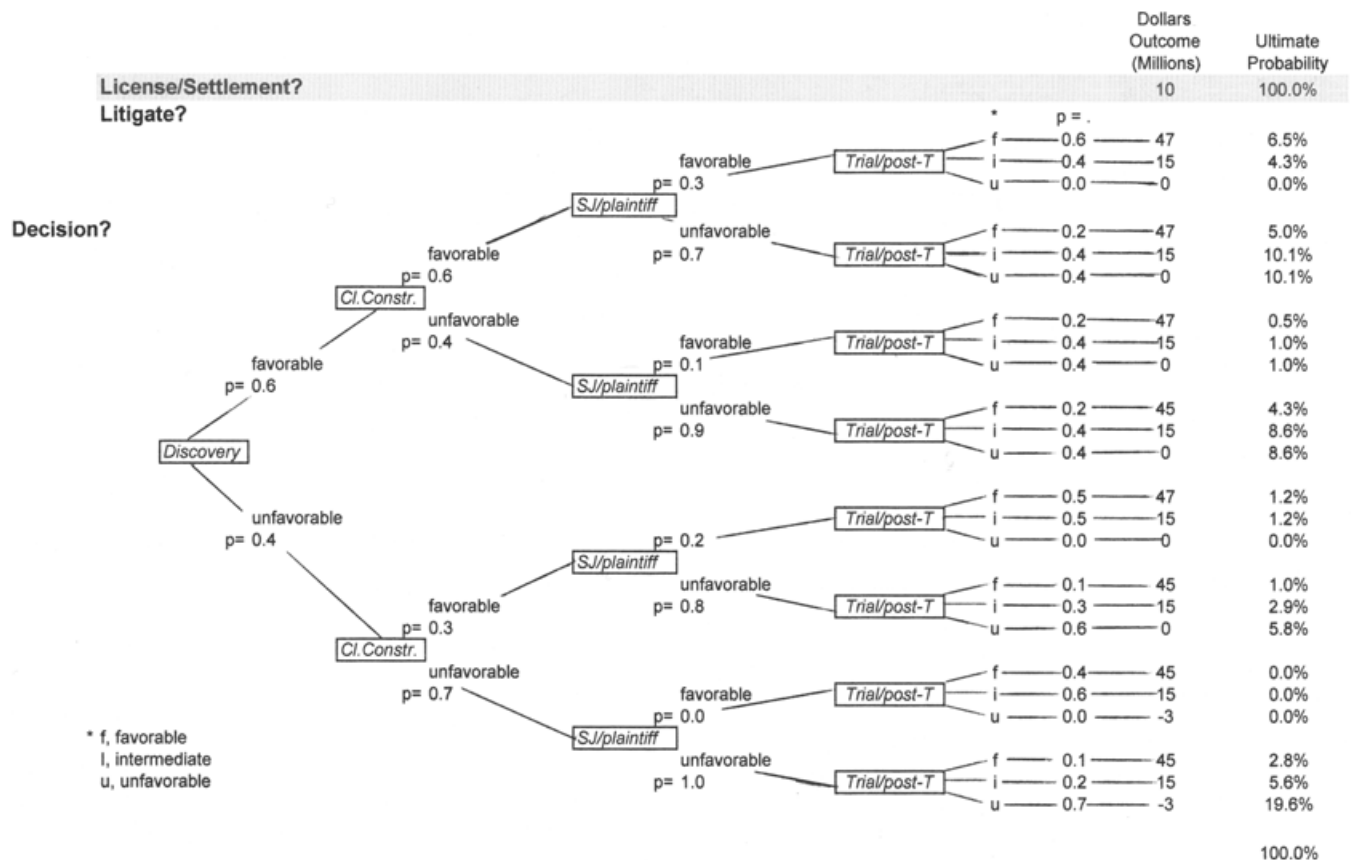
Specifically, with reference to the Figure 1 data, we can add (or aggregate) the probabilities for similar outcomes. For example, the damages (dollar) outcome of \$47 million occurs four times in the DTA. So we add the Figure 1 last column "Ultimate Probabilities"

of obtaining \$47 million (6.5% + 5.0% + 0.5% + 1.2%) and obtain an aggregate probability of about 13%.

Similarly, the damages (dollar) outcome of \$15 million occurs eight times in the DTA. So by adding the Ultimate Probabilities associated with each occurrence of \$15 million (4.3% + 10.1% + 1.0% + 8.6% + 1.2% + 2.9% + 0.0% + 5.6%), we obtain an aggregate probability of about 34%. This yields a better perspective of the hypothetical results of the litigation option (rounded to reflect that all data is estimated), as shown in Table 1, on the opposite page.

Typically, DTA compares the results of a chosen option with different estimates of one or more variables for that option. Figure 1A, opposite, illustrates an example of this by assuming reasonable minds may differ as to the likelihood of a favorable outcome at the discovery stage of the litigation illustrated. A question may be posed, for instance, "What will the results and probabilities be if the probability of a favorable outcome at the discovery

**Figure 1. Conventional Decision Tree Analysis**



**Table 1**

Aggregate Probability	Dollar Result
20%	-\$3 Million
25%	\$ 00
34%	+\$15 Million
8%	+\$45 Million
13%	+\$47 Million

phase is 30% (or 0.3 as shown in Figure 1A), compared to the probability of 60% (or 0.6 as shown in Figure 1) in the original analysis illustrated in Figure 1? Figure 1A illustrates both the question and the answer. But the answer is better illustrated by a comparison of the aggregate probabilities, as seen in Table 1A, above right.

The aggregate probabilities set forth in the first column of Table 1A (20%, 25%, 34%, 8%, 13%) were calculated, as explained above, from

**Table 1A. Probability With Different Assumptions of Favorable Discovery Results**

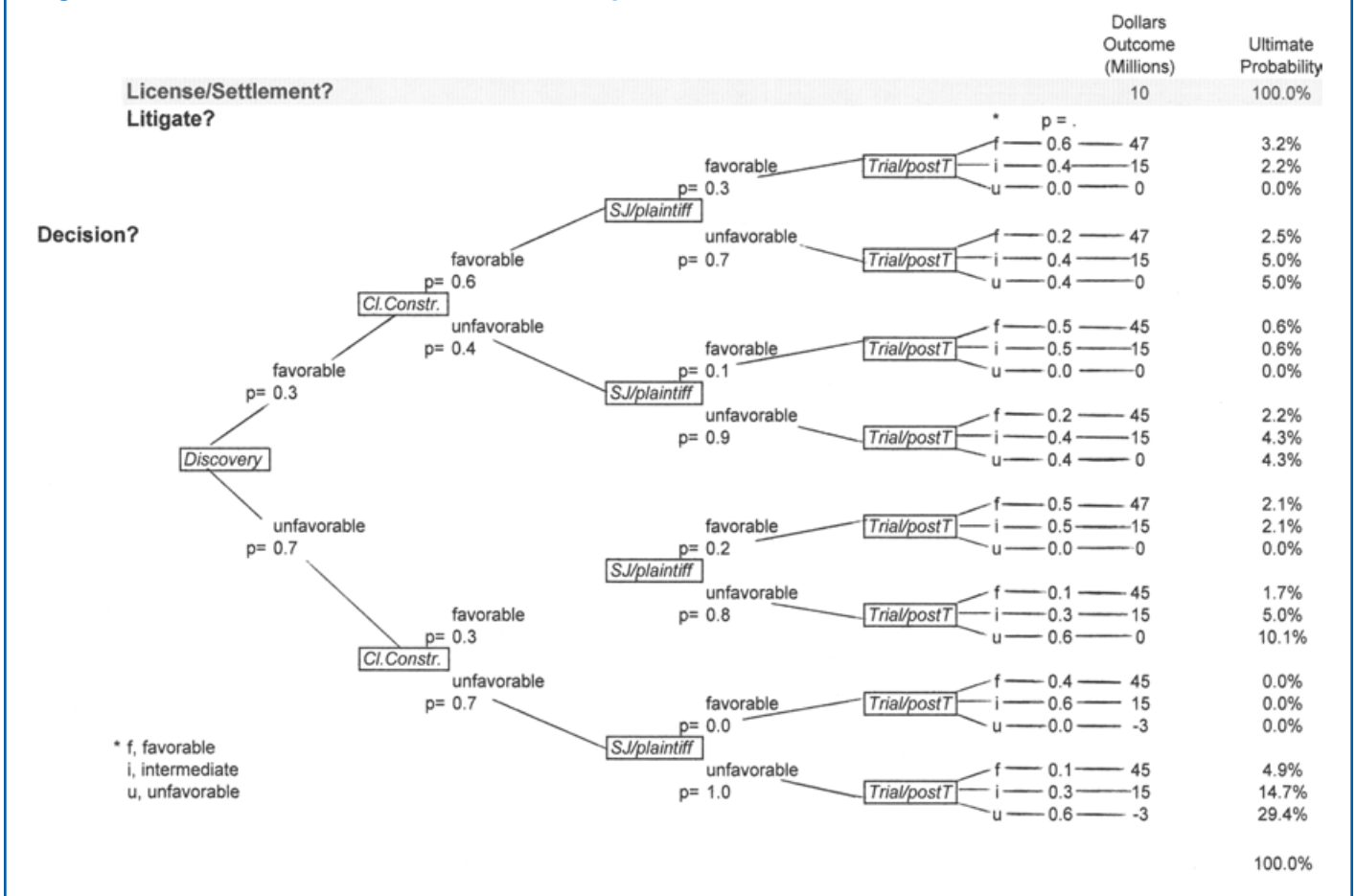
Probability, 60% (Fig. 1)		Probability, 30% (Fig. 1A)	
Aggregate Result Probability	Result	Aggregate Result Probability	Result
20%	-\$3 Million	29%	-\$3 Million
25%	\$ 00	19%	\$ 0
34%	+\$15 Million	34%	+\$15 Million
8%	+\$45 Million	9%	+\$45 Million
13%	+\$47 Million	8%	+\$47 Million

data generated by performing the DTA, assuming a favorable discovery outcome of 60%. See Figure 1. Likewise, the aggregate probabilities set forth in Table 1A's third column (29%, 19%, 34%, 9%, and 8%) were calculated as explained above from data generated by performing the DTA assuming a favorable discovery outcome of 30%. See Figure 1A. So, for example, with refer-

ence to Figure 1A, the 8% aggregate probability for damages (dollar outcome) of \$47 million comprises the sum of the ultimate probabilities associated with each occurrence of \$47 million (3.2% + 2.5% + 2.1%) rounded to 8%.

Not surprisingly, as shown in Table 1A, when the assumed probability of a favorable (continued on next page)

**Figure 1A. Conventional Decision Tree Analysis**



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discovery outcome decreases, from 60% to 30%, the aggregate probability of the least favorable dollar result increases and the aggregate probability of the most favorable dollar result decreases. This comparative analysis likely confirms the decision maker's predisposition, but it also quantifies the extent of the differences for different assumptions.

MULTIVARIABLE ANALYSIS

DTA also can be augmented by factoring in the incremental cost and time associated with pursuing each option. As in the Aggregate Probability analysis described above, this is done by considering each option separately, rather than by representing alternative options as DTA tree branches.

Using the patent litigation examples of Figure 1 and Figures 1A as starting points, Figure 2, below, adds hypothetical estimates of the elapsed time required for each critical litigation

stage, and the cost incurred at that stage (see numbers horizontally displayed across the top of the Figure 2, associated with the "Litigate?" option). For example, the hypothetical total time to reach the ultimate litigation outcome, assuming trial is required, is 34 months, obtained by adding together the hypothetical elapsed time of 16 + 5 + 5 + 6 + 2 months.

And the hypothetical total cost to reach the ultimate litigation outcome is \$3.5 million obtained by adding together the hypothetical elapsed costs in millions of dollars: \$1.6 + \$0.3 + \$0.4 + \$1.0 + \$0.2. In those cases where no trial is required, i.e. a favorable summary judgment is the outcome, these numbers are reduced to 28 months and \$2.5 million, respectively.

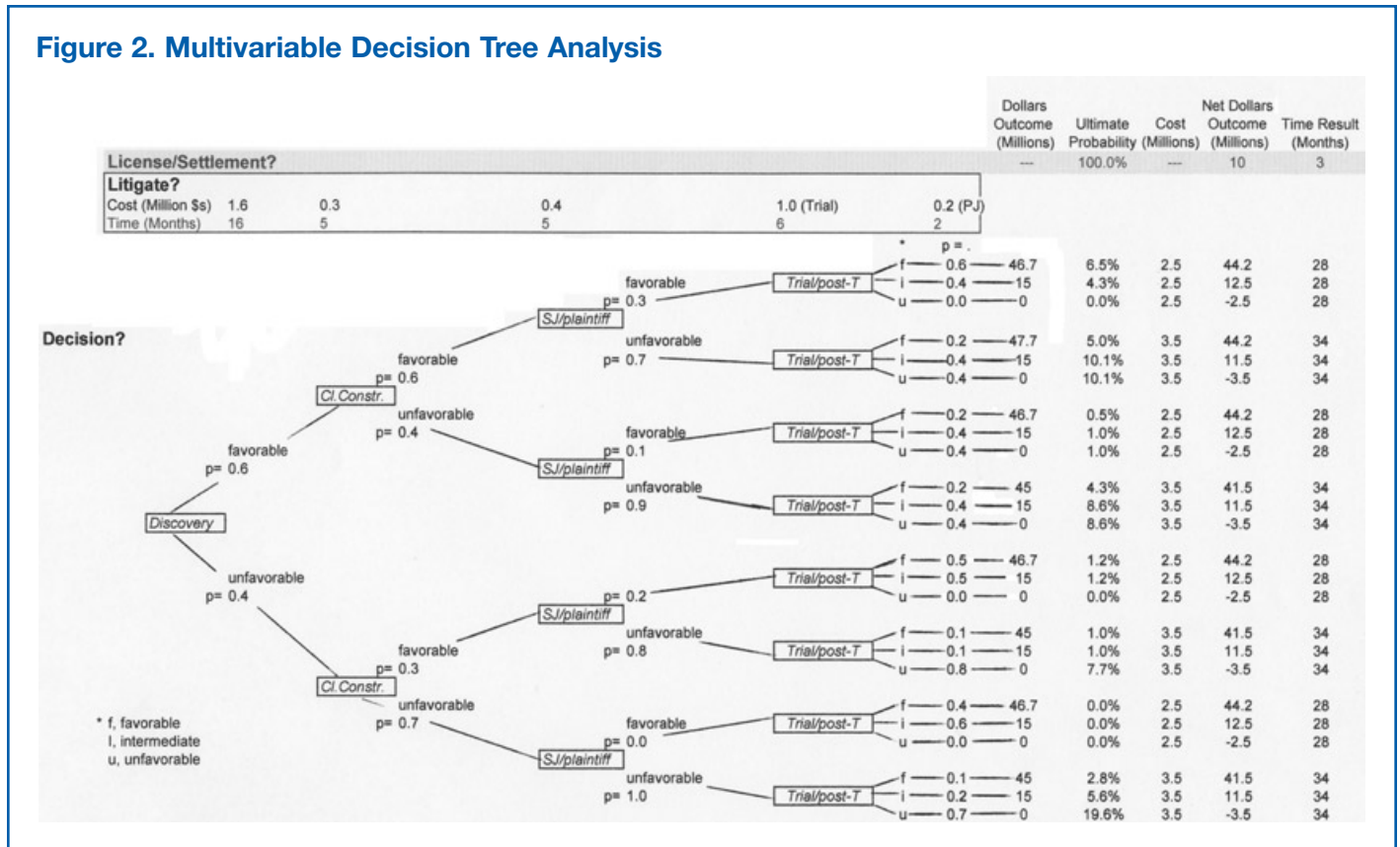
Similar to the results shown for the ultimate dollar value outcomes in DTA, the Figure 2 results reflect a range of elapsed time for the litigation, and a range of total litigation costs associated with each ultimate probability/outcome. The latter permits a new Figure 2 Net Dollar Outcome column (the "Cost" column subtracted from "Dollar Outcome" column).

While the aforementioned elapsed time and cost are the variables associated and ana-

lyzed with respect to the various sequential stages in the Figure 2 example, other incrementally analyzable variables could be similarly incorporated in the analysis. One such variable might be the cumulative value of executive and management time committed to decision making, consultation, document review, depositions, etc. at each process stage.

As with the simple Figure 1 decision tree analysis, a decision maker may run the more detailed option analysis of Figure 2 with differing estimates for a given variable (e.g., discovery) to compare the results. So, for example, Figure 2 illustrates an option analysis using a favorable probability for discovery of 60%, while Figure 2A illustrates the analysis using a less favorable discovery probability, i.e., 30%. This lower probability of a favorable discovery outcome may be attributed to a less aggressive discovery strategy, accompanied by reductions in the estimated cost and elapsed time associated with the discovery phase (i.e., \$0.8 million and eight months for a less aggressive discovery strategy and a lower probability of a favorable discovery outcome (Figure 2A, opposite) versus \$1.6 million and 16 months respectively

Figure 2. Multivariable Decision Tree Analysis



**Table 2. Probability With Different Assumptions of Favorable Discovery Results**

Favorable Discovery Outcome Probability, 60% (Fig. 2)				Favorable Discovery Outcome Probability, 30% (Fig. 2A)			
Net Dollar Outcome Aggregate Probability	Net Dollar Outcome	Elapsed Time Result Aggregate Probability	Elapsed Time Result	Net Dollar Outcome Aggregate Probability	Net Dollar Outcome	Elapsed Time Result Aggregate Probability	Elapsed Time Result
47%	-\$2.5 to -\$3.5 Million	16%	28 months	58%	-\$1.7 to -\$2.7 Million	11%	20 months
32%	+\$11.5 to \$12.5 Million	84%	34 months	26%	+\$12.3 to \$13.3 Million	89%	26 months
21%	+\$41 to \$44 Million			17%	+\$42.3 to \$45 Million		

for a more aggressive discovery strategy and a higher probability of a favorable discovery outcome (Figure 2).

Taken together with the aggregated probability analysis, this permits a comparison not only of the aggregate ultimate probabilities associated with more or less aggressive discovery, or more or less favorable probabilities, at the discovery stage, but also of the cost and elapsed time associated with these ultimate outcomes.

Again, as with the Figure 1 example, the best perspective for this assessment is a tabular listing of these aggregate probabilities and the related cost and time variables. This is shown in Table 2, above.

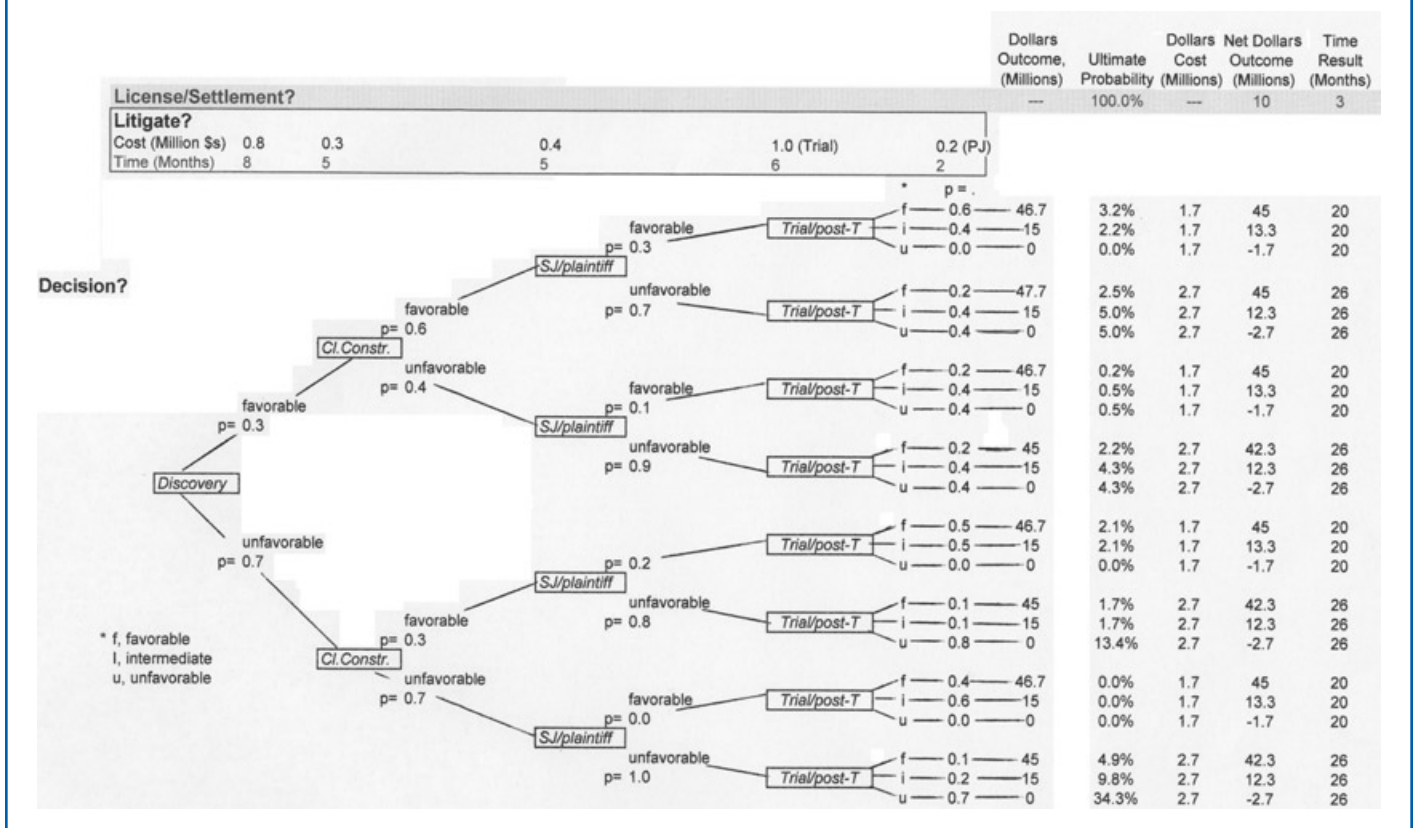
Specifically, with reference to the Figure 2 data, the probabilities were aggregated (added) for various net dollar outcome ranges (e.g., -\$2.5 to -\$3.5 million). There are eight net dollar outcomes within the range of -\$2.5 to -\$3.5

million dollars. Those outcomes are associated with the following probabilities in the Figure 2 "Ultimate Probability" column: 0.0%; 10.1%; 1.0%; 8.6%; 0.0%; 7.7%; 0.0%; 19.6%.

When added together and rounded, the aggregate probability of a net dollar outcome in the -\$2.5 to -\$3.5 range equals 47%, as indicated in Table 2. Similarly, there are 12 ultimate outcomes in Figure 2, for which the elapsed time is

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**Figure 2A. Multivariable Decision Tree Analysis**



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28 months. The aggregate probability of elapsed time equaling 28 months is the sum—rounded off—of the ultimate probabilities of each these outcomes (6.5%+4.3%+0.0%+0.5%+1.0%+1.0%+1.2%+1.2%+0.0%+0.0%+0.0%+0.0%), or 16%. This same arithmetic process can be performed with other data in Figures 2 and 2A to obtain the other aggregate probabilities in Table 2.

As in the analysis of the Figure 1 example, the trends shown in Table 2 likely confirm the predispositions of knowledgeable decision makers. But the data shown in Table 2 also provides a qualified quantification of those trends, and a realistic way of assessing the impact of differing estimates or of changing circumstances as the actual process unfolds.

## ANALYSIS PROCESS INTEGRITY

The intrinsic value of the derived information in the Augmented Option Analysis, like that of DTA, results from the thought that goes into discerning the key unknowns—and the interrelationship of those unknowns—that will influence the ultimate outcomes. A significant investment of time at this early stage of the analysis must occur to provide some assurance of the integrity of the process. Because the complexity of the process increases geometrically as the number of unknowns increases,

those few unknowns most likely to have the greatest influence on the final outcome must be selected carefully, and then positioned sequentially as logically as possible.

This requires a significant undertaking. Thoughtful consideration of the outcome-influencing unknowns and their interrelationship pays dividends in the form of process integrity and confidence in the analysis.

Likewise, assessing the various probabilities of the intermediate outcomes at each of the nodes of uncertainty requires a competent understanding of the relevant facts—as well as the law where analyzing legal options. Attention to these considerations in preparing the Option Analysis assures the integrity of both the process and the information derived from the process. This then raises the questions of how and when to use the analysis.

## USING THE AUGMENTED OPTION

As in decision tree analysis, the analytical approach explained here facilitates discussion of the unknowns associated with a particular option, often serving as confirmation of a decision-maker's predisposition.

For example, discussing the probability of obtaining an award of a certain amount may lead to a discussion of the strength of various damages theories, the scope of infringement (that is, which products may be found to infringe), the strength of a willful infringement argument and the likelihood a court would award attorney's

fees were a case deemed “exceptional.”

As noted, the Augmented Option Analysis Process also permits the decision maker to factor into their analysis consideration of other variables, namely time and the cost of pursuing the option. It also correlates all of the individual ultimate outcomes by aggregating or totaling all of the probabilities of all outcomes above or below a certain level. One can perform this analysis for any of the variables under consideration but the most relevant, at least, in the examples discussed above, relates to the net dollar outcome. This type of analysis can serve as a useful tool for adverse parties to discuss their different views of a particular relationship and thus to arrive at a better mutual view for possible settlement of a dispute or consummation of a transaction (such as a license).

As compared to DTA generally, the additional data and the aggregation of the data, derived from the original analysis, facilitates comparisons and discussions of alternatives in a negotiation environment. A mediator may also find this tool useful to convey to adverse parties the uncertainties and risks associated with their subjective views, and thus to bring them closer to one another's positions.

Though conventional DTA is useful in many settings, the Augmented Option Analysis Process can answer several additional questions that may help upper management in making informed business decisions. ■

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## CPR News

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At press time, the agenda was being prepared, with the breakdown of New York CLE credit hours is to be determined. The course is non-transitional and will not be acceptable for newly admitted attorneys. The CPR Institute has been certified by the New York State Continuing Legal Education Board as an Accredited Provider of continuing legal education in the State of New York [July 14, 2007-July 13, 2010]. CPR is a nonprofit organization. Under financial hardship guidelines, at its discretion, CPR may waive the fee for attorneys who demonstrate that they are not currently employed (not retirees). CPR also

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**BRYAN AT THE ABA:  
CPR PRESIDENT'S  
PRECONFERENCE KEYNOTE**

CPR President Kathy Bryan will deliver the keynote speech at a full-day event before the American Bar Association Section of Dispute