50 Risk Evaluation in Intellectual Property Litigation

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SCOPE NOTE

This chapter describes how to perform a risk evaluation of a lawsuit, using a patent infringement dispute as an example. The introductory section identifies the kinds of uncertainties that must be dealt with in any type of intellectual property litigation, and then gives a detailed fact pattern that will be evaluated in the remainder of the chapter. The next four sections correspond to the steps of a good risk analysis: organizing the key issues into a decision tree, subjectively assessing the probabilities of the uncertainties, calculating the value of litigating, and identifying those issues to which the case value is most sensitive.

SYNOPSIS

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§ 50.01 Introduction

Advice on whether or not to pursue litigation is a difficult task requiring careful analysis of many uncertainties and a balancing of the potential benefits against the costs and risks.

One of the more difficult tasks counsel faces is advising the client whether or not to file suit or on what terms to settle pending litigation. Either of these decisions requires a careful analysis of numerous uncertainties—some legal, some business. For example,

- What standards will the court apply on the issue of liability?
- How good will our/their evidence be?
- What are our chances of winning?
- What measure of damages will apply?
- How persuasive will our/their experts be?
- What damages will be awarded?
- Is there any chance of punitive-type damages? If so, in what amount?
- When will a judgment get paid?
- What other benefits would flow from winning the litigation?
- What are the downside business risks of litigating and losing?

Uncertainties such as these must then be balanced against the more certain costs of litigating, including management time as well as attorneys and experts fees, or against the possible business consequences of *not* pursuing litigation.

The more uncertainties to be dealt with, the more useful it is to have a rigorous method for organizing, and a logical process for integrating, all of the legal and business judgments involved in evaluating litigation strategy. Decision tree analysis provides the necessary tools to accomplish this, as demonstrated by the following example:[1]

Razor Inc. obtained a patent on a disposable razor with three blades. The patent was a narrow one; the claims set forth that the blades would be placed in such a way that all three blades would reinforce the head of the razor, providing rigidity which market tests showed consumers preferred. Diversified Corporation's Shaving Division began manufacturing a razor different in no material way from Razor's patented product. When Razor served notice, Diversified changed back to its previous design. It gradually began losing market share to Razor. Eventually, in January 2000, Diversified began marketing a three-bladed disposable razor it had designed in such a way that only one, not all, of the blades reinforced the razor head; an integral plastic bar was used in place of the second and third blades to provide extra rigidity.

In early 2001, Razor sued Diversified Corporation in the U.S. District Court for the Eastern District of Wisconsin alleging infringement of its patent and seeking damages for past infringement and an injunction against future sales. Diversified defended on the grounds that: (1) its razor did not infringe Razor's patent (neither literally nor under the doctrine of equivalents) because reinforcement of the head was provided not by the second and third blades, but by the additional plastic bar (which added three percent to the cost of manufacture); and (2) Razor's patent was invalid because Razor's patent lawyers failed to call to the attention of the Patent and Trademark Office the existence of two prior patents which together covered the claimed invention

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[1] I wish to thank Thomas M. Stanton, former Vice President and General Counsel, Kimberly-Clark Corporation, for his invaluable contribution to the initial development of this problem. The reader should appreciate from the outset that the tools of a decision tree analysis can be applied to *any* type of litigation, and that this patent infringement example is merely one illustration.

and made it unpatentable. Razor disputes the relevance of these prior patents, and furthermore asserts that it was unnecessary for Razor to have disclosed them since they were cited in several other applications reviewed by the government patent examiner at about the same time. On this point, Diversified has suggested it may try to call as a witness the examiner who reviewed Razor's application. Now retired, the examiner is presently in uncertain health and not within the court's jurisdiction. Razor fears that should he choose to testify, his testimony is more likely to hurt than help.

The U.S. market for disposable razors was $150 million in 1999 (the year before Diversified's new product was introduced). While sales of all razors increased somewhat each year, the market share of disposables was increasing substantially during the period in question, so that sales of disposable razors were $200 million in 2000 and $250 million in 2001. It is anticipated that the market this year (2002) will be $300 million, and will remain at that level (once adjusted for inflation) for the next two years (at which point the patent expires).

Razor's market share of disposable razors was 40 percent in 1999 (the year before Diversified changed to its current three-blade disposable). It dropped to 35 percent the first full year after Diversified changed to its new design, and by the next year (2001) it had dropped to 30 percent. Diversified gained substantially all of Razor's lost market share. Razor claims that was all attributable to Diversified's infringement; Diversified claims it was entirely due to increased advertising and quality better than Razor's. Razor's market share appears to have leveled off at about 30 percent.

Razor's profit margins on disposables had been running at 20 percent. Thus Razor will claim that it lost profits the first year of Diversified's infringing design in the amount of $2 million (5 point loss in market share × $200 million × 20% profit); the second year, of $5 million (10 point loss × $250 million × 20% profit); and the third year (at the end of which a trial judgment is expected), of $6 million (10 point loss × $300 million × 20% profit); for a total claim of $13 million in past damages. To summarize:

	1999	2000	2001	2002
	Year Before Change	1st Year of Change	2nd Year of Change (Suit filed mid-year)	3rd Year of Change (Verdict due at year-end)
Total Revenues	$ 150	$ 200	$ 250	$ 300
Razor's Market Share	40%	35%	30%	30%
Diversified's Share	10%	15%	20%	20%
Razor's Lost Market Share		5%	10%	10%
Razor's Lost Revenues		$ 10	$ 25	$ 30
Razor's Lost Profits (using 20% margin)		$ 2	$ 5	$ 6

(all dollar amounts in millions)

It is unclear whether the court will find Razor's proof of lost profit damages too speculative and look instead to what would have been a reasonable royalty if the patent had been licensed. Royalties on other features of disposable razors were about two to three percent of sales, which would translate to roughly $3 to $4 million on Diversified's 2000–2002 sales of $140 million. In addition to past damages, Razor also hopes to recover (at least temporarily) some or all of its market share if Diversified is forced to abandon its current three-blade design. Each 5 point increase should translate to additional 2003 and 2004 combined profits of $6 million when multiplied by annual sales of $300 million and a 20% profit margin. (Razor feels that any recovery of market share will be lost again after its patent expires at the end of 2004.)

Diversified has offered to pay Razor $600,000 today plus 1% on Diversified's 2003 and 2004 sales (estimated at $60 million each year) in final settlement of the lawsuit and for a license to Diversified under the patent. Should Razor settle on these terms?[2]

§ 50.02 Structuring the Problem

The evaluation of any lawsuit must begin with "structuring" the major uncertainties whose resolution by the judge and jury will determine just how well the client does. This structuring consists not merely of identifying the key legal rulings and factual findings that are in dispute, but also clearly setting out the relationships between all of these uncertainties using a decision tree.

The first step in our analysis is to capture the major liability and damage uncertainties related to our litigation alternative. This is most clearly done with a diagram known as a decision tree,[3] as shown in Figure 1. Decision trees are read and constructed from *left to right*, sequencing the important uncertainties in the order you expect them to be considered by the judge and jury. Thus, although the tree in Figure 1 progresses from validity to infringement and then to the amount of past damages and the amount of future benefit, if you thought the jury would think first about infringement and only then about validity, the tree should have been drawn in that order. Similarly, because the jury's award of past damages depends on how the judge instructs it to measure those damages, the judge's ruling on damages precedes the jury's finding as to the amount.[4]

On each branch of the tree we see one possible outcome of the uncertainty in question:

- Razor's patent might be found valid *or* invalid;
- if valid, it might have been infringed by Diversified *or* not infringed;
- only if valid and infringed do we get to the question of how the court will instruct on damages—possibly by Razor's lost profits *or* possibly by a royalty applied to Diversified's sales;
- if the measure is lost profits, Razor might get the full $13 million it is claiming, *or* it might get a lesser amount of $10 million *or* only $6 million;
- if the measure of damages is a reasonable royalty, there is still the uncertainty of whether the royalty will be roughly 3% *or* only 2%; and
- if the patent is held valid and infringed (in which case Diversified would be enjoined from selling its current three-blade model for the remaining two years of the patent), Razor might recover all 10 percentage points of its

[2] Had Razor not yet filed its suit against Diversified, the analysis of the decision to sue or not would vary only slightly from the settlement analysis that follows.

[3] If several attorneys are working on the lawsuit, they are advised to develop the tree as a group, not individually. And in particularly complex cases, a tool known as a dependency diagram is often a better starting point. See J. Bryan Whitworth, Clyde W. Lea, Marc B. Victor and Craig B. Glidden, "Evaluating Legal Risks and Costs with Decision Tree Analysis" in SUCCESSFUL PARTNERING BETWEEN INSIDE AND OUTSIDE COUNSEL, §12:17 (West Group & ACCA 2000).

[4] In order to keep this example decision tree from growing too large, some issues such as willful infringement have been intentionally omitted.

lost market share, *or* only 5 points, *or* none of its prior market share.[5]

The five major uncertainties displayed in the decision tree create 17 different possible "total values" associated with the Litigate alternative. On the other hand, the Settle alternative poses no significant uncertainty—it consists of an initial payment of $600,000 plus 1% of Diversified's expected $60 million of sales in each of the next two years, for a total of $1.8 million (current dollars). Should Razor accept this settlement? Clearly, counsel's recommendation must depend in large measure on the relative likelihoods of the 17 different litigation scenarios, and therefore on the probabilities of each of the major uncertainties in the decision tree that define these scenarios.[6]

§ 50.03 Describing Subjective Judgments with Probabilities

Probabilities are no more than a numerical scale for describing a lawyer's best guess: 0% = No Chance, 100% = Sure Thing. The quantitative scale, however, offers several advantages over the qualitative one, as shown towards the end of this section. Several exercises critical to the formation of realistic assessments are discussed first.

Before we see how to use counsel's probabilities to calculate the value of litigating, there are several important points to be made about assessing realistic probabilities.

1. The more the result of one uncertainty depends on the results of other uncertainties, the harder it is to form an opinion as to its likely outcome because of the many sub-issues that must be weighted and balanced to do so. But it can be made easier by dissecting the issue and capturing its complexity in the form of a "sub-tree." For example, as was indicated at the outset, counsel for Razor feels that the outcome of the validity issue depends on whether or not the trier will think the examiner was aware of the two prior patents. This, in turn, depends on whether or not the retired government examiner will testify. Rather than trying to think about all of these uncertainties at once, the sub-tree in Figure 2 will greatly help. Note the following general rule about the sequencing of issues in a sub-tree: the influencing uncertainties go to the left, the dependent (or ultimate) issues go to the right. (Remember, decision trees are read from left to right.)

2. Don't form an opinion about your likelihood of success on an issue until you have thought *thoroughly* about how *both* sides will argue the issue.[7] Psychologists have amply demonstrated that the mind frequently does not deal well with uncertainty. For example, one very common problem is that unlikely events are given *too* small a probability, while the odds of the more likely events are significantly

[5] The numbers used for the quantitative issues (i.e., the amount of past damages and the future increase in market share) are not meant to be the *only* possible outcomes. Instead, they are simply meant to be values representative of the range of possible outcomes, and thus provide the decision maker with reasonable approximations to the entire spectrum of possibilities. The wider the range of possible results, the more branches can be used to approximate different areas of the range. Thus, three branches were used in this example for lost profits and market share recovery, while only two were used for the royalty rate.

[6] For most clients, the Litigate v. Settle decision will also depend on the magnitude of litigation costs that it could save should an early settlement be reached. It is very easy to deduct these costs from the value of the litigation alternative we will calculate below, and so arrive at a *net* value of litigating that can be compared to the $1.8 million settlement option. (Just be careful to subtract *only* those *future* costs that could be avoided should a settlement be reached. In particular, do not subtract those "sunk costs" your client has *already* incurred.)

[7] As with the construction of the decision tree, it is very important that this step be done by having the attorneys work *as a group*, rather than work separately and then compare notes.

overstated.[8] Also, recent information is given undue weight as compared with older information, even though the latter is still very relevant. Only by getting all of the knowledgeable people together in a group to discuss all of the evidence, law, and other reasons that could cause or explain each of the possible results, will you provide the most realistic assessments possible. Figure 3 illustrates this step—but it is incomplete: with just a little effort you should always be able to identify at least 5 or 6 reasons each issue might be won or lost.

3. Probabilities are better expressed in numbers than words—for a couple of reasons. First, phrases such as "very likely" or "good possibility" mean very different things to different people despite their common usage. (For example, many lawyers mean 40% or 50% when they say "good possibility" while others mean 65% or 75%!) Second, no one has any logical, consistent method of combining such verbal expressions to arrive at the overall probability of the ultimate result. For example, how would you come up with the overall probability of the patent being held valid if the chances on each of the uncertainties in Figure 2 had been described in words, as they have been in Figure 4? And even if a colleague evaluated each possible outcome with the same words, do you think they would necessarily reach the same conclusion as to the overall probability of validity as you just did?

4. The best way to arrive at numerical probabilities is to use a two-color wheel such as shown in Figure 5, where the relative amount of each color can be varied (from 0% shaded/100% unshaded to 100% shaded/0% unshaded). Counsel then adjusts the two colors until they are in the same relative proportion—based on counsel's *subjective* judgment—as are the two litigation outcomes, and then reads the corresponding percentage off the reverse side. Use of a wheel is important because a visual representation makes people think much harder, and because most people have a very imperfect idea of probabilities: 80% and 90% seem very similar until one *sees* that 80% is equivalent to 4-to-1 odds and 90% to 9-to-1 odds.

Figure 6 shows the opinions of Razor's counsel expressed in probabilities.[9] Since issues to the right in a decision tree are influenced by (or dependent on) issues to the left (but the reverse should never be true if the tree is properly constructed), each probability should be thought of as "conditional" on the previous branches of the tree. Thus, for example, counsel feels that if the examiner does *not* testify there is a one-in-three (.33) chance of the trier concluding that the examiner was aware of the uncited patents, but that if the examiner *does* testify, there is only a one-in-five (.20) chance. See Column II. Similarly, all of the probabilities on the last issue (shown in Column III) are conditional on the previous issues: validity is far more likely if the trier feels the examiner was aware of the uncited patents than unaware, with some smaller variations depending on whether or not the examiner actually testifies.

The four different probabilities of "Patent Held Valid" in Column III of the tree (.75, .30, .85, .20) now need to be

[8] This particular bias is one that I have consistently seen in experiments I have conducted on hundreds of groups of attorneys. It and others are described in an article entitled "Judgment Under Uncertainty: Heuristics and Biases" by A. Tversky and D. Kahneman, SCIENCE 185, page 1129 (September, 1974).

[9] "Sixty percent" can be expressed as either .60 or 60%. I typically use the decimal form under the branches of a tree, and the percentage form to represent the results obtained after multiplying or adding probabilities together.

"weighted" by the chances of getting to each. This "weighting" or averaging can be done by (a) multiplying the probabilities from left to right, thus determining the "compound probability" of each scenario (as shown to the right of the tree), and then (b) adding up the probabilities of the four scenarios that result in the patent being held valid (scenarios 1, 3, 5, and 7). The result here is 40%.

Note that this process of multiplying probabilities—*and only this process*—will perfectly reflect the lawyer's judgments on each of the underlying issues:

— scenario 1 is three times as likely as scenario 2 (15% v. 5%) because of the relevant probabilities in Column III (.75 v. .25);

— scenarios 1 & 2 together are half as likely as scenarios 3 & 4 (20% v. 40%) because of the relevant probabilities in Column II (.33 v. .67);

— scenarios 1–4 add to 60% and scenarios 5–8 to 40%, as would be expected given counsel's assessments in Column I.

The sub-tree result (40% chance found valid) can then be entered on the original tree, now reproduced as Figure 7. All of the other probabilities would be obtained in a similar way:[10]

- by listing *all* the reasons why each uncertainty might be resolved one way or the other (as we began to do in Figure 3),
- by using a probability wheel to help arrive at percentages (as illustrated in Figure 5), and
- for complex issues (e.g., infringement under the Doctrine of Equivalents) whose probability depends on the careful analysis of several underlying uncertainties, by first dissecting the issue into a sub-tree (as we did in Figure 2) and finally—after assessing each sub-issue by listing reasons and employing the wheel—using simple arithmetic to calculate the overall probability of the ultimate issue (as we did in Figure 6).

It is important to recognize that all of these assessments are obviously based on counsel's *current* state of knowledge, and that your probabilities will change and must be reassessed as discovery and legal research progress and as other significant events occur.

§ 50.04 Calculating the Case Value

The value of pursuing any strategy (absent risk aversion by the decision maker) is simply derived by weighting each of the possible outcomes by its probability of occurring. This produces a value somewhere between the extremes, closer to one extreme or the other depending on the relative likelihood of the different outcomes.

Now we are ready to calculate the value of litigating, once again by using simple arithmetic. We are going to take a series of probability-weighted averages, beginning at the *upper right* of the tree shown in Figure 8.

$19.0M[11] — This is the average value if the patent is valid and infringed, and the award for lost profits is $13 million, but the future increase in market share is uncertain. It is arrived at by taking a 25% chance of the high Total Value (.25 × $25M), plus a 50% chance of the middle Total

[10] It should be realized that not all assessments will be provided by counsel. Razor's potential increase in market share would undoubtedly be provided by the marketing manager, for example.

[11] The other average values in this same column of the tree—$16.0M, $12.0M, $10.0M and $9.0M—were arrived at in a similar fashion.

Value (.50 × $19M), plus a 25% chance of the low Total Value (.25 × $13M).[12]

$15.1M — This is the average value if the patent is valid and infringed, and if damages are measured by lost profits. Notice it lies between the high possibility of $19M and the low possibility of $12M, but is closer to the low because of the three probabilities on this issue: 10% of the high possibility, 60% of the medium and 30% of the low. In fact, the average is determined in just that way: (.10 × $19.0M) + (.60 × $16.0M) + (.30 × $12.0M) = $15.1M.

$9.8M — This is the average value if Razor wins, but damages are measured by a royalty. Notice it is much closer to $10.0M than to $9.0M, because the higher royalty was given an 80% chance by the attorneys: (.80 × $10.0M) + (.20 × $9.0M) = $9.8M.

$11.9M — Because the measure of damages is uncertain, we give the average value of $15.1M (if measured by lost profits) a weight of 40% (the probability assigned by counsel to that possibility), and the average value of $9.8M (if measured by royalty) a weight of 60%: (.40 × $15.1M) + (.60 × $9.8M) = $11.9M.

$ 6.0M — The $11.9M value just calculated is the average value *if Razor wins.* Since there is only a 50% chance the patent will be held infringed (even if valid), the $11.9M value must be discounted by 50% to account for the chance of not winning the infringement issue: (.50 × $11.9M) + (.50 × $0) = $6.0M.

$ 2.4M — Similarly, the $6.0M million must be further discounted, this time by 60% to account for the chance of not winning the validity issue: (.40 × $6.0M) + (.60 × $0) = $2.4M.

This $2.4 million represents the "probability-weighted" value (or "expected value") of the Litigate option.[13] As was discussed in §50.02 *supra* (at footnote 6), in order to decide whether to litigate or settle, many plaintiffs would deduct (and many defendants would add) their remaining litigation costs before comparing the expected value of litigating to the expected settlement value of $1.8 million.

Another adjustment that clients frequently make to the expected value of litigating involves consideration of their risk tolerance. It can be demonstrated that *if risks of the magnitude shown in the Total Value column of the decision tree* can be tolerated, a decision maker will maximize its wealth over the long run by consistently selecting the strategies with the best expected values. However, many clients are risk averse when confronted with the potential consequences of a specific lawsuit, preferring a lesser amount for certain rather than a higher—but uncertain—

[12] Notice that the same result could be obtained by adding the $13M lost profits on this branch of the tree to the $6M average value of the uncertain future benefit: (.25× $12M) + (.50 × $6M) + (.25 × $0) = $6M.

[13] Another way to calculate this "probability-weighted" value is to multiply the probabilities in the tree from left to right, producing a "compound probability" for each of the 17 scenarios. The first scenario, for example, would have a compound probability of .40 × .50 × .40 × .10 × .25, or .002 (= 0.2%). Then multiply these 17 compound probabilities times their respective "Total Values" (e.g., times $25 million for scenario 1), and sum the 17 products so obtained. The answer will be the same $2.4 million calculated above. (The method for calculating the expected value described in the body of the text is usually referred to as the "roll-back" method, while the one described in this footnote is often called the "compound probability" method.)

expected value. To help the client make this determination, it is important to provide them with the full probability distribution of the litigate alternative, and not just the expected value. This is done by calculating the compound probabilities (as explained in footnote 13 *supra)* of each of the 17 scenarios (see Table 1) and graphing the results as shown in Figure 9. In this case, it is now easy to see that Razor might prefer to settle (almost certain value of $1.8M) rather than litigate (expected value of $2.4M, less remaining litigation fees), since scenarios 16 and 17 add up to an 80% chance of Razor coming up empty if it litigates.

If Razor is *not* risk averse and the defendant's initial offer is below the expected value of litigating (as it is here), that expected value will help counsel determine the extent to which the settlement terms need to be modified to close a deal. For example, changing the future license fee from 1% to 2% of Diversified's anticipated 2003 and 2004 sales ($120 million in total) would be enough to make settlement the clearly preferred strategy, as this would increase the settlement expected value to $3.0 million (after including the initial payment of $600,000).

§ 50.05 Exploring "What If …?" to Improve Case Strategy

The majority of strategy decisions made during the course of a lawsuit do not involve choosing between litigating and settling, but involve instead choosing among alternative pretrial and trial strategies. The risk evaluation performed to analyze the settlement decision can be easily adapted to allow counsel to identify profitable (or unprofitable) areas of additional pretrial activity and profitable changes in trial strategy.

Although the basic analysis is now done, it is possible to get many more insights from the analysis. For example, what if Razor's lawyers are wondering how concerned they should be about the possibility of the examiner testifying. In just a few minutes,[14] the average value of litigating can be recalculated by (1) substituting 1.00 under "Examiner Testifies" at the bottom of Column I of Figure 6 in place of .40 (and .00 at the top of Column I in place of .60), (2) determining that this changes the overall probability of "Patent Held Valid" to 33%,[15] and (3) calculating the new value of litigating by using .33 in Figure 8 instead of .40 for Patent Valid. The new expected value (before litigation costs) would be $2.0 million,[16] down from $2.4M—certainly not a disaster for Razor.

As another example of what is frequently called "sensitivity analysis," imagine you are debating whether to conduct an extensive—and expensive—market survey of how other manufacturers solved the razor-head rigidity problem. Your results should help convince the trier that there are non-infringing alternatives, and thus increase the probability of a finding that Diversified's design infringes on your patent. Almost immediately it can be determined that just a 10 percentage point increase on the "Patent Infringed" branch of the main tree in Figure 8 (from .50 to .60) increases the case value by nearly $500,000.[17]

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[14] This recalculation is even faster if the decision tree has been programmed using one of the special decision tree analysis software packages now available. For more information on one of the leading programs, visit www.LitigationRisk.com and click on "Full Software."

[15] This is true because the compound probabilities of scenarios 1, 3, 5, and 7 are now 0%, 0%, 17% and 16% respectively.

[16] This is true because (.33 × $6.0M) + (.67 × $0) = $2.0M.

[17] This is true because (.60 infringed × $11.9M) + (.40 not infringed × $0) = $7.14M, and (.40 valid × $7.14M) + (.60 not valid × $0) = $2.86M, up from $2.4M.

These numbers are, of course, not meant to be precise, but they do give the attorney a good sense of the approximate value of pursuing different pretrial and trial strategies.

§ 50.06 Conclusion

The application of decision tree analysis, as we have now seen, is fundamentally just an attempt to probe and record in a very disciplined and unambiguous way a lawyer's *intuition* about the key uncertainties in a case—and the reasons and odds they will be resolved favorably or unfavorably—so that *logic* can then be used to synthesize the many subjective judgments that are part of analyzing complex legal problems. This combination of intuition and logic results in better assessments of case value. It also permits the lawyer to provide an explicit, quantitative risk evaluation that enables the business client to make the best litigation strategy decisions with greater ease.

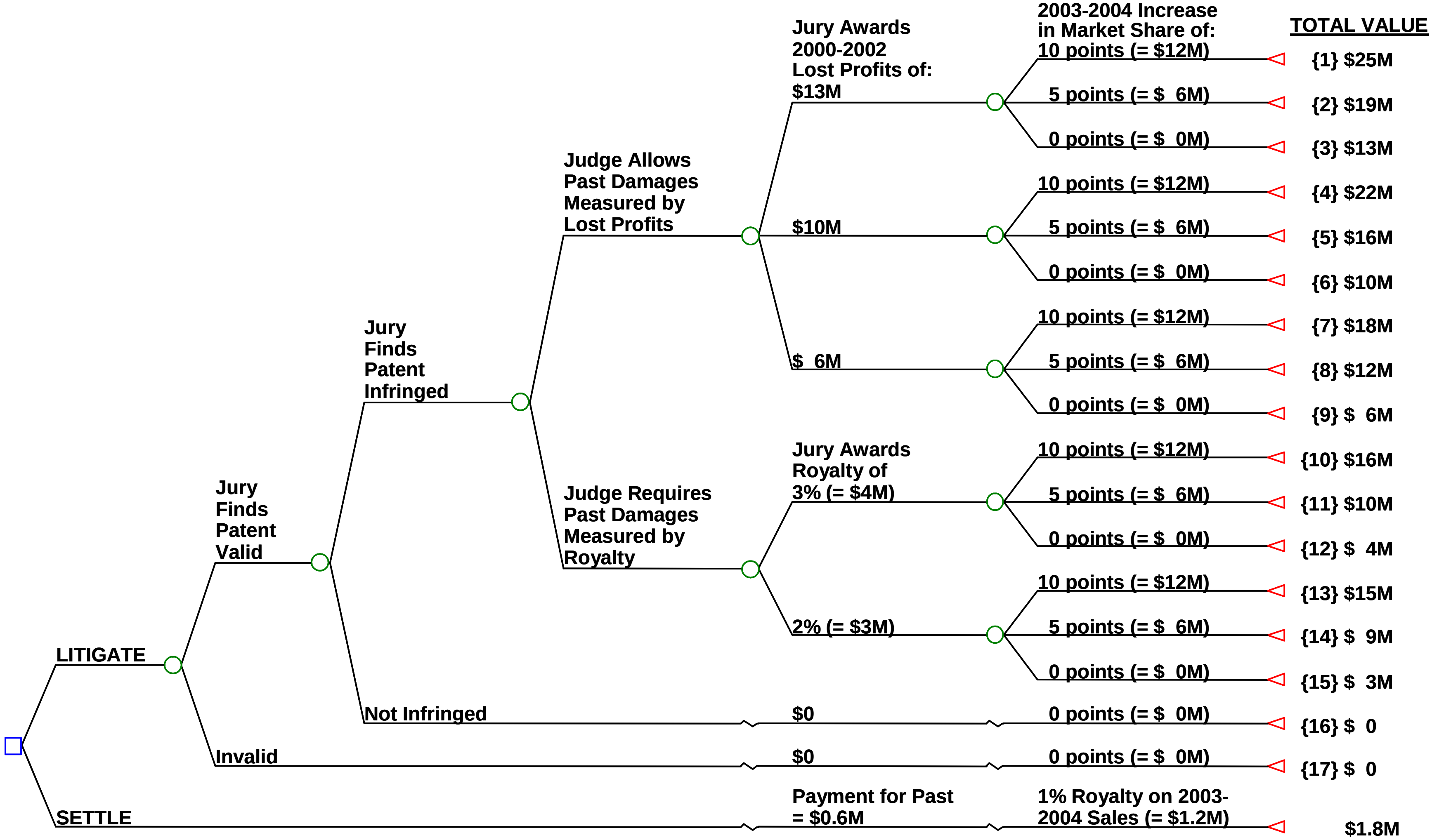

FIGURE 1. Decision Trees Display Possible Results of Major Uncertainties

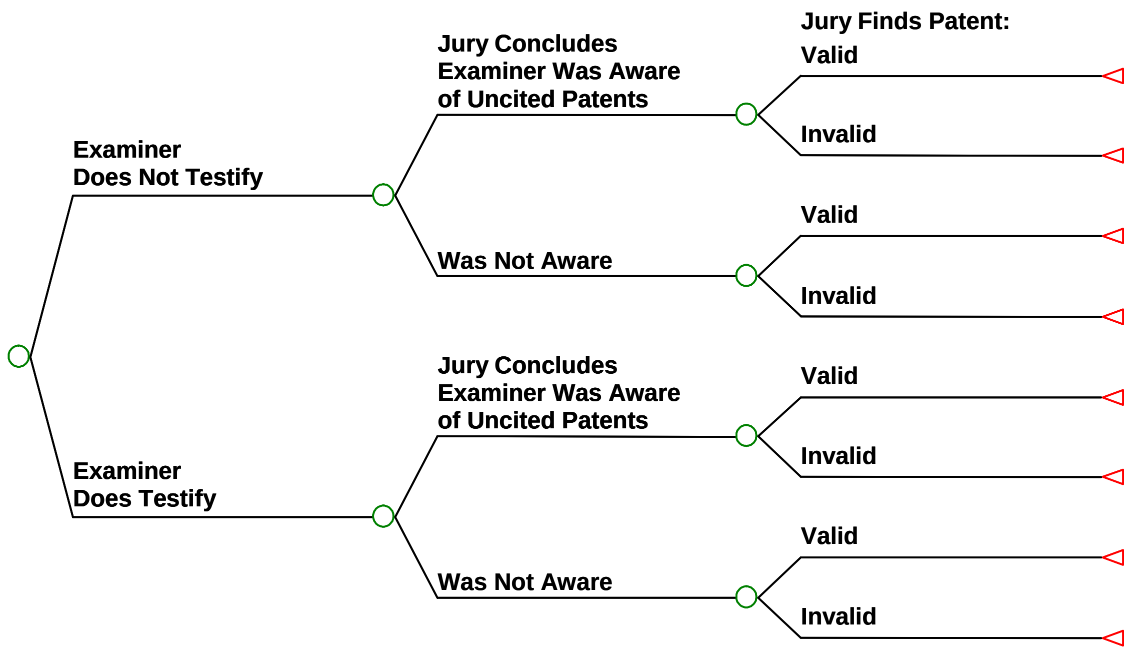

FIGURE 2. Sub-Trees Help to Evaluate Complex Issues by Showing Sub-Issues that Influence Ultimate Outcome

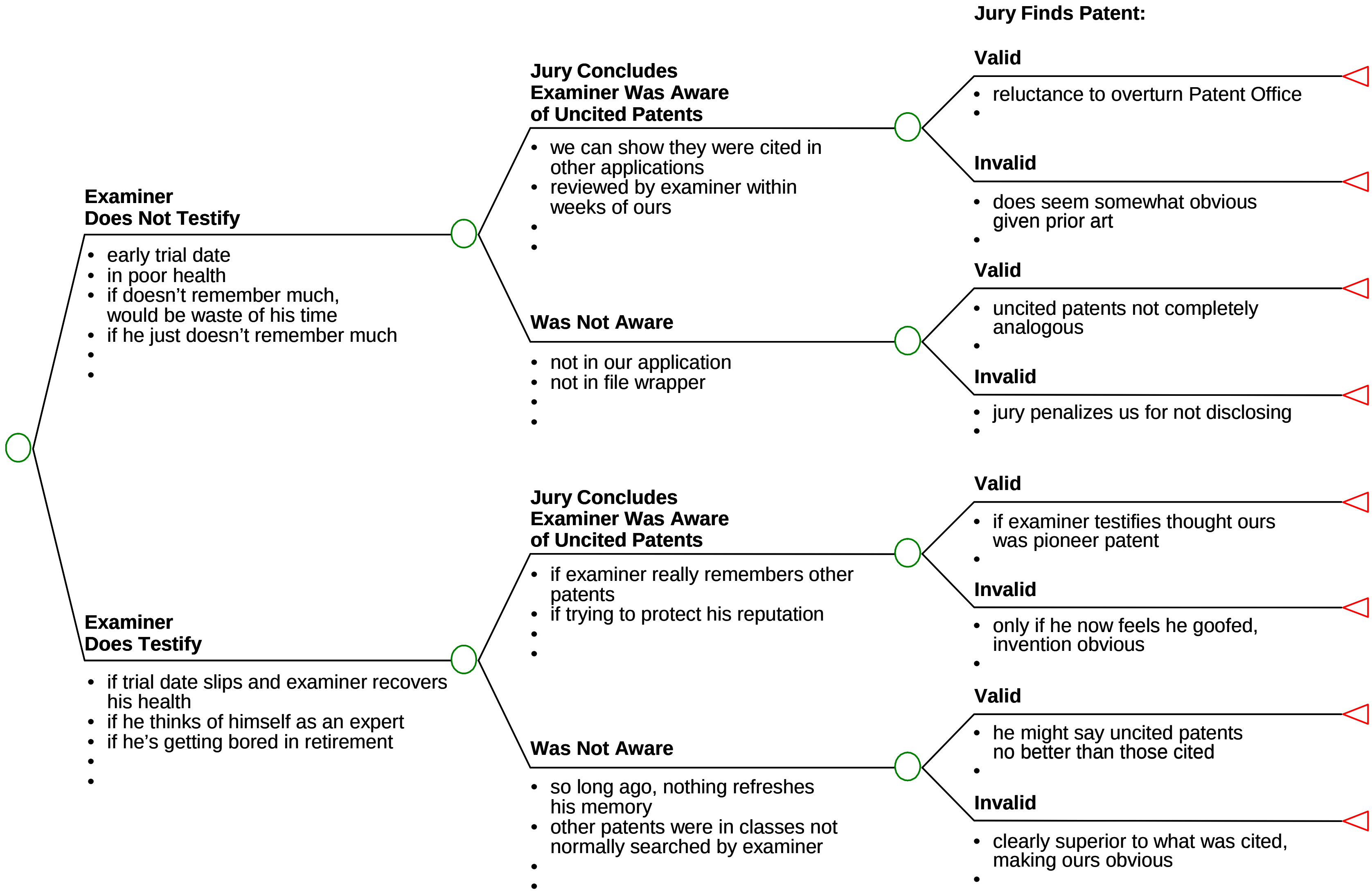

FIGURE 3. Realistic Evaluation Requires First Identifying All Possible Reasons for Each Possible Outcome of Each Uncertainty

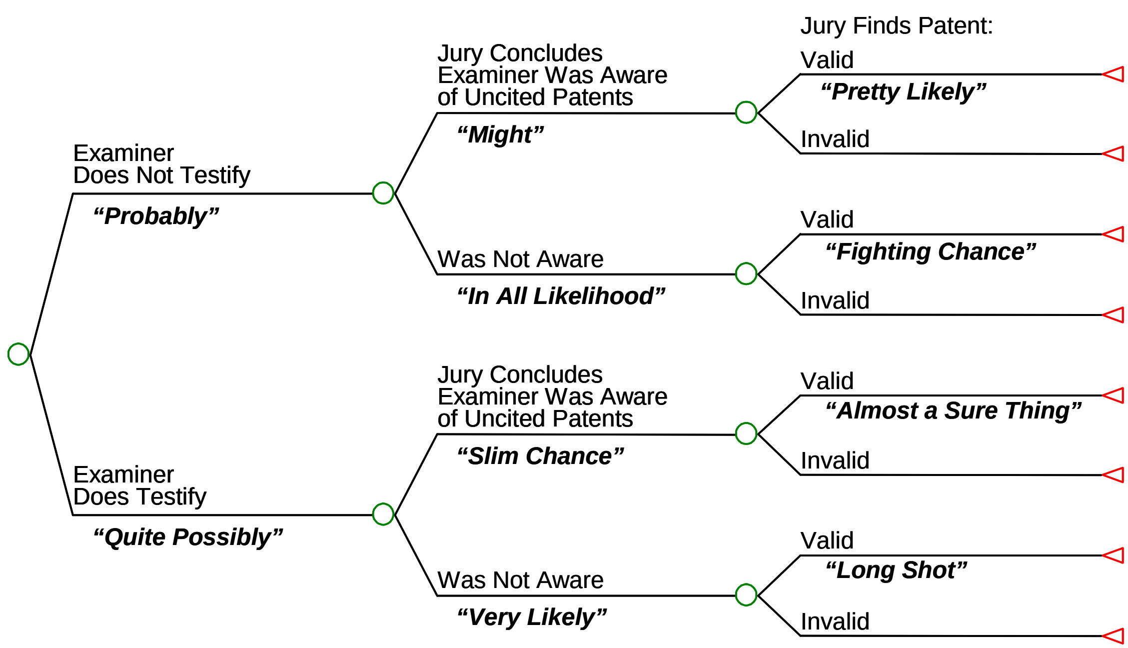

FIGURE 4. Qualitative Expressions of Probability Make Decision Making Difficult: What Is the Overall Probability of "Patent Held Valid" Based on *These* Assessments?

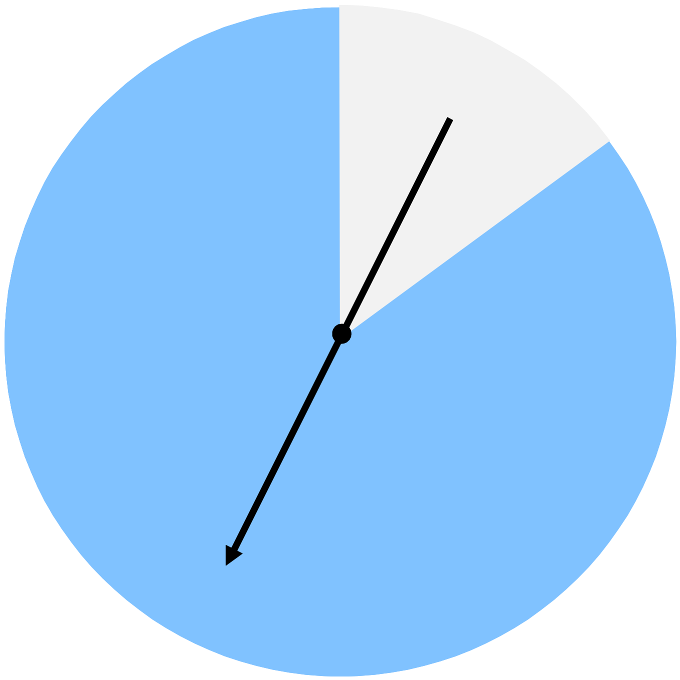

FIGURE 5. Visual Reference Results in Better Probability Assessments

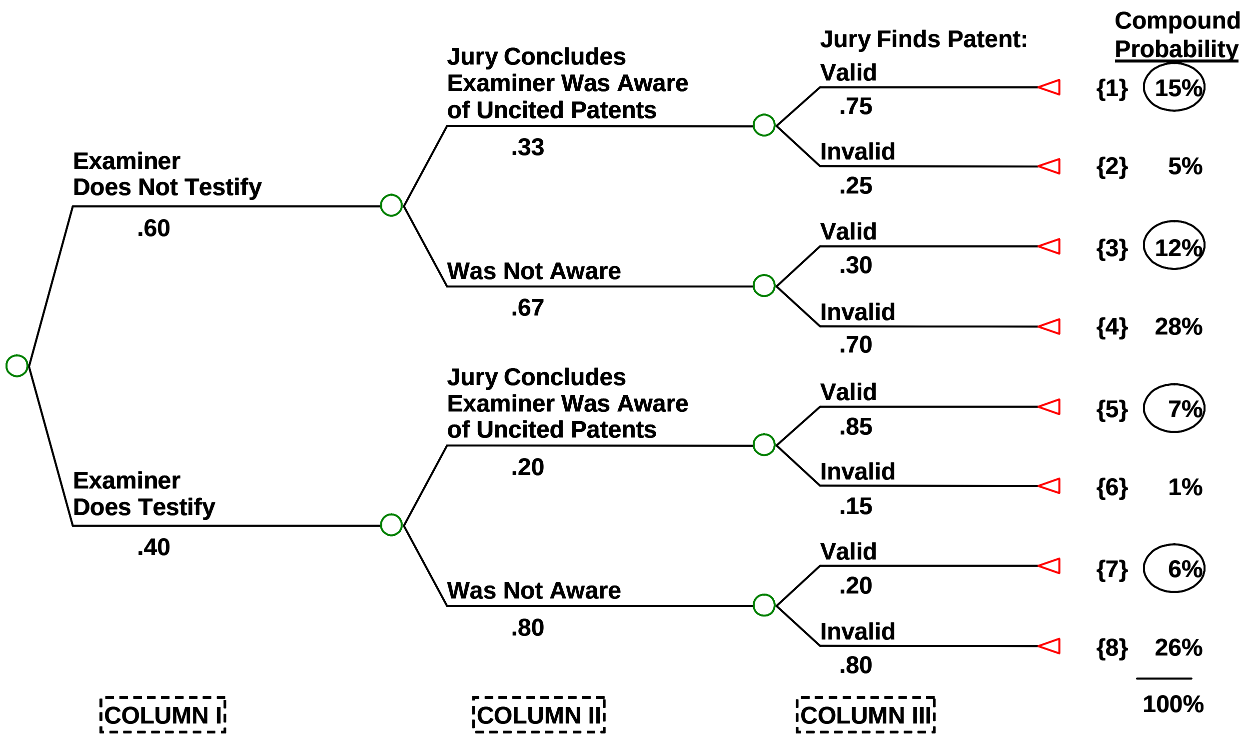

FIGURE 6. Probabilities Permit Logical Conclusions on Complex Issue

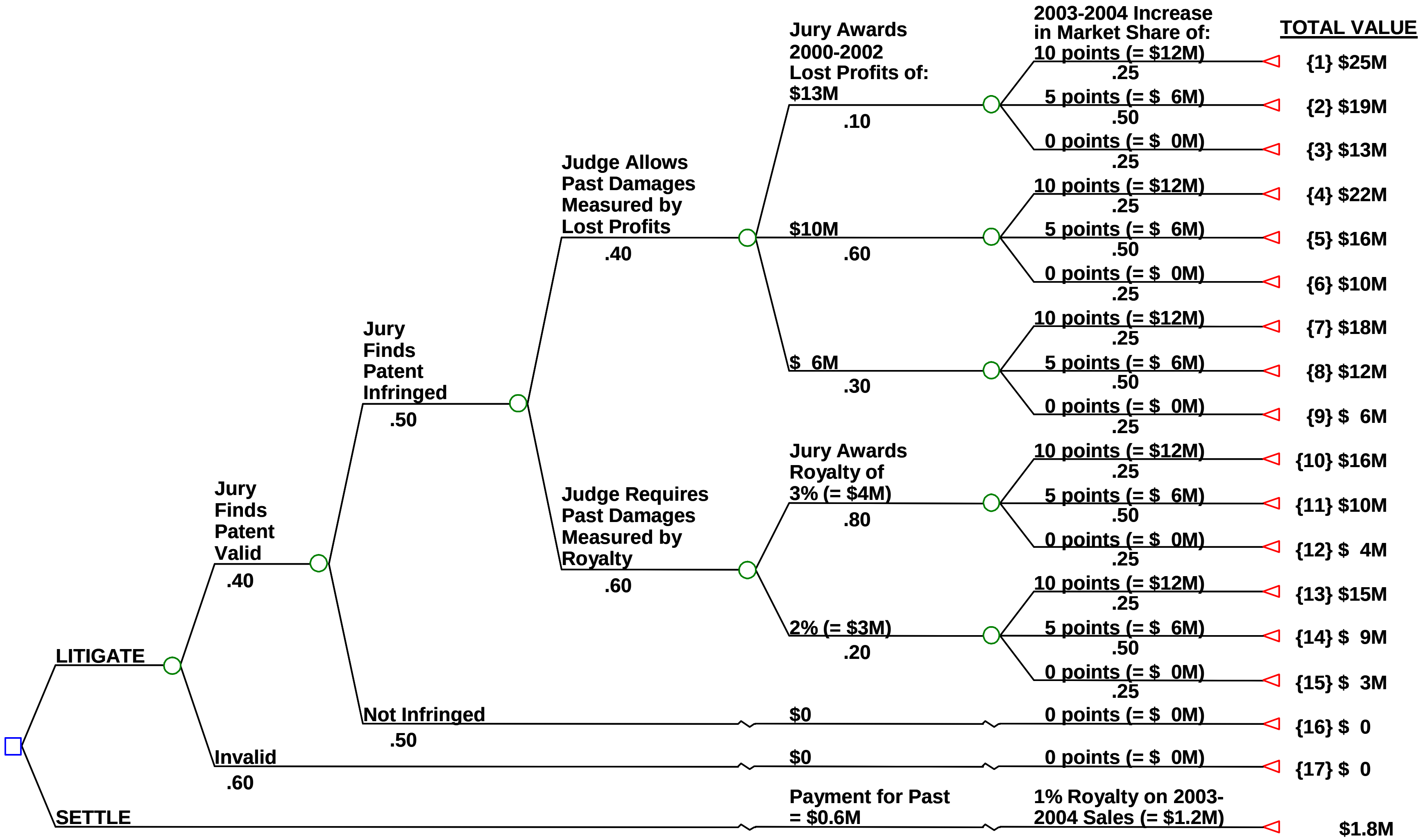

FIGURE 7. Probabilities Are Instrumental to Calculating Case Value

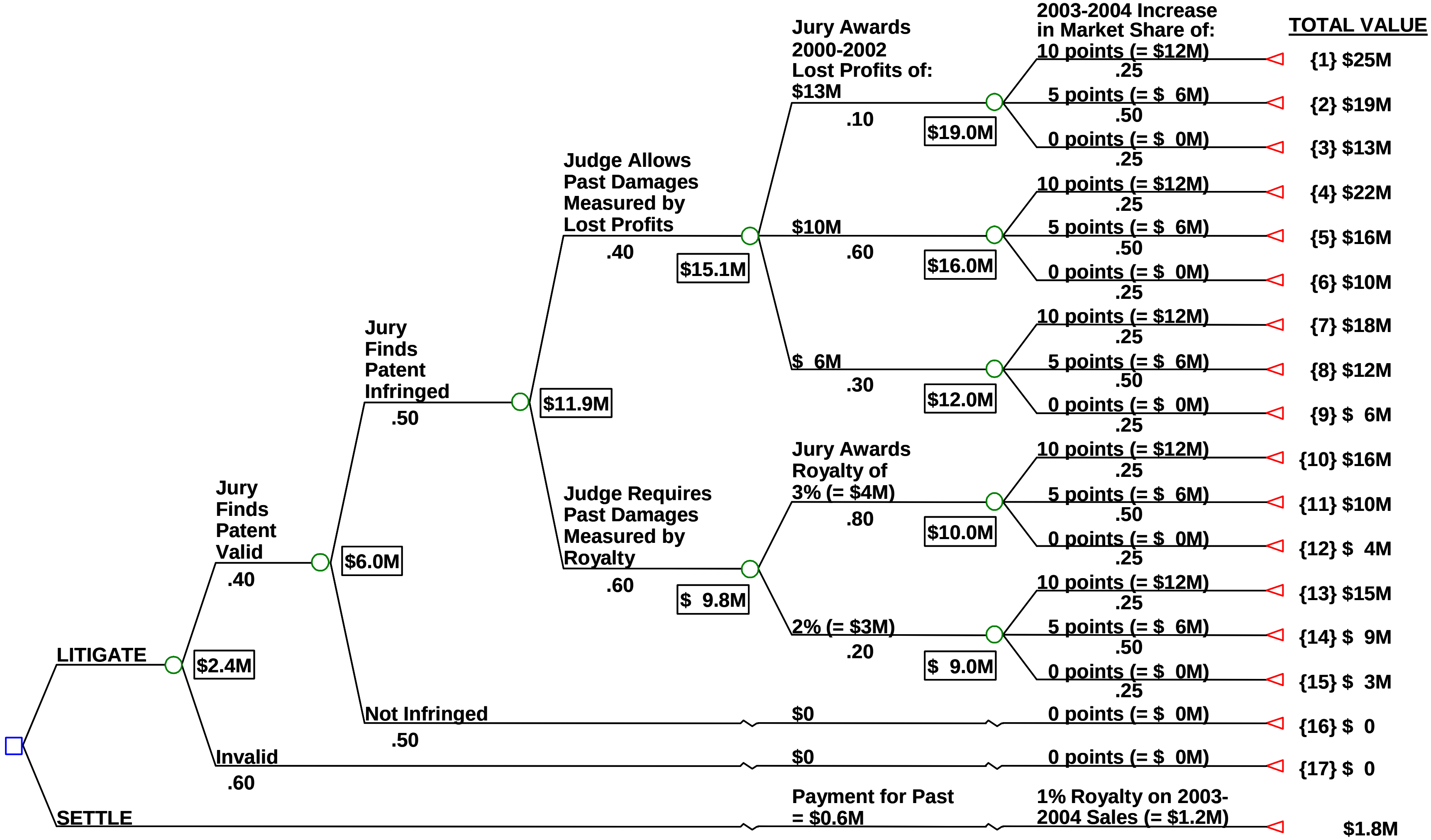

FIGURE 8. Expected Value Reflects All Outcomes Weighted by Their Probabilities

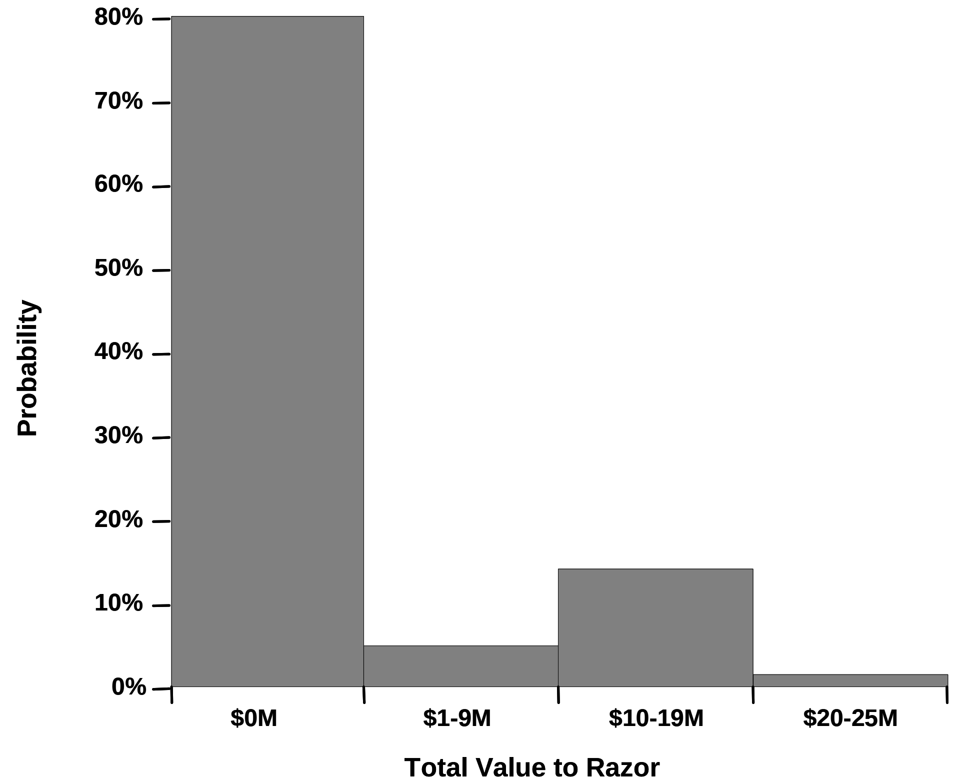

FIGURE 9. Bar Chart Portrays Full Risks, Allowing Informed Client Decisions

Scenario	Compound Probability			Total Value
1	.40 × .50 × .40 × .10 × .25 =	.002 =	0.2%	$ 25M
2	.40 × .50 × .40 × .10 × .50 =	.004 =	0.4%	$ 19M
3	.40 × .50 × .40 × .10 × .25 =	.002 =	0.2%	$ 13M
4	.40 × .50 × .40 × .60 × .25 =	.012 =	1.2%	$ 22M
5	.40 × .50 × .40 × .60 × .50 =	.024 =	2.4%	$ 16M
6	.40 × .50 × .40 × .60 × .25 =	.012 =	1.2%	$ 10M
7	.40 × .50 × .40 × .30 × .25 =	.006 =	0.6%	$ 18M
8	.40 × .50 × .40 × .30 × .50 =	.012 =	1.2%	$ 12M
9	.40 × .50 × .40 × .30 × .25 =	.006 =	0.6%	$ 6M
10	.40 × .50 × .60 × .80 × .25 =	.024 =	2.4%	$ 16M
11	.40 × .50 × .60 × .80 × .50 =	.048 =	4.8%	$ 10M
12	.40 × .50 × .60 × .80 × .25 =	.024 =	2.4%	$ 4M
13	.40 × .50 × .60 × .20 × .25 =	.006 =	0.6%	$ 15M
14	.40 × .50 × .60 × .20 × .50 =	.012 =	1.2%	$ 9M
15	.40 × .50 × .60 × .20 × .25 =	.006 =	0.6%	$ 3M
16	.40 × .50 =	.200 =	20.0%	$ 0M
17	.60 =	.600 =	60.0%	$ 0M
		1.000	100.0%	

TABLE 1. Compound Probabilities for Each Scenario Are Needed to Produce Bar Chart (see Figure 9)