

DECISION-MAKING IS

HUMAN



Decision analysis is the overarching decision process, which explicitly addresses the fact that, ultimately, decision-making is human. In large organizations, humans have to make complex, expensive decisions, riddled with risk and uncertainty. Recognizing this, decision analysis weaves facilitation and mathematical and organizational behavior tools into a winning process that is helping companies all over the energy sector make better decisions, faster.

Although the decision analysis process is often customized from company to company, and therefore may look slightly different, it always comprises three distinct elements: framing, uncertainty analysis, and decision-maker dialogue. Each element has set objectives and tools to accomplish those objectives.

By Ellen CooperSmith,
Founder and President of Decision Frameworks

THE FRAME

“It isn’t that they can’t see the solution. It is that they can’t see the problem.”

G.K. Chesterton (1874–1936)

A decision frame is a person or groups definition of a problem—how they view it, and which alternatives they are going to consider to solve it. People set up decision frames, both consciously and unconsciously, to control complexity and move forward with a decision.

In decision analysis, a group of individuals is brought together to evaluate a complex problem via a series of facilitated meetings. The actual development of the decision frame is referred to as “framing the problem,” and is the first and, often believed to be the most important step in any decision process.

The Legend of Ulster* illustrates the importance of framing and the fact that how a problem is viewed has immense potential to either gain or lose value in any corporation:

Once upon a time, a certain King fell sick, and believing he was on his deathbed, he called his only two sons to him. As soon as his sons arrived, the King said, “I am old, and my end is fast approaching. I have decided to hold a swimming race to choose my successor. Whichever one of you wins will gain my kingdom. Swim out and round yonder rock in the sea, and the first to lay his hand back onshore will succeed to the throne.”

Both sons set out swimming, but the elder son gained an advantage, and rounded the rock first. The younger son shortly rounded the rock too, but realized his brother was on the point of winning. Taking out his knife, the younger son cut off his hand and threw it onto the shore, winning the race and gaining the Kingdom.

While neither advocating making decisions based on the outcome of a swimming race nor believing there is a firm cost/benefit of losing a hand to winning a kingdom, what is relevant in the Legend of Ulster is how the solution came by considering the problem from a different angle. The younger son won because his solution fulfilled all the conditions of the contest. Moreover, his novel solution did not rely on the presumed winning skill of being the fastest swimmer.

Decision framing has the same overarching goal of understanding the problem from multiple angles, and developing a few novel alternative solutions to evaluate realistically. To do this, framing has multiple objectives, each of which is accomplished through the use of different facilitation tools. A robust decision frame will include pertinent background information on the problem, decisions that need to be focused on to find novel solutions, a few



distinctly different alternative solutions to consider, perceived risks and uncertainties associated with those alternatives, and an agreed approach to assess and incorporate uncertainty in the evaluation.

UNCERTAINTY ANALYSIS

“Rule Number 1 is don’t sweat the small stuff. The hard part is figuring out what’s the small stuff.”

Robert S. Eloit (1929–)
U.S. cardiologist

Making the best decision for the range of possible outcomes is the second key component

of decision analysis, and is enabled by incorporating uncertainty into the evaluation of alternatives. Uncertainty analysis allows us to determine which risks and uncertainties are important, and to potentially change the value of an opportunity, given this insight.

Uncertainty analysis may be accomplished via a variety of different analysis tools, such as decision trees, Monte Carlo simulation, portfolio optimization, or real option financial analysis. The selection of the specific analysis tool will depend on the type of decision to be made and the questions that need to be answered to make a decision.

Many of the questions we are trying to answer stem from attempting to understand the value of an opportunity or asset, given the different future decisions, or options, imbedded in prudent management of the asset. Future options in the energy industry can range from phasing a field development or power plant to purchasing seismic or running well tests prior to drilling a well. Uncertainty analysis is able to explicitly address this value using both decision trees, or financial option analysis, depending on the complexity and nature of the decisions involved.

No matter the uncertainty tool, however, the primary goal of uncertainty analysis remains the same—to gain insight and choose directionally, the best course of action, given insight on the inherent risks and uncertainties.

DECISION-MAKER DIALOGUE

The goal of decision analysis is to work smarter, not harder. Decision analysis enables this through a third key element—structured conversation between decision-makers and project teams, at key points in the evaluation of a complex problem. A robust decision approach includes a few collaborative meetings between a decision board and a project team: after the project is framed, after the economic input variables have been assessed, and once the analysis has been performed.

• **Meeting To Improve the Frame—**

Decision-makers and project teams discuss and improve the decision frame, prior to moving forward with any evaluation. Jointly, they agree on the problem focus, alternatives, selection criteria, and analysis methodology—before time is wasted and numbers are run either on the wrong alternatives or using the wrong analysis approach.

• **Meeting To Approve Economic Input Variables—**

Decision-makers validate the input variables to the economics, prior to reviewing the results of any analysis, thus lessening the inclination to change the input variables if the results aren't telling the group what they want to hear.

Meeting To

Make a Decision—

Decision-makers and teams meet to review results, gain insight, and either suggest a hybrid to evaluate or make a decision.

Integral to the success of the decision-maker dialogue is the concept of project teams dialoguing with a “decision board,” rather than with one key decision-maker. A decision board is a group of decision-makers comprising the managers responsible for making the decision, implementing the decision, and managing the asset or opportunity once the decision is made.

Involvement of a decision board ensures coordinated action and the ability to extract maximum value from a decision. All involved understand the key value drivers—and carry that shared knowledge into the negotiation, development and management of the asset. In this manner, uncertainty is better monitored and managed, enabling future real options, inherent in the asset, to be exercised when it is ideal to do so.

PICTURE THIS

A team walks into a conference room to discuss how to approach a new opportunity in Country A. They are meeting to frame the problem and have an internal decision facilitator to assist them along the way.

The meeting begins with a discussion of the opportunity, agreement on the problem, and the questions that the analysis will have to answer before a decision can be taken. Once done, the team raises and records issues (anything of concern) about the opportunity. They group the issues into facts (known information), decisions (things that can be controlled), and risks, and uncertainties (things that cannot be controlled).

The team then works with the decisions. First, they segregate the decisions in a hierarchy to define the focus of the problem. Next, they take the focus decisions and use them to brainstorm and generate a few, distinctly different, creative strategies to consider.

The team then works with the risks and uncertainties associated with the alternative strategies they are considering. Together, they build a “map” of their economic model, for each strategy. The map is a diagram illustrating how revenue and costs will be realized if the opportunity is pursued, and the relationship of the risks and uncertainties to the opportunity's net present value (NPV).

At this point, the team meets with their decision-makers to improve their frame—asking their management to clarify the focus, alternatives, decision, criteria, and analysis approach. Once that is done, the team simultaneously develops their economic model and assesses ranges and probability distributions for the uncertainties identified for each strategy being considered.

Next, the team's economist develops a sensitivity (or tornado) plot for each strategy and meets with the team and decision-makers to both validate the uncertainties and gain insight from the analysis to this point. The sensitivity

plot illustrates the impact on NPV of each uncertainty varying across its range of possible outcomes, while the other uncertainties are held constant at their median (or “p50”) value. Together, the project team and decision-makers identify key uncertainties and brainstorm ways to control or mitigate the downside and maximize the upside value of the opportunity. During this step, insight is gained and hybrid strategies are developed and added for consideration.

Finally, the team incorporates the key uncertainties into a probabilistic evaluation, for each strategy, to better understand the joint impact of the key uncertainties on NPV. Depending on the uncertainty tool used, the team gains further insight. Assuming they use decision trees, one of the more common uncertainty tools, the team gathers to look at the various decision pathways and uncertainty scenarios revealed for each strategy considered.

Together with the decision board, the team notes the expected (risk weighted) value and range of NPV for each strategy. They observe which scenarios are leading to value enhancement and which are leading to value degradation. This leads to the development of a stronger hybrid strategy, containing the best elements of the initial strategies evaluated, which is subsequently evaluated and eventually pursued.

IMPLEMENTING DECISION ANALYSIS

To fully implement decision analysis is easier said than done, because fundamentally it involves changing corporate culture and the manner in which decisions are made. Having said that, many companies realize the importance of decision analysis and have embarked on the road to full implementation. Others are testing the benefits of decision analysis by focusing its initial use on key decisions in certain business segments.

This “decision-focused” implementation is a good way to start. It

allows for the relevance and benefit of decision analysis to be understood, while building champion support and internal resource capability. Basically, it lays the groundwork for the necessary elements of implementation by first convincing key individuals in the organization that there is a need to change and illustrating the benefits of doing so. Secondly, it provides those charged with Implementation, a better understanding of what will be involved and how best to accomplish their task, given the current corporate culture and structure.

There are four necessary elements to successful implementation of decision analysis in a company—a well understood and communicated implementation plan, a network of champions, a network of internal resources, and relevant training or awareness for the organization.

- An implementation plan serves as the vision for the organization. It explains why the company is implementing a more structured approach to decision-making, which decisions will require its use, and

how its use will be supported within the organization itself.

- A network of champions imbedded around the organization is necessary to communicate the vision and to support the internal resources and use of the process. Just as important, it provides a viaduct for necessary changes in the implementation plan as they become apparent.
- A network of internal resources is the foundation for implementation of decision analysis. Without internal decision consultants, independence from outside consulting firms and true cultural change cannot occur.
- Relevant training for the organization is necessary at three different levels. Management must understand how to use decision analysis and their internal resources to make better decisions.

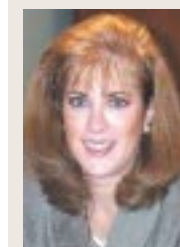
Professionals in the organization need to understand how to use decision analysis to develop or evaluate opportunities to propose to management. Internal decision consultants require more in-depth training and coaching to learn how to facilitate the decision analysis process and effectively use the tools. All of this requires commitment from management and, to some degree, patience—skill development and cultural change do not occur overnight.

WHO IS USING DECISION ANALYSIS IN THE ENERGY SECTOR AND HOW ARE THEY BENEFITING?

Many oil companies, such as Conoco Inc. and Chevron are long-time E&P users of decision analysis. They have not only adopted the process but have worked to successfully change their corporate cultures to enable better decision-making. These companies boast millions of dollars added to their bottom line each year, stemming from a disciplined decision methodology. For them, the operational, commercial, and strategic decisions in which decision analysis plays a key role include development concept selection, appraisal strategy, acquisitions, dispositions, regional gas strategy, prenegotiation analysis, and power plant expansions.

But oil companies are not the sole practitioners of decision analysis in our industry. Oilfield product and service providers are starting to realize value gain from a structured decision process as well. Companies such as Aker Maritime and Schlumberger use decision analysis to value their products and services, make product development decisions, and manage oil field assets. More importantly, the industry is demanding that risk be shared across the energy sector, which is further prompting the use of decision analysis to both design and negotiate risk contracts to the satisfaction of all involved.

* The Legend of the Province of Ulster, Northern Ireland, relayed by Peter Cunningham, Conoco Inc.



Ellen Coopersmith is Founder and President of Decision Frameworks. She works with companies in building industry decision capability through decision analysis training and in-company decision coaching, problem framing and facilitation, and decision analysis projects ranging from stranded gas strategies to international business expansion as well as appraisal and development of deepwater discoveries. Coopersmith worked at Conoco Inc. for 16 years, where she held numerous technical, supervisory and change management positions in the E&P Dept. before taking on the directorship of decision analysis in the company. She earned a BS degree in petroleum engineering from the Colorado School of Mines and is a member of SPE and the Decision Analysis Affinity Group.