MindManager and Risk Analysis

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Why Risk Analysis

Risk and uncertainties are everywhere. In fact, almost all complex natural, business, and technological processes are probabilistic. Deterministic analysis in most cases is just an approximation of complex problems. When we are talking about weather forecasts, project management, financial analysis, geophysical surveys, military planning – all these processes have uncertainties, which require probabilistic methods of the analysis.

Where are these uncertainties are coming from? Uncertainties can be related to the possible variations and random errors in the values of the parameters and their estimates. An example of such uncertainties is geological properties. Another group of uncertainties is related to lack of our knowledge about certain subjects. It most cases, it is lack of knowledge about something, which has not yet occurred. A clear example of this is predicting a stock price.

Managing of uncertainties includes the steps of identification, analysis, and, if required, risk mitigation. Different risk analysis methods and tools are widely available and used in many industries. In most cases, different statistical methodologies such as Monte Carlo simulations are applied to particular subject areas such as schedule and cost risk analysis. The question remains, if risk analysis tools are well established and developed, why is the actual use of risk and uncertainty management still limited in many industries?

One of the main issues is identification of uncertainties, which can be a very complex process. If uncertainties such as the low and high estimates that are used in schedule risk analysis are not properly identified, it will lead to incorrect results regardless of what methods of analysis are used. This phenomenon is popularly referred to as “garbage in/ garbage out.” If uncertainty is related to random variations of parameters, it is possible to determine them objectively, for example, through accurate measurement. However, if uncertainties are related to a lack of knowledge, industry experts who base their estimates on historical data or actual measurement during a process can only determine them subjectively.

Psychological Issues in Identification of Uncertainties

Decision and risk analysis is based on two fundamentals: statistics and psychology of judgment and decision-making. In 2002, Daniel Kahneman was awarded the Nobel Prize in economics "for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty." According to this theory, fundamental limitations in human mental processes cause people to employ various simplifying strategies or heuristics to ease the burden of mentally processing the information required to make judgments and decisions. In many cases, these heuristics or 'rules of thumb" provide a correct judgment. However, under many circumstances, they lead to predictably faulty judgments or cognitive biases.

According to the availability heuristic, decision makers assess the probability of an event by the ease with which instances or occurrences can be brought to mind. For example, project managers sometimes estimate task duration based on similar tasks that have been previously completed. If they make judgments based on the most or least successful tasks they remember, it can cause inaccurate estimations. The anchoring heuristic refers to the human tendency to remain close to the initial estimate. For example, you started thinking about the duration for an activity that had an original estimate of five days. Anchoring causes your analysis to stay close the original estimate, so that after your analysis the five days will remain the most likely or average duration with a range from three to four days. The representativeness heuristic refers to how judgments concerning the probability of a scenario are influenced by the amount and nature of details in the scenario in a way that is unrelated to the actual likelihood of the scenario. Selective perception refers to instances where "you see what you want to see." For example, this occurs when your estimate of a task is cost are influenced by the intention to fit it into the project's budget.

As we can see, we are making predictable mistakes when we assess risks and make decisions. The question is how can we mitigate negative impact of these heuristic and biases?

Using MindManager for Identification of Uncertainties

Because many problems with identification of uncertainties lie in certain limitations of our mental processes, we should use tools that will facilitate our ability to process information and make proper assessments. Let us see how MindManager can help us identify uncertainties.

One or many subject experts perform the process of identifying uncertainties. Sometimes this is done using brainstorming meetings. The first step is to define the questions these experts will answer. In most cases, these questions ask what could happen and what actions must occur in specific circumstances?

Many uncertainties can be defined as different events, which can affect processes. For example, a change of requirements can affect the project. This event can affect the project schedule in different ways. For example, it can increase duration, increase cost, or cause a cancellation of a project. Events can have different probability and chance of occurrence. MindManager can be easily used to capture information about each event with its properties: probability and impact. Events can be grouped together. For example, a group of events related to a change in requirements can include an event related to different stages for a project. MindManager is an ideal tool to capture such a hierarchy.

Sometimes uncertainties can be defined as ranges of certain parameters. For example, when we calculate the cost of construction, the cost of materials can be within certain ranges. Often, it is possible to assign a statistical distribution to such uncertainties. MindManager can be used to define and visualize different estimates, such as low, base, and high, for these ranges.

Another way to represent uncertainties is to identify different possible scenarios and alternatives. For example, this could be the different ways to achieve project goals. MindManager can easy capture possible scenarios with their properties.

If MindManager is consistently used for the identification of uncertainties, it can help to mitigate negative impact of heuristics biases. MindManager will present a full map of different uncertainties defined with the same set of properties and similar amount of details. It will help to mitigate a negative impact of representativeness heuristic. Visual presentation of uncertainties during a brainstorming meeting in MindManager format will help experts to define a more comprehensive set of uncertainties. This will help to mitigate the availability heuristic. With a visual map of related uncertainties, the expert will be able concentrate more on logical relationship between uncertainties instead of goals. It may mitigate the negative impact of selective perception. MindManager visualization will help experts to elaborate a full set of options and alternatives instead of thinking about the original estimate and, therefore, mitigate negative effect of anchoring.

MindManager as a Part of Risk Analysis Solution

MindManager can be an integrated part of many risk analysis solutions because it helps to capture activities, scenarios, and steps of the process together with information about uncertainties.

To illustrate how MindManager can be used for uncertainty management, let us examine a project risk management process. Project risk management starts with identification of risks and opportunities, as well as defining a project schedule. MindManager can help in both processes. Project managers can use it to create a risk breakdown structure and work breakdown structure. They can then use the data, defined in MindManager in different project management software, including Microsoft Project, to input the project schedule.

Intaver Institute's project risk management software RiskyProject can use work a breakdown structure and risks, defined in MindManager, as an input for quantitative cost and schedule risk analysis. RiskyProject uses Event Chain Methodology to model project uncertainties. RiskyProject assigns risks and uncertainties to tasks and resources, performs Monte Carlo simulations and determines the chance that project will be completed on time and within a budget, as well as crucial tasks, critical risks, and project success rate.

If a project schedule has multiple alternatives, RiskyProject can automatically convert it to a decision tree using third part decision analysis software. As a result, MindManager through RiskyProject helps to perform project decision analysis.

A project schedule with applied risks and uncertainties is different from an original project schedule. A risked schedule, generated in RiskyProject, can be exported back to MindManager. The project manager can then use MindManager to compare the original schedule with the results of analysis to perform a reality check. These checks are used to validate if the risks and their properties -probabilities and impact - are properly defined.

Conclusions

MindManager is one of the most remarkable tools in the area of decision and risk analysis in recent years. It helps in the most difficult step of the uncertainty management processes: identification of uncertainties. Many uncertainties are related to a lack of knowledge about a certain subject and resist any objective definition. MindManager helps to capture a expert's subjective assessment, visualize it, and combine it with objective evidence. As a result, MindManager helps to mitigate the negative impact of heuristics and biases related to judgment and decision-making.

Using MindManager has one more advantage. It allows independent experts, belonging to different teams to communicate with each other using common format. MindManager it helps to exchange information, augment, validate, and review sets of uncertainties captured by different groups of experts.