

Table of Tools

Risk Assessment Tool	Main Components	Advantages	Limitations (Sources of Uncertainty)	Examples of Output
<p>(1) Event Tree Analysis— An event tree begins with an initiating event that leads to a set of possible outcomes. Each event has two possible outcomes: success or failure. The probability (P) of the final event is calculated as the product of the failure (or success) probabilities along its path.</p>	<ul style="list-style-type: none"> ▶ Initiating event ▶ Subsequent events ▶ Final event ▶ Probability of success (1-P) ▶ Probability of failure (P) 	<ul style="list-style-type: none"> ▶ Organizes the information ▶ Breaks down the problem into smaller, more manageable parts ▶ Shows how the different events are connected 	<ul style="list-style-type: none"> ▶ Is difficult to include all possible sequences of events 	<p>The chance of a sewage system pipe break that can result in a large release of effluent is 0.001.</p>
<p>(2) Fault Tree Analysis— Fault tree analysis is a technique used to better understand the failure of a system. It starts with the definition of the undesired outcome, then works backward to define all possible causes of the failure.</p>	<ul style="list-style-type: none"> ▶ Undesired outcome at the top of the tree ▶ Possible events leading to the undesired outcome ▶ "And"/"Or" gates leading to the next event 	<ul style="list-style-type: none"> ▶ Increases understanding of the system being analyzed ▶ Organizes the information ▶ Shows the relationship between the different parts of a system 	<ul style="list-style-type: none"> ▶ Is difficult to cover all possible causes of the undesired event 	<p>Your document did not print because the paper in the tray was folded, creating a paper jam.</p>
<p>(3) Toxicity Testing— The results of a toxicity test are plotted on a dose/response curve. This curve, based on experimental data, represents the relationship between exposure (dose) and the resulting effects (response) of a chemical.</p>	<ul style="list-style-type: none"> ▶ X axis—dose ▶ Y axis—response ▶ Test subject ▶ Route of exposure ▶ Duration of exposure 	<ul style="list-style-type: none"> ▶ Uses controlled experiments ▶ Provides useful chemical toxicity information 	<ul style="list-style-type: none"> ▶ Involves extrapolation from animals to humans ▶ Involves extrapolation from high to low doses ▶ Assumes causality between chemical and response (that the effect is a result of the toxin) ▶ Assumes that the response is related to the dose 	<p>The lethal dose of chemical xxx is 0.05 milligrams of the chemical per kilogram of body weight for mice (0.05 mg/kg = 50 parts per billion)</p>
<p>(4) Epidemiological Study— The results of an epidemiological study can be used to generate rate, ratio, and proportion calculations. These calculations are obtained from the observation of patterns of disease in a population. The goal of such a study is to characterize and identify high-risk groups in a population.</p>	<ul style="list-style-type: none"> ▶ Exposed population ▶ Control population ▶ Total population ▶ Time frame 	<ul style="list-style-type: none"> ▶ Uses actual human data ▶ Can provide the most convincing evidence for human risk when done well 	<ul style="list-style-type: none"> ▶ Is extremely difficult to replicate ▶ Maintains a chance that a contributing factor has not been accounted for ▶ Allows bias in subject selection and data collection ▶ Often deals with multiple exposures, making it more difficult to identify a causal relationship between one exposure and an adverse effect 	<p>According to a National Cancer Institute study, women under the age of 40 are more likely than men to get skin cancer, and men over the age of 40 are more likely to get it than women.^a</p> <p>^a Ellis & Associates Inc. "Skin Cancer: Messages from the Centers for Disease Control." <http://www.jellis.com/news/feb97/cancer.htm>, accessed April 27, 1998.</p>