that X will fall within a given range of values on the next trial of the system. We may also wish to condense our distribution of information by expressing it in terms of the mean or expected value of X, together with some value representing the amount of dispersion of X about the mean.

The situation I have just described involves considerations of probability theory and statistics. A part of these considerations is the frequency distribution of the random variable. Frequency distributions are of two types - discrete and continuous. In a discrete distribution the random variable X can take any of a set of discrete values. And the frequency distribution function, as shown on the slide, is a bar graph. The height of each bar shows the probability that X will have a particular value at a given time. The X with the line over it, in the little box, is the expected value of X and is obtained by multiplying each X by its probability of occurrence and then summing these products over all possible values of X.

In a continuous distribution the random variable can take on any of a continuous set of values. And the distribution function, as shown, is a continuous curve. The probability that X will fall within a given range of values is just the area under the curve in this range. This is illustrated on the slide by the shaded portion which is equal in area to the probability that X will fall between 2 and 3 at a given time.

When properly applied, the probability theory is one of the most powerful tools we have today for constructing mathematical models. When improperly applied it can be rather dangerous. Even statisticians have trouble. I like to tell the story about a well-known statistician who confidently waded into a river having an average depth of three feet, and drowned.

I would now like to discuss briefly two of its more important applications - queuing theory and game theory. Queuing theory, or waiting-line theory, has also