STOCHASTIC MODEL - POSITIONAL TOLERANCE

The concept of uncertainty in spatial data is handled mathematically by the stochastic model which addresses issues of probability, standard deviations and positional tolerance. The following is a brief review of concepts but not a comprehensive discussion.

<u>Uncertainty</u> is related to the following kinds of errors:

- **Blunders are mistakes and/or information which is wrong. They are eliminated by exercising care, checking ones work, and making redundant observations. There is no mathematical magic for accommodating blunders in a set of spatial data.**

- **Systematic errors arise from a mismatch between the functional model and the physical environment of a measurement. Examples include using a plane triangle to represent a curved portion of the earth's surface or assuming one set of atmospheric conditions for a electronic distance measurement when, in fact, the conditions at the time of the measurement were somewhat different. The effect of a systematic error can be eliminated by computing/applying an appropriate correction. Small (inconsequential) systematic errors are often treated as if they were random errors.**

- **Random errors are the result of imperfect observations. The stochastic model tracks the behavior of random errors and shows how a small error in a measurement affects the reliability or quality of a subsequently computed value such as a distance or direction. Random errors exhibit the following general characteristics:**

    1. **Small random errors occur more often than big ones.**

    2. **Positive and negative random errors occur with similar frequency, giving a symmetrical distribution curve.**

    3. **Very large random errors very seldom occur. If they do, they are conservatively counted as blunders and the measurement is not used.**

