The Bayesian technique, which is a method of using data from generic sources as a surrogate to describe statistics for a similar but specific type of application for which little or no data exists, addresses the problem of absence of specific data in a technically rigorous manner, but does not provide any help when comparing different types of variables. In addition, the Bayesian technique is conceptually very difficult to understand and is complex mathematically, requiring distributions rather than single numbers to represent parameter values.

The AHP process therefore appears to offer the technically best method available for a decision analysis process that is required to handle the subjective comparisons of an analysis of this nature.

Its advantages, in terms of the software Expert Choice™, are:

- The analysis is mathematically not complex and could be manually approximately spot verified, independently of the software, if required, being linear additive manipulations with weighted model variables.

- The process can deal with the measurement of intangibles; political, social, ideological as well as economic and technical.

- The software is not very expensive (U.S. $500).

- Use of the basic options of the program can be learned in one or two days, with no prior experience. Changes, updates and sensitivity runs then can be made very quickly.

- The analytic hierarchy process is mathematically sound and simple for participants to input data, and is based primarily on the principle of pairwise parameter comparisons. The relative ranking scales chosen are soundly based upon psychological research, unlike the arbitrary scaling methods of a normalization method.

D.3   Example Use

D.3.1   Tree Structure and Terminology

A partially worked example is provided below to illustrate the method. Terminology as used in the program is used. Figure 1 represents the basic tree structure used. The tree branches down from the Goal (Likelihood of Facility Anomaly for an Undeclared Gas Centrifuge Facility), through to main and sub-category hierarchy levels, and finally down to the highest hierarchy level, the three types of states that are being compared.

The subjective variable pairwise comparisons used are those derived by the analyst based on expert opinion. The decision basis is highly visible and, with access to the program, changes for sensitivity purposes, updates or differing opinions, for example, can easily be made.

D.3.2   Ranking Process

Having built the model defining the ranking criteria for the states, the judgment process can be started.