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The Decision Analysis Initiative

The Decision Analysis Initiative (DAI) is the main operational activity of the George Boole Foundation. The DAI is being organized as an extension service to disseminate information on decision analysis systems through combination of online demonstrations of decision analysis systems applied to different sector activities. These will be associated with publications and occasional lectures and meetings of interested sectors.

Boole & decisions

The reason for this emphasis on decision analysis is that George Boole dedicated himself to the analysis of the processes¹ whereby humans infer or deduce things from their experience and their perception of the probabilities of events. Boole successfully identified and described the mathematical logic of the procedures which make it possible to code, or write down, the logic used by humans to analyze processes and events so as to arrive at conclusions. George Boole's work was therefore concerned with the analysis of the logical processes used to take decisions.

Although George Boole was more concerned with the mathematics of the logic of thought, the logical procedures he developed have found widespread application in information technology. Thus, Boolean reduction, became the principal method for optimizing the design of complex integrated circuits (chips). Boolean logic and algebra have become the fundamental root of computer programming logic and the basis for communication between humans, software and hardware. Paradoxically, only relatively recently, George Boole's original quest to describe the logic of human thought processes has been re-invented in the application of Boolean logic in expert systems and knowledge engineering.

Decision analysis

George Boole's work on the analysis of the logical processes is essentially the core of decision analysis. The term decision analysis appeared in the 1960s in work by Ronald Howard² and collaborators working at the Stanford Research Institute, Menlo Park, California, USA. In 1968³ Matheson & Howard noted the evolution of a new discipline "decision analysis" which, in their

¹ see, "The State of the Art and the future of Decision Analysis", GBF_ABS 01, London, January, 2010.

² Professor Ronald Howard is currently based at Stanford University, Palo Alto, California, USA.

³ Matheson J. E. & Johnson R. A., "An Introduction to Decision Analysis", Stanford Research Institute, 1968

words, seeks to apply logical, mathematical, and scientific procedures to the decision problems of management that are characterised by the following:

- *Uniqueness* - each is one of a kind, perhaps similar to - but never identical with - previous situations
- *Importance* - a significant portion of the organization's resources is in question
- *Uncertainty* - many of the key factors that must be taken into account are imperfectly known
- *Long run implications* - the enterprise will be forced to live with the results of the situation for many years, perhaps even beyond the lifetimes of the individuals involved
- *Complex preferences* - the task of incorporating the decision-maker's preferences about time and risk assumes great importance

The role of an extension service

Extension is an activity of spreading useful information and knowledge about new technologies and techniques as a proactive means of raising awareness, providing opportunities to assess their worth and to provide guidance in the most appropriate way to use them by those interested in adopting a new or improved practice. The term innovation refers to the process of something being done for the first time. In this context, extension has the role of spreading innovation through geographic space so that an increasing number of people benefit and thereby stimulating a sustained rate of economic growth. Extension systems have existed for many years in the agricultural sectors as a system to assist farmers take decisions in a complex environment. The approach is particularly relevant to the promotion of decision analysis.

Sustaining an evolution in behaviour based on improving practice

Extension services do not normally operate on the basis of a one-way "technological-push". They have a vital role in conveying challenging user circumstances and requirements to those who are concerned with the creation of new technologies or the improvement of existing technologies. Extension services can often become intimately involved in the assessment of promising new techniques by carrying out applied research. Quite often experimental design is undertaken to take into account matters of significance to the likely users of technology. The assessment of applied research and development output is often undertaken by extension services so as to present results in a transparent form of use to the potential user; the DAI has such a role.

Showing & not talking about what is possible

In this environment, "proof of concept" is substituted by a more practical "observation of how it works in practice" based on demonstrations carried out on pioneer sites. As a result the innovation being contemplated is not a theoretical concept but rather something the potential innovator has seen in operation. As a result of well-conducted demonstrations the confidence of those contemplating the use of a new technology or technique is enhanced because the assumed risk is lower than might have been the case if no demonstration had been seen.

Transparency and objectivity

An extension service has the role of introducing an adequate level of transparency and objectivity in the assessment of new applications so that potential users are less subject to the direct influence of promotional arguments of commercial systems producers. The role of extension is to point out the full range of benefits and costs and not just the benefits associated with ownership of a new process.

Detecting similarities & differences in circumstances

The challenge facing anyone observing a demonstration is to make sure that they understand what is required to emulate what was observed in practice. Is there a need for training? What resources and equipment are required? How much does it cost? More to the point, observers always need to check to see that the circumstances under which a demonstration takes place are the same or similar to their own. If not, to what degree might the performance observed be affected by the specific circumstances of the potential adopter of the innovation? For people to be in a position to decide there is a need for parallel information inputs such as guidelines on what is needed for success, a means of communicating with those who already use the practice and an ability to analyse, in an objective fashion, the demonstration environment and the intended environment in terms of possible differences that might affect outcomes.

Journalists are referred to the DAI website at <http://www.decisionanalysis.org.uk> and in particular the sections on "online demonstrations" and "demonstration development cycle".

For further information journalists can use the email info@boolean.org.uk