To The Editor:

The Editor's comment by William R. King in the September 1984 issue of **MIS Quarterly** on decision support systems (DSS), artificial intelligence (AI), and expert systems (ES) did an excellent job of warning the reader that this area has the potential to be the "snake oil of the 1980's." The editorial was particularly important in light of all the "hype" in the press about expert systems. Unfortunately the editorial failed to mention the positive aspects of this area.

First, there are many fields under the AI umbrella. The two fields presently impacting DSS, and more generally computer-based information systems (CBIS), are expert systems and natural language interfaces (NLI). For certain problems under certain conditions both areas can make a valuable contribution to an organization.

Allow me to briefly describe my view of when rule based expert systems are a valuable tool. I will try to quickly justify the view based on my experience as a practitioner in the area for IBM, and my contacts with practitioners of some major IBM customers as part of IBM's market support of expert systems. The opinions voiced here are my own, and not that of IBM.

Expert systems are a valuable tool to assist a particular class of problems under certain circumstances. The problem area is classification (diagnosis and treatment, configuration, scheduling, etc.). The particular problem or task chosen probably does not lend itself to traditional mathematical solutions, is stable, is reasonably straightforward, has a set of rules which govern a large percentage of behavior, and the rule set is collectable with a reasonable amount of effort. The purpose of the expert system is to collect and make readily available non-trivial rules or knowledge bases to assist the decision maker at the whatever organizational level is appropriate for the problem. The goal is not to be the world's best expert in the area. So perhaps a better name for the area would be knowledge systems. The expert system provides a series of benefits to the organization:

— cognitive amplification or augmentation of the decision maker
— making valuable knowledge available to a variety of users who otherwise would not have access to this information
— use the roles in an adaptive manner to respond to a stimulus from the environment
— characterize the environment
— simulate changes in policy or the environment

The first necessary, but not sufficient condition needed to build a successful expert system is "computer use maturity." If the organization is still only providing weekly printed operation reports to managers it is probably not ready for an expert system. My rule of thumb is the area of the organization looking to use expert systems should have the decision support phase under control.

The addition of expert system components to information systems is a natural evolutionary step. As an organization's use of computers matures, it asks the computer to be a more "active" member of the organization. Until the correct level of maturity develops, expert system components will not succeed.

The second condition is to see expert systems as one type of application information system, and treat it with the same caution and respect. Expert systems are not a new phenomenon. There is a long history of work in this area in both business settings and research (universities, corporate, and government research). What is new is:

— the synthesis and refinement of work in this area which resulted in the "software advance" of expert system shells or generators and non-procedural programming. The separation of the problem into databases, knowledge bases, and inference engines which use the rules in an adaptive manner to respond to a stimulus from the environment, and can explain or document its conclusion.
— now many organizations have reached the necessary level of computer maturity.

Consequently, there is now a number of "easy expert system problems" waiting to be plucked.

The history of research work on expert systems is well documented, the business work is not. Two groups of people are responsible for the pace-setting applied information system work done in corporations. They are the lead systems people (the builders) and the system oriented risk-taking managers (the financers). The lead systems people have the ability to pull together various state of the art technology components in a creative manner to satisfy a business need. They also have the ability to sell the system and deliver it in a timely manner. The manager understands systems at a high level, is open minded, and can identify the "sellers" who can really deliver. It is these people who have built and are now building applied expert systems for corporations. The problem is that most of this work is not reported in the literature. Let me provide you a few examples:

In the early 1970's Gary Sullivan of IBM built a real time enrollment (RET) system to help with the education of IBM customer engineers. This system had an expert system component to help with such items as course prerequisites, branch office needs, and future machine deliveries. Gary received an Outstanding Achievement Award for his work. In the middle '70's Gary built two other systems with expert system components.

In addition to Gary's work, I am familiar with two other system people within IBM, and three outside of IBM who worked on expert systems in the '70's. At that time decision tables (which can be viewed as ancestors to expert systems) were popular enough that IBM put out a technical publication on them.

What about today? I am presently involved in building four information systems with expert system components in APL. They are:

— a logistics management system for the manufacturing facility in Burlington, Vermont
— process planning
— plan view
— enhancing worksheet model generators with equation analyzing expertise

There are presently many other internal applications of expert systems within IBM, but not only IBM is taking expert systems seriously. As a result of my work in market support of expert systems, I am aware of a number of expert system projects being undertaken by major IBM customers.

As a last piece of evidence, look at the groups put in place by the major hardware vendors to support expert system work done by customers (customer support, satisfying immediate software and hardware needs, and additional research). IBM has such groups, and every hardware vendor I have talked to at conferences has similar groups.

I have tried to sketch out a case why expert systems are here to stay as an addition, not a contradiction, to the warning issued by Professor King. Again, I stress the opinions voiced here are my own, and not that of IBM. Hopefully this letter will promote further discussion of expert systems and their role in computer-based information systems.

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