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Panel 4: Artificial Intelligence and Business: What Are the Real Prospects?

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PANEL 4

Artificial Intelligence and Business: What Are the Real Prospects?

Chair: John Leslie King
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Panelists: Rob Kling, University of California-Irvine
Tom Malone, Massachusetts Institute of Technology
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During the past several years the cry has gone up that artificial intelligence has finally arrived. Soon, we are told, AI will alter the world in profound ways. Business will be altered along with everything else, presumably for the better. The positions people take on the issue of AI in business vary greatly, from the shrill promotional stance of AI marketeers, to the skeptics, who, a la Gertrude Stein, maintain that "there is no there there." Without drifting toward one of the other of these extreme views, it would be useful to know just what it means for AI to "be here," and how we should feel about it. Are we seeing the completion of something, or the beginning of something, or just an important part of a long and evolutionary process? In what ways might AI affect the world of business, and with what potential consequences? This panel attempts to provide a practical assessment of the current state of AI in business, and to make some grounded and sane projections about what will come in the future. The charge to the panel is simple. These three experts are asked to provide their best assessment of the probable outcomes of current efforts to apply AI technology to the world of business. Each of the panelists will approach the question from their own background, perspective, and interests.

Tom Malone has been engaged in assessing, building, and applying AI technologies in organizations. His current research is in the refinement of the concept of expert systems to fit more closely the reality of most organizations. He argues that AI technologies of the expert system variety can be used in a wide range of business applications. However, he feels the traditional view of expert systems is incomplete and often misleading. There are important problems with application of the standard expert system view. Perhaps most important, much of the knowledge that must be coded into an expert system in order to make it effective is not sufficiently available in many domains of business and management. Systems built in such domains will probably never have sufficient knowledge bases to make adequate decisions by themselves. Since these domains are common in organizations, penetration of AI technology into them will require a modification of the expert systems concept. Malone argues that a useful model is that of the decision support system, where the system is designed to support a decision maker, not to make decisions. Expert support systems designed to aid the work of human experts offer much promise and are likely to have a more immediate and significant impact on business than are expert systems as commonly described. This approach requires use of computers as intelligent and flexible media for representing knowledge rather than on trying to use computers as autonomous, intelligent decision makers.

Vasant Dhar is also a systems builder who has been laboring to apply emerging AI technology to business. He feels the struggle has only begun. He notes that much of the expert system building activity to date has been in "classification oriented" problem solving in the physical sciences, engineering, and medicine. These systems map facts to conclusions that have been articulated, a priori, by an expert. The application domain of managerial problems is quite different. It is based less on formal or systematized bodies of knowledge and more on experience that is often specific to an organization or project. Such problem solving is fundamentally knowledge based and in principle is amenable to support by intelligent systems. To support decision making in these problem domains

requires that the intelligent systems acquire and encode context-specific knowledge without constant intervention from specially trained personnel. In other words, the system must allow users to shape the form and content of the model, much as computerized spreadsheets do.

According to Dhar, this is a major challenge that requires the ability to link explicitly the qualitative context embedded in the model to the model itself. This capability is lacking in current systems, but the ability to incorporate it could/might be achievable within the short term. Conceptually, it requires designing support systems not as repositories of prefabricated OR/MS models, as much of literature on "model management" advocates, but as systems that allow the user to define and synthesize domain-specific model fragments incrementally and to guide the process of search for solutions or alternatives in a much more deliberate and fluid way than is possible with OR/MS models. At the same time, the system must take on the responsibility of model evolution in a changing reality - a burden for the user in current systems. Finally, the system should contain what Dhar calls "process knowledge." This is knowledge acquired as a consequence of "learning by doing." It often plays an important role in problem solving in protracted projects and, perhaps more importantly, can be passed along to new members of the team. This functionality requires systems to be able to learn by observation as well as being told. It is an active area of research in AI and still requires resolution of certain key theoretical issues.

Rob Kling's Ph.D. research in the early 1970's focused on fuzzy logic problems in AI, and his "Fuzzy Planner," is still widely cited as a key work in the field. In recent years, he has been concerned with the organizational and social implications of computing technology. He is presently investigating the area of expert systems and the way they might be absorbed into organizations. According to Kling, expert systems are domain- specific symbolic inferencing programs. Like their predecessors, the parametric mathematical models and operations research techniques, they expand the range of problems which are computationally tractable. They also depend upon specialized information about a task domain to provide a high degree of analytical leverage over less sophisticated methods. Although expert systems depend on sets of symbolic relations and rules of inference rather than sets of equations and techniques for solving them, from the perspective of organizational adoption and adaption they exhibit many of the same complex problems that limit the successful use of parametric modeling technologies. All of these technologies raise questions of what constitutes expertise and whose expertise shall be embodied in the system. They also tend to cloud the relationship between particular outputs and particular input assumptions, especially when used by naive users. They are plagued by problems of reliability and validity in maintaining the bases of the technology (e.g., rule systems, data bases) and in application to new problems on which they have not been tested.

Problems like these arise routinely in the world of modern computer using organizations. Even if the "technical" problems of expert systems are resolved, these problems will remain and will influence the effect of expert systems in organizations. These similarities allow us to draw upon what we have learned from recent empirical research into the use, operation, politics, and impacts of a variety of computer-based technologies which embody specialized expert judgments.