THE USE OF SIMULATION AND GAMING IN INFORMATION SYSTEMS RESEARCH

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ABSTRACT

Research in management information systems and in information, communication or intelligence systems in general has grown significantly within the past decade. Yet although significant work is evident at both the theoretical level with the development of information economics and statistical decision theory and at the technical level as is evidenced by the development of complex on-line networks and advanced information storage and retrieval systems, little research which has focused upon information systems has utilized gaming and simulation techniques. Such techniques have been used by the authors in a series of related studies into information systems and decision processes. The paper contains two major experimental studies. The first is a series of information economics experiments where discreet event simulation is utilized to estimate the ex ante value of more timely information in a fifteen period decision process which contains four random environmental variables.

The ex ante value and the information value which is realizable given the actual decision environment are then used as a standard with which to compare actual, realized information values obtained in controlled experiments. The empirical results obtained include evidence with respect to the value of more timely information, the value of detailed budgetary feedback and the impact of these information differences on learning rates.

The second main study described in this paper considers gaming used to analyze an on-line directive planning system. In this context it is not possible to estimate information value, but experimental data with respect to user attitudes, type and degree of information utilization and the impact of decision approach is obtained.

Summary of results:

The data collected in the first set of experiments show that the value of more timely information measured both in terms of profits and cost savings was significantly greater than expected. Also when the amount of feedback information was experimentally controlled, the value of an explicit budget-variance system proved to be greater than hypothesized. Presumably the value of such feedback lies in its ability to aid the decision maker's learning processes as to what constitutes effective strategies and as to a valid model of the underlying decision environment.

The first set of experiments also considered the interrelations among alternative information systems and several behavioral characteristics. For instance, differences in the timeliness of information did not affect observed learning curves but, as expected, budgetary feedback did result in greater rates of learning. The data also showed that subjects classified as being analytically oriented outperformed those who tended to approach the decision task in a more heuristic fashion.

The second set of experiments continued to consider relationships among decision style (analytic versus heuristic) in the context of an on-line directive planning system. Our tentative results imply that analytics prefer systems that emphasize quantitative data and which facilitate ease of usage. In contrast heuristic decision makers prefer qualitative data and rapid interactive capabilities.

As important in terms of using simulation and gaming in information research were insights gained with respect to pilot or preimplementation testing of systems. In addition to aiding the debugging and documentation aspects, the experiments provided several insights that would help make an interactive planning system more useful from the user's viewpoint.