FORMAL INQUIRY SYSTEMS FOR INFORMATION RESOURCES ANALSYSIS

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ABSTRACT

In her article on systems rethinking, Alice Kienholz demonstrated the importance of recent scholarship based upon the formal inquiry systems identified by C. West Churchman for an understanding of organizational learning. A parallel research path has not been established for Information Resources Analysis. It is proposed here that this is not only possible but also desirable. To this end, a beginning popularized matrix is presented along with an initial introduction. The result is a path for future scholarship that will add the lessons of current research in a related area to that of Information Resources Analysis.

Keywords: Information Resources Analysis (IRA), Inquiry Systems

INTRODUCTION

In an article entitled 'Systems Rethinking: An Inquiry Systems Approach o the Art and Practice of the Learning Organization' Alice Kienholz [1999] shows how learning organizations can use formal inquiry systems as a basis for further research to better understand how people go about acquiring, creating and sharing knowledge. She begins with Churchman's classic work 'The Design of Inquiry Systems' [1971] as operationalized into inquiry modes by Mitroff and Pondy [1974] for public policy and decision-making analysis. Brunwold, Patlette, Bronson and Bronson [1983] then developed an Inquiry Mode Questionnaire (InQ) to help guide the decision-making process in highly complex and diverse situations. As a next step in the research stream, Courtney, Croasdell and Paradice 1998] presented learning organizations as inquiry systems. These are further developed by Malhortra [1997] for today's 'wicked' environments. Finally, of special importance is Senge's 'The Fifth Discipline' [1994] where he outlines the new component disciplines that gradually converge to innovate learning organizations.

This paper proposes that Churchman's inquiry modes can also serve as a similar impetus for further research in Information Resources Analysis. Carugati and Demoulin [2004] offer a beginning in their paper 'On the Use of Churchman's Inquiry Modes in Information Systems Development'. They propose that Churchman's inquiry modes are complimentary and that they can serve for a better understanding of specific management practices. Without commenting specifically on this proposal, Churchman's inquiry modes, as present primarily by Mitroff [1974], are presented here and organized into an initial, popular matrix for impetus and encouragement for further studies in Information Resources Analysis.

A Brief Review of Formal Inquiry Systems

The following discussion is presented in historical-chronological order more for convenience than according to any inherent structure. For Information Resources Analysis, the ordering is neutral. This discussion is also not meant in any form to be an introduction to formal philosophical systems. To do this here would be both misleading and a mistake. Rather, what is provided is a popular map indicating the path to a study of formal inquiry systems for Information Resources Analysis. The formal inquiry systems chosen are those first presented by Churchman [1971] and include rational, empirical, ideal, dialectic and pragmatic inquiry systems. A more complete summary of these inquiry systems is presented by Mitroff and should be referenced as part of a first step for any research project [Mitroff, 1974, 235-236].

Rational Inquiry Systems derive their name from the philosophical arguments of Gottfried Leibnitz (1646 – 1716). The popular name for Leibnitz' philosophy is Rationalism and it describes how formal logic through a network of facts presents a complete model of the world and the truths governing it. The facts, or fact-nets, become ordered in a hierarchy such that for every result there is a cause, which in turn leads to the ultimate cause (*ultimo ratio*). The process of discovery is data centric and is based upon a formal logic.

For an example one can select from any number of hierarchical establishments. Religious orders offer simple structures. They are based upon formal theological logic and progress, for example, from laymen, priests, bishops, cardinals, to a single leader, who receives inputs from God (the ultimate cause). Many traditional academic establishments maintain a

similar management structure, from student, instructor, (assistant, associate) professor, dean, provost to the president (the final authority in most instances). In the former the guarantor of truth is God, and in the latter the president.

The strength of the process is that it s based upon data and is precise and coherent. The guarantor can be expected to be rigorous and consistent. The weakness is that the process is selective. While it might be dangerous to question whether the input from God is always understood. It has been done: Why does God permit little children to suffer? For many, something in the answer may be missing or excluded. It is safe enough to write that a university president is always questioned.

Empirical Inquiry Systems derive their name from the philosophical arguments of John Locke (1632 - 1704). The popular name for Locke's philosophy is Empiricism and it is centered not only on data but contains a community of experts, who act as inquirers. These inquirers are knowledgeable and can be expected to find truth in the surrounding world. The process of discovery is data and consensus centered, and is based upon formal opinion that can be accepted by all.

Examples can be found in newspapers with popular slogans: We print all the news that is fit to print; or even the Preamble to the *Declaration of Independence*: "We hold these truths to be self evident, that all men are created equal, that they are endowed by their Creator with certain unalienable rights, that among these are life, liberty, and the pursuit of happiness" The guarantors are the newspaper's editorial board and for the preamble an assembly of notable thinkers such as Thomas Jefferson, Samuel Adams and Benjamin Franklin (all of whom had similar experiences in France).

The strength of the process is both interpretive and consensual. The guarantors represent a communal, sensory understanding of the data. But is the process reliable? It is not difficult to question any editorial decision, but the preamble is more interesting. For the sake of argument: Who says that it is self evident that all men are created equal? Certainly there exist a number of religious orders in the United States that would not accept such a consensual view, especially in regards to women. The process cannot be demonstrated to be reliable and the guarantors often act in an assumptive manner.

Ideal Inquiry Systems derive their name from the philosophical arguments of Emanuel Kant (1724 - 1804). The popular name for Kant's philosophy is Idealism and it assigns equal weigh to data and theory. For a given model (a priori), one finds a contrasting model, with which to challenge the first model. The result is a new model for which one in return finds a contrasting model, etc. This process provides the basis for the scientific inquiry of thesis – antithesis – synthesis. Assumptions are made, all but one model is recursively eliminated. Based upon both data and theory, the result is satisfying to the larger community and there exist no multiple truths, i.e., there exists one truth, which is ideal.

Examples are easily found in the arts and in literature. How do we know if a picture is beautiful? One may hang it in the living room, while a guest may wonder at the host's taste. Yet, one does assume that there exist some pictures that are universally acclaimed. When a suitable body of knowledgeable scholars agrees under a common theory that a picture is beautiful, then it is proclaimed to be beautiful and valuable. Similarly, one approaches the list of the hundred greatest books. There exists a discovery and elimination process, along with the presence of theoretical structures.

The process is one of discovery and satisfaction. It is guaranteed by the level of satisfaction, and may be reexamined at any time. Yet, at what point is one certain that the latest model is the best? The resent escapades of post-modern literary theory show how the process can go wrong. There exists always a level of uncertainty, which cannot be removed.

Dialectic Inquiry Systems derive their name from the philosophical arguments of Georg Hegel (1770 – 1831). Hegel's philosophy creates opposing models, and truth emerges from this opposition. There exists a debate between differing worldviews that produces a grand synthesis. The guarantor of truth is the efficiency of the debate between extreme viewpoints; and there exists a neutral observer who can discern which model is stronger. By using data and interpretation, weaker models are thus eliminated.

Examples may be found from the Meistersinger contests to the presidential debates during the campaigns. The process is speculative and involves a synthesis .The guarantors are the neutral observes who select the best. However, are negatives really better? Are the weaker models, according to the guarantors, really weaker? Who is guarantying the guarantors? Who is really correct: Zarathustra on the

Mountain or Jesus of Nazareth? How would one know using Hegel's dialects? Yet, one must win the debate.

Pragmatic Inquiry Systems derive their name from the philosophical arguments of E. A. Singer (1873 – 1954). In its broadest applications, Singer's inquiry system may be said to contain a composite of all formal inquiry systems with an underlying ethical component. Studies of formal inquiry systems sometimes do not always include Singer's pragmatic approach, but it is relevant nonetheless. A pragmatic inquiry system chooses and adapts inquiry systems as they apply to (part of) the application.

The strength of Singerian inquiry systems is that they are adaptive. They are eclectic in that they include multiple inquiry systems at the same time. An example can found in a typical Florida gated community planning process that begins with a marketing concept, goes through various stages from architectural planning, site development, construction and to sales. Each stage can involve a different form of systems thinking. The guarantor may be considered the master builder, whose profits depend upon a successful project; or an observer who examines several such developments, including whether suitable buyers can be found. Each of the weakness in the inquiry systems discussed above applies here. Who is to say that the best has been accomplished at each step, and who is to say that the builder has accepted the best advice, and who is to say that the neutral observer has a valid concept of what is actually best?

Formal Inquiry Systems and Common Information Systems Applications

As with the discussion presented above, the following will remain in historical- chronological order more for convenience than according to any inherent information systems structure. For Information Resources Analysis the ordering remains neutral. Each of the formal inquiry systems, along with strengths, weaknesses and guarantors, can be used to define the same strengths, weaknesses and guarantors for individual common Information Systems applications. It is assumed that the Information Systems examples selected below can be viewed from differing inquiry perspectives. The one chosen is for the purposes of an initial discussion.

Rational Inquiry Systems and Expert Systems (ES)

Expert Systems are those systems that through data and logic constructs provide initial solutions to common problems. Data are processed by a set of chaining algorithms that generate a result expected to closely match that which an expert might generate for the same data. The process is clearly understood and as accurate as the algorithms permit. The guarantor is the logic behind the algorithms and they are expected to be complete and consistent for repeated sets of data.

A simple example could be a kiosk that advises employees, based upon the data they enter, whether they might be prepared for retirement. The algorithms might be considered, although in actually more complex, a series if IF-THEN-ELSE statements that pass the data to a terminal output with a percent of reliability. The same weaknesses exist as with a formal inquiry system. How does one know that all of the necessary data are present and that some have not been excluded? How can one defend the accuracy of the algorithms? The resulting system will not escape the limits imposed by formal inquiry systems. One can only accept its limitations.

Empirical Inquiry Systems and Group Decision Support Systems (GDSS)

Group Decision Support Systems are generally systems whereby, under guidance of a moderator, data are presented to and manipulated by the opinions of knowledgeable clients until a generally accepted structure is agreed upon. The process interprets the data presented and seeks consensus. The guarantor is the degree to which the clients cooperative to provide inputs that move the process to a satisfactory conclusion.

An example might include clients who have come to a GDSS session to decide upon the best way to reorganize their department. The process, under the guidance of the system, continues until all the data are interpreted and a consensus is reached. The result in general is an agreement that a solution has been generated. As with formal empirical systems, one can only assume that the agreed upon solution is reliable. A process has generated a result while other results might more viable.

Ideal Inquiry Systems and Decision Support Systems (DSS)

Decision Support Systems are those that begin with a set of data organized into a model. As new ideas about these data are generated, new data is added to the model, creating a new model. This process is

continued until the client is satisfied that a better idea does not exist or is not desirable. The result is a model, which is accepted by the client as the best fit.

A simple example is a spreadsheet. One makes an initial assumption and then makes changes until the data on the spreadsheet are considered acceptable. There is a heuristic involved that generates consensus. Yet, how does one know that the accepted result is the best fit, or that it is even accurate? There have been recent court judgments that have forced developers to live with underbids generated by deficient spread sheets. With a DSS there remains, as with the formal inquiry system, a degree of uncertainty which is built into the system.

Dialectic Inquiry Systems and Information Systems (IS)

Dialectic inquiry systems may be said to begin with more than one model and proceed by debate until a synthesis is reached. Data are vigorously presented until one of the models is chosen as the best. There exists a neutral observer who is capable of making the decision, which will be the more successful the more efficient the debate.

One might image here a three-tiered systems proposal. One is minimal, one is in the middle, and one is maximal. The analyst makes a best case for each scenario and the principle user then makes the final decision. It is assumed that the analysts is honest and accurately represents each of the scenarios, and one tier looks the best. Yet, who can say that each scenario was fully developed, and who can vouch for the principle user? How will one know if one of the other two scenarios would not have better and would not have been chosen by a different principle user?

Pragmatic Inquiry Systems and Executive (Decision) Information Systems (EIS)

Executive Information Systems basically consist of a set of reports that are tailored to meet the managerial needs of a single manager or a small group of manages. It is commonly accepted that for a single manager the number of such reports is both limited and highly individualized. Individual reports might be generated by any of the inquiry systems presented above. The choice would depend upon the data in the report itself and would be guaranteed by the manager since the process is directed at an individual.

The strengths are in the various avenues that can be selected as a best alternative. At the same time, the inherent weakness of each inquiry system is inherited, included those surrounding the various guarantors. And because one is dealing with a set of inquiry systems, there is the additional danger that misunderstandings will be compounded. Such systems are also expensive to create and to maintain.

SUMMARY

A matrix containing a summary of the individual inquiry systems and the corresponding Information Systems examples is presented below. While there is indeed much more to be said, the matrix provides a starting point for further investigation. The ultimate purpose of the matrix is to demonstrate that, like other sciences, there is a basis upon which to develop Information Resource Analysis as a science. There are, in fact, extensive bodies of literature in other sciences that can be brought to Information Resources Analysis. All too long, Information Resources Analysis has used historical data as a basis for its craft. Here is an opportunity for Information Resources Analysis scholarship to recognize what possibilities for research award its attention.

Formal Inquiry Systems for Information Resources Analysis

descriptor	description	key word	common name	process: strength	process: weakness	guarantor: strength	guarantor: weakness	IS example
						logic		
rational	formal-didactic	fact-net	Leibnitizian	precise coherent (data)	exclusive	rigorous consistent	indefensible	ES
						agreement		
empirical	inductive-consensual	agreement	Lockean	interpretive consensus (data/ opinion)	unreliable	communal sensory	assumptive	GDSS
						consensus		
ideal	consensual-conflictual	heuristic	Kantian	discovery satisfaction (data/	uncertain	satisfaction	uncertainty	DSS

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