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The Informing Science Framework: An Assessment and Implications for the Discipline of Information Systems

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Abstract

The discipline of Information systems has established itself as an independent discipline now. However there are criticisms of it being fragmented and there being a lack of pluralistic approaches of inquiry. The Informing Science framework conceptualizes Information Systems as a part of the growing discipline of Informing Science and proposes to draw upon the other disciplines that share the common goal of informing the client. This paper assesses the strengths and weaknesses of this framework. While cautioning against indiscriminate borrowing of concepts from other disciplines, the paper suggests that the principles of General Systems Theory may be quite useful in conceptualizing and enriching Information Systems. It suggests that pluralism should not be considered a sign of disorder. Homogeneity may be desired but it may also be a sign of a closed system whereas heterogeneity is a characteristic of any open, growing system.

Key Words: Informing Science, Information Systems, General Systems Theory

Introduction

The discipline of Information System has witnessed innumerable debates and discussions in the past three decades. The debates have principally centered around delineating the bounds of the discipline [Alavi and Carlson, 1992; Gorry and Scott Mortan, 1971; Mason and Mittroff, 1973; Ives, Hamilton and Davis, 1980; Ein-Dor and Segev, 1993], and to characterize the nature of inquiry that is suitable to study the problems within these bounds [Antill, 1985; Klein and Lyytinen, 1985; Jenkins, 1985; Orlikowski and Baroudi, 1991]. According to Liles et al., a discipline has six basic characteristics: 1) a focus of study, 2) a world view or paradigm, 3) a set of reference disciplines used to establish the discipline, 4) principles and practices associated with the discipline, 5) an active research agenda and 6) the deployment of education and promotion of professionalism [Liles et al., 1995]. Within a discipline there may be different foci of studies, or controversies among the paradigms or the paradigms may be still emerging and not all academic disciplines have to promote professionalism (as understood by professions of law, medicine, business etc.). However these six characteristics do provide a useful way of characterizing a discipline. Even though IS has established itself as a separate academic discipline [Culnan and Swanson, 1986] there have been criticisms of fragmentation among different themes of research with a lack of cumulative tradition [Keen, 1980; Lyytinen, 1987] On the other hand there is the issue of certain research approaches being more dominant than others and the lack of diversity of methodologies or "schools of thought" as a result [Orlikowski and Baroudi, 1991]. IS research is described as still pre-paradigmatic [Culnan, 1987] or as a fragmented adhocracy [Banville and Landry, 1989].

Given these debates, the Informing Science framework is proposed that can possibly overcome the limitations of the IS discipline itself. The Informing Science framework conceptualizes Information Systems as a part of the emerging discipline of Informing Science [Cohen, 1998]. According to Cohen, Informing Science *"applies to the disparate fields that share the common goal of providing a client with information in a form, format and schedule that maximizes its effectiveness"*. These include the well-established fields of Journalism, Education, Public relations etc. The focus of informing science approach is on the client, the content (information), the process of "informing" and the environment that enables the delivery of information.

We assess the Informing Science framework in terms of its focus and insights into understanding Information Systems. We begin with issues of definition of an emerging discipline as it is tightly linked with the nature and scope of a discipline. We point out the aspects of the Informing Science framework that need to be put on stronger foundations by drawing upon the General Systems Theory.

The definition of an emerging discipline

Definitions are a powerful means of conveying the key concepts, assumptions and delineation of a subject matter. As the story goes, Socrates always used to begin his dialogues by asking people to define their terms. He believed that defining the terms first helped in clarifying one's viewpoint to the audience. Many an arguments can be avoided (or launched!) by defining the terms in the beginning. Definitions must be rigorous, comprehensive, precise, and unequivocal. Further, it should allow sub-definitions that are consistent with the main definition.

Otherwise it can create ambiguities in the scope of the subject matter. A definition is like an axiomatic statement, generally accepted by the scholars and practitioners of the field. It defines what is important and what is not. Thus a definition of a discipline indicates the scope of a discipline e.g. the well-known definition of MIS by Mason & Mitroff identifies the key variables that comprise an MIS. They then recommended exploration of the different characteristics of an MIS by manipulating these variables systematically [Mason and Mitroff, 1973].

A definition, agreed upon by most of the scholars in a field, gives an identity to the discipline and is a hallmark of a relatively mature discipline. We believe that a precise definition is tied with the nature and stage of development of a discipline. For example, Economics has been defined as "the study of how societies use scarce resources to produce valuable commodities and distribute them among different people [Samuelson and Nordhaus, 1998]. This definition permits one to identify the key concepts that Economics deals with and one can then define specific sub-fields within Economics that would be consistent with the main definition. One may argue that Economics is quite a mature discipline with a history of three centuries behind it. If a discipline is in the adolescence phase of its lifecycle it may be too early to expect a well-defined identity of the field. It would be unfair for us to expect such precise definitions for an evolving, maturing discipline. So the question naturally arises whether definitions matter at all for a nascent, growing discipline? Nevertheless a definition does give us a reference or a starting point to target for more precise definitions of the discipline.

Informing Science and Information Systems

Within the Informing Science Framework, Information Systems is defined as "the field of inquiry that attempts to provide the business client with information in a form, format, and schedule that maximizes its effectiveness"[Cohen, 1998]. However we would argue that the scope of Information System was never limited to providing information to a **business client** alone. The classic definitions of Information Systems relate to organizations in general and are not limited to "for-profit" business organizations in particular [see for example: Davis 1974, Mason and Mitroff, 1973]. An information system is not bounded by the kind of organization it serves: "for-profit", "not-for-profit", formal or informal. Moreover, the definition of Information Systems in the Informing Science framework introduces a value judgment of **maximizing** the **effectiveness**. One may then argue whether other aspects like efficiency of the delivery process or quality of information content are as important or not.

Further Informing Science is defined as *"applying to disparate fields that share the common goal of providing a client with information…"* But it is difficult to delimit which disciplines do not share this common goal of providing information. One may argue that Marketing too provides information to the clients (i.e. the customers) so that they can make the judgment about the product purchase (e.g. through advertisements) and Accounting too provides information to clients (the managers or the shareholders). Hence the function of providing information to clients falls under the purview of many disciplines. Although this aspect of providing information is common to other disciplines it does not help us gain a better understanding of Information Systems in this context. Further, the specific goals of information provider and information recipient may not be assumed to be the same across the fields. While developing an Information Systems it is well understood that one needs to look in terms of the information needs of the clients (through requirements engineering) and provide information in such a way that it is useful to them. However in the Informing Science Framework, esp. when it pertains to other fields like Journalism or Public Relations it is not as clear whether the goals of information providers and information recipients are the same or are conflicting, and what is the utility of information for clients.

Moreover, it seems that the informing science framework emphasizes the "providing" of information i.e. "informing" part much more than other aspects. It assumes that all information can be precisely determined by the providers or can be specified exactly by the clients and it is only a matter of providing it. It leaves out the information "demanding-providing", push-pull interaction. It perhaps reinforces the myth that if we provide the information to clients (i.e. managers), they would be able to reach their goals (i.e. lead to effectiveness) [Ackoff, 1967]

One may also argue that if Informing Science is founded upon such disparate disciplines it may lead to lack of focus and in fact increase the fragmentation of the discipline. If the discipline intends to serve too many masters it may raise a question as to whom is it intending to be relevant?

The advantages of cross-fertilization

We certainly do not wish to suggest that research in a discipline should be done in isolation. There are lot of advantages of learning from the research and theories developed in other fields. The approach of the Informing Science framework focuses attention to the common concepts and processes across fields. One can draw upon the practices and research methods being used in other disciplines and it can enrich IS discipline itself. For

example, it may be interesting to study what leads to customer-satisfaction and loyalty to an information-providing medium when looking from the perspective of Journalism studies or the methods of communication in Public Relations. One may relate it with issues of IT adoption in organizations.

The framework points out the evolutionary aspects of the discipline. It may be inappropriate to limit ones attention at the current state of the affairs of a discipline or attempt to define it by looking into the past. Though growth of a discipline is path dependent it is equally important to look into the future. However we would like to point out that an evolutionary approach cannot predict the exact path that a discipline will take in future though it can powerfully explain the historical development of the field.

Bringing the Systems approach back into Information Systems

In the middle part of the twentieth century there was much debate on the fragmentation of science itself. It was realized that the increasing specialization in Sciences made communication across disciplines difficult [Boulding, 1956]. Each discipline with its own paradigm or worldviews sometimes limits the amount of cross-exchange of ideas and knowledge. It is well noted that many times is the cross-fertilization of ideas that makes scientific breakthroughs possible. The twentieth century witnessed the birth of many new disciplines founded on intersection of other disciplines. Boulding however pointed out that the growth of new fields of scientific endeavor that are cross-disciplinary in nature should have coherence otherwise it can degenerate into the undisciplined [Boulding, 1956]. The General Systems theory endeavored to provide the integrating mechanisms.

General Systems Theory (GST) was proposed as a solution to the quest for finding the existence of yet undiscovered principles of "general system theory" that unify diverse disciplines [von Bertalanffy, 1968]. It looks for isomorphisms across disciplines and attempts to unify those general principles that govern various physical, chemical, sociological systems. Boulding suggested two approaches for the organization of General Systems Theory (GST): "*first, to look over the empirical universe and to pick certain general phenomena which are found in many different disciplines, and to seek to build up general theoretical models relevant to these phenomena. The second approach is to arrange the empirical fields in a hierarchy of complexity of organization of their basic "individual" or unit of behavior, and to try to develop a level of abstraction appropriate to each*" [Boulding, 1956]. The second approach is much more ambitious and it also lead to the criticism of the heroic attempts of GST to provide a grand, unified theory of explanation. However we believe that the first approach does offer some useful insights when we apply it to understand the nature and conduct of inquiry within a scientific discipline. Different disciplines have been studying the same or different phenomenon through different lenses. If one can bring different perspectives into a discipline it can provide a new understanding. However von Bertalanffy cautioned against misuse of analogies that only represented superficial similarities across phenomenon [von Bertalanffy, 1968]. While replying to the criticism that General Systems Theory may end up in meaningless analogies, Bertalanffy asserted that "*general system theory is not a search for vague and superficial analogies. Analogies as such are of little value since besides similarities between phenomenons, dissimilarities can always be found as well. The isomorphism under discussion is more than mere analogy. It is a consequence of the fact that, in certain respects, corresponding abstractions and conceptual models can be applied to different phenomenon. Only in view of these aspects will system laws will apply*"[von Bertalanffy, 1968 pg. 35]. He clarified that homologies, which contain different factors but have similar laws are of considerable importance as conceptual models. Though his examples of homologies were all related to the physical sciences, they can be applicable to the social sciences as well. Thus one should be cautious in applying simple analogies for drawing upon the models from other disciplines.

The pluralism in Information Systems: Is it a problem?

We can conceptualize the domain of scientific inquiry in a particular discipline as a socio-cultural system. Science as a practice is an organized, social activity, with goals shared by the community of scientists belonging to the same discipline. Being an open system, the scientific enterprise draws upon knowledge and ideas from the environment to generate new knowledge. Concepts, methodologies and theories drawn from other mature disciplines can enrich the fabric of the discipline. As Ashby's Law of requisite variety states, one may find as much variety within the adaptive system as one may find in the environment. The environmental pressures may lead to increasing specialization and formation of sub-systems within the system. In a growing, living system there would be high interaction between the various sub-systems and with the environment. However, different portions of the environment may influence different sub-systems and hence the interactions among them. If a sub-system (of a scientific discipline) stops interacting with other sub-systems and the environment, it may become a closed system. Like any closed system it may become more homogenous (due to normative pressures to conform within the discipline). As it happens in a closed system, with no interaction with other sub-systems or the environment, it can only lead to increased entropy. This leads to fragmentation (i.e. weak ties with other sub-

systems and the environment) and then to marginalization. This would in turn inhibit the growth of the sub-system (discipline). Thus one may be able to achieve greater homogeneity through being closed from the environment but it would inhibit the growth of the discipline in the long run.

Thus, not all "fragmentation" may be unhealthy. An open system that continuously interacts with its environment grows and becomes more heterogeneous. However this heterogeneity should not be considered a sign of disorder. Along with this "fragmentation" if there were growth of the sub-system (due to it feeding from the environment) then it would become mature and later on gain recognition as a separate discipline in itself. Developing from the embryonic stage in which it fed mainly from the parent system, it would become relatively independent from the parent system(s) and become more dependent upon the environment. In fact one can trace the development of the disciplines of Management, Social Psychology, Cognitive Science or Information Systems in the twentieth century and one would find this trend. Thus fragmentation is not unhealthy in itself. The heterogeneity that we find within the discipline should not be considered a sign of disorder, a property of a closed system. However if the fragmentation within the discipline hinders the growth of the discipline, it is certainly not desirable. It is the fragmentation of a sub-system along with its becoming closed from the environment that leads to its marginalization.

Conclusion

While agreeing with the approach of Informing Science framework to draw upon disparate disciplines that share the common goals of informing the clients, we suggest that the General Systems Theory may be a better guide to understand how research in Information Systems can be enriched. The General Systems Theory was criticized for being too ambitious in providing a grand, unifying theory that attempts to explain many things. However it does provide useful insights in understanding the growth of a discipline. It suggests that heterogeneity should not be confused with disorder since heterogeneity is a characteristic of an open, living system. Homogeneity may appear attractive but it may also be a sign of a closed system in which a discipline has decided to distance itself off from other disciplines. At the same time, though interactions with other disciplines are much fruitful, one should be also careful in borrowing ideas, principles and theories without scrutiny; otherwise one may be end up fitting square pegs in round holes.

References

Ackoff, R.L. "Management Misinformation Systems," *Management Science* (14:4), December 1967, pp. 147-156.

Alavi, M. and Carlson, P. "A Review of MIS Research and Disciplinary Development," *Journal of Management Information Systems* (8:4), Spring 1992 pp. 45-62

Antill, L. "Selection of a Research Method," in *Research Methods in Informtion Systems* Mumford et al (eds.) Elsevier Science Publishers B.V. (North-Holland), 1985

Banville, C. and Landry, M. "Can the field of MIS be disciplined?" *Communications of the ACM* (32:1), January 1989, pp 48-60.

Boulding, K. E. "General Systems Theory- The Skeleton of Science," *Management Science* (2:3), April 1956, pp. 197-208

Cohen, E. "Reconceptualizing Information Systems as a Field of the Transdiscipline Informing Science: From Ugly Duckling to Swan," *Journal of Computing and Information Technology* 7:3, 1999, pp. 213-219

Culnan, M. J. and Swanson, E. B. "Research in management information systems, 1980-1984: points of work and reference," *MIS Quarterly* (32: 9), 1986, pp. 289-301

Culnan, M. J. "Mapping the Intellectual Development of Management Information Systems, 1980-1985: A Co-citation analysis," *MIS Quarterly* 1, 1987, pp. 341-353

Davis, G. B. *Management Information Systems: Conceptual Foundations, Structure and Development* Mc-Graw Hill, New York 1974

Ein-Dor, P. and Segev E. "A Classification of Information Systems: Analysis and Interpretation," *Information Systems Research* 4:2, 1993, pp. 166-204

Gory, G. and Scott Morton, H. "A Framework for Management Information Systems," *Sloan Management Review* (13:1), Fall 1971, pp. 55-70

Ives, B., Hamilton S. and Davis G. B. " A Framework for Research in Computer-Based Management Information Systems," *Management Science* (26:9), September 1980, 910-934

Jenkins, A. M. "Research Methodologies and MIS Research" in *Research Methods in Information Systems* Mumford et al (eds.) Elsevier Science Publishers B.V. (North-Holland), 1985

Keen, P. “MIS Research: Reference Disciplines and a Cumulative Tradition,” *Proceedings of the First International Conference on Information Systems*, December 8-10, Philadelphia, PA, 1980, pp. 1-8.

Klein H.K., and Lyytinen, K. “The Poverty of Scientism in Information Systems” in *Research Methods in Information Systems* Mumford et al (eds.) Elsevier Science Publishers B.V. (North-Holland), 1985

Liles et al., "Enterprise Engineering: A Discipline?" *Society for Enterprise Engineering Conference Proceedings*, June 1995.

Lyytinen, K. “Different Perspectives on Information Systems: Problems and Solutions,” *ACM Computing Surveys* (19:1), March 1987, pp. 5-46

Mason, R. O. and Mitroff I. I. “ A Program for Research On Management Information Systems,” *Management Science* (19:5), January 1973, pp. 475-487

Orlikowski, W. J. and Baroudi, J. J. “Studying Information Technology in Organizations: Research Approaches and Assumptions” *Information Systems Research* (2:1), 1991 pp. 1-28

Samuelson, P. A. and Nordhaus, W. J. *Economics* (16th ed.) The McGraw-Hill Companies, Inc. 1998

von Bertalanffy, L. *General Systems Theory: Foundations, Development and Applications* George Braziller, New York 1968