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ON THE IMPORTANCE OF HUMAN ACTIVITY SYSTEMS IN ORGANIZATION MODELING FOR IS DEVELOPMENT

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Abstract

This paper investigates the context of information systems (IS) development, underlining the importance of organization modeling in the process of IS design and construction, which should satisfy different scenarios of human purposeful activities according to various organizational imperatives. The research is driven by a belief that the design issues of IS support should be situated in the context of social processes in which, in a specific organizational scenario, a particular group of people can conceptualize their world and hence the purposeful action they wish to undertake. This provides the basis for ascertaining through organizational modeling, what information support is needed by those who undertake that action. Only then does it become appropriate to ask how modern information technology (IT) can help to provide that support. And we call this the meaning attribution approach to conceiving IS support based on characterizing, through action research, the underlying human activity systems (HAS), a term often used in soft systems methodology (SSM). The paper concludes by reiterating the main context for IS work is the appropriate systems thinking, and meeting the challenge of designing suitable IS starts from a re-thinking of what is entailed in providing informational support to purposeful action in the real world of HAS modeling, by which IS architects could learn of the organization's continual adjustments to its changing world.

Keywords: Human activity systems, information systems development, organization modeling, soft systems methodology

Introduction

It is understood that the variety of real-world problems concerning IS work in an organizational setting, is enormous; however, it is useful to see them as lying within a spectrum which extends from 'hard' to 'soft'. There are a number of ways in which 'hard' and 'soft' can be defined, but the definition often cited is in terms of the degree of agreement about what the problem is among the particular population of individuals to whom the problem is of concern (Wilson, 2001). For example, in the IS context, the hard approach often assumes that organizations are systems with information needs which IT can supply, whereas the soft approach takes a process view of organizations and explores, using soft systems ideas (Checkland & Scholes, 1999; Checkland, Forbes, & Martins, 1990; Checkland, 1979), the way in which people in organizations inter-subjectively attribute meaning to their world and hence form a view on what information is relevant. The IS staff assigned to redesign the organization in terms of various purposeful human activities, must be able to create the necessarily detailed models in support of different organization objectives. This work often involves with creating different design alternatives and the IS team must collaborate to make decisions at different levels of design from the comprehensive architectural level (functional structures + resources needed) down to the detailed, dynamic levels of events (Robbins, 1990). To minimize the pitfalls associated with haphazard decision-making, we need a framework by which the organization may be designed and re-designed. This framework must comprise a consistent set of constructs, representing the organizational pieces, their interconnections, and their behaviors. We call this framework an instance of an evolving organization model, and the creation of such framework, the practice of organization modeling (Morabito, Sack & Bhate, 1999). Oftentimes, we consider an organization model as composed of its static and dynamic portions. The static portion is often referred to as the organizational architecture, and the dynamic portion its specific organizational behavior. The major constituents of the organizational architecture are its organizational domains, representing areas of interest to the organization, which are typically composed of two types of constructs: the core and the derived (Daft, 2001). Basically, we maintain that an organization can be described in a relatively stable fashion with a constant set of core constructs, such as people, strategy, structure, process and technology. Still, many other management notions are advanced every now and then, which represent variations of existing core constructs. We call such variations the derived constructs, examples of which include culture, empowerment, individual learning, organizational learning, and knowledge management. In practice, it is useful to interpret an organization as a set of behavioral specifications, each of which represents a view (say, a HAS view) that is designed to

characterize the organization premised on some set of organizational domains. Meanwhile, modeling an organization requires managerial choice at every stage of development: choice associated with the constructs chosen by management to represent the organization, choice with respect to the organizational domains which management is interested in proactively designing, choice of alignment among such domains, and choice of possible implementation. Throughout the organization modeling process, which could include establishing an organizational philosophy, identifying domains in need of design, specifying an organization's invariant (rules) at all levels of abstraction, it is likened to the act of composing a symphony or painting a picture. The artist starts with an image – the final rendering is visualized even if not fully formed. Planned or emergent, the molded image is a product of visualization. It is the process that interweaves strategic intent, architecture, and change into molding the organization image. In creating the organization model for IS development, we understand that the architecture and the behaviors, with which it operates, form not only the foundation, but also the character of design, and ultimately, the character of the organization itself. The great challenge is to shape the organizational IS support so that all of its pieces (organization domains) work together in consonance. In order to accomplish this, probably most interpretive action researchers would accept the notion of (Argyris, Putnam, & McLain-Smith, 1982) that the crucial elements in the approach include: a collaborative process between researchers (IS team) and people (organizational stakeholders) in the situation; a process of critical inquiry; a focus on social practice; and a deliberate process of reflective learning. Moreover, a maturing modeling process, according to Ivar Jacobson (Jacobson et al., 1994) should focus on the organization's development of any information system truly integral to the context of the specific transformed organizational system. Importantly, we should have a tight seamless relation between the process to develop a specific organization model and the process to develop the supporting IS. Establishing this relation has become our relevant question of inquiry; namely, what is the working context of IS work for organizational systems?

Organizations as the Main Context for IS Work

In their 1977 publication, *The Management of Innovation*, Tom Burns and G.M. Stalker, argued that the form of an organization should be dependent on the situation in which it is trying to operate. They proposed two polar ideal types of organizations respectively known as the mechanistic and the organic systems. The former “mechanistic” system carries such features as hierarchical differentiation, vertical communication, and centralized authority, and they are often viewed as appropriate to stable conditions. By contrast, the latter “organic” system is characterized by an emphasis on the holistic tasks of the organization, collegial relationships, decentralized authority and horizontal as well as vertical communication. Such systems are considered as often appropriate to conditions of change or uncertainty, such as those prevailing in today's knowledge economy. This perspective from Burns and Stalker, has given IS designers the necessary organizational context required for aligning the various organizational pieces (also called domains or constructs, say strategy, people, resources, structure, goals and process). An example of the alignment is that there must be some strategy to combine people and resources in a suitable way in a particular structure, to create some process in order to achieve some defined goals compatible with the organization. In fact, dominating IS work today is a set of assumptions which sees organizations as goal seeking (Checkland & Holwell, 1995; Zwass, 1992), a characteristic of the command and control mechanistic model. The prime organizational activity is then decision-making in pursuit of goals, objectives or some longer-term mission. Information required by the organization is then that which supports and services decision-making. It is not difficult to criticize this view of the world, and there is currently some growing recognition in IS that an alternative strand of thinking is also relevant. Namely, people feel that being a member of an organization is more like being part of a family than being the servant of a rational machine. For such people, social reality is constantly being constructed and reconstructed in a social process in which meanings are negotiated. For them, an organization does not exist as an independent entity but is part of sense making by a group of people engaged in dialogue, an essential characteristic of the organic model. This makes the idea of information, and information system much more problematical, since information is now obviously related in some profound way to meaning attribution and sense making (Weick, 1995). Equally, this view will not automatically embrace positivist-scientific methods of investigation and research, based on systematic data collection aimed at hypothesis testing. It will seek alternative processes of inquiry in such areas as interpretive action research (Anderton, 1991; Boland, 1986; Checkland, 1983; Galliers, 1992). The difference between these schools of thought in IS work could also be captured in the words ‘hard’ (for the objective scientific view) and ‘soft’ (for the subjective interpretive view). In the following section, we examine the two strands of thinking in IS work together with the concept of organization in order to understand better the idea of an information system, which is established with the intention of serving or supporting members of an organization and the organization itself in the everyday world.

The Hard Strand of IS Work

In the hard strand of IS work, the notions of organization are usually accepted without being questioned (Robey & Zmud, 1992). Namely, the typical view expounded is that organizations, assumed to be social entities, seek to achieve goals, with managerial activity being seen as decision-making in pursuit of the declared goals (Jackson, 1987). Essentially, an organization is considered to comprise a group of people who together can seek to achieve objectives which would be beyond

the reach of an individual, and that the entity, the organization, can be thought of as a system, usually 'a socio-technical system' whose managing comprises such activities as planning, organizing, staffing, coordinating, directing and controlling. This latter thought usually conveys the view that an organization's members will be working in several different functional parts connected together, and changing any one of these will have some affect on all the others. As a member of such a social unit, the fundamental activity in problem solving is decision making, which is the process of identifying a problem, identifying alternative solutions, and choosing and implementing one of them (Zwass, 1992). Information systems have an important role in this; namely, they are there to support individual decision-making. In fact, it is the work of Herbert Simon (Boland, 1987; Simon, 1960) which has persuaded so many people to assume the nature of managing to be problem solving through decision making. In Simon's words (1960, page 27), "problem solving proceeds by erecting goals, detecting differences between present situation and goal, finding in memory or by search tools or processes that are relevant to reducing differences of these particular kinds, and applying these tools or processes. Each problem generates sub-problems until we find a sub-problem we can solve. We proceed until, by successive solution of such sub-problems, we eventually achieve our overall goal – or give up." At this hard end of the IS problem spectrum, the method of solution essentially consists of the following stages, with stages 2 and 3 being plausibly iterative: 1) define the problem; 2) assemble the appropriate techniques; 3) use techniques to derive possible solutions; 4) select most suitable solution; and 5) implement the solution. This structured approach to conceiving IS support for organizational work, requires judgment in terms of a set of guidelines, which stimulate the intellectual process of analysis.

The Soft Strand of IS Work

In the soft strand, nevertheless, an organization is seen at core as a social process, essentially a conversational process, in which the world is interpreted in a particular way which legitimates shared actions and establishes shared norms and standards. There is no single body of work, which underlies the soft (interpretive) approach to information systems, but the work of Sir Geoffrey Vickers (1965) provides quite an interesting reference. For Vickers, organizational members set standards or norms rather than goals, and the focus on goals is replaced by one on managing relationships according to standards generated by previous history of the organization. Furthermore, the discussion and debate which leads to action is one in which those taking part make judgments about both 'what is the case' (Vickers' reality judgments) and about its evaluation as good or bad, satisfactory or unsatisfactory – what Vickers calls appreciative judgments. This places Vickers' work firmly in the interpretive tradition, which sees social action as based upon personal and collective sense making. Interestingly, Vickers' idea is also at the core of the writings of Winograd and Flores (1986), whose much-noticed *Understanding Computers and Cognition* is written from the point of view that language as a medium does not simply reflect the world out there but constitutes it in the social process of interaction. This leads them to the view that organizations are constituted as networks of conversations in which commitments are generated. Information systems can support such conversations: "Computers are a tool for conducting the network of conversation (page 172)." Another author within the soft strand of IS thinking is Ciborra (1987). He argues that organizations should be seen as networks of communicative exchanges, and that computer-based information systems should be thought of as making such exchanges easier – the exchange support systems. He contrasts this idea with the more conventional view within IS work, when he writes: "Present-day IS designers either tend to a data view of organizations, or in the case of those most influenced by business needs, to a decision-making view. These two ways of looking at the problems of computerization are so widely accepted and have been so much taken for granted that they can be said to form the conventional wisdom of today. The origins of the former can be traced directly back to the EDP field, while the latter stem from the influential work of Herbert Simon." Consequently, at the soft end of the IS problem spectrum, a strategy for IS support needs to be thought of, through which desirable change and organizational learning are often considered as the aims. Its stages of development could be characterized as follows with plausible iterations in stages 3, 4, and 5: 1) define the situation that has provoked concerns; 2) express the situation with different sets of concerns; 3) select concepts that may be relevant; 4) assemble concepts into an intellectual structure; 5) use this structure to explore the situation; 6) define changes to the situation as the challenges to be explored; and 7) implement the change processes.

A Pragmatic Context of IS Development

As an elaboration of the context of IS work, we consider the setting up of an information system is a social act in itself, requiring some kind of concerted action by many different people, and the operation of an information system entails such human phenomena as attributing meaning to manipulated data and making judgments about what constitutes a relevant category. Indeed, the implicit belief behind such an observation is that in all possible real-world organizational problem situations, there is at least one thing in common: namely, they contain people interested in trying to take purposeful action. The idea of a set of activities linked together so that the whole, as an entity called the human activity system (HAS) from the viewpoint of soft systems methodology (SSM) (Checkland & Holwell, 1998; Checkland & Scholes, 1999), could pursue a specific purpose, is often interpreted as a new type of organization model. Pragmatically, given a handful of models of this kind, namely, models of concepts of purposeful activities built from a declared point of view, they could be used to give a

coherent structure to debate about the problem situation and what might improve it. Tellingly, the proper use of this debate can be seen as a process which learns its way to the meanings among people with an interest in or concern for the problem situation. This idea of learning the meanings which characterize an organizational context, by which people sharing a human situation seek to make sense of it, is a significant feature of SSM. The important point is that the HAS models created, must not be regarded as the would-be descriptions of parts of the real-world. Instead, they are considered as the abstract logical machines for pursuing a purpose, defined in terms of declared worldviews, which can generate insightful debate when set against actual purposeful action in the real world. In constructing the necessary HAS models, what counts as facts about the social world inside an organization, is the ever changing outcome of a social process in which human beings continually negotiate and re-negotiate, and so construct with others their perceptions and interpretations of the world outside themselves, and the dynamic rules for coping with it. Researching social reality in the context of IS development then becomes an organized discovery of how human agents make sense of their perceived worlds, and how those perceptions change over time and differ from one person or group to another. In the process, we do not expect to discover unchanging social laws to set alongside the laws of natural sciences. Rather, an organization is perceived as entailing readiness on the part of its members to conceptualize it and its internal and external relationships in a particular way, though it is also understood that such readiness changes through time, sometimes incrementally, sometimes in a revolutionary way, as perceptions and membership change. The basic shape of the HAS-based modeling approach (Checkland, Forbes & Martins, 1990) could simply be described as follows: Find out about the problem situation that has provoked concern; Select relevant concepts that may be integrated into different human activity systems; Create HAS models from the relevant accounts of purposeful activity; Use the models to question the real-world situation in a comparison phase. The debate initiated by the comparison normally entails the findings of accommodations between conflicting interests, that is to say, situations that may not satisfy everyone, but could still be lived with, enabling action to be taken. Oftentimes, the purpose of the debate is to collectively learn a way to possible changes (improvements) to the problem situations, by activating in the people involved, a learning cycle, which counts on their ability to articulate problems, to engage in collaboration, to appreciate multiple perspectives, to evaluate and to actively use their knowledge. It is worthwhile to notice that taking the purposeful action would itself change the situation, so that the whole cycle could begin again, and is in principle never ending. Likewise, through different scenarios of HAS modeling, IS architects could provide help in articulating the requirements of specific IS support through operating the learning cycle from meanings to intentions to purposeful action among the specific group of organizational members.

Action Research in Support of HAS Modeling

Essentially, the use of HAS models in IS work always assumes that the purpose of creating an organized IS, is to serve some real-world action; namely, organized provision of information is always linkable to action (Checkland, 1983). Thereby, in a specific organizational context, when a real-life problem situation arises, our typical approach of enquiry is to formulate some HAS models of purposeful activities, which it is hoped will be relevant to the real-world situation, and use them by setting them against perceptions of the real world in a process of comparison. That comparison could then initiate debate leading to a decision to take purposeful action to improve the part of real life, which is under scrutiny. Thus, designing an IS will require attention to the purposeful action which the IS serves, and hence to the meanings which make those particular actions meaningful and relevant to particular groups of actors in a particular situation. As Walsham (1993) usefully put it, the nature of this kind of interpretive research starts from the position that our knowledge of reality, including the domain of human action, is a social construction by human actors and that this applies equally to researchers. There is no objective reality, which can be discovered by researchers and replicated by others, in contrast to the assumptions of positivist science characterized by the principles of reductionism, repeatability and the refutation of hypotheses. The theories of interpretive research concerning realities are ways of making sense of the world and shared meanings are a form of inter-subjectivity rather than objectivity. Practically, this approach of research involves the researchers (IS team) immersing themselves in a human problem situation and following it along whatever path it takes as it unfolds through time. It requires interaction with real problem situations in an action-oriented mode; namely, it requires a readiness to use the experience itself as a research object about which lessons can be learned. The term “action research” attributed to Kurt Lewin (1946), is often used to describe the involving process of this work, which Kemmis (1980) further elaborated as the application of tools and methods from the social and behavioral sciences to practical organizational problems with the dual intentions of improving the practice and of contributing to the theory and knowledge in the specific area under study.

Meaning Attribution in the Creation of IS Support

From an IS architect’s point of view, the use of action research in constructing the necessary HAS models for specific IS development, must be based on some declared-in-advance intellectual framework of ideas, a framework in terms of which what constitutes knowledge about the situation researched will be defined and expressed. For example, one of the most obvious characteristics of human beings is our readiness to attribute meaning to what we observe and experience in the world outside ourselves. If information is interpreted as what we get when human being attribute meaning to data in a particular context, then an information system (IS), in the full sense, will be a meaning attribution system in which people select certain

data out of the mass potentially available and get them processed to make them meaningful in a particular context in order to support those engaged in purposeful action (Checkland & Holwell, 1995; Checkland & Haynes, 1994). Thus, if we wish to create an appropriate IS in the exact sense of the phrase, we must first understand how people in the specific situation conceptualize their world. We must find out the meanings they attribute to their perceptions of the world and hence understand which action in the world they regard as sensible purposeful action, and why. Having obtained that understanding we shall be in a position to build some of the purposeful models, and use them to stimulate debate aimed at defining some HAS models widely regarded by people within the situation as truly relevant to what they see as the required real-world action. Once an agreed truly relevant system has emerged, the use of HAS-based development requires us to ask of each activity in the model the following questions: What information would have to be available to enable someone to do this activity? From what source would it be obtained, in what form, with what frequency? Besides, we need to be aware of what information would be generated by doing this activity. To whom should it go, in what form, with what frequency? In this way, an activity model may be converted into an information-flow model. Given the information-flow model, which is agreed to be a necessary feature of the situation studied, we may then ask: What data structures could embody the information categories that characterize such information flows? It is only then that we could start the design of a suitable information system, which should yield the information categories and information flows required by the structured set of activities regarded as truly relevant to the real-world action that is itself relevant according to the meanings which people in the situation attribute to their world as a result of their worldviews.

Critical Perspective for Modeling Human Activities

Understandably, the major motivation behind HAS modeling in a particular ill-structured organizational problem situation is to enable IS designers to identify areas of possible improvements, with which the design of suitable IS support could be determined to help the people involved to produce results of value to the organization in the process of performing their purposeful activities. The key to successful HAS modeling and thus IS development, is in understanding the users' situation, the problems associated with the situation, and correctly identifying the information requirements. Oftentimes, the challenge is to know what the problem is, and to resolve conflicting views of perceiving problems and requirements among users. It is well recognized today that conventional "hard" (systems engineering) methods suitable for tackling well-defined engineering problems would hardly survive unscathed their transfer to fuzzy "soft" problem situations set in the socio-cultural contexts of today's organizations. The hard tradition declares that at the start of a systems study, it is necessary to define the need, the aim to be achieved, the system which when engineered, should meet the need, and the mission to be accomplished. Nevertheless, the issue is goal-oriented: How can we provide an efficient means to meet the specific objective? The taken-as-given assumption is that "what to do" has been well defined, and there is a gap to be bridged between the desired future state and the present state; how to bridge it is the problem. Put it simply, in the hard tradition, the need and objective-defining are taken as given at the start of problem-solving. Yet, in problems involving purposeful human activities, goals are often obscure, and it is often not possible to take for granted the concept of a problem, let alone the activities of trying to solve it. In fact, there are always many possible versions of the system to be engineered or improved, and systems boundaries and objectives may well be impossible to define. Instead, in the thinking embedded in SSM, our coping with the "soft" problem situation is typically organized as a process of inquiry into the peculiar situation, comprising such steps as follows: Always start from a careful account of the purposeful activity to be served by the IS support. From that, work out what information support is required by the people to carry out their activities. Thirdly, treat the creation of that support as a collaborative effort between technical experts and those who are truly involved with the purposeful actions served. Meanwhile, ensure that both system creation and system use are treated as opportunities for continuous learning. In this way, models of purposeful human activities have to be derived accordingly to initiate and structure sensible discussion about IS support for people undertaking the real-world problem situations.

Remarks for Continuing Challenge

IS development often requires the collaboration of team members possessing a variety of knowledge and skill. Yet, organizing a group of individuals to work together is a difficult problem in any type of undertaking. It takes time for team members to pool their knowledge in discussions, negotiate decisions, coordinate their efforts, and incorporate the work of others in their own efforts. Oftentimes, IS developers have to face convoluted networks of trade-off and inter-dependence, the need to integrate the contributions of many kinds of experts, and the potential of unintended impacts on people and their social institutions. In the design of any information systems, it is also observed that one of the most obvious characteristics of human beings demonstrated is our readiness to attribute meaning to what we observe and experience in the world outside ourselves. We have in our heads stocks of ideas by means of which we interpret the world. It seems clear that such ideas may come from two sources. They may be part of the genetic inheritance of mankind, namely, truly innate; or they may be built up as a result of our experience of the world. What is being of interest is that we perceive the world through the filter of – or using the framework of – the ideas internal to us, but that the source of many or most of those ideas is in fact the perceived world outside. Thus, the world is continually interpreted using ideas whose source is ultimately the perceived world itself, in

a process of mutual creation. As human beings, we enact this process every day, usually unconsciously. But, if we now add the thought that we are able consciously to think about our own mental processes, then the ideas we have can be used explicitly in some methodology to interpret perceived reality. Indeed, this is an instance of holistic (or systems) thinking, implying the application of consciously organized thought, where the word ‘systems’ has been used to imply the concept of a whole entity, carrying such characteristics as a single whole (emergency and hierarchy), properties which have no meaning in terms of the parts of the whole (Atkinson & Checkland, 1988). In systems thinking, accounts of wholes (or models) are formulated as holons (Checkland, 1988), and these can be set against the perceived world, in order to learn about it. Within the systems movement (Bertalanffy, 1968), two schools of thought are complementary: that which takes the world to be holonic (hard systems thinking) and that which creates the process of enquiry as a holon (soft systems thinking), where the former assumes that the perceived world contains holons, and the latter takes the stance that the methodology (or the process of enquiry) can itself be created as a holon. More intuitively, the hard tradition assumes that systems (holons) exist in the world and can be engineered to achieve declared objectives, while the soft tradition assumes that the world is problematic, always more complex than any of our accounts of it, but the process of enquiry into the world can itself be engineered as a learning system (holon). It is this shift of systemicity from assuming systems to exist in the world to assuming that the process of enquiry into the world can be organized as a learning system, which defines the two tracks of systems thinking today. In fact, this also defines the way we interpret organizational problem situations for IS development. Many of today’s IS support are difficult to learn and awkward to use; they often change our activities in ways that we do not need or want. The problem lies in our inability to appropriately use the hard and the soft approaches to IS development. In the case of SSM, we have a cyclic methodology, which is itself a systemic (we would better say, holonic) process, one that within its procedures happens to make use of models of holons (the human activity systems). In everyday language, we say that SSM is systemic in two senses. Namely, it is a systemic process of enquiry, which happens to make use of ‘systems models’, each of which is conceived as a set of activities so connected as to make a purposeful whole. Our previous description of HAS-based investigation represents the stream of soft systems thinking, which is essentially logic-driven. It uses the purposeful (HAS) models as logical machines to question the real world, in which human situations are hardly static. Any changes in the IS implemented as a result of the use of HAS models certainly would change the problem situation as originally perceived, and in the new situation, the cycle of learning can begin again. It is expected that through maintaining a continuous focus on situations of and consequences for human work and activities, IS developers could become more informed of the problem domains, seeing usage situations from different perspective, and managing trade-offs to reach usable and effective design outcomes.

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