A Purposeful Framework for IS

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ABSTRACT

This paper highlights the need for theories in IS that assign a key role to the influences of human intentionality. Ulrich's (1983) critical systems heuristics and activity theory both satisfy this requirement. A model based on the combination of these two theories is developed and explored in some detail. The background and description of Ulrich's (1983) critical systems heuristics is presented first and then the integration of activity theory with Ulrich's (1983) approach is examined within the context of IS. It is argued here that the combination of these two theories provides a powerful conceptual tool with practical applicability in the range of areas covered by the domain of IS.

1. INTRODUCTION

Gregor (2006) advocates an increased focus on theory development in IS and promotes the idea of integrating different theory types in order to strengthen the theoretical base within the discipline. Ghoshal (2005) contends that the current base of "bad" management theories is having a profound negative influence on management practices and describes how the underlying assumptions of causal determinism and deductive reasoning have permeated theories developed in and applied to the various management related fields. According to Ghoshal (2005), theories based on scientific models that do not include any role for human intentionality lead to a lack of morality and ethics which can, at least partially, explain some of the recent corporate collapses in the United States. Similarly, Gregor (2006) calls for theories that address the omission of causal reasoning commonly found in theories associated with logical positivism. Von Hayek (1989), Ulrich (1983) and Churchman (1979) also point out the potential dangers of using scientific models to analyze social phenomena.

This paper presents a theoretical framework based on the integration of activity theory and Ulrich's (1983) critical systems heuristics. The core strength of the framework arises from the significant role it attributes to human intentionality. Ulrich's (1983) framework would be classified in Gregor's (2006) taxonomy of theory types as a Type V theory which can be used for design and action. Activity theory qualifies as a Type II theory based on its explanatory power. It is argued here that the combination of the two theories results in a powerful conceptual tool for the design and evaluation of information systems in their organizational settings. The critical systems heuristics framework (Ulrich, 1983) encourages system designs that focus on the contribution of the people involved in and affected by the system. Activity theory highlights the role of tools (such as information and technology) and community in the information systems context and provides a more detailed framework for characterizing an organization's activities and the relationship between IS and business activities. In terms of contribution to a general conceptual framework for IS, the model presented here provides practical guidelines for IS research and practice based on theories that give prominence to the key role of human intentionality.

The basic premise of the purposeful systems approach (Ulrich, 1983) is that human activity systems should be seen as social systems, in contrast to theories that take a mechanistic or organic view. Ulrich (1983, p.334) defines a purposeful system as follows:

*"S [is] a purposeful system if S is **self-reflective** with respect to its own normative implications, seen from the point of view not only of the involved, but also of the affected, and if S has at least partial **autonomy** in determining its client, its purposes, etc."*

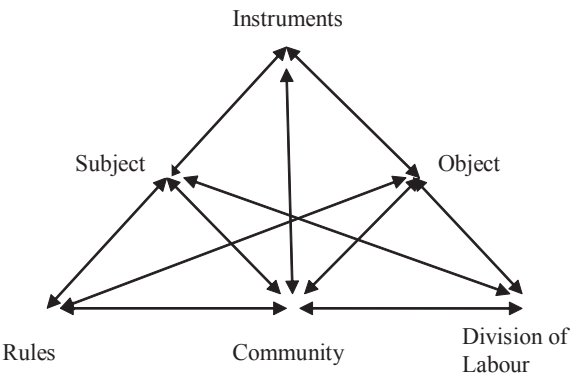
So, if an organization is viewed as a purposeful system, there will be some opportunity for all participants to reflect on the organization's purpose and to choose actions in relation to that purpose. This view of an organization can be contrasted with a mechanistic view where the role of participants is to perform specified duties in support of a well defined purpose. No opportunity is afforded to participants to question or contribute to the definition of goals. Employees mechanically perform specific roles. An organic view of an organization can be distinguished from a mechanistic conception in that employees have some control over how they perform their roles and achieve specified goals. However, no involvement in the definition of goals is supported. Employees decide **how** they will go about their jobs, but have no influence in relation to **what** they are expected to achieve or **why** it is important.

In terms of IS, both organizations and information systems can be seen as purposeful systems and Lewis (2002) highlights some of the potential benefits of applying Ulrich's (1983) framework in this context. Ulrich (1983) argues that the task of the social system designer is to facilitate critical reflection and motivation of those involved in the system, whereas the task of the designer of a mechanistic system is to define, codify and control the optimum configuration of the system. Dietz (2003, p.205) criticizes mechanistic approaches that don't *"do justice to the social character of human beings"*. Ghoshal and Bartlett (1995) point out that the underlying problem with traditional management approaches is in their objective *"to create a management system that minimize(s) the idiosyncrasies of human behavior"*. Ulrich's (1983) purposeful systems approach addresses these criticisms by providing a set of guidelines that encourages the contribution of all stakeholders potentially involved in and/or affected by a system.

Hasan (2002, p.30) proposes that activity theory is a good candidate *to "span and integrate the breadth of the field of IS providing it with unity and identity"*. Consistent with Ulrich's (1983) framework, activity theory also assigns a key role to the influence of human intentionality. As shown in Figure 1, activities are carried out by subjects in order to produce an object and/or outcome using instruments, according to rules and with a division of labor as defined by the associated community. In addition to the key role of human intentionality, activity theory also provides a framework for considering the use of tools and the influence of community which play an important role in any information system. Activity theory suggests that activities can be improved by exploring 'contradictions' within the activity. Incorporating this suggestion with Ulrich's (1983) guidelines for purposeful systems design enables the practical application of the theoretical framework in a range of areas covered by the domain of IS.

The next section will cover the purposeful systems approach in some detail, including its philosophical basis, an outline of how a purposeful system can be seen as a set of problem-solving processes and finally, a set of categories that can

Figure 1. Activity theory framework – adapted from Hasan (2002)



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be used to define the various interests of stakeholders either involved in and/or affected by the system. The following section will highlight how activity theory constructs can be used to augment and extend the approach for the IS context. The proposed model uses activity theory to represent the set of problem-solving processes associated with purposeful systems in more detail and to define the link between information systems, their design and their use in a business context. The final section will begin to explore potential areas of application in IS and will also look at possible areas for further research.

2. THE PURPOSEFUL SYSTEMS APPROACH

2.1 Philosophical Basis

Ulrich (1983) developed the purposeful systems approach in order to provide a conceptual framework for critical social inquiry and design. The intent of the approach is to provide a set of guidelines for rational social planning that will help planners to avoid the drawbacks of contemporary, scientific systems approaches. Ulrich (1983) argues that contemporary approaches to planning suffer shortcomings because of their underlying scientific, reductionist assumptions. In the domain of social reality, these assumptions can mask the inherent human interests that are served by the system. In order to overcome these shortcomings, Ulrich (1983) maintains that a rational approach to social planning should expose the underlying assumptions that affect the design and operation of the social system being planned for. The purposeful systems approach addresses this by combining Kantian a priori science with a reinterpretation of the systems approach and applying the combination to the domain of social reality. The critical intent of Kant's philosophy and the practical heuristics provided by systems theory combine to form a powerful tool for assisting with rational social planning.

Social planning, which involves the activities of social inquiry and design, is basically about making choices that improve a particular social system. In the domain of IS, both the organization and the information systems that support the organization's activities can be seen as social systems. Ulrich's (1983) framework is meant to assist with planning activities and to make clear whose interests are being served by the improvements made to the system. Ulrich (1983) endeavors to translate Kant's a priori science from the domain of physical reality to the domain of social reality in order to develop a conceptual tool for thinking about social systems. Combined with this, the systems idea is used to identify components of the system that cannot be completely specified or controlled i.e. to clarify the boundaries of the system. This improves understanding of the whole system leading to opportunities for enhanced designs.

In Kant's development of a priori science, the domain of interest is physical reality. For social planning, the domain of interest is social reality. Within the domain of physical reality, the constructs of space and time are critical for thinking about the domain. For social reality, Ulrich (1983) proposes that the parallel concept for thinking is human intentionality, including self-consciousness, self-reflection and self-determination. Nothing can be understood within the domain of social reality without reference to human intentionality. In Ulrich's (1983) purposeful systems approach the construct of human intentionality is pervasive and is referred to as a "mapping dimension" used to define our conception of the social reality in question.

According to Ulrich (1983), Kant characterizes human thinking as having two fundamental components – reason and understanding. The principle of reason is used to reflect on understanding and can be used to reflect on and expose the underlying assumptions in any social system design. Reason itself has two components – theoretical reason that helps to understand "what is" and practical reason that questions "what ought to be" and incorporates the manifestation of free will. Ghoshal (2005, p.81) also identifies these aspects of thinking as important and points out that if we were to give up our reliance on scientific theories *"Business could not be treated as a science, and we would have to fall back on the wisdom of common sense that combines information on "what is" with the imagination of "what ought to be" to develop both a practical understanding of and some pragmatic prescription for "phenomena of organized complexity"".* Reason can be used to resolve conflicts that might otherwise be decided based on the prevailing distribution of power. Using the principle of reason to reflect on understanding is a difficult task and the guidelines provided by Ulrich (1983) are designed to assist with this task. The guidelines are also meant to ensure that the interests of all relevant parties are represented in the process. Without a set of guidelines to ensure rational planning, there is a risk that the objectives served by the system will not be representative of all those involved in and/or affected by the system.

2.2 Purposeful Systems & Problem-Solving Processes

According to Ulrich's (1983) definition as given in Section 1, the two significant aspects that characterize a purposeful system are the capabilities of self-reflection and partial autonomy. Dewey's (1997, p.6) definition of reflective thought is: *"Active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends."* Therefore, in a purposeful organization employees and broader members of society affected by the operation of the organization will continuously question the organization's vision, the underlying assumptions that support its validity and the implications of pursuing the vision. The mandate for partial autonomy of the system implies that the design of a purposeful organization will support and encourage participants to reflect and pursue actions based on this reflection.

Ulrich (1983) claims that every purposeful system must perform three types of problem-solving processes: inquiry, action and valuation processes. In terms of an organization as a purposeful system, inquiry processes are those that produce knowledge about the purpose (vision/mission) of the organization. Action processes define how the knowledge is put to use and valuation processes are those that facilitate reflection on how the production and use of knowledge affects all those who work and live with the system. These three problem-solving dimensions can be used to assess the purposefulness of an existing system, or to design a purposeful system. A purposeful system implements inquiry, action and valuation processes that encourage reflection and contribution by all those involved in and/or affected by the system.

2.3 System Boundaries

The final aspect of Ulrich's (1983) framework which is of interest here is a set of critically-heuristic categories of pragmatic mapping. These categories help to operationalize the definition of a purposeful system. For example, they help to identify who represents "the involved" vs. "the affected" and they assist in evaluating the capabilities of self-reflection and autonomy inherent in the system. The categories arise out of the systems conception of social reality – specifically by exploring the boundaries of the system in relation to those involved in the system and those affected by it. Ulrich (1983) developed the formulation of categories by asking questions about who might be involved or affected by the system, what their concerns might be and what implications each group and their concerns might have for the planner. The categories provide the planner with a framework for developing criteria to evaluate his/her conception of and design for a social system.

The boundaries of a social system can be explored by investigating four different groups of stakeholders. These include those who provide sources of motivation for the system, those who represent sources of control, those who act as sources of expertise, and those who represent sources of legitimation. An investigation of the roles and concerns of these four groups will help to surface, or make explicit, any underlying assumptions associated with a system's design. The investigation should use reason to reflect on understanding of the system by asking questions about 'what is' and 'what ought to be' in relation to each group.

So, for instance, in relation to the first group – sources of motivation – questions to be asked would include who the client is, what the purpose of the system is and how the success of the system can be measured. For the second group – sources of control – the questions would explore who the decision makers are, what they are able to control and what falls outside their domain of control. The third category – sources of expertise – would involve questions about who the designer is, what type of expertise is required and how the design can be evaluated. The final group to be considered – sources of legitimation - is meant to represent those affected by the system who do not contribute to its design or operation. Since this is such a potentially large and diverse group, a representative category of witness takes on the role of legitimizing the system. This category is concerned with emancipation of the affected. These categories should be kept in mind when 'designing' an organization and planning and developing information systems. The planner's task is to reflect on these categories in order to critically develop a comprehensive system design. Using reason to reflect on these categories of understanding suggests asking questions about "what is" and "what ought to be".

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So, for example, questions should be asked about who actually plays the roles in each category as opposed to who should ideally be playing the roles.

It should also be mentioned that Ulrich (1983) envisions a process of discourse that would ensure reason is used to resolve conflicts and that the views of the affected are adequately represented. The philosophical basis for the practical discourse is derived from Kant's a priori science combined with Habermas' communication model. The discursive process would use the four categories above as a guideline for deciding whose views need to be represented in the discourse and would be designed to expose underlying assumptions in a system's design. Underlying assumptions are reflected in implicit boundary definitions which can be made explicit in a discourse following the guidelines outlined above. It is important to note that the goal of the dialogue would be to increase awareness of a design's implications and not to reach a consensual agreement between all of the groups. The discursive process will not be explored further in this paper. For the moment, it will be assumed that the onus is on the planner / system designer to consider the implications of his design for all of those involved and/or affected. The conditions required to ensure that the discourse occurs in an open environment with the appropriate participants would be an interesting avenue for future research.

3. INTEGRATING ACTIVITY THEORY FOR THE IS CONTEXT

The previous section detailed Ulrich's (1983) purposeful systems approach and highlighted how an organization can be viewed as a purposeful system with associated inquiry, action and valuation problem-solving processes. This section will incorporate activity theory constructs into the approach in order to provide a more detailed conception of an organization's processes / activities and to characterize the link between these activities and the information systems that support them. The basic components of activity theory are shown in Figure 1 and have been highlighted in an earlier section.

Each of the problem-solving processes described previously (inquiry, action and valuation) can be viewed as an activity and characterized by the components of activity theory as diagrammed in Figure 1. So, for example, an organization that manufactured shoes would have inquiry processes to determine how to manufacture better shoes, action processes to put this knowledge to use in the manufacturing process and valuation processes to reflect on the implications of the manufacturing process for all those involved in and affected by the process. Using activity theory to model these processes ensures consideration of the instruments used in the process, the community involved in the process and the rules that govern the process.

Information systems can be seen as activities in their own right. The object of an information system is to provide information which can be used to support business activities. Referring to Figure 1, if an information system is modeled using activity theory, the object on the right side in the middle of the triangle would be the information which then flows into the apex of the business activity triangle where it is used as an instrument to support that activity. Using activity theory to model business processes and their supporting information systems provides a method of characterizing the link between the two. When information systems are modeled as a separate activity, recognition is also given to the fact that the rules and community for the information system activity are not the same as the rules and community of the associated business activity. Taking this conceptualization one step further, information system design can be seen as an activity which produces an information system which is then used as an instrument in the ongoing activity of the information system.

In terms of Ulrich's (1983) purposeful systems approach, if an organization is viewed as a purposeful system, then the ongoing activities of an organization are its problem-solving processes which can be classified as inquiry, action and valuation processes. Activity theory can be used to model each of these processes and to define the link between these business processes and their associated information systems. Note that although the supporting information systems would then be viewed as separate triangles for each type of business process, they would not necessarily be distinct information systems in practice. The final step in applying the model within the IS context requires information systems professionals and business professionals to consider the concerns of the various groups of stakeholders when designing, enacting or evaluating information system activities (including information system design) and business activities or processes. This would require the categories described in Section 2.2 with associated interests to be considered in the context of the various business activities and their associated information systems.

4. POTENTIAL APPLICATIONS AND FUTURE RESEARCH

This paper has so far argued that a purposeful systems approach based on the combination of Ulrich's (1983) taxonomy of purposeful systems and activity theory would be a useful contribution towards a general conceptual framework for the IS discipline. The question as to how this approach can be specifically applied to the various areas of IS still remains. The framework would seem to fit naturally with research in the area of knowledge management given the classification of processes into inquiry, action and valuation processes that produce knowledge, use knowledge and reflect on the use of knowledge in support of organisational objectives. Lewis (2002) discusses the application of Ulrich's purposeful systems framework to Alavi's (2000) classification of knowledge management systems and concludes that the guidelines presented in the framework could be used to help with the design and development of knowledge management systems based on Alavi's (2000) network model.

Lewis (2004) also highlights the potential benefits of using the combined model, as presented here, to address issues related to strategic alignment. The ability to explicitly characterise the link between IS and business activities while modelling information systems activities and their environmental influences independently from the associated business activities offers opportunities for improved understanding of strategic alignment. The framework would also seem to have a natural fit with the area of business process management. Characterizing business processes as inquiry, action and valuation processes in support of an organization's purpose provides a conceptual link between **what** a business does (the processes or activities) and **why** (the purpose / vision or mission of the organization).

This paper has presented a theoretical framework with support for the particular orientation of the framework and some indication of its applicability in different areas of IS research and practice. Potential applicability in three areas was highlighted - knowledge management, strategic alignment and business process management. The diversity in these three areas helps to justify the suitability of the framework as a general conceptual tool for the discipline. This paper represents preliminary work which will form the basis for a larger research project in which empirical validation of the appropriateness and usefulness of the approach will be the next step. The main focus here has been to provide a detailed description of the framework and to highlight why it should be considered as a contribution towards a general conceptual framework for IS. The main strengths of the framework arise from its underlying philosophical focus on human intentionality combined with the practical nature of the guidelines it offers for the design and evaluation of human activity systems including organizations and information systems.

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