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LOITERING WITH INTENT: DEALING WITH HUMAN-INTENSIVE SYSTEMS

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Abstract This paper discusses the professional roles of information systems analysts and users, focusing on a perspective of human intensive, rather than software intensive information systems. The concept of 'meaningful use' is discussed in relation to measures of success/failure in IS development. The authors consider how a number of different aspects of reductionism may distort analyses, so that processes of inquiry cannot support organizational actors to explore and shape their requirements in relation to meaningful use. Approaches which attempt to simplify complex problem spaces, to render them more susceptible to 'solution' are problematized. Alternative perspectives which attempt a systematic, holistic complexification, by supporting contextual dependencies to emerge, are advocated as a way forward.

1. Introduction

There is a strand of IS discourse that focuses on *software intensive systems*, e.g. design science [1]. While the concepts of *human activity system* and *hardware system* are both acknowledged, the main focus of attention is put on software intensive systems. Our intention is to shift the focus onto arguments following a human centered tradition in IS, and to discuss analysis and design in a context of *human intensive systems*. Here we believe it is important to consider whole work systems, including sociological and philosophical perspectives, without losing sight of their relationship to concrete IT artifact design. This is demonstrated by work of e.g. [2] on data modeling, [3] discussion of intelligent machines, and [4] on object oriented design. When viewing IS as human intensive, we need to give careful consideration to human sense-making processes [5, 6, 7]. This includes giving attention to aspects of sociological and philosophical complexity [8, 9, 10]. In this paper, we explore problems of reductionism that can arise from different

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traditions of inquiry, and present a possible approach to dealing with them in which professional analysts take on an on-going role of 'loitering with intent' to support people in creating their own systems. Commonly, developers will ask 'Who will be using this system? What do those people expect that the system will be able to do, and how do they expect it will do this?' [11, 12]. However, we believe that these questions alone will not explore what is 'meaningful use' from the point of view of the individuals using the system. For this, an inquiry is needed which goes on to address the question 'Why would this IT system be used?' [8, 13, 14]. This question goes beyond consideration of functionality or usability to address the socio-technical and philosophical complexities inherent in human-intensive systems [15, 2, 16]. Consider teachers currently using traditional classroom methods, wishing to embrace e-learning. Developers could provide support for existing materials to be translated into a virtual learning environment and ensure that teachers have the appropriate buttons and menus to interact with this system. This is intended to bring about an optimization of existing processes for functionality, usability and efficiency. A better result might be achieved if teachers are supported to design how they want to teach using the characteristics of the new environment and its potential to support effective learning, i.e. create a system that is not just user-friendly but meaningful to use. This is intended to result in systems which are purposeful, useful and efficient in supporting strategic change. IS analysts/developers may have every reason to run away from the concept of 'usefulness' and hide instead behind 'functionality' (see discussion in [17]). This can be demonstrated by considering how success or failure of IS developments are measured. A team might be proud of their work in a project that is finished on time and within budget, with all the functionality required in the specification. Often, these are regarded as measures of success, both by developers and leaders of organizations. However, in a documented example [18], one such team received a shock when told that the auditors had pronounced the project a failure! The auditors had noticed a factor not even considered by the team or by managers in the organization - the resultant system was not being used! In such a case, management cannot say that the company is deriving utility from its investment – beyond the book value of the assets involved. Going beyond functionality is difficult and raises the complexity of the task of systems analysis and design. Writing specifically in the field of software engineering, [11] asserts:

"... human, social and organizational factors are often critical in determining whether or not a system successfully meets its objectives. Unfortunately, predicting their effects on systems is very difficult for engineers who have little experience of social or cultural studies ... .if the designers of a system do not understand that different parts of an organization may actually have conflicting objectives, then any organization-wide system that is developed will inevitably have some dissatisfied users." p.35.

These difficulties have led IS researchers to focus on human, social and organizational factors, leading some people to fear that relevance to design of IT has been lost (see e.g. [19, 20]). These feelings can be explained as a response to experi-

enced uncertainty, arising from loss of identity and sense of purpose [21]. It is possible that IS professionals crave certainties derived from adherence to 'technical' needs of system (functionality). What is missing is the important role of Geist – the spirit in the system. When the technical specification has been met, the system still awaits that spirit – the spark of 'life' with which it can only be endowed through use by people who have some context to fulfill [22]. This requires a technical specification being purposeful from the end users' points of view. [23] extends this view in his discussion of design of purposeful social systems. He highlights the importance of the role given to subjective self-reflection in design of such systems. A purposeful system is here defined as one which is self-reflective and at least partially autonomous with regard to its own normative implications, seen not only from the viewpoint of those involved but also those affected by the system. An essential question, for Ulrich, would be 'Does 'the designer' design for critical reflection on the part of those who will live/work with the system, including those beyond the immediate group for whom the design is undertaken?' Concepts of functionality, or even usability, may not amount to the experience of meaningful use for those involved. [15] hints at this when he exhorts analysts using soft systems methodology to consider Weltanschauung when conducting an inquiry into a problem situation. This is taken further in work by [17], highlighting the individual perspective that renders a particular view of the situation meaningful to someone. When asked to specify their requirements, potential users of an IS may not be able to express them unless they are supported to explore their individual and collective perspectives on contextual dependencies associated with 'use' [24, 25, 17]. With no opportunity to explore these dimensions of uncertainty and complexity, they may be disappointed in their experienced interactions with newly-created, functional, IS and resort instead to 'work-a-rounds' in order to get the job done. It is this realization which has informed changes in approach to IS development where the supportive role of a professional developer is seen as an on-going mission (loitering with intent) to promote creation of useful systems by and for organizational actors. This contrasts with traditional approaches to development which focus around 'projects'.

2. Complex Problem Spaces

Complex problem spaces call for sufficiently complex methods for inquiry [26]. [7, 9] points to a tendency for IS developers to ignore the role of human choice behind the exploitation of technical artifacts, and to use common methods to tackle technical and human dimensions of a design space. We need to exercise our human ingenuity [27, 28] to reflect and adapt methods available to us in order to address complex problem spaces appropriately. IS professional practice requires engagement in what [21] calls 'second order' reflection. When conducting inquiry, many researchers have turned to methodologies intended to simplify organization-

al problem spaces, in a desire to steer a manageable path through rich, diverse and often 'messy' situated knowledge. However, such attempts to simplify processes of inquiry can lead to pitfalls of reductionism, so that a focus on complexity and emergence is lost. Some of these tendencies towards reductionism include:

Psychological reductionism that can occur if an investigator is assumed (consciously or unconsciously) to be making a description of an external reality which is susceptible to inquiry, i.e. inquiry presupposes a Cartesian split between mind and body [29]. Human beings interact with their environments but their cognitive systems may be regarded as operationally closed, as they are not controlled by such interactions [30]. We cannot describe an objective reality, but only create subjective descriptions of our perceptions of experiences.

As investigators of social phenomena, we may find ourselves becoming entrapped in sociological reductionism, i.e. a focus on group processes, and political dimensions of problem spaces, to an extent which ignores individual uniqueness [31, 32]. No matter how powerless individuals may appear to be, they nevertheless possess a 'freedom' related to their ability to resist and reconstruct social structures.

Philosophical reductionism relates to perspectives from traditional systems thinking, which can be demonstrated to be non-inclusive or 'closed'. Here, system behavior is viewed as an emergent property of interaction between simpler elements within the perceived boundary [33, 15]. In this view, individual elements (including people) disappear, as they are subsumed into the perceived identity of the system [32].

Logical reductionism may arise from misguided assumptions related to classical binary logic [34]. Human reasoning is capable of dealing with complex uncertainties when expressing opinions (and thus multi-valued logic). If a person is asked a question, an answer such as, 'I am not sure' or 'it depends' rather than simply yes or no, is common. However, resultant data for analysis are frequently recorded into simple binary logic. Methods capable of keeping inconsistent or incompatible opinions in view until late in an inquiry are therefore needed in order to avoid such an outcome [35].

Systematic reductionism can occur when analysts try to manage uncertainty by attempting to simplify problem spaces into discrete predicaments, for which solutions may be sought [12]. Such systemic approaches risk incurring a well-recognized problem of sub-optimization [36]. In this paper, therefore, we focus on problem spaces as irreducible.

Any or all of the approaches described above may be valid perspectives on messy, organizational problems such as IS development. It is not the perspectives themselves we wish to highlight as problematic, but distortions arising from unquestioned assumptions based in any of them in isolation. In order to avoid pitfalls of a number of reductionisms, there is a need for contextual inquiry to bring about complexification. Diversity of opinion is a quality to be celebrated in the context of inquiry. A rush to achieve a consensus acceptable to all may screen out an important insight or novel idea which could have held the key to an informed resolu-

tion. In order to avoid philosophical reductionism, and to take into account unique individual sense-making processes within an organizational problem arena, we suggest there is a need for analysts to explore multiple levels of contextual dependencies [25]. Every observation which is made is made from the point of view of a particular observer [29]. Since it is not possible to explore a problem space from someone else's point of view, it follows that an external (professional) systems analyst can only lend support to individual actors within a given context to explore their own sense-making. If an organizational system as an emergent property of unique, individual sense-making processes and interactions within a particular problem arena, individual people are not then subsumed to become invisible. Each exhibit emergent qualities of their own, sometimes greater than those of the perceived system [37]. Efforts to overcome problems of reductionism have been a subject for IS research for some time. Some research [38, 39] focuses on organizational contingencies and contexts. In other work [40, 41, 7], interpretations in local contexts of individuals and groups is explored. [42], recognizing that there is no obvious or necessary consensus over requirements or objectives for an IS, suggest that user-oriented approaches should be adopted [39]. This is supported by work of e.g. [43, 44] and [45]. Contextual analysis and its relations to individuals, groups and teams are more pronounced in research on continuous development [46, 47]. This work represents a shift in perceptions of the role of a professional developer, away from that of designer of systems for other people to use. There is a transformation towards a facilitating role of friend, guide and helper 'loitering with intent' to support those people to create their own IS for meaningful use. This emphasizes ownership and control of (contextual) inquiry that must rest with the participating actors themselves, rather than professional analysts or managers acting on their behalf [24, 48, 9, 32].

3. Conclusion

Organizations, formed through the interactions of individual people with multiple perspectives on their working contexts, are arenas in which uncertainties and challenges must be addressed. Thus, at a micro level, within organizations, a need for robust decision-making can be seen. Systematic and holistic means are required to deal with systemic uncertainties. In the face of such perceived uncertainties, we must adopt new perspectives that draw on new concepts and utilize new analytical tools. Methods for IS analysis and design which focus unduly on software intensive systems may, we believe, lead to entrapment in unchallenged assumptions arising from reductionism in various forms. We believe inclusive, contextual approaches are the way forward. A particular challenge in relation to IS development relates to decision processes that involve a range of stakeholders with diverse interests. If IS professionals wish to achieve 'success' in supporting transformation or design of systems for meaningful use (human intensive systems), then unique

individual perspectives of these different actors need to be explored. There is clearly a need for approaches to supporting robust decision-making and design. We do not suggest that attention to IT artifacts, including software intensive systems, is not a relevant area for IS professionals to address. However, in this paper, we present an approach to inquiry which aims to overcome some problems of reductionism and provide support for people to address the complexities of human problem spaces with appropriately complex methods.

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