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IT artifacts during process-oriented field studies

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ABSTRACT

This paper examines how combining narrative research methods with an actor-network perspective is valuable for the process-oriented field studies that adopt an ensemble-view of technology. In response to a call by senior IS researchers to theorize the IT artifact, the paper draws on five premises previously identified as a basis for more seriously engaging such artifacts. The paper synthesizes actor-network theory and narrative methodologies to identify four key tenets that are useful for researchers who aim to show how and why information technology matters in our studies. In particular, through the concept of a narrative action-net readers are guided toward a method of operationalizing these five premises in their fieldwork.

Keywords

narrative, actor-network theory, action-net, IT artifact

INTRODUCTION

Recently IS researchers have critiqued the discipline's literature for its failure to substantively theorize the technical components of socio-technical systems (Alter, 2003; Benbasat and Zmud, 2003; Galliers, 2003; Orlikowski and Iacono, 2001; Weber, 2003). The technical has been called the 'IT artifact' by some (Orlikowski and Iacono 2001) and 'IT-reliant work system' by others (Alter, 2003) but the call from these senior researchers is unanimous - we must do a better job distinguishing IS studies from other social science disciplines (Benbasat and Zmud, 2003; Weber, 2003). Raising this issue has challenged IS researchers to reflect on past and current studies and consider the centrality of the non-human components of the systems they study. Orlikowski and Iacono (2001) identify five premises as a basis for beginning to address this weakness identified in our literature (summarized in Table 1). This paper continues the discussion of theorizing the IT artifact and proposes a way to operationalize the call through a methodological and analytical focus on 'narrative-action nets'. This concept results from the author's synthesis of actor-network theory and narrative methodologies and is meant to provide a framework for conducting information systems research that takes the IT artifact seriously.

Premise for theorizing IT	Researcher action
1 – IT artifacts are not natural, neutral, universal or given	Theorize about specific technologies with distinctive capabilities, existing in various contexts, understood in particular ways, used for certain activities.
2 – IT artifacts are embedded in some time, place, discourse, and community	Focus on how people engage with various technological artifacts in the course of their daily lives.
3 – IT artifacts are usually made up of parts requiring workarounds	Explain IT artifacts as multiple, fragmented, partial, and provisional. Study workarounds and forms of articulation work that enable people to make dynamically complex systems work in practice.
4 – IT artifacts emerge from ongoing social and economic practices.	Take into account emergent aspects of technological artifacts that arise as stakeholders engage with evolving artifacts over time and across a contexts.
5 – IT artifacts are not static or unchanging, but dynamic.	Follow specific artifacts over periods of time and highlight the changes occurring in the IT artifacts themselves.

Table 1: Summarized from Orlikowski and Iacono (2001, pp 131-133)

The phrase 'action-net' derives from Czarniawska (1997) who uses it as methodological shorthand for her actor-network perspective where individual stories as analyzed as representatives of ontological networks of interests:

"My study….took me about 14 months, 4 of which were directly in the field. During that time, a new city council was elected, which meant that I lost half of my interlocutors. Moreover, the neighbors also changed as a result of an administrative reform. The point is that I was not studying a community of city managers but an action-net of city management: interconnected acts of organizing." [p. 26]

The action-net concept is most valuable to information systems researchers because it supports a research goal of taking IT seriously:

"If, as IS researchers, we believe that information technology can and does matter-in both intended and unintended ways-we need to develop the theories and do the studies that show our colleagues how and why this occurs" [Orlikowski and Iacono, 2001, p. 132]

As a process-oriented field researcher, when I decide that my methodological and analytical focus will be 'action-nets - interconnected acts of organizing', it frames my thinking. No longer is my default perspective that I am following individual human actors over time, instead I seek out network of interests that underpin stories, I analyze the interconnectivity of stories as interests are negotiated, and I trace how some interests are made tangible through the design of artifacts.

The action-net concept is insufficient for accomplishing these goals during fieldwork in a systematic and rigorous manner. A crystallized understanding of actor-network theory coupled with a narrative methodology provides the basis for operationalizing the action-net approach - hence the term narrative action-nets. The narrative perspective that informs this study is commensurate with the idea that individual stories are delegates for networks of interests. This perspective results from my synthesis of Bruner (1990), Czarniawska (1998, 1997), and Boland and Shultze (1996a, 1996b) whose respective attention to narrative cognition, narrative as a method for understanding negotiation, and the stories inscribed within technology and standard work practices, raises awareness of the multiplicity of interpretations constituting research contexts. In this way narrative data helps the researcher see multiple stories, emphasize the interconnectivity of those narratives, study their impact on coordinated action, and analyze how coordinated actions are supported and achieved.

BACKGROUND

The cornerstone of this work is grounded in research that conceptualizes IT artifacts, such as software products, as needing to be negotiated into an ontological network of interests before such artifacts can be considered a working information system (Scott and Wagner, 2003). Orlikowski and Iacono (2001) classify such intensive research studies as adopting an "ensemble view of technology" where the IT artifact is an integral and equal part of the socio-technical system but is not its sole driver. They argue that although research adopting the ensemble view of technology has received limited publication in the top academic journals of our field to date, this perspective has potential to add to our field by offering a mature conceptualization of IT artifacts (p. 125).

Given that ensemble view research 'will help develop our understanding of either how technology comes to be or how it comes to be used' (p. 126), it is valuable to begin a discussion about how we might best operationalize such studies and communicate findings in a way that is palatable to the IS audience.   The distinction between studies that focus on how IT artifacts come to be designed versus how they come to be used is a useful classification for labeling seminal and state of the art ensemble-view literature. The authors attribute studies of the first kind to work done in the style of Bruno Latour. His actor-network approach focuses on the ways in which artifacts are achieved before they can be taken for granted as an organizational matter of fact (Latour, 1999). Whereas ensemble studies that emphasize how technologies come to be used in particular contexts derive from social informatics and the work of Rob Kling which illuminated the ways in which technologies inform (and are informed by) social contexts.

NARRATIVE ACTION-NETS

Focusing on narrative action-nets are particularly useful for such research because the approach provides a powerful method for theorizing technologies in context as they are designed, introduced, shaped, and reshaped over time. Narrative action-nets connect individual stories, experiences and actions to social events, processes, and organizational achievements by applying actor-network theory (ANT) in the field over time (Scott and Wagner, 2003; Wagner, 2003a). In order to further discuss these ideas the section is organized in four main parts each relating to a key tenet for studying IT artifacts using a narrative action-nets approach. I do not spend time in this paper reviewing state-of-the-art narrative research in the field of information systems because it has been done so elsewhere (Wagner, 2003b). Instead the narrative methodology is illuminated through the description of narrative action-nets. Each tenet is handled in turn and is described in order to respond to Orlikowski and Iacono's call to action presented in section one. Finally, table two illustrates the relationship between the five premises for theorizing the IT artifact and the narrative action-net approach described herein.

Working with technology: give voice to actors

As information systems researchers we are presented with recalcitrant objects of study: human beings who cast doubt on the ability to access 'objective truth and reality' through their language, symbols and actions (Latour, 1999c), and non-human artifacts imprinted by human fingerprints during design and often black-boxed from analysis until there is a breakdown. As such, interpretive researchers seek to understand the process of sense-making as situations emerge and are made meaningful by individuals and groups (Scott, 2000). The first two premises for theorizing technology call on us to prioritize the non-human components involved in this sense-making process by adopting a perspective that challenges IT artifacts as natural, neutral, universal or given (premise 1), and begins to study these artifacts as embedded within particular temporal and spatial contexts (premise 2). How though do we realize these perspectives in practice?

As humans engage with particular technological artifacts their interests co-mingle, fusing together to create hybrids or action-nets where the distinction between the social and the technical can often be unclear. How do we write about the perspectives of non-humans during a certain period in time in order to theorize these artifacts and their roles within a work system? I find it useful to 'give voice' to non-human actors such as specific software components, a particularly problematic management report, a pressing deadline, all of which reflect particular values and politics and represent an 'epistemological ordering' (Scott, 2000) that can influence the future of work activities. For example, the Y2K system changeover was a pressing deadline in many organizations who were modernizing their IS at the end of the 20th century. In one study, the changeover deadline became a powerful actor embedded within an enterprise resource planning (ERP) project that was running gravely behind schedule. Despite the powerful interests of human stakeholders to install the ERP product with full system functionality, the January 1, 2000 calendar date became a delegate for managing risk, ensuring organizational governance and securing operational activities in a way that it would not have if the temporal context had been different. As a result, the Y2K 'drop dead date' reordered the importance of end-user functionality as 'non-essential'. This decision set in motion a series of events that allowed the financial ERP module to be customized in a way that might not have occurred had the ERP product as a whole been perceived as complete at the time of installation (Scott and Wagner, 2003).

Narrative data is particularly helpful when adopting a broad sense of agency to include both human and non-human actors because stories highlight the artifacts with which humans are connected. Individual stories of negotiation speak on behalf of a network of interests and highlight, either through omission or negative appropriation, the conflicting agendas that are at work. An individual's account of change when viewed from an actor-network perspective is interpreted as a delegate, or spokesperson for a particular set of interests. Not only should the researcher interpret visionary stories as an expression of personal perspective, but should seek out the extent to which this visionary narrative is repeated time and again within the narratives of diverse actors. For example, the promises made by software vendors related to their 'product solutions' or the rhetoric of CIO's seeking support for their newest IT-based initiative are political narratives that aim to ensure a desired outcome. If we agree that it is only through coordinated action that change takes place (Boland and Tenkasi, 1995), then it follows that the appropriation and re-telling of a particular narrative is an expression of affiliation; a 'connecting up' to a powerful group of interests which in turn helps to perpetuate a particular network. It is this interpretation language as a tool for conveying particular agendas or understanding of context that focuses data analysis and helps researchers have the eyes to see the ensemble view.

Most importantly for IS researchers is the ways in which this network perspective gains momentum through the inscription of interests into material objects such as a software development contract, project office space, seed funding, and software code. These non-human actors are delegates that work on behalf of a particular perspective in order to translate the interests of conflicting network interests and thereby perpetuate the stability of one vision.

Viewing the ensemble: relate narratives to inscriptions of interest

The fourth and fifth premises focus on "the emergence and evolution of IT artifacts as complex and changing technosocial processes existing in time and over time" (p. 132). From a narrative action-net perspective there is no optimal moment in time for research to begin because the primary analytical focus is on how technologies come to be and be used over time. For example, valuable IS longitudinal field studies have begun at different and interesting moments in history - perhaps during negotiations related to IT-dependent business transformation, at the signing of a software development contract, or the 'flipping of the switch' as a new system goes live - each offers a legitimate starting point for process-oriented research. We seek out the formation of a group – or action-net - that connects up the interests of multiple actors. This network is constituted by the relationships between these actors and indicates that other groups are being dismantled as a result of this particular enrolment. For example, the signing of a development contract with a single software vendor represents the strengthening of one network and a weakening of other interests with preferences for a multi-vendor approach or the upgrading of legacy systems. If this is our starting point, then what is relevant is how this decision enables and constrains certain future scenarios both in terms of organizational transformation and IT design.

As Latour says 'let us study the bombardment of offers for contradictory social groups because by sitting at the controversy of group formation we can compare group making to group making' (Latour, 2001). I argue that it is this act of comparing that is most valuable for theorizing how technologies evolve over time because it directs the researcher's gaze to specific controversies where options come to be (or fail to be) designed into the artifact. Unfortunately the application of actor-network theory by IS researchers has historically tended to construct management-centric analyses that imply a single trajectory of technological development (Walsham, 1997). The narrative action-nets perspective seeks out multiplicity through the collection of narratives belonging to competing ontological networks - doing this highlights the bombardment of offers.

Narratives illustrate different networks translating artifacts in an attempt to enroll them as representatives - delegate actors – speaking on behalf of their interests. Introducing IT components into most contexts may induce a dramatic shift to the artifact itself, as well as organizational culture in terms of business practices, membership, reporting structures and professional identity:

"By following specific artifacts over periods of time, it should become clear that changes occur not only in the social, behavioral, and economic circumstances within which the artifacts are embedded but also the changes that are constantly occurring in the IT artifacts themselves" (Orlikowski and Iacono, 2001; p. 132).

During such change processes individuals are encouraged to coordinate their thoughts, actions, practices and goals so as to be attentive to the interdependencies of the community (Boland, Tenkasi and Te'eni, 1994). If IS researchers are willing to move beyond analyzing and representing individual narratives gathered during a moment in time, narrative action-nets have the potential to provide a powerful vehicle for accessing how such coordinated outcomes are (are not) supported and achieved over time (Boland, 1991; Bruner, 1990).

The creation of one group over another is an act of enrolment and a translation of interests: a process that illuminates the back and forth transformation between collectives of human and non-human actors (Latour, 1999a). Following acts of translation provides insight into how individuals and groups negotiate for the dominance of their preferred work practices, ordering of the world, and pace of activity. Translation is a process of reordering the dominant organizational landscape and cycles of activity by making decisions about 'what will be carried forward into the future and what will be left behind to make room for the new' (Latour, 1999a, p. 71). This transformation is a key principle of actor-network theory where translation results

in the formation of an ensemble of interests both similar and different from the past. For example, in a recent study within an Ivy League university the narrative action-nets approach gave me the eyes to see the emergence of newly formed IT artifacts (premise 4) that resulted from a dynamic change process (premise 5). I found that creating an information system, accepted and used by all organizational groups, requires not just the thoughtful consideration of who to involve in the implementation (c.f. Mumford and Weir, 1979 on user participation) but when to involve these groups (Wagner, 2003a; Scott and Wagner, 2003).

Despite attempts by the project team to involve faculty members in the requirements definition for an enterprise-wide software application, faculty were uninterested until the application was installed and their work practices were dramatically impacted. The failure of the project team to engage faculty and translate their interests meant that the business-oriented team members designed grant accounting functionality based on popular corporate budgeting techniques that were directly at odds with faculty accounting methods. It was only during the 'use phase' of the project life cycle that faculty interests surfaced through narratives of betrayal and demands for design modifications. I had been following the ebb and flow of multiple socio-technical interests over time and was able to theorize the emergence of a hybrid information system that resulted from post-installation customization efforts involving both faculty and project members. This hybrid system was both different and similar to the application designed by the project team in the year prior (premise 4).

**Following interactions: narratives point to IT artifacts of many sizes**

Not only does the narrative action-net perspective seek out a broad sense of agency, but it encourages researchers to find and describe relationships between actors of varying size and proximity to the focal point. Two of the premises for theorizing IT highlight the limitations of research that black-boxes the nature and status of artifacts both in terms of constituents parts that must come together in order to create the artifact under investigation (Premise 3), and particular social and economic contexts the relevance of which may evolve over time (Premise 4). In order to prioritize the nature and status of IT artifacts one must show the relationships between actors without setting an a priori boundary on the scope of the research context. For example, in traditional sociological studies the millennium bug might be studied as part of a worldwide research project on contemporary Western society at the turn of the century, whereas a particular management report, of interest only to a small group of actors within a single organization, might be the subject of a locally situated case study. However when adopting a narrative action-net perspective these issues are connected and afforded equal status if human actors express their agency in storytelling.

A critique of actor-network theory is that its conceptual apparatus produces analyses that privilege micro-level negotiations but fall short of explaining the dialectic between macro-level societal structures and these negotiations (Winner, 1993). In response to this critique Latour (1999b) has argued that the foundations of ANT are based on tracing relationships between actors rather than on their relative size – or scale. For example when studying accounting practice within a prestigious US university, the narratives of actors should determine the action and transport the research focus. US society becomes an actor within the study only when and if interviewees define it as such. It is not interpreted a priori as the macro-level structure that influences local action but rather is a resource employed by delegate actors. Producing an analysis able to transport the reader between traditional levels of sociological inquiry is particularly powerful because it illuminates how the agency of seemingly global and distant actors like Y2K interpenetrate across actor-networks and are present in local negotiations.

Leaving the unit of analysis open means that researchers constrain their field study in terms of the concepts and vocabulary of ANT but do not predefine what they will describe and analyze – this instead is born out of the narrative action-net method. The narrative data are constructed accounts of negotiation and change and focusing analysis on highlighting multiple stories, emphasizing the interconnectivity of narratives, and understanding how coordinated actions are supported and achieved (or not) makes these action-nets visible. Traditional sociological analysis might classify these three events as adopting a macro (VP), meso (project), and micro (faculty) level focus. Instead, I argue that the global, collective, and local negotiations are connected as a result of relationships under investigation.

A comparative example is drawn from Latour (2001) who relates levels of analysis to a Russian doll where increasingly smaller versions are hidden inside the shell of the 'macro-doll' and each level of analysis is considered separately from the

other. In such a research project the scientist might study the algorithms constituting the accounting module of enterprise resource planning (ERP) software. This is visually represented in Figure one. In contrast, actor-network researchers view the world as flat where connections between actors circulate within and over time (Latour, 1999b). As such researchers attempting to understand how software such as ERP comes to be and be used as an accepted matter of fact would be interested in 'chains of transformations' that link the accounting categories to the trend for ERP within Western companies. Having said this we recognize the difficulty in expressing connections as if we lived in a 'flat world'. It is at times necessary to employ language (global, collective, local) that might traditionally be associated with isolated levels of analysis.
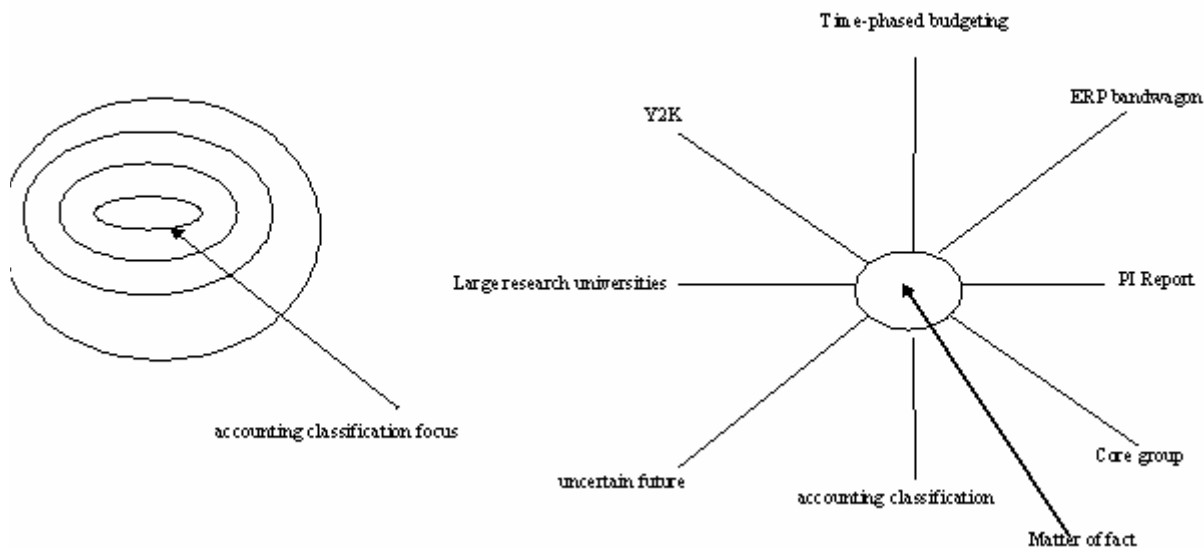
Figure 1: Levels of analysis versus chains of transformations

This perspective is commensurate with the ensemble view of technology where IT artifacts are seen as an integral part of a socio-technical network of interests situated within time and space. When interpreting the third premise from an ensemble perspective it is equally important for researchers to be able to sum up to at collective action-net and be able to 'let go of a monolithic view of technology...recognizing that technologies do not provide the same material and cultural properties in each local time or context of use' (Orlikowski and Iacono, 2001; p. 132). The information system that becomes localized within a context of study represents a "summing up of interactions through various kinds of devices, inscriptions, forms and formulae, into a very local, very practical, very tiny locus" (Latour, 1999a; p.17).   In this way when researchers move along a chains of transformations they are shifting frames of reference but always holding these frames in relation to one another in order to emphasize the process of change and order that occurs over time (Latour, 1999b).

Creating a working information system: relating narratives to a negotiated order

The interconnectivity of narratives illustrates significant events and emphasizes multiple agencies of change and order that provide a non-linear account of negotiation. The creation of an information system represents an 'achievement of order' in which the ensemble has managed to create an organizational matter of fact. However, as stated in the premises for theorizing IT any such achievement of stability will be 'provisional and will most likely have resulted from workarounds enabling people to make dynamically complex systems work in practice' (Premise 3). Creating and maintaining such negotiated order requires just as many (if not more) resources to conscript users into the system and away from alternatives like Excel-based shadow systems, and the data derived from such customized artifacts.

Therefore, while the value of a narrative action-net perspective begins in multiplicity, it must conclude with an analysis of the extent to which a stable information system is achieved. The approach seeks to present a narrative landscape that illustrates

not only significant events that occur over time but also how these disruptions are progressively repaired or neutralized. I argue that actors use narrative to express shared meanings amongst community members, but as complexity increases and change involves multiple functional groups; it becomes more difficult to rely on consensus across narrative accounts. Rather, during change processes individuals and groups are forming interpretive procedures that help them evaluate and judge the increasingly uncertain and complex organization. As Bruner (1990) notes, narrative accounts can be analyzed in order to reveal the ways in which communities create an integrated environment despite conflict:

"It is probably the case that human beings forever suffer conflicts of interest, with attendant grudges, factions, coalitions, and shifting alliances. But what is interesting about the fractious phenomena is not how much they separate us but how much more often they are neutralized or forgiven or excused." [p. 95]

Over time, those actors that are able to negotiate a voice for themselves and get written into the IT artifacts are able to shape its boundaries. Despite the legitimization of certain narratives, actors whose voices are in conflict with the IT designs often become recalcitrant, choosing to remember that which has been deemed unimportant. I argue that the extent to which this recalcitrance is ignored, limits the achievement of order. The coordinated action required during IT enabled change initiatives means that actors confront an intense pace of work and must negotiate multiple and conflicting perspectives, priorities, and deadlines if a socio-technical ensemble is to be accepted and used. It is through narrative accounts that actors articulate their situated understanding of these negotiations and how they relate legacy work practice to future operating environments. A narrative action-net approach is concerned with crafting an analysis that illustrates this transformation by highlighting the interconnectivity of detailed negotiations over time.
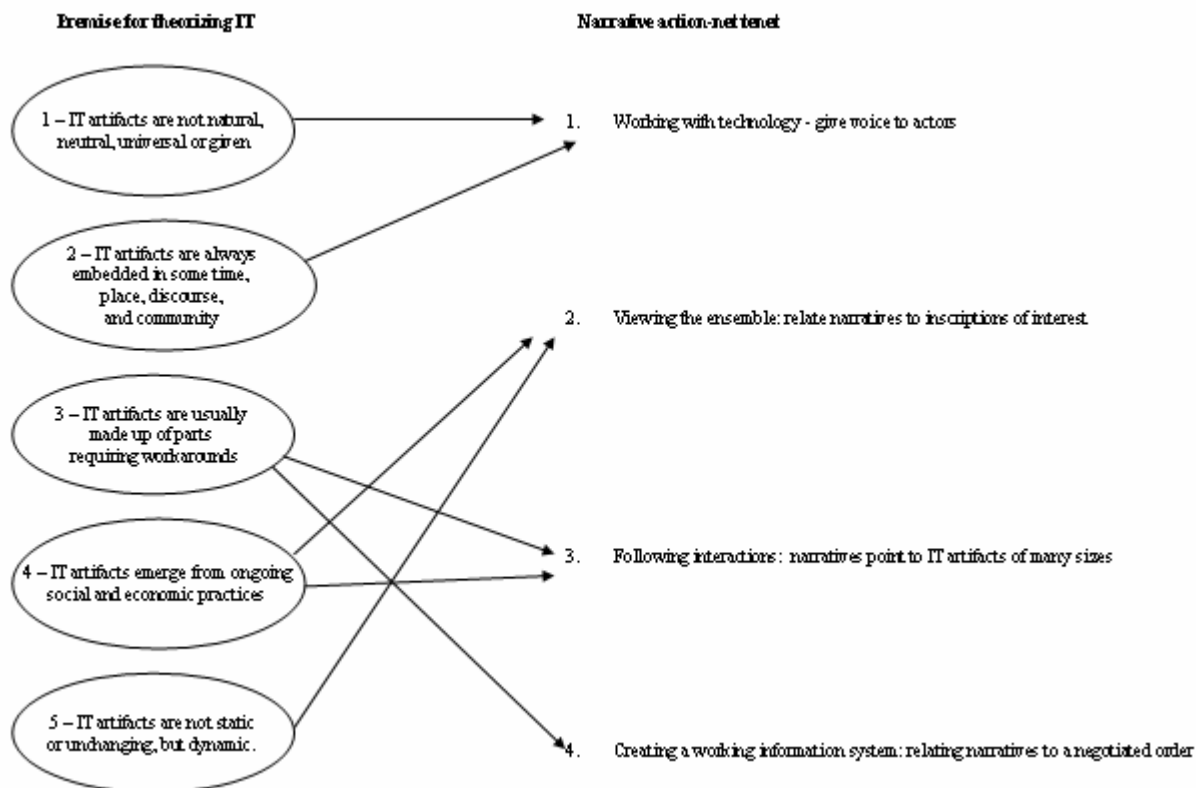
Table 2: Relationship between the 5 premises and 4 tenets of narrative action-nets

CONCLUSION

This paper proposes narrative action-nets as an approach that will help soften what I interpret to be an increasingly artificial boundary between IT design and use. A more fluid research scope that transitions between traditional boundaries of the IS life cycle is becoming increasingly important as organizations choose to buy enterprise-wide software packages because IT artifacts enter organizations with standard, rather than bespoke designs that impact the entire organization rather than one functional unit. These artifacts can be modified by multiple parties whose agendas will change over time and may conflict with other functional areas (Scott and Wagner, 2003). Achieving coordinated action across groups for the entire life of an information system is challenging and insights can be gained when we follow the socio-technical ensemble as it is iteratively (re)designed. This fluid approach is in keeping with Benbasat and Zmud's (2003) call for research that focuses on the relationships between the IT artifact, its use, and impact on practices and capabilities.

Attending to narrative accounts of change emphasizes the multiple voices of actors as they work to regain an ordered state where interconnectivity and coherence exist despite conflict. Actor-network theory is a theoretical apparatus for understanding 'change and order'. As such, when it is applied to field research through the action-net concept, ANT help highlight the controversies and connections involved in forming, transforming and transporting socio-technical ensembles networks over time. Foregrounding the interconnectivity of narratives highlights the multiple histories involved in crafting organizational reality and provides an opportunity for us to understand the complexity of computer-mediated change efforts before this multiplicity becomes silenced beneath the one, official record of the initiative. By doing so, we gain insight into how human actors work with IT, and the ways in which choices made during one moment in time can impact later opportunities if such perspectives are designed into or out of material objects. I suggest that focusing on the narrative action-nets over time presents IS researchers with an opportunity to analyze the flow of events differently and explore the ensemble view of technology through a new lens.

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