Enterprise Information Systems as Objects and Carriers of Institutional Forces: The New Iron Cage?

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Enterprise Information Systems as Objects and Carriers of Institutional Forces: The New Iron Cage?*

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Abstract

This paper draws upon the institutional theory lens to examine enterprise information systems. We propose that these information systems engender a duality. On one hand, these systems are subject to institutional forces and institutional processes that set the rules of rationality. On the other hand, they are an important embodiment of institutional commitments and serve to preserve these rules by constraining the actions of human agents. The complexity inherent to enterprise technologies renders them an equivoque. This, when combined with the propensity toward lack of mindfulness in organizations, is likely to lead to acquiescence to institutional pressures. Enterprise information systems bind organizations to fundamental choices about how their activities should be organized; unquestioned choices that tend to appear natural. We suggest implications of this view and develop propositions examining: (1) enterprise information systems as objects of institutional forces in the "chartering" and "project" phases, (2) the resolution of institutional misalignments caused by the introduction of new systems, and (3) enterprise information systems as carriers of institutional logics in the "shakeout" and "onward & upward" phases.

Keywords: New institutional theory, Isomorphism, Enterprise Information Systems, Sensemaking.

Introduction

Recent years have witnessed the proliferation of computerized systems in business organizations with growing use of off-the-shelf packaged applications that help automate organizational workflows. These applications are often minimally customized to the specific needs and context of the organization. Implementing such enterprise technologies has been a source of great challenge for enterprises, resulting in a high incidence of failure (cf. Bingi, Sharma and Godla, 1999; Robey, Ross and Boudreau, 2002). There is a clear need for understanding the reasons for such failures. Data on Enterprise Resource Planning (ERP) package implementations collected by the Meta Group suggests that the average implementation cost $10.6 million and took 23 months to complete. In addition, companies spent an average of $2.1 million on maintenance over a two-year period. Companies indicated an average ROI <u>loss</u> of $1.5 million over a six-year period (Stein, 1999). In spite of the substantial investment and length of time needed to implement ERP systems, companies have generally proceeded to implement ERP without a rigorous financial case (Umble, Haft and Umble, 2003).

The business impact of ERP implementations has also been mixed. For instance, a study of implementations in Swedish companies showed that, while modules supporting the customer order process and financial management were most frequently implemented, the performance outcomes related to these areas (on-time delivery, inventory levels and cash management) were among the poorest (Olhager and Selldin, 2003). This evidence points to underlying problems in the organizational decision-making with respect to enterprise technologies. However, very few studies have gone beyond looking at implementation to tackle issues related to longer-term usage and the impacts of these technologies on organizations. This paper uses the institutional theory lens to generate fresh insights that may help organizations better understand and manage these technologies.

Enterprise information systems (EIS) refer to organizational implementations of commercial software packages that enable the integration of transaction-oriented data and business processes throughout an organization (Markus and Tanis, 1999). These systems cut horizontally across the organization while standardizing business processes. A core benefit promised by these multi-user systems is the seamless integration of information flowing through the company--financial and accounting information, human resource information, supply chain information and customer information (Davenport, 1998). However, these systems also embody institutional logics.

Human interaction with information technologies is typically habitual. Regularities begin to emerge as an individual interacts over time with a technology. Continued use results in the reenactment of the same "technology-in-practice" so that over time it becomes taken for granted (Orlikowski, 2000). Robey et al. (2002, p. 27) point out how enterprise systems cause people to become entrenched in ways of thinking and to try to reinstate "what they had done in the past, even workarounds." In the case of EIS, expected reenactment gains even more leverage as different users work with the technology interdependently. It becomes even more difficult for an individual embedded in this actor network to use technology differently from the way others expect him or her to use it based on past behavior. Thus, greater stability is expected in the work practices of the users and how they engage with the information system.

Over time, such patterns of use become institutionalized and predetermined and form prescriptions for social action, impeding change (Tyre and Orlikowski, 1994). Institutionalization occurs whenever there is a reciprocal typification of habitualized actions by types of actors (Berger and Luckmann, 1966). EIS facilitate typified actions as well as typify actors and are available to various members of the organization, thus aiding in institutionalization.

Enterprise technologies are configurable tools. They provide designers with the possibility of defining a wide array of local properties and enacting a wide variety of technologies-in-practice[1] (Orlikowski, 2000). But, institutional contexts shaping how these technologies are configured and deployed may lead to less variety in practice. A formal blueprinting process, including design and validation of system templates, is an important activity in the creation of enterprise systems (Berinato, 2003). The extent to which organizations want to interconnect their enterprise systems with other organizations and ensure interoperability across platforms will lead to tighter coupling across artifacts and further restrict the extent to which these systems can be idiosyncratically configured by any one organization. Also, these systems typically involve a formal training process that familiarizes employees with specific patterns of system use before they go online. Further, there are established ways of organizing ERP technology implementations that are embedded into the documentation, existing installations, experience, competence, and practices of the "development community" (Hanseth, Ciborra and Braa, 2001). The application software constrains users into specific modes of interaction that may not be the ones preferred by individual users. With SAP, for example, information provision processes often take longer and require navigation among a series of several screens, whereas the same processes with legacy applications may have taken only a single screen to complete (cf. Pliskin and Zarotski, 2000).

Finally, while the software underlying these systems can typically be configured to accommodate different business processes, the vendors of the software (e.g., SAP, Oracle, JD Edwards etc.) provide configurations that reflect blueprints for "best-practice" processes. Vendors argue that using these economizes on the cost of configuring the software and improves upon the efficiency of existing work processes. Consequently, organizations face pressure to conform to these "best practices." Jackson Laboratory, a non-profit, genetic research facility that supplies about two million mice a year to universities, medical schools, and research laboratories is a case in point. Jackson faced a unique technological challenge in tuning the new system to accommodate the processes of raising and supplying mice to researchers (Katz, 2001):

> *Jackson's IT processes in raising the mice must fit very precise genetic-research needs. By a specified date, a researcher would typically require, say, a seven-week-old mouse and have no use for an eight-week-old one. In fact, researchers would regard the two mice as "different products". That situation doesn't fit neatly into the discrete Oracle Process Manufacturing (OPM) modules that are part of the Oracle 11i product suite the lab uses for its ERP. OPM was designed for*

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[1] We distinguish between enterprise technologies and enterprise information systems. The latter refers to "technologies-in-practice" representing specific organizational appropriations of the generic technology that supports most aspects of an enterprise's information needs. Enterprise Resource Planning (ERP) packages, from vendors such as SAP, Oracle and Peoplesoft, represent a typical example of enterprise technologies.

> *companies that mix ingredients together to produce products like bread or beer but at Jackson, the batch doesn't end – it is constantly evolving. In the end Jackson ended up modifying certain fields in the OPM product not originally intended for such a purpose to accommodate the information about the processes of raising and distributing the mice.*

Similarly, other organizations have reported facing severe challenges in adapting ERP packages to their specific contexts. Footwear company Aerogroup dropped the apparel/footwear industry solution of SAP half-way through the implementation due to its inability to model the uniqueness and complexities of the footwear business (Soh et al., 2003).

These packages can be similarly constraining for end-users. One person, caught in the throes of a new enterprise information system, provides a stark illustration of the potential for information technologies to control organizational actors and their activities – it is strongly reminiscent of the Weberian iron cage:

> *To the tens of millions of Americans whose lot it is to stare into video terminals for most of our waking hours, each new system is more confounding than the last, and each new product strips away many of the advantages of the previous system….The reaction of the clueless masses is to grumble and crack wise and then meekly accept the commands of our techie masters. My boss says she has one more change of systems in her before she is so diminished as a human being that she will have no choice but to retire. One of my most intellectually keen colleagues was reduced to incoherent babbling on the screen…with each advance in technology, I believe that I have lost a significant chunk of my personality, some measurable portion of my soul.* (Fisher, 2003).

Max Weber argued that the rationalist spirit had become an iron cage under which humanity was imprisoned. He contended that this spirit fostered by capitalism, would lead to irreversible bureaucratization of organizations. Barker (1993) has theorized that bureaucracy constitutes an iron cage that enables organizational control, and it appears that information technology has come to occupy a similar role in enabling systems of control. The institutional theory lens provides valuable insights on how enterprise information systems serve as objects and instruments through which control is manifested.

Institutionalization refers to the rule-like social fact quality of an organized pattern of action (Zucker, 1977) that leads to an "infusion of value beyond the technical requirements of the task on hand" (Selznick, 1957). Zucker (1987) delineated two views of institutionalization--the organization as the institution and the environment as the. In the former view, the process of institutionalization creates stability by enabling the persistence of norms and beliefs. The latter view recognizes that organizations must compete for political power and institutional legitimacy to ensure their survival. Institutionalization provides gains to the organization due to the reduced information processing needed because expectations and behavior are stable (Weick, 1976). While early institutional theory focused on homogeneity and persistence, more recent work (e.g., Goodrick and Salancik, 1996) has also recognized institutional change and how institutional entrepreneurs create and empower institutions. Institutional theory is not inconsistent with change--"jolts" may occur to destabilize existing practices (Meyer et al., 1990). However, once an idea is fully institutionalized it may survive across generations,

uncritically accepted as the definitive way of behaving (Tolbert and Zucker, 1996).

In the information systems literature, Kling and Iacono (1989) point out the need to conceptualize computer-based information systems in terms of both their institutional characteristics and their information processing characteristics. Institutional characteristics may effectively support routine activities but hinder substantial innovation. They suggest that the rhetoric of innovation generally associated with computerization ignores the social and technical commitments and historical patterns that continue to shape the future. Prolonged use of an information system may even lead to "legitimized" elements that outlive the demise of the system.

Industry evidence also supports that EIS cause institutionalized routines and mindsets to persist over time despite changing business imperatives. A study of the collapse of WorldCom Inc. suggests that a contributing factor was that the company had become accustomed to a business environment with little need for efficiency. This, in turn, was reflected in its information systems that were not geared to change in response to new requirements in a changing environment (Krim, 2002):

> *As business slowed, WorldCom needed to dramatically cut costs and improve efficiency -- not something the company was built to do….Bringing costs and revenues into balance proved difficult when many of the most basic systems to control costs were absent or ineffective at WorldCom.*
>
> *"Groups purchase new equipment without verifying whether the equipment is already in inventory," according to an internal audit report for 2001. "The purchasing system does not require that inventory be checked. . . . In December 2000, $10 million in new equipment purchases was processed without existing inventory review. A sample of these purchases indicated unnecessary spending of $2 million to $3 million . . . on fiber patch cords alone."*

While the WorldCom situation illustrates how EIS embody institutionalized rules and norms and cause them to persist, there is also empirical evidence showing that institutional forces impinge on decisions related to the development and deployment of these systems.

Recognition that institutional elements can constrain change is likely to alert organizations to the possibility that individuals may be committed to "set" ways of interpretation and types of action. Their behavior may become an undeniable and unchangeable aspect of their world that drives their sensemaking. This paper seeks to uncover the ways in which EIS may covertly make workers vulnerable to these constrained cognitive frames.

We pose three research questions drawing upon the institutional perspective: (a) How do institutional forces affect the configuration of enterprise technologies in organizations? (b) How does the resulting system influence the organization's earlier institutional commitments, and (c) How does the new system contribute to the preservation of the institutional frames?

Our theory development broadly applies to implementations of packaged application software that is 1) used by multiple roles across the organization, 2) instantiates workflow components, 3) has pre-configured workflow, usage and interaction patterns,

and 4) spans multiple functional areas. This paper presents integrative models that delineate the phenomenon of new enterprise information systems adoption, implementation, and usage from an institutional perspective. We divide this process into two main sections – the inscription phase, where the organization is subject to institutional forces that influence specific trajectories of adoption and configuration of the adopted package; and the enactment phase where the new EIS now constrains the activities of the organization and shapes the cognitive processes of members. We map these two phases to the four stages of enterprise systems implementation (figure 1) identified by Markus and Tanis (2000). Between these two main phases is the process of resolution of institutional misalignments. It is particularly important for organizations to manage the potential conflict between the incumbent institutional regime and the institutional logics embedded in the new system.
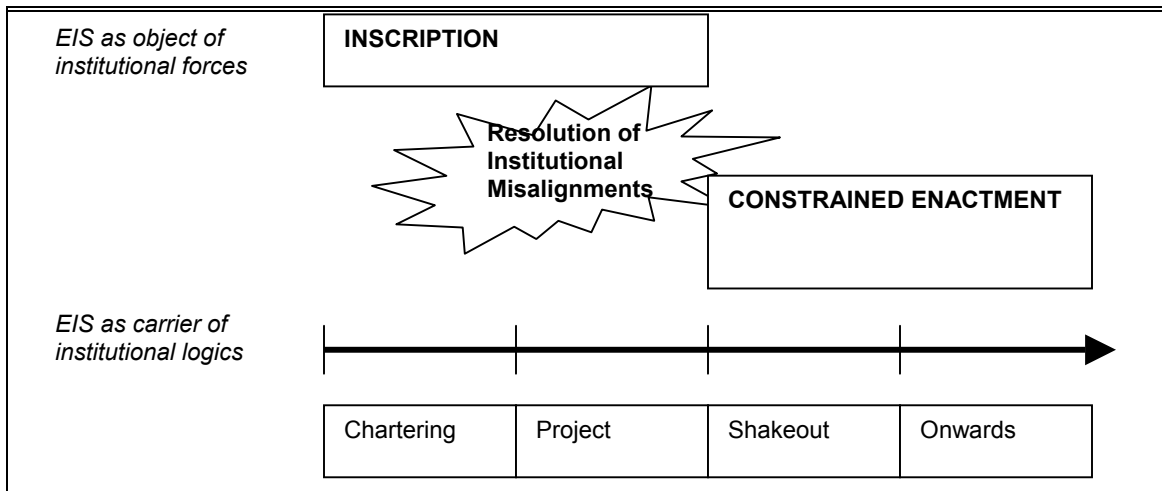
Figure 1 - Conceptualization of phenomenon

This distinction between the two phases maps to the model used by Orlikowski (1992) that considers two modes of interaction between actors and technology – the *design mode* and the *use mode*. The level of analysis for this paper is the organization or business unit that implements the enterprise technology.

This rest of the paper is organized as follows. In the following section we develop theoretical models conceptualizing EIS as objects and carriers of institutional forces. We begin by arguing that complex enterprise technologies are an equivoque and create problems in sensemaking for organizations. Further, organizations are prone to a lack of mindfulness. We then draw upon this view to develop propositions related to each of the two facets (carriers and objects of institutional forces) and related to the reconciliation of institutional conflicts. In the last section, we discuss implications and outline directions for future research.

Theoretical Models and Propositions

In this section we develop theoretical models and propositions based on neo-institutional theory. We begin by characterizing enterprise technologies and organizational sensemaking to suggest the viability of this perspective.

Enterprise Technologies as an equivoque

Weick (1990) suggests that new technologies, such as complex production systems that use computers, create problems in sensemaking for managers and operators. The problems arise as they deal with failures that are incomprehensible because much of the technology is concealed from view, limiting the mental models that people can work with. This creates the possibility of a disconnect between the technology being applied in the organization and its conceptualization by managers and decision-makers:

> *"Parallel technologies involving a technology in the head and a technology on the floor… Each is self-contained. Each is coordinated with the other intermittently rather than continuously. Each corrects the other discontinuously."*

We use the term equivoque to refer to the technology that admits several possible and plausible interpretations and creates the possibility of misunderstandings, complexity, and uncertainty. This occurs because newer automated technologies impose   (1) Stochasticity: randomly occurring and unpredictable "important events," (2) Continuous events: causing continuity and reliability to become important concerns with high levels of interactive complexity, and (3) Abstract events: that require interference, imagination, integration, problems solving, and mental maps to monitor and understand what is going on out of sight.

ERP vendors have only fairly recently started introducing tools to enable sensemaking in the light of the fundamental complexity of these systems:

> *Characteristically, ERP systems are difficult to either upgrade to reflect changes in a business or modify to augment business-related practices. As part of its new product strategy, J.D. Edwards introduced ActivEra, a software suite the company hopes will help overcome these barriers. The company sees ActivEra allowing users to change capabilities of its OneWorld product and the SCOREx supply chain solution after implementation. The software suite includes three components: the ActivEra console, business and technology activators and extension architecture. The console provides users with a window to see the actions required to implement changes.* (Tiazkun, 1999).

Enterprise systems are problematic for sensemaking, as perception and intuition are developed through action. As Weick (1985) suggests – "How can I know what I think until I see what I say?" The integrated nature of enterprise systems precludes experimentation with these systems to develop intuition. In addition, the abstract nature of these systems makes it difficult for users to ascribe material and symbolic properties to them. At the same time, the systems may be configured in a bewildering variety of ways – as many as 8,000 "switches can be flipped" to manipulate the performance of the software (Deutsch, 1998).

Case studies of ERP implementations suggest that these technologies have the characteristics of equivoques. Enterprise technologies are characterized by product immaturity, multiple and overlapping product trajectories, constant need to upgrade composite components, and multiple products in flux. In addition, the implementations involve multiple stakeholders with different assumptions and perceptions, and multiple effects for different organizational groups. Further, vendor information may often be

loosely specified – "two enterprise software packages that comply to the same standard may still not operate well together" (Sawyer & Southwick, 2002, p. 268). This poses increased uncertainty and complicates analysis for the organization.

We propose that since enterprise systems pose stochasticity, abstract events, and imperatives for continuous processing, they reduce meaning, control, and predictability. This means that workers understand neither the nature of these systems nor the causal linkages related to configuration parameters, thus making organizations susceptible to institutional forces.

Organizations Susceptible to Lack of Mindfulness

Organizations must make problematic decisions about enterprise technologies involving cross-module integration, data standardization, compressed implementation schedules, and the involvement of large number of stakeholders (Soh, Kien and Tay-Yap, 2000). Due to active agency, organizations may respond differently to the institutional pressures surrounding the enterprise systems. Weick et al. (1999) propose that a reluctance to simplify interpretations, a commitment to resilience, and a preoccupation with failure are indications of mindfulness in organizations. The simplification of behaviors, on the other hand, can lead to homogeneous and bandwagon-like collective beliefs and behaviors (Miller, 1993). Once enough individuals start doing things a certain way, the processes become taken for granted and engaged-in with little reflection (Berger & Luckmann, 1966).

We propose that this combination of the equivoque nature of information systems and the susceptibility toward lack of mindfulness in organizations, renders them vulnerable to institutional forces.

Institutions are patterns of social activity that give shape to collective and individual experience (Bellah et al., 1991) and influence how individuals behave and relate to others. Organizational institutions may encompass organizational identities, structures, and activity routines (Meyer, 1994). EIS, in their chartering and project phases, are subject to institutional pressures to conform. These institutional pressures may be conveyed into the public domain as regulations, or into modernized society as professional or scientific analyses, or in the models set by exemplary organizations (Meyer, 1994). Besson and Rowe (2001) –believe the "interpretative schemata of the designers are to a certain extent based on social considerations," indicating that institutional pressures impinge on enterprise system design choices. Caldas and Wood (1999) use the case study of LVR to depict the seemingly "natural" case for an ERP solution, and illustrate the powerful penetration of institutional forces.

> "…And then the perfect solution emerged: Enterprise Resource Planning (ERP) systems. Competitors were adopting it, gurus were all prescribing it, and business media had hardly a word about anything else. LVR (The company) simply could not stay out of it. The investment would be monumental, and the implementation would be no rose garden. But, at the end of the day, the entire organization would be completely integrated in one single system"

Many organizations' espoused logic for implementing enterprise technologies points to the importance of conformance to institutional forces. Besson and Rowe (2001) recall how a French steel company (Usinor) reported its logic:

> *... Faced with increasingly stringent environmental constraints and rising sectorial concentration, the company has been forced to adopt a global growth strategy that requires it to coordinate units that feature very different types of information systems. Senior management would like Usinor to appear as a group where everyone speaks the same language.*

In this study we also propose that in the usage phase, EIS are an institution, since they embody a specific logic of the organization's activities, enabling certain actions while denying legitimacy to others. Institutional theory suggests that institutional logics define the norms, values, and beliefs that structure the cognition of actors in organizations (DiMaggio, 1997).

It is to be noted that in developing this view of information systems we are not proposing a technological determinism perspective. Users of a system still have some flexibility to choose to appropriate features of the technology. Nevertheless, the material and symbolic properties of the technology-in-practice constrain how the technology may be used and lead to an emergent set of rules and resources that shapes specific patterns of interaction. EIS pave the way for social action—recurring conducts that stand out as regularities and are oriented to the conduct of other actors.

This perspective, one that takes into account the role of "non-humans" in the process of social interaction, is also central to theoretical advances built on the ideas of social realism. Mutch (2002) proposes:

> *"Of particular value here are notions of inscription and irreversibility. The construction of (actor) networks that are durable involves the inscription into material form of the assumptions that underpin the interests of particular actors in the network. In many organizations, for example, particular ways of working (notably within functional boundaries) are inscribed into software, inscriptions that subsequently make other forms of action difficult."*

The role of the enterprise information system in reinforcing the institutional logics is quite evident in the following description of the introduction of a computerized order entry system (COE) in an acute-care hospital (Davidson, 2000):

> *The switch from paper-based to electronic media has had other organizational consequences. By using the COE interface to create electronic orders, organizational guidelines and protocols are subtly enforced. Guidelines and protocols for clinical care existed before the COE system was implemented, but monitoring and enforcing their use was difficult with paper-based orders. With the COE interface, physicians are not prohibited from issuing any type of order, but the interface was intentionally designed to make it easier to select officially sanctioned orders from the departmental order sets and cumbersome to create non-standard orders. According to system designers, physicians usually chose the easier, faster route to ordering and thus are more likely to select administratively sanctioned orders. Thus, in the electronic medium for physician orders, physicians' decisions and actions can be shaped to conform to the policies of clinical administrators.*

Figures 2 and 4 show our conceptualization of the dual nature of information systems.

On one hand, the diffusion and use of information technology is susceptible to institutional forces--for example, technology may be cast in utopian terms and be subject to mythical narratives linking it to progress. On the other hand, information systems may be "created, standardized, justified, deployed, modified, priced, and promoted" to include regulatory arrangements and the social organizations of its users (Kling, 1996). We propose that organizations respond to institutional pressures by inscribing a vision of *intended* rules, practices, and norms in the technology configurations. This then grants legitimacy to a constrained range of enactments on the part of organizational actors.

In the following section we outline propositions based on the view of EIS as objects of institutional forces and as carriers of institutional logics. In addition, we develop a set of propositions related to the resolution of institutional misalignments.

Enterprise Information Systems as Objects of Institutionalization

Dimaggio and Powell (1983) argue that structural change in organizations is driven less by considerations of efficiency than by the structuration of organizational fields. They make a distinction between competitive and institutional isomorphism and identify three mechanisms through which isomorphic change occurs: coercive isomorphism that is based on political influence and the problem of legitimacy; normative isomorphism that is based on professionalization and structuration of organizational fields; and, mimetic isomorphism that is based on standard responses to uncertainty. In this paper, we focus on these three types of institutional pressures that affect organizational decision-making with reference to EIS (Figure 2). We propose that these institutional pressures get reflected in the EIS configurations that exert control over organizational actors--control that is powerful, sometimes not apparent, and often, difficult to resist.
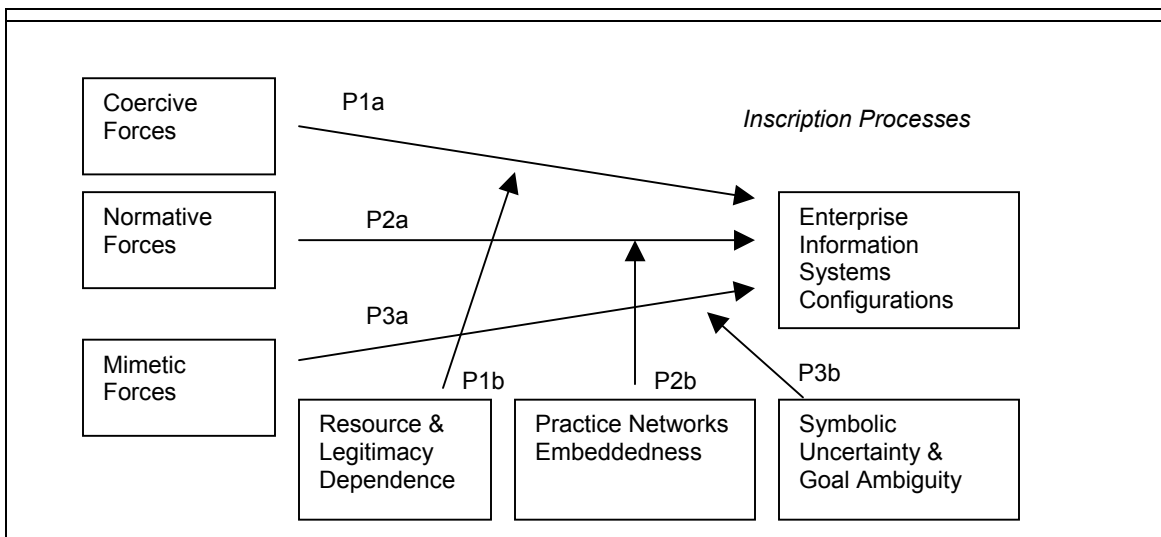
Figure 2 - Enterprise Information Systems as object of institutionalizing forces

There are a number of decisions at various stages of the information systems development lifecycle where objective criteria in the form of technical or economic analyses are not available or cannot be effectively employed. In some cases, an assessment can only be made post-facto or after a long period of experimentation. Consider, for example, the choice of systems development methodology or choice of a software design tool. There is often inadequate knowledge or expertise available to an

organization, particularly one that is small and inexperienced, to make informed decisions. Hence, IS decisions are influenced by perceptions of the current "state of the art" or by what major users uphold; organizations are particularly susceptible to "myth-making" (Alvarez, 2000). The emergence of "rational" choices such as "user involvement", "cross-functional integration" or "customer relationship management" may be attributed to managers' need to create appearances that they are conforming to norms of rationality (Meyer and Rowan, 1977). In specific design decisions as well, issues of legitimacy play an important role. For instance, Pettersen (1995) shows that the decoupling of budgeting (ex-ante) and accounting (ex-post) information systems in Norwegian hospitals reflected legitimacy concerns with external constituents in the area of planning and not a more rational need for management control. Studies of ERP implementations have shown that organizations often "discover too late that their purchase has been based more on faith than good judgment, and run up tens or even hundreds of millions of dollars in extra costs and schedule delays" (Wagle, 1998). Once a configuration choice has been made, it takes on a natural "matter of fact" quality that is difficult to question in the light of the institutional logics. As an example, Wagner & Scott (2001) document the ERP platform choice made by a university:

> "*The (VP's) strategic narrative was so powerful, it had the effect of black-boxing the negotiations preceding the purchase of Oracle's ERP technology. The appropriateness of a standard package for university operations was unquestioned, and took on matter-of-fact status within the organization. The irreversibility of this network proved quite phenomenal over time as it maintained the enrollment of almost the entire university community who became unable to recall a time when alternatives to this vision existed.*"

Configuring an EIS involves making a number of choices. The organization must decide on issues such as the software modules that need to be implemented, the adjustments that need to be made to the default system through configuration tables, the extent of centralization of control, the mapping of system-defined artifacts to the business constructs, and so forth. The organization also must decide on the extent and patterns of usage of the systems and the roles taken on by different employees in their interactions with the system. In the case of the popular ERP package SAP R/3, for example, the choices encompass main modules, sub-modules, a few thousand parameters, user profiles, supplementary programming, and design of reports. While there appears to be considerable choice in configuration, in practice, organizations are constrained by inbuilt models and assumptions in the package (e.g., separation of internal controlling and external accounting in finance module), often continue to use basic configurations (e.g. MRP II in the logistics module), and use the default profiles and vendor-recommended business processes (Koch, 2001). In addition, most organizations face very significant knowledge barriers in reflecting their context and business rules in their implementation (Robey et al., 2002).

Inset: Enterprise Information System Configuration Features

Our first set of propositions is based on a view of EIS as "complex social objects constrained by their context, infrastructure and history" (Kling and Scacchi, 1982). In this view, information systems are subject to institutional forces as political interests, structural constraints, and human interpretation of their subjective situations impact them. Dominant interests are expected to be reflected in the form and functioning of the technology through an "inscription process" (Latour, 1992), based on how the designers of the system respond to institutional pressures and envision the state of the world.

Organizations construct a collective picture of their social reality over time. These shared understandings are reinforced by regulatory processes that coercively or normatively press conformance upon constituent communities (Greenwood et al., 2002). Regulatory processes disseminate and reproduce coded prescriptions of social reality – deviations from the prescriptions cause discomfort and require legitimization (Deephouse, 1999). Regulatory agencies are particularly important in the theorization phase of the institutionalization process as they enable the formation and reproduction of shared meanings and understandings (Ruef and Scott, 1998) and adjudicate for negotiated settlement among competing claims (Greenwood et al., 2002). The pressures exerted on organizations by other organizations upon which they are dependent and by cultural expectations in the society are expected to lead to coercive isomorphism. Hence, we propose that:

Proposition 1a (Coercive Forces): Organizations operating in highly regulated domains will tend to have enterprise information systems with similar mandated configurations.

A central premise of institutional theory is that actors and their interests are themselves institutionally constructed (Powell and DiMaggio, 1991). Thus, while institutional pressures take root as taken-for-granted rules, norms, and routines and lead to similar choices of EIS configurations and their adaptation, there may be varying degrees of acquiescence to those pressures depending on their construction. In the face of institutional pressures, organizations are not always passive, but respond according to their resource dependencies (Oliver, 1991). A higher level of dependence is expected to reduce the ability to resist external pressures (Ang and Cummings, 1997). On the other hand, by incorporating practices in accordance with socially legitimated myths, the dependent organizations increase their legitimacy and thereby enhance resources and their survival prospects (Meyer and Rowan, 1977).

Soh et al. (2003), in their study of an ERP implementation at a Singapore hospital, report that in most cases users "lived with" the lack of desired functionality provided by the package. However, the hospital struck a separate contract with the vendor to generate reports needed to comply with regulatory authorities at specified intervals. Hence, we propose that,

Proposition 1b (Moderating factor – dependence): Organizations will acquiesce to coercive forces that demand mandated configuration features to a greater extent when they are dependent on the organizations that expect compliance for resources and legitimacy.

Dimaggio and Powell (1983) argue that homogenization emerges from the structuration of organizational fields. Organizational fields are defined as "those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, producers, regulatory agencies, and other organizations that produce similar services or products" (DiMaggio and Powell, 1983, p. 48). It has been shown that the diffusion of personnel across organizations leads to the adoption of prevailing practices. Studies, for instance, have documented the diffusion of financial reporting standards based on the evolution of professions (Mezias, 1990). Professionals in organizations, or those who interface with the organization such as accountants and auditors, bring standards from their professional affiliations into those organizations. A well-developed educational system also serves to create commonality of viewpoints across organizations.. Professional associations may be important in shaping how organizations view themselves, and they

constitute arenas for organizations to interact.

While information systems is not as structured a profession as accounting, it does have well-developed norms about educational qualifications and experience. A key feature of the discipline is the high turnover rate in IT functions, which means that personnel are rapidly churned among organizations. Common educational backgrounds and a collective normative order would tend to create greater agreement among members of the field. Swanson and Ramiller (1997) suggest that the supra-organizational community creates an organizing vision of an IS innovation that influences its interpretation, legitimation, and the organization and mobilization of economic roles and exchanges. In addition to their functional characteristics, information systems are social objects charged with meaning. Also, information systems are now seen as an important source of competitive advantage for companies, and appearing to be on the leading edge of technology adoption can signal managerial competence leading to higher market valuations (Subramani and Walden, 2000).

At the same time, the "rational" choices are expected to be transitory since existing choices may be de-legitimized as new normative frameworks gain foothold. Within relatively less mature fields like IS, it is expected that the boundaries of occupational and professional communities will be contested and the logics of action not be as resilient. However, IS professionals will tend to share collective transitory beliefs about "rational" enterprise information system choices.

Organizations typically use external consultants in enterprise technology projects in order to provide specialized expertise for systems configuration, business process design, and other activities. Case studies have documented that consultants wield great influence over configuration choices, often do not understand the client's business and culture in detail, have low commitment to the client, and tend to espouse the use of standard solutions and terminology that may not be context-specific (Skok and Legge, 2002, p. 77). Given the influence of outside consultants, it is expected that organizations would have a reduced ability to move away from the standardized templates.

Normative isomorphism derives from professionalization: formal education and the growth and elaboration of professional networks legitimize and rapidly diffuse new models. Organizations belonging to such professional networks tend to adapt. With ERP package implementations, for example, technical consultants tend to be heavily involved in implementations and diffuse practices from one project to another. While these consultants tend to possess specialized knowledge, since project teams are often temporary, they may not clearly understand the clients' business processes. This is expected to lead to conformance to institutional pressures in two ways--on one hand, it will lead to a diffusion of institutional logics, and on the other, due to lack of discrimination about the specific needs of the organization in question, it will lead to critical areas of mismatches between technology and organizational needs and capitulation to institutional pressures (Soh et al., 2000).

As an example, chemicals company Celanese underwent a project designed to replace decentralized systems with a single enterprise system. The project was justified, not on the basis of informed opinion, but mostly on the basis of an appeal to faith in a "centralization benefits" logic articulated by the CIO, a veteran of such efforts with different organizations (Berinato, 2003):

"There's something religious about embracing ERP. It requires faith that the destination will justify a long period of sacrifice and change. Culturally that means that Celanese must turn itself inside out. And to do that we have to make people feel pain to an almost near-death experience. That's the only way to get to the ultimate goal….the real project is we are trying to become one company and this (OneSAP) is how we are doing it"

Hence we propose that,

Proposition 2a. (Normative Forces) Organizations will tend to use enterprise information system configurations that reflect the "vision" currently collectively upheld by the IS professions.

In the semi-institutionalization stage of organizational practice, before it is taken for granted by its social group, there is an active role for human agency. There is limited consensus about the value of the practice and not complete commitment to it. At this stage, institutional entrepreneurs can seek to introduce competing logics or different forms of rationality (Townley, 2002). There may be formal acquiescence or public compliance with the new practice, at the same time private challenges are being issued. Institutional agency is also important in the reproduction and maintenance of institutions--institutional entrepreneurs may incentivize other actors by providing them with common meanings and identities (Fligstein, 1997). Thus it is expected that there will be variations across organizations in their receptiveness of the "vision" upheld by IS professionals.

Embeddedness in inter-organizational networks is expected to facilitate the development of a macro-identity with shared beliefs across managers of organizations. Managers who perceive their organizations to be participants in the shared identity would be expected to act in identity-appropriate ways and have a propensity toward mimetic behavior (Abrahamson and Fombrun, 1994). Also, given that prior adopters must serve as conduits of information about strategic actions related to ERP technologies (Haunschild & Beckman, 1998), we propose that:

Proposition 2b (Moderating factor - Organizational networks): Organizations will acquiesce to the normative "vision" to a greater extent when they are embedded in mature organizational networks that diffuse specialized practices related to enterprise technologies.

Legitimacy has been considered an important imperative in institutional theory, and concerns about legitimacy force organizations to look alike for the fear of appearing illegitimate (DiMaggio and Powell, 1983). Technological fields are particularly characterized by legitimacy battles between old and new technologies and technological trajectories within a field and shifting evaluation criteria (Garud et al., 2002). Until institutional closure can be achieved, the set of evaluation criteria remains unclear and technology choices need to be legitimized through mimetic means. This is particularly the case in contexts where there is considerable uncertainty about the consequences of actions. Thus the actions of other earlier movers become reference points to guide actions.

A recent example of the need to ensure legitimacy is provided by the following quote from a practitioner report (InformationWeek, 2002):

> *"Web services are still used primarily to integrate information within companies. But recent decisions by Amazon.com Inc. and search-engine website operator Google Inc. to deploy web services may give the technology more credibility for use in business-to-business settings."*

"Best Practices" and standards provide an acceptable way of doing things with an ostensibly technical rationale (Leblebici et al., 1991). These confer legitimacy on the organizations conforming to them. Large and reputable organizations can deviate from the standard because they have the legitimacy to differ. Large and successful organizations will also tend to inherently have greater legitimacy. In information systems practice, technology solutions are often promoted by vendors as singular "best practices," but given that these systems can be variously configured, the notion of a standard is illusory (Swan et al., 2000). Technologies are often labeled and coded in simple rhetorical terms to permit formal conformance and ease of diffusion, when they are, in fact, complex and subject to many different implementation approaches. This leads to organizations imitating the choices made by other reputable organizations in their deployment and usage of enterprise technologies. Hence, we propose that:

Proposition 3a (Mimetic Forces). Organizations will tend to mimic the direction and timing of "rhetorical" enterprise information system configurations used by large, reputedly successful organizations.

The creation, transformation, and diffusion of institutions require legitimacy such that other alternatives are seen as less appropriate, desirable, or viable (Dacin et al., 2002). Innovations may need to be cast in legitimate as well as familiar designs in order to shape the outcomes of contests between innovation and established institutions (Hargadon and Douglas, 2001). Decisions related to the design, development, and deployment of information systems are subject to institutional pressures – outsourcing decisions, for example, would be influenced by what is generally expected of companies in the industry (Ang and Cummings, 1997). Existing cognitive interpretation and cues used by players in the enterprise's environment need to be attended to in order to create conditions for favorable assessment of a new system.

Mimetic isomorphism is particularly a result of uncertainty - "when goals are ambiguous, or when the environment creates symbolic uncertainty, organizations may model themselves on other organizations" (DiMaggio and Powell, 1983, p. 69). Analysis of investments in enterprise technologies is difficult in terms of conventional metrics such as cost savings, and organizations frequently use qualitative criteria such as cross-functional integration to justify their actions (Stedman, 1999). Organizations in such situations are, therefore, more likely to model themselves after other organizations in the same institutional field that are perceived as both similar and more legitimate or successful. Hence, we propose that:

Proposition 3b (Moderating factors - Symbolic uncertainty and goal ambiguity) Organizations will acquiesce to mimetic forces to a greater extent when confronted by symbolic uncertainty and goal ambiguity in decision-making about enterprise information systems configurations.

The Resolution of Institutional Misalignments

The introduction of a new EIS in an organization creates the potential for conflicts

between the incumbent institutional regime and the institutional logics embedded in the new system. Old work habits, values, and dilemmas faced by users working with legacy systems are likely to carry over and confront the new system (Alvarez and Urla, 2002). Pre-existing structures may orient organizations to be pre-disposed to oppose the logics of new enterprise technologies. In other cases, the new technologies may be selectively appropriated to be consistent with existing institutional conditions. Our second set of propositions engages the process of resolving the conflicts posed by different institutional logics embodied in the new systems (Figure 3).
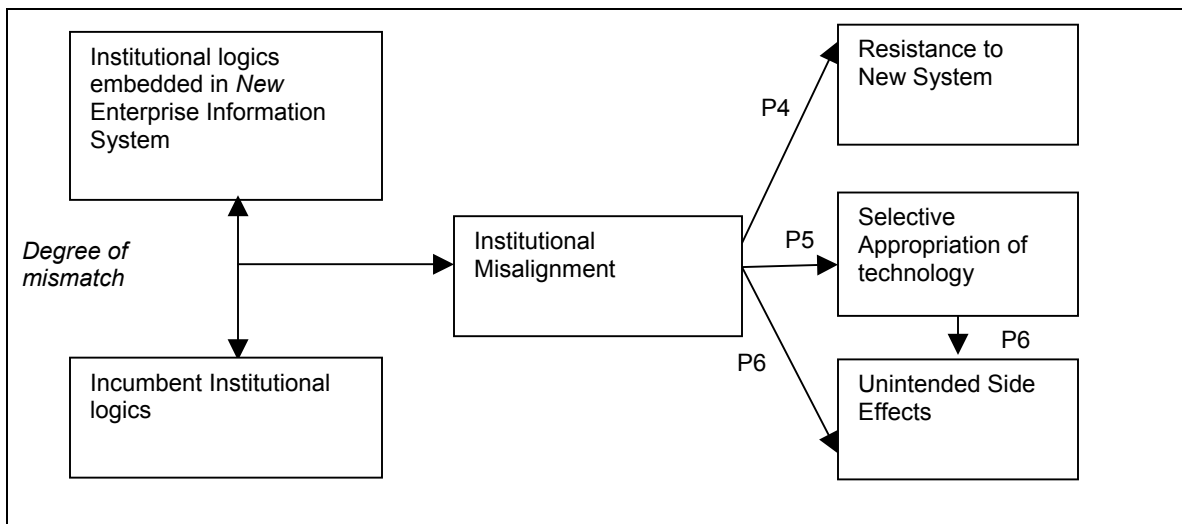
Figure 3 - Misalignments due to New Enterprise Information System

A number of studies have documented the potential for misalignment between the incumbent institutional logics and those encoded into new EIS. Sia et al. (2002) study the case of an enterprise technology implementation where the control aspects of the technology (panoptic visibility) seemed to evolve naturally as management/users discovered, learned, and eventually instituted the use of such information. On the other hand, empowerment-linked usage that ran contrary to the existing institutional logic was not manifested.

Wagner (2003) similarly recounts the experience of an ERP implementation at a university that conflicted with the existing institutionalized values:

> *The system managed to temporarily squash the valued academic fiefdoms of many faculty researchers despite their power within the wider University community. This shifted the administration effort to the academic departments, placing the onus of time-phased budgeting onto faculty support staff. This shift was temporary, however, because faculty joined together to reject the 'ERP solution'. The phase-one system that had been interpreted by the project team as an organizational matter of fact was challenged, and its stability as a viable system was reduced.*

At footwear company Aerogroup, such conflict following the company's failed foray into new ERP implementations created severe stress and conflicts in the organization:

> *The vice president of IT had just been fired, and the IT director quit. The entire IT*

department was taking a beating from employees throughout the company, who were divided along two lines: those who thought the old system was fine and were mad at IT for messing things up, and those who saw the benefits of the new system but thought IT didn't have the expertise to carry out the implementation. (Solomon, 2001)

A number of studies have also documented the presence of a "performance dip" with the switch to new enterprise information systems. These dips reflect adjustment costs incurred by the firm as it learns to use the new system and refines its systems and processes in combination (Hitt et al., 2002). We propose that misalignments in the incumbent institutional logics and those embedded in the new system will exacerbate the performance dips as members in the organization resolve these rule mismatches that have the potential to cause cognitive dissonance:

Proposition 4 (Resistance): Mismatches in the institutional logics of new enterprise information systems and the dominant institution logics with current legitimacy in the organization will lead to greater performance dips and resistance to the usage of the new system.

Misalignments between the functionality of an enterprise system and the current work patterns in an organization often lead to workarounds (Markus & Tanis, 2000). Soh et al. (2003) explore the misalignments between the structures embedded in ERP software and the existing organizational structures at a hospital. They found that the hospital chose to retain its functional structure (e.g. centralization of wards to be shared among medical specialties), despite the inherently process-oriented logic embedded in the ERP (end-to-end processing by medical specialty). The hospital made additional efforts to repackage the information that the systems collected, for reporting to individual wards. The hospital also did not expand job scope along more-process-oriented lines as envisaged by the package – casting the enhanced flexibility as "cumbersome or silly." In another case of the ERP implementation in a university context, resolving the misalignments was attempted by "creating boundary objects that connect the ERP to the working rhythms, cycles, and pace of activity favored by faculty" (Wagner, 2003). Over time, the utilization of system features in a manner consistent with the institutional logics will lead to a transition to stable outcomes. In the period of transition, we propose that:

Proposition 5 (Selective Appropriation): Mismatches between the institutional logics of new enterprise information systems and the dominant institution logics with current legitimacy in the organization will lead to selective appropriation of technology features to reduce the mismatch.

Drawing upon Giddens' analysis of modernization, Hanseth, Ciborra, & Braa (2001) study an SAP implementation at Norsk Hydro. They show that the introduction of new technologies and the implementation of organizational structures and work procedures have unintended side effects. While Norsk Hydro introduced the technology to achieve organizational integration, over time, it took on dynamics of that led to unforeseen challenges. For example, the integrated nature of the chosen ERP platform created complex lattices of production processes, making upgrades to the software very complex and time-consuming.

We expect that because of institutional misalignments, EIS will not be used as intended toward directed ends, potentially creating unintended side effects not envisaged by

designers of these systems. For instance, Braa and Rolland (2000) show that the deployment of an enterprise IT system designed for knowledge sharing between different communities had side effects that were quite opposite to that goal. Thus, we propose that:

Proposition 6 (Side Effects): Mismatches between the institutional logics and selective appropriation of technology features will lead to unintended side effects.

Enterprise Information Systems as the Carriers of institutional logics

Our third set of propositions (figure 4) is based on the view of EIS as carriers of institutionalization. EIS represent a particular template for the conduct of the organization's activities. At the core of enterprise software packages are numerous assumptions about how organizational processes should work; but even with careful configuration, the fit to organizational needs is often lacking (Talbert, 2002). As the organization evolves over time and the assumptions built into a system's configuration stay static, this misfit has the potential to increase.
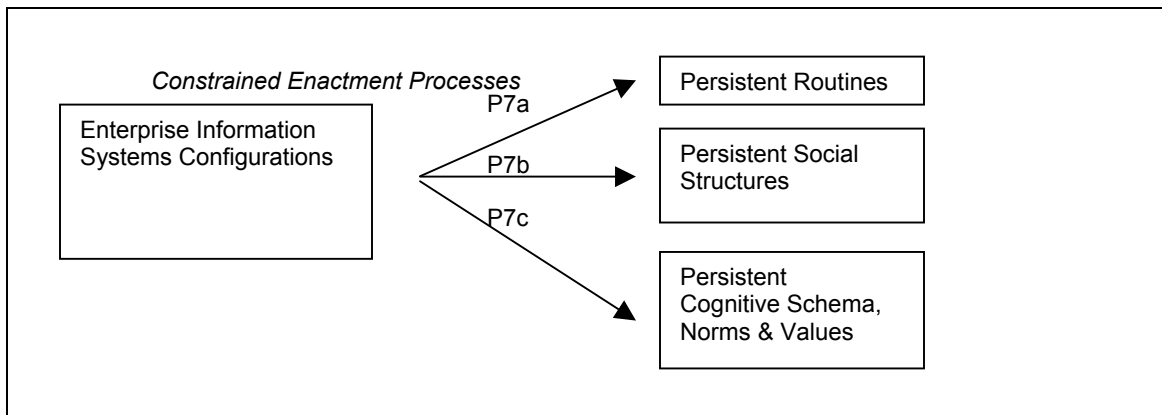
Figure 4 - Enterprise Information Systems as carriers of Institutional logics

The directive power of EIS as institutions comes from both cognitive and normative elements embedded in them. These systems effect and shape social action just as other institutions that depend on subtle, shared beliefs do: by creating classification systems, specifying what is similar and what is different, conferring identities on actors, and determining what is remembered and what is forgotten (Douglas, 1986). In addition to these cognitive elements, EIS also embody normative rules – prescriptions of behavior for designated positions or actors.

By impinging upon information flows in the organization, EIS shape organizational practices and may also impact the economic discourse (Robey and Holmstrom, 2001). They may also change the culture of the organization, sometimes the language and symbol system as well as the enacted genre (Davidson, 2000). A number of enterprise technology studies indicate the specific direction of such impacts. Studies have shown that an ERP system transforms the organization into a much more tightly coupled system. The implementation of an ERP can therefore be construed as a change in the nature of the organization's life, since it suddenly precludes the existence of diverging views (Besson and Rowe, 2001). Different views and interests inscribed in the existing

information and artifacts put serious constraints on the design and implementation of an ERP (Braa and Rolland, 2000). Pozzebon (2001) posits the possibility of rhetorical closure, suggesting that due to time-space discontinuity between the design and the use of technology, people forget that it is malleable. When the interpretive flexibility of technology is very low, people tend to abandon any attempt to change it, and rhetorical closure is reinforced.

New institutional practices are not created de-novo but are built on, and their adoption is constrained by, older institutional practices (Holm, 1995). Organizational change is informed by historically guided values and norms that have stabilized and persisted (Powell and DiMaggio, 1991). Similarly, historical choices made with reference to EIS will constrain the future decisions that can be made, Not only is this persistence due to interdependencies among the generation of technologies that exist in an organization, but also due to institutional constraints that limit conceptualizations of technology.

Enterprise technologies serve to accumulate the impact of decisions made by the organization over time and progressively constrain the range of actions that employees can perform. Organizations tend to routinize many repeatable activities so that they can easily reproduce their goods and services (Cyert and March, 1963). And information systems tend to embody these standard operating procedures that have become deeply embedded in an organization. Designers of information systems "build into the technology certain interpretive schemes (rules reflecting knowledge of the work being automated), certain facilities (resources to accomplish that work), and certain norms (rules that define the organizationally sanctioned way of executing that work)" (Orlikowski, 1992, p. 410). These rules and resources serve to constrain human actors into sets of routines that are legitimate based on the choices made by the designers. The following example shows how enterprise technologies may fail to reflect the specific context of organizations and their desired business practices:

> *Kmart wrote off $130 million for supply chain hardware and software and another $65 million for replacing two distribution centers. Part of its problem: Kmart was never able to demonstrate the operating benefits it gained by adopting software from i2 Technologies. i2's work to speed up Kmart's supply chain process appeared to stall, as Kmart's financial troubles grew. What's more, individuals close to the project say i2's software failed to deliver in key areas such as "micro-merchandising," a practice intended to help the retailer deliver the right goods to stores based on local demand.* (Girard, 2002).

On the contrary, EIS may embody powerful institutional logics that enterprises find difficult to resist. Ultimately, these systems will constrain the activities of organizational actors. Hence, we propose:

Proposition 7a (Routines): Enterprise information systems configurations chosen by organizations will encode institutionalized principles into these systems and constrain the routines of organizational actors.

When the confectionary giant Nestle SA signed a $200 million contract to install SAP, the analyst who covers Nestle for HSBC Securities downgraded her recommendation on Nestle stock. Expressing her wariness about the project, she said, "*It touches the corporate culture, which is decentralized, and tries to centralize it*" (Worthen, 2002). Her comment reflects the role of EIS in restructuring organizations.

Barley and Tolbert (1997) propose a recursive process model of institutionalization based on structuration theory (Giddens, 1984) in which institutions not only constrain action, but require constant maintenance or modification through action. The dualism of action and structure suggests that the enactment of institutional behavioral routines will also lead to constrained social structures. The introduction of new technology disturbs the established balance between institutional arrangements and the exigencies of daily life and introduces a dynamic of restructuring, through which tasks, responsibilities, competencies, social relationships, and professional boundaries are re-negotiated (Barley, 1986). But at the same time, the enterprise information system can be considered to provide a framework for action that is enacted and recreated through use. While some structuration researchers suggest that the configuration of enterprise systems is expected to embed structures that are then appropriated during the use of the technology (DeSanctis and Poole, 1994), Orlikowski (2000) modifies this view to propose that structure emerges from, rather than is embodied in, the technology. She proposes that it is only when technological elements are routinely mobilized in use that they structure human action and become implicated as rules and resources in the constitution of a particular recurrent social practice. We, therefore, propose that it is the recurrent social practice that produces structures in the course of technology use, but these emergent structures are constrained by the choices made by the designers of the EIS. Hence we propose that,

Proposition 7b (Social structures): Enterprise information systems configurations chosen by organizations will lead to enactment of patterned behaviors that generate constrained social structures.

Information systems can be seen as inherently conservative structures that are devoted to ensuring compliance by social actors and perpetuating rules of social conduct. DiMaggio and Powell (1983) imagine organizations as dramatic enactments of rationalized myths. The "taken for granted" nature of the organizational practices that result causes the technical and social elements of an institutionalized information system to be extremely resistant to change. Further, since EIS in themselves impose a social arrangement that appears to be natural, they will be additionally difficult to resist. Over time, the institutionalized routines upstage the cognitive activities of organizational members. Choices made by the designers of EIS may serve to influence what employees "see" and how they reason about their business issues. As an example, consider the case of a large packaged goods manufacturer that implemented a business data warehouse solution using software from a large ERP vendor. The system analyzed sales and inventory data to provide executives with an assessment of brand performance. The system failed to alert executives about the sharp fall in new orders for a specific product line due to its emphasis on open orders and cumulative order position. Thus, the reporting model conceived by the designers of the system had found a way to impose its vision on the users of the system.[2]

The designers of technical artifacts define "actors with specific tastes, competences, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science and economy will evolve in particular ways" (Akrich, 1992, p. 208). Enterprise systems, over time, become intimately embedded in an organization's socio-

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[2] Based on corporate presentation. Due to confidentiality reasons, the company's identity is not disclosed.

technical ensemble (Orlikowski & Iacono, 2001) and both give rise to and reflect norms of behavior and artifacts of action (Sawyer & Southwick, 2002). Hence, we propose:

Proposition 7c (Cognitive Schema, Norms & Values): The choices of enterprise information systems configurations will lead to the development of change-resistant cognitive schemas, norms, and values that are perceived as natural and legitimate.

Discussion & Implications

Researchers have used the institutional theory lens to study the success or failure of information systems implementations (e.g., Christiaanse and Huigen, 1997). This study provides fresh insights by conceiving of EIS, on their own, as having institutional elements and also being subject to institutionalizing pressures. This perspective is expected to provide a better understanding why technology implementations fail by looking at the existing institutionalizing elements at work in the organization and in its historic social and technical choices. While recent organizational theory stresses the interplay of institutions and firm-level actors, the critical role played by EIS in shaping this interaction has not received much attention. EIS and social arrangements that facilitate stable operating environments may also act as an impediment to future change. On the other hand, information systems will facilitate the embedding of practices that organizations seek to institutionalize.

Institutions exist in the minds of organizational actors and serve to provide sensemaking templates that can cope with situations when rational cognition is either absent or severely constrained due to the complexity of the task. Bowker and Star (1999, p. 5-6) suggest that: "Each standard and each category valorizes some point of view and silences another. This is not inherently a bad thing – indeed it is inescapable. But it is an ethical choice, and as such it is dangerous – not bad, but dangerous." This study points to the need for organizations to be sensitive to the alternatives made invisible as a result of the choices they have made in their enterprise systems (Wagner and Scott, 2001). Further, organizations need to engage with these technologies in a substantive manner to explore opportunities for individual empowerment that will allow them to overcomeconstraints embedded in the technology (Pawlowski, Boudreau, and Baskerville, 1999).

The conceptualization of EIS as institutions presented in this paper suggests that these systems make cosmopolitan, rather than local, sense. While there still may be variation across systems in different organizations, our paper brings into focus the consistency among trends and features that are all the more remarkable given the variation in organizational contexts. The implications of this view for society at large are also very significant. Hanseth et al. (2001) suggest that these technologies portend accelerated organizational drift and runaway. The "global electronic embrace" of technology embodied in these systems has the potential to overwhelm local contexts (Adams, 1995). Thus, attention to consequences such as uncontrollable expanding infrastructures and lack of alignment to specific organizational conditions is warranted.

Contributions to research

In the information systems literature, much attention has been devoted to change–

theories of information systems adoption and adaptation figure prominently. Theorizing to explain persistence has not received as much attention. Robey and Boudreau (1999) specifically suggest the use of institutional theory to understand the processes promoting and impeding change in organizations. This paper theorizes about the emerging role of EIS in constraining organizational activities, and more importantly, in constraining the cognitive frames of organizational members. While they are essentially reconfigurable technologies, the challenges they pose to sensemaking in organizations render them as equivoques that can only be engaged with great difficulty. Thus, EIS constrain social practices in organizations to persist across time and to become isomorphic with other organizations using similar technologies.

IS researchers have pointed to the problems of social theory in its broad-brush approach to information and technology (Mutch, 2002). And while structuration theory has been used to conceptualize interactions with technology; it provides little in the way of insights to inform decision-making related to IT. Jones (1999) argues that, because of the emphasis on structures as memory traces, instantiated only through action, this perspective does not reflect the more enduring patterns that technology engenders. This paper draws upon institutional theory to introduce the temporal dimension that allows for the role of technology to be more fully played out.

Although institutions profoundly affect the nature of change in organizations, it is important to recognize that institutions change over time, can be contested, and can be influenced by activities of institutional entrepreneurs. Over time, technical adaptations made by organizations may have feedbacks for institutional pressures and alter institutional norms and definitions of legitimacy (Kraatz and Zajac, 1996). Organizations need to be very cognizant of changing institutional commitments and the conflicts between alternative institutional logics. In a number of instances, enterprise systems implementations have failed and organizations have moved on to a different set of technologies. In such cases, organizational actors may then reinterpret the past in light of their changed institutional commitments. Ignoring valued legacy processes and changing the meanings that organizational actors ascribed to past activities can be fraught with potential for conflict before the new institutional logics have been widely accepted.

The propositions developed in this paper are not intended to outline precise outcomes, but to help understand the direction of institutional forces. For researchers, a key imperative is to build on this study to explore the insights that the institutional perspective can provide to the implementation and usage of enterprise technologies. Reesearchers should pay particular attention to the cognitive processes of users and implementers to understand how they view enterprise technologies – how they understand technology in their setting and how they make sense of information.

Implications for theory – Institutional theory versus structuration

Structuration theory, based on Giddens' (1984) institutional theory of social evolution, has been a key lens to theorize about the organizational use and adaptation of technology (Barley, 1986; Orlikowski, 1992; Orlikowski and Robey, 1991). Structuration theory suggests that users structure technologies in the course of interacting with them. This collapsing of structure into agency does not allow for the interplay of structure and agency across time: how pre-existing structures may constrain action and how action may reproduce or transform existing structures (Archer, 1995). Adaptive structuration

theory extends structuration models to consider the mutual influence of technology and social processes (DeSanctis and Poole, 1994). Majchrzak et al. (2000) synthesize a model of technology adaptation, proposing that preexisting structures (technology, group and environment) impact appropriation moves depending on the degree of misalignment (Leonard-Barton, 1988), the malleability of the structures (Johnson and Rice, 1987), and the occurrence of discrepant events (Tyre and Orlikowski 1994).

The institutional theory perspective provides complementary insights to the structuration perspective. The latter view recognizes that structural properties of social systems exist only to the extent that forms of social practices are reproduced by human actors. The institutional theory perspective allows us to theorize about why there may be natural constraints upon social practices that lead to constraints on the range of structures that are instantiated in practice. Humans have a capacity for reflexivity as they act to reproduce social structures--they can monitor their actions and review them in the light of new information and knowledge (Giddens, 1984). Institutions provide unconscious sources of motivation to constrain this reflexivity.

Theorists drawing upon structuration theory have suggested that technical adaptation proceeds through the process of structuration, so that technological systems become institutionalized within the organization and become viewed as legitimate (Haggerty and Golden, 2002). This paper goes beyond this by suggesting that the EIS themselves may supply the social norms that have a 'taken-for-granted' and rule-like status.

In addition to institutional theory, we have drawn upon the sensemaking perspective to understand how institutions grant legitimacy to specific actions and provide cognitive frames that form the basis for organizational actors to make sense of their world. The sensemaking perspective has been applied to individual users' initial interaction with technology. The features-based theory of sensemaking triggers (FBST) (Griffith, 1999) suggests that technology features (core versus tangential) interact with sensemaking triggers (novelty, discrepancy, and deliberate initiative) to influence perceptions about the new technology. Our study adopts a macro perspective and tries to understand organizational usage of technology, which can then be understood at the micro level through this complementary perspective. There are, however, important distinctions between the two views of technology (equivoque perspective versus FBST's features-based view) and the sensemaking focus (conformance or resistance to institutional logics versus FBST's sensemaking triggers).

Implications for practice

We alert managers to the need to recognize that current EIS configurations embody institutionalizing elements and is the importance of thinking independently of the legacy infrastructure. Enterprise systems generally have high levels of complexity due to numerous interacting components, and this leads to demands on managerial sensemaking. In addition, enterprise systems lead to highly specified decision structures and patterns of organizational practices that are expected to also constrain mindfulness (Weick et al., 1999). The organization may be forced into a mode of operating in a state of reduced attention, employing cognitively and emotionally rigid rule-based behaviors (Langer, 1997). The stability provided by the enterprise system may create a false sense of stability about the environment and may lead to mismatches between the environmental conditions and the organization's decisions and actions.

An important implication of the view of an enterprise information system as an object of institutional forces is that managers need to resist bandwagon effects that may force them into making technology choices out of alignment with their organizational needs. Software vendors, publicly acclaimed "thought leaders," and consultants will often champion enterprise technologies in an uncritical manner. Thus, managers need to carefully disentangle the functional capabilities from the hype. This is easier said than done. As the decisions around enterprise systems implementations become "typified" or depersonalized, procedures devised for instrumental value may become valued ends in themselves as a standardized organizational response. Thus, certain types of decisions will seem natural and legitimate without reference to the needs of the organization. Institutional controls depend on subtle shared beliefs – "the high triumph of institutional thinking is to make the institution completely invisible" (Douglas, 1986). Thus, actors in organizations end up enacting their institutionalized roles, as it is inherent in their social definition, making it difficult to resist conformance to institutional pressures.

Managers need to attend to the specifics of their context to resist institutional pressures. Institutional pressures make organizations susceptible to bandwagons. Managers can counter these pressures by focusing their environmental scanning activity on details relevant to current organizational conditions, and not simplifying interpretations of real-time information (Fiol and O'Connor, 2003). Similarly, decision makers' greater commitment to resilience expands the range of scanning through experimentation on the fringes of what is known and leads to a better understanding of unusual and unexpected situations specific to the organization. A preoccupation with failure or success is expected to lead to greater scanning of contradictory information, rather than simply following the behavior of others. Mindfulness expands scanning and permits context-relevant interpretations of information, enabling more discriminating decisions in the face of institutional pressures.

Recognizing the role of EIS as institutions in themselves is important because it alerts managers to the delegation inherent in the ceding "of social choices or values, of inclusions or exclusions, of rules and regulations, of wishes and intentions" (Bloomfield, 1995, p. 495). The most powerful influence of these systems is expected to be on shaping social interaction when organizational members come to regard technology as a black box and accept its role as neutral support.

Recognizing the institutional logics embedded in enterprise technologies is also likely to be useful in facilitating technological change. Often, new system rollouts collapse into chaos as workers cannot make sense of the new cognitive and normative rules embedded in the new system, and become angry and confused (Worthen, 2002). Pre-existing structures may also orient organizations to be pre-disposed to oppose the logics of new enterprise technologies. In other cases, the new technologies may be selectively appropriated to be consistent with existing institutional conditions. Sia et al. (2002) study the case of an enterprise technology implementation where the control aspects of the technology (panoptic visibility) seemed to evolve naturally as management/users discovered, learned, and eventually instituted the use of such information. On the other hand, empowerment-linked usage that ran contrary to the existing institutional logic was not manifested. Employees in organizational contexts where institutional change is warranted or where the technology may be more flexibly appropriated need to be supported as they cope with these changes.

Finally, misalignments between a new EIS and incumbent institutional logics create

motivations for selective appropriation of technological features. Unless this process is carefully managed it can lead to uncontrolled localized adaptations.

It is also important for designers of new EIS to understand the incumbent institutional logics and the role played by existing technical artifacts. As an example, Braa & Sandahl (1998) describe a news agency's attempt to implement paper-based television schedules into a new system. Before this, faxes and shelves were used to indicate progress and states of the work process; and since this work process was visible to all workers at the office, the artifacts played an important role in coordination of the work. The new system failed because these technical artifacts were not considered relevant for design. Recognizing the meaning embedded in local technical artifacts is therefore important, as these may be institutionalized in the organization.

Directions for Future Research

This paper has developed an initial framework of organizational response to institutional pressures in the context of EIS adaptation and usage and, further, elucidates the role of the enterprise system in creating the cage that shapes organizational practices and structures. We do not expect the proposed model to be tested in a single study, given the wide scope of our theory development. We suggest that empirical evidence may first be generated through qualitative studies that elaborate the model. Further, the utility of the institutional lens needs to be validated by comparing the insights generated using this perspective to alternate views such as a knowledge barriers-focused dialectics of change perspective (Robey et al., 2002). Researchers studying EIS configuration choices need to be sensitive to alternate rational explanations driving isomorphism as well. For instance, organizations may fall back to "vanilla" reference template implementations due to the greater economic costs of supporting customized configurations that may not be adequately supported in vendor upgrades.

There is a substantial literature, primarily in the form of case studies of selected enterprise systems implementations, which has emerged in recent years. However, these studies have predominantly tended to present linear, uncomplicated narratives derived from the interpretations of a few people involved in the implementation process. The choice of the ERP package and various decisions related to configuration are presented as rationally thought-out activities. Attention to institutional pressures is rarely considered in these studies and is a fruitful avenue for exploration.

Longitudinal studies are also needed to elaborate on the dynamic aspects of how enterprise system configuration choices become the source of institutional pressures over time. Subsequent testing can proceed to operationalize these concepts on a cross-sectional basis to determine if we can better understand organizational usage of enterprise technologies through this lens. It may be particularly important to disentangle rational behaviors from conformist behaviors driven by institutional pressures, as both may lead to similar outcomes. It would, therefore, be necessary to understand the information processing activities and the premise for decision-making used by individuals. A longer-term period of observation immersed in the context may be needed for this. Given that institutional logics may appear natural, and the role of information systems be taken largely as neutral support, a complex and detailed process of the elaboration of deep structures may be necessary to uncover institutional processes at work. Interpretive or hermeneutic analyses of narratives drawn from the context are likely to yield such insights.

Future research studies need to be careful when investigating the institutional logics embedded in EIS and driving the chartering and implementation of these systems. For instance, mimicking of the technology choices made by larger established players may also have a functional basis – the decisions may be based on considered expectations of the spillovers from strategic actions. Prior adoption may have created skilled manpower conditions and provided experience for consultants and the vendors, benefiting the mimetic adopters. Such positive externalities indicating rationally informed views needs to be disentangled from institutional explanations. It would be especially insightful to explore cases where firms mimic the action of other firms to the point of discarding their own private information. Friedland and Alford (1991) and Scott (1987) suggest that because of multiple institutional environments, there may notnecessarily be harmony or consensus as to the structures and policies appropriate for different types of activities. Future research can also build on this study to consider situations where institutional environments are pluralistic, offering multiple and possibly conflicting views of what constitutes legitimate practice.

Researchers may tap into repositories of project documentation created and maintained for ERP implementations. Logs of outstanding issues, requests for customization, and business case constructions are likely to yield rich data to identify institutional forces. Event history methodologies may be appropriate to study the role of institutional pressures in adoption decisions. Such studies may focus on adoption decisions related to a specific ERP package or component across organizations. Similarly, studies can also address the impact of usage of similar ERP packages on organizational characteristics.

Future research can also examine some of the contingency factors shaping organizational response to institutional forces. For instance, it may be expected that with a high degree of environmental dynamism, acquiescence to institutional forces is more likely. Organizational strategy and decision making becomes increasingly disjoint in highly complex and turbulent environments (Smart and Vertinsky, 1984; Provan, 1989). Due to costly information gathering, changing information sources, and short time spans for decision making, organizational actors will tend to economize on cognition. When the environment is uncertain and unpredictable, organizations will favor approaches to reestablish control and ensure stability of future outcomes (Ang and Cummings, 1997). Imitation of legitimate actions or responses of successful organizations, or taking actions based on professionalized norms, would lead to a stabilizing influence (Galaskiewicz and Wasserman, 1989).

In building upon the conceptual foundations of this paper, researchers can also explore the role of active agency and other organizational factors in resisting institutional pressures. Further, institutions themselves are subject to change as practices get reconstituted and there are sufficient accumulations of anomalies in a current institutional frame to cause new institutions to emerge. Theorizing about these institutional change processes is a fruitful avenue for further development.

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