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Abstract

Understanding how information technology (IT) transforms individual, organizational, and societal ways of being is becoming increasingly complex and discourses on IT present opportunity and risk as two inseparable sides of the same phenomenon. Among the themes that extend throughout practitioner literature, and have emerged gradually in the academic literature as well, ERP projects are illustrative of the opportunities and risks IT presents. In this essay, I propose a discussion centered on the ERP phenomenon as an exemplary illustration of a major question: why does rhetorical closure dominate some discourses about IT when, in fact, all technologies are social constructions, always open to change? *Dealing with ideas borrowed from structurational and social constructivist streams of thinking, I identify occasions of ERP package negotiation and change at three levels—segment, organization and individual—demystifying the rhetorical closure that seems to dominate public debate.*

Keywords: Structuration theory, research frameworks, software packages, software management, IS integration.

INTRODUCTION

Understanding how information technology (IT) transforms individual, organizational, and societal ways of being is becoming increasingly complex, whatever lens is adopted to study it. Enabling and constraining properties of new technologies have triggered discourses that blend enthusiasm and caution. Among the topics on IT that pervade the practitioner literature, and have emerged gradually in the academic literature as well, ERP projects are illustrative of the opportunities and risks IT has presented. ERP (enterprise resource planning) can be viewed as one type of enterprise system (or enterprise-wide system), which includes a range of commercial software packages that enable the integration of transactions-oriented data and business processes throughout an organization (Markus and Tanis 2000). ERP systems are sold as a package commodity and organizations are read as passive buyers of a standardized and universal solution (Clausen and Koch 1999).

Discourse about ERP seems to succeed in dominating public debate surrounding two core ideas. The first is that ERP packages have become a technological imperative, as inevitable as globalization, for most organizations. "ERP is now considered to be the price of entry for running a business, and at least at present, for being connected to other enterprises in a network economy" (Kumar and Van Hillegersberg 2000, pg. 24). The second idea is a corollary of the first: once having decided to adopt an ERP package, organizations should undergo ERP logic. "It is preferable to modify the business processes of the organization to fit the capabilities provided by the system" rather than the opposite (Pereira 1999). Therefore, organizations are not only constrained to adopt ERP packages, they are also compelled to modify their business processes and adapt them to the allegedly best practices embedded in such solutions.

In effect, ERP packages represent one of the today's largest IT investments (Chung and Snyder 2000). How can one explain the wide-ranging presence of ERP packages as the end-solutions for what I call the legacy systems "drama"? A promising explanation comes out of the idea of *myth making.* The organizations' dissatisfaction with their legacy (non-integrated and incompatible

systems) and with the complexity involved in interconnecting all their "islands of technology" allowed the creation of the myth of a dying system, calling for replacement with a new system: better, integrated, and ready to implement. Particular needs and discourses reinforced the emergence of this new myth, a myth of an integrated system for an integrated organization (Alvarez 2000). We cannot forget that such a myth-making process is sustained by strong economic reasons surrounding integration issues. Creating the illusion that a complete and ready to implement and use solution to legacy systems exists, organizations seem disposed to pay a high price to have their problems solved, a price that, in theory, is lower than in-house development. Besides, the myth of full integration with a generic package is advantageous to ERP vendors and suppliers who find greater profitability with mass-produced standardized solutions. ERP packages emerged as able to realize such a myth. Because they are complete and ready to configure and use, they are sold as not open[1] and limit users' options to those within the parameters of their designs. Rhetorical closure, therefore, dominates discourses of ERP packages. By rhetorical closure, I mean the idea that a given artifact is not open to change because it has reached technological stabilization; it is already well-defined, ready to use and able to solve the problem it sets out to solve (Bijker et al. 1984).

At first glance, rhetorical closure seduces both customers and vendors. However, implementation stories make clear that fully integrating a company is a very complex task, with or without an ERP. Most reported cases go from initial "one-package" to "best-of-breed"[2] solutions that progressively break down integration (Lee 2000). Even when a company buys all its software from one vendor, ERP packages cannot automate more than 30% of the company's applications (Themistocles and Irani 2000). In addition, most of the time, changes are revealed to be necessary. Complexity cannot be addressed simply. A *problem redefinition* rather than a *problem solution* takes place and the legacy systems drama is replaced by the ERP drama. The two sides of advanced IT are present here: opportunity and risk.

If implementation stories show that *ERPs-in-practice* have been neither a complete solution to integration nor readily implemented and used, why does ERP rhetorical closure remain dominant? The argument I develop in this paper is that ERP packages, as technological artifacts, (1) are not imperative, but a choice, and (2) have reached neither stabilization nor closure. What exists is a *rhetorical closure* surrounding the "why" and "how" of experiencing ERP packages and such a rhetorical closure, when analyzed from a structurational lens, can be demystified. Doing so is also an opportunity to discuss its effects on users' practices.

The purpose of this essay is to address prevailing discourses about the closure of ERP packages. The discussion is centered on the ERP phenomenon because it represents an exemplary illustration of a major question: *why does rhetorical closure dominate some discourses about IT when, in fact, all technologies are social constructions, always open to change?* In the next section, I explain my perspective, which combines structurational lenses (Orlikowski 1992, 2000) with social shaping views of technology (Clausen and Koch 1999). Dealing with ideas such as *rhetorical closure, duality of technology, interpretive flexibility, time-space discontinuity,* and *occasions for negotiation,* I propose an interpretation that revisits structurational perspectives on technology. In the following section, I propose that the rhetorical closure that dominates ERP discourses can be broken down and viewed differently. The review of recent literature on ERP suggests that ERP packages are open to change and have been changed more often that we might suppose. I intend to demystify the rhetorical closure of ERP packages at three levels: segment,[3] organization, and individual. The essay ends with a discussion about the effects of rhetorical closure on interpretive flexibility and users' practices that point toward a view that is still evolving and open to further debate.

THE STRUCTURATIONAL PERSPECTIVE ON TECHNOLOGY REVISITED

The perspective adopted in this study combines influences of structuration theory and social constructivism, trying to make sense of how organizations and individuals interact with a special class of technology: ERP packages.

Structuration Theory: Giddens' View of Change

The point of departure is the theory of structuration as elaborated by Giddens (1984), who attempts to synthesize the classical categories of structure and agency in a dialectical framework. The primary contribution of structuration theory is to articulate these constructs as temporal levels of analysis for understanding how social institutions are produced and reproduced over time. The

[1]"Not open," in this case, means not open to changing the code.

[2]The modules are chosen from several vendors to compose the "integrated" systems.

[3]The notion of "segment" will be clarified in the third section.

theory of structuration suggests that human actions simultaneously condition and are conditioned by institutional properties in social contexts.

From the perspective of structuration theory, organizational change is the combined effect of the interactions of individuals with institutional structures like communication vehicles, professional norms, and information systems. These structures both enable and constrain the daily action and thoughts of people, but do not wholly determine them. Individual choices are not independent of the structures within which they take place but they move toward maintaining, reinforcing, changing, or ignoring them (Volkoff 1999). Such interplay between individuals and structures is conceived of as the *duality of structure.*

Giddens' theoretical formulations provide a useful framework for exploring the ongoing interactions that inform the organizing process, offering a conceptual mechanism for explaining the reproduction of social structure. The macro-theory developed by Giddens was extended to explicitly consider the role of technology.

Extending Structuration Theory to Understand Technology-based Change

Seeking to extend the understanding of IT from the point of view of structuration, Orlikowski (1992) proposes the structuration model of technology. Technology is created and changed by human action at the same time that human action is mediated by existing technologies. Such a recursive notion of technology is what Orlikowski termed the *duality of technology*. *Interpretive flexibility,* a concept that originally comes from social constructivist writings (Bijker et al. 1984), emerges as a corollary of this first premise. Although technology is physically and socially constructed by human actors, once developed and deployed, people "forget" that technology is socially constructed and take it for granted. Consequently, taken for granted views of technology become dominant in organizational discourse and technology becomes a black box (Orlikowski 1992). In this paper, interpretive flexibility is defined as the degree to which people perceive a given technology as changeable. It depends on (1) the technology's physical properties, (2) the users' knowledge, skills, and perceptions about the technology, and (3) the context in which users and technology interact.

Because there is a *time-space discontinuity* between the design and the use of technology, people forget its malleable nature. When the *interpretive flexibility* of technology is very low, people tend to abandon any attempt to change it and *rhetorical closure* can be incorporated into the interpretive scheme of organizational members, vendors, and consultants. Concepts such as rhetorical closure and stabilization have been applied by social constructivists to explain how a given technological artifact changes until achieving closure. Supposedly, stabilization occurs when the problem being addressed disappears. The key point is that different groups interpret problems, technologies, and solutions differently. Several factors can shape the meaning that social groups give to an artifact. Sometimes, closure can be reached because relevant groups are persuaded that a solution has been found (Bijker et al. 1984).

Recently, Orlikowski (2000) proposed an extension to earlier work on the structurational model and addresses *technology-in-practice*. She challenges some of the constructivist premises, such as closure and stabilization, as well as her own previous perspective of technology, which emphasized appropriation of the structures inscribed in the technology, and moves toward a more proactive and practical lens that focuses on emergent rather than embodied structures and replaces appropriation by enactment. Adopting such an alternative view, Orlikowski points out that there are always boundary conditions on how people use physical properties, of artifacts. People *can* (even if they *do not*) redefine the meaning, properties and applications of a given technology after development. The practical lens is illustrated with empirical examples based on a class of software programs known as groupware, the technological properties of which seem to be relatively open to individual or group reconfiguration. I wonder how this practical lens may be applied to more integrated, interdependent and complex configurations such as ERP packages.

To what degree is a given technology malleable? It is expected that the continuous development of advanced IT will be toward increasingly reconfigurable tools providing opportunities to improve flexibility in the way technologies are chosen and applied. However, artifacts integrated into complex configurations require standardization across a range of technological platforms, departments, and organizations. The more a particular technological artifact is integrated into a larger system, the narrower the range of alternative uses that may be possible (Orlikowski 2000). Consequently, one can assume that when the degree of interdependence and complexity is high, the flexibility of the way technologies are chosen and applied tends to decrease, even if in essence they are highly tailorable. At the same time, implementation costs tend to increase. Consequently, the difficult balance between flexibility, complexity, and cost should be taken into account to understand why high interdependent IT solutions like ERP packages tend to be interpreted as "closed to changes."

In summary, recent work on the structurational perspective of technology extends previous concepts of appropriation with concepts of enactment and seems more adapted to deal with the emergence of highly configurable technologies. However, it fails to make sense of the emergence of tailorable *but highly interdependent and complex configurations* influenced by a complicated network of players. In a collection of social shaping studies on information technology, which adopts a purposive political account and integrates macro and historical analyses, I found ideas that help to complement structurationist perspectives. I suggest that structurationist views of IT offer a valuable framework for understanding interactions between technology and people *within an organization* and that social shaping views of technology amplify their focus by incorporating a *broader and more heterogeneous set of players.*

Extending Structurational Perspectives of Technology to Understanding Configurational Tools

Like the structurational perspective, social shaping views of technology as worked out by Clausen and Koch (1999) and by Koch (2000) aim to overcome the rather deterministic conception of technology often found in mainstream technology management literature, which tends to take technology for granted and as a well-defined tool. Instead, social shaping perspectives examine technological change as the outcome of social processes of negotiation, through a complicated and heterogeneous network of diverse players (Clausen and Koch 1999). They are strongly influenced by social constructivist approaches, which devote special attention to the diversity of actor interpretations of the meaning and content of technology. Therefore, they emphasize the identification of *occasions* where changes can occur, opportunities where technology can be interpreted or reinterpreted in different ways, increasing the interpretive flexibility and opening up its rhetorical closure. Briefly, social shaping opens a window to the management of complex technologies through the understanding of *occasions and spaces open for negotiations and change* (Clausen and Koch 1999).

IDENTIFYING OCCASIONS FOR NEGOTIATION OF CHANGE

I maintain that the ERP packages, like any other technological artifacts, are open to changes; but to what extent? In theory, there are two general loci for shaping ERP packages: the design phase and the customization phase, which are separated temporally and spatially. In the following paragraphs, I identify occasions for negotiation in an effort to show that ERP packages are open to changes at three levels: segment, organization, and individual (Table 1).

Table 1. Identifying Occasions for ERP Changes

Level of analysis	Type of occasions	Nature of ERP changes
Segment level	Both punctual and cyclic events	Influences on design phase
Organizational level	Top management and implementation team decisions about adoption and customization	Influences on customization and design phases
Individual level	Users' daily actions	Influences on customization phase

Segment Level: Occasions That Emerge Along the Historical Development of Any Technology

The historical development of ERP packages can be viewed from the perspective of their segment. The notion of segment is related to the *network of interdependencies that developers/suppliers and their customers tend to build up over time* (Clausen and Koch 1999). Segment is not a synonym for industry, but is more limited. For example, the SAP-segment is composed of the SAP company and all the customers and consultants involved in the ERP marketplace. Development of packaged software can be described as an incremental process. They are not developed through a clear-cut rational process of innovation, diffusion, and adaptation but gradually shaped through a cyclic process of "versions." Each new version reflects new visions of possible features and faces reality in the customer enterprise. The new features crafted by the design, when used, enact new learning and a diversity of experiences creates new demands and new visions in the supplier organization (Clausen and Koch 1999). This is a cyclic interaction between supplier/developer and customers (Figure 1).

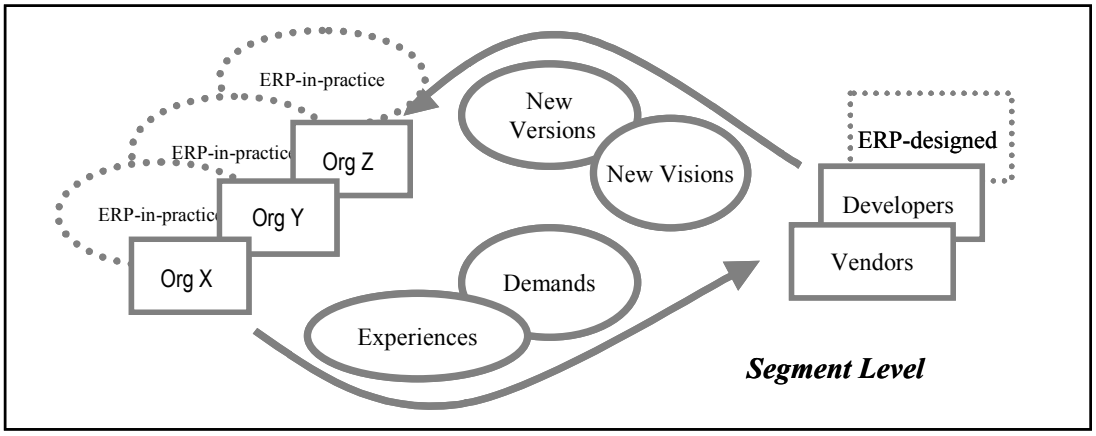

Figure 1. The Segment Level: Cyclic Interactions
(Adapted from Clausen and Koch 1999)

The segment perspective suggests two forces driving change. From inside, mechanisms of feedback and learning drive new demands that *may or may not* force vendors to embrace new changes. The suppliers do not consider all learning and experience from the customers as relevant. On the other hand, external social actors and events might intervene and force some changes. Examples of external forces are developments of new solutions by other developers, new governmental regulations, and the force of public discourse (Clausen and Koch 1999). Beyond the control of suppliers and customers, such external forces seem to be recurrent in the ERP marketplace and, consequently, drive many changes (Markus and Tanis 2000).

What power does a single company have in creating enough pressure to change ERP packages? Broadly speaking, the power of a single organization regarding the segment level tends to be relatively low and depends, clearly, on its economic and potential value vis-à-vis its segment. From the literature review on ERP implementation, I identify two occasions for negotiation related to the segment level. The first occurs when an organization first enters the ERP segment. This is the point at which the buyer has its greatest power of negotiation (Clausen and Koch 1999). The second occasion regarding the segment level is somewhat more complex and is related to the ability to make coalitions with other users in order to exert pressure on suppliers (Hislop et al. 2000; Koch 2000).

Briefly, occasions for shaping the features of ERP packages at the segment level are opportunities to influence the *design phase.* These occasions depend on *the context of interplay between suppliers and user firms in different segments*. Contrary to the dominant discourse about rhetorical closure, possibilities to reshape ERP package exist and all players should be aware of this to be able to take advantage of it. Suppliers should consider that not respecting the learning experience or demands of their customers can mean assuming risks to their future relationships within a segment. On the other hand, customers should be able to acquire the knowledge needed to better negotiate their requirements and needs.

Occasions at the Organizational Level: Decisions About Adoption and Customization

At the organizational level, ERP has a particular history in each customization process, where different players who take part in or are absent from the negotiation endorse that history (Figure 2) (Clausen and Koch 1999). Different occasions, when *decisions* should be made regarding adoption and customization, should be considered. The best example of change provoked by a single organization is when its demands for changes are incorporated in the basic features of the software by the vendor, therefore affecting design and taking part in further upgrades. Kelly et al. (1999) provide a clear example of this modality. They describe three case studies that focus on ERP projects. One case illustrates a situation where the organization requests a number of modifications to the software, many of which are then espoused by the vendors and incorporated in future upgrades. This is a clear example of situated negotiations forcing ERP to evolve. It is also an example of the demise of rhetorical closure. The two other organizations investigated interact with the same ERP vendor and adapt themselves to the ERP features and functionalities instead of promoting changes. Therefore, empirical evidence exists that organizations can purposively create occasions to shape ERP packages and even affect the design phase.

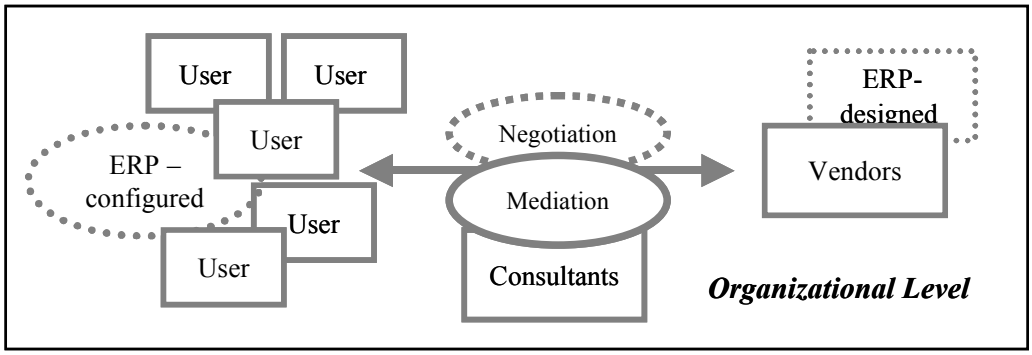

Figure 2. Organizational Level: A Particular History of Decisions

When organizations do not achieve such an influential role, and their demands do not affect ERP design, what is affected is customizations and use, or applying Orlikowski's (2000) practical lens, what changes is the *ERP-in-practice*. The literature review shows a rich repertoire of alternatives that organizations enact to live the ERP experience. The approach recognized as the most cost-effective is the "vanilla approach."[4] No changes are made and rhetorical closure is reinforced. Although several cases following the vanilla approach are reported (Brown and Vessey 1999; Smethurst and Kawalek 1999), the experience of many ERP-package adopters has been otherwise. Companies have used a wide variety of approaches for dealing with the lack of appropriate functionality in ERP packages, including (1) adopting manual workarounds; (2) adopting specialized modules designed by independent software vendors to work with a particular ERP system; (3) integrating multiple enterprise package with the organizations' legacy systems; (4) building new custom modules to work with the ERP systems, and finally (5) modifying ERP package code (Markus et al. 2000). In other words, even if ERP packages are not expected to be open to changes, they have been intensively changed in practice. Users' practices are influenced by users' understandings of the properties and functionalities of ERP packages.

The investigation of factors affecting users' practices is certainly not a new issue in IS research. What is relatively new is the predominance of packages instead of in-house development and increasing networking. I suggest that *time-space discontinuity* and *rhetorical closure* are key factors involving software packages such as ERP. They affect *interpretive flexibility*. Another peculiarity of the packages trend involves the role of *mediation*. Users of packages are strongly influenced by the mediating role exerted by consultants and vendors, which intervene in the users' interpretation (reading) of the software functionalities and also affect *interpretive flexibility* (Orlikowski 2000). Clausen and Koch outline the political dimension of organizational technology adoption and use, remembering that users have different amounts of power to influence decisions and that the micro-political strategies involved are as important as the different interpretations that actors attach to ERP.

Occasions at the Individual Level: Daily Actions

From segment or organizational levels, the choices that an individual can make about cross-functional applications in a context of mandatory adoption seem negligible. However, from the structurational perspective, the line that commonly separates macro and micro levels of analysis has a different meaning, rendering it difficult to understand the macro without plunging into the micro level. The actors, individually, with their *daily actions*, reproduce or reinforce structured rules, norms, and meanings (Figure 3) (Orlikowski 1992). By their articulation within subgroups, they constitute social spaces and play important roles in the choice of management and use of technology (Clausen and Koch 1999). Even the silenced voices play a role in the shape of technology.

In effect, changes in organizational or segment levels *emerge from individual practices.* According to Brown (1998), the very fundamental level at which change must be achieved is that of an individual's psychology. The implications of a particular IT configuration are not determined *a priori*, but depend on the individual perceptions, understandings, and legitimacy attributions. Technological artifacts are not unproblematic predefined packages, but *equivoques* that possess a high degree of interpretive flexibility, permitting users to appropriate or enact routines and even reinvent material properties during use. The introduction of a new IT system provides opportunities for those associated with it to reinforce their status as legitimate members, to reinforce privileged power relations, maintain credibility, and guarantee continued successful career paths (Brown 1998).

[4]To buy and to install the package without any change and using "default" options.

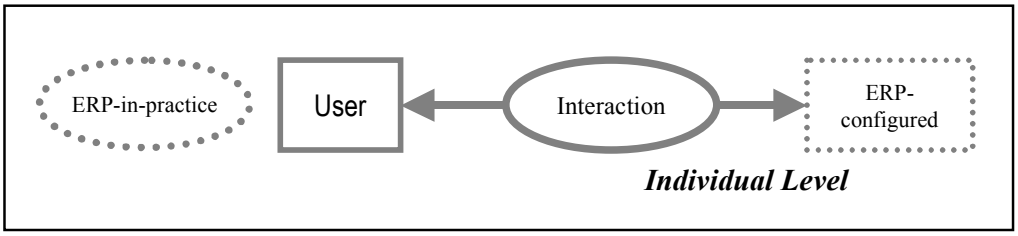

Figure 3. Individual Level: Daily Actions Transforming or Reproducing ERP-in-Practice

DISCUSSION AND CONCLUSION

This essay begins from a few premises about technology: (1) there are no technological imperatives, but situated organizational choices and (2) all technologies are social constructions, always open to change. Although open to change, we recognize that all technological artifacts are not equally malleable. On one hand, it depends on the physical properties crafted during the design and on the complexity of the configuration where it will be used. Taking configurational tools as an example, it seems that when the degree of interconnectivity and interdependency increases the complexity of a given configuration, the degree of flexibility of each element tends to decrease. The high interdependency between configurations and players make technological change complex. But *complexity differs from closure*.

On the other hand, the degree of malleability of a given technology depends on users' practices. Among the several factors that can affect users' practices (political, cultural, economic, cognitive, psychological, and so on), I outline the interpretive scheme as defined by Giddens (1984). My focus is on the meanings or interpretations by which users read or see a given technology. Because there is a *time-space discontinuity* between the design and the use of technology, people forget its malleable nature. When the *interpretive flexibility* of technology is very low, people tend to abandon any attempt to change it and *rhetorical closure* is reinforced in the interpretive scheme.

What stimulate this debate are ERP experiences. I argue that the ERP closure that dominates public debate is rhetorical. ERP is a class of technological artifact that, through their historical development, emerged with a myth that an integrated and ready to implement solution to legacy systems exists. However, implementation stories have shown that *ERPs-in-practice* have been neither a complete solution to integration nor readily implemented and used. Why does ERP rhetorical closure still overshadow the reasons for adoption and use of ERP packages? I suggest that reasons can be found on several levels: the history of ERP development, the legacy systems drama, the divergent interests struggling in the marketplace, the divergent interests and power within each organization, the economic constraints involving IT investments on organizational integration, etc.

Based on the idea that ERP are open to change and have been changed more often than one might suppose, I tried to demystify the rhetorical closure of ERP packages, identifying occasions of negotiation and change at three levels: segment, organizational, and individual. At the segment level, changes can affect the design phase and occur eventually, as the result of external events (the entering of a new competitor in the marketplace) or internal forces (pressures from coalitions of customers). At the organizational level, changes can affect both the design and the customization phases and take the form of regular decisions that organizations make during adoption and implementation. Finally, the occasions for individuals to change technology are uninterrupted. *Technology-in-practice* is reproduced or changed by users' daily actions. Individual daily actions, with different amounts of power, influence organizational decisions regarding the adoption and strategies of use of a technology. Organizational decisions, at different levels of power, exert pressures to influence the segment level, compelling changes in the design of the products. The link between micro and macro levels emerges clearly (Figure 4). What occurs at the micro level is transmitted to the other levels, explained by the mechanisms of structuration process and social construction.

Perceived flexibility affects individuals' practices, which affect organizational decisions that in turn affect segment events and the history of technological development. The final flexibility through which organizations deal with technological configurations depends in part on the perceived flexibility of technology as lived by individual users. In this direction, regarding ERP experiences, it is expected that the rhetorical closure that characterizes discourses on ERP packages triggers a chain of effects from individuals to segment levels, affecting the way individuals and organizations manage and use such technologies. If we interpret technology as always open to change, the degree of change can be determined by the opportunistic identification of occasions to negotiate and act. "Potential choices vary as technology moves across social settings and barriers of colliding institutions of

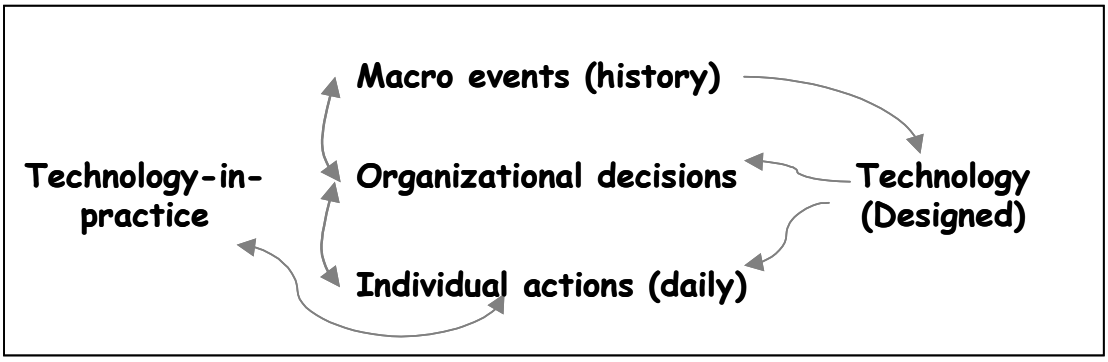

Figure 4. The Link Across Micro and Macro Levels of Technological Change

suppliers and user companies. Likewise, potential choices vary as technology is moved through history, unfolding more or less along a path of dependent trajectories of technological templates, systems and their use" (Clausen and Koch 1999, pg. 103). I believe that the awareness that occasions for negotiating technological change exist is the first step to being proactive and frees users from "closed" ERP designs, moving toward open ERP-in-practice.

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