



Developing a cultural perspective on ERP

A cultural
perspective on
ERP

Kees Boersma and Sytze Kingma

*Department of Culture, Organization and Management, Free University
Amsterdam, Amsterdam, The Netherlands*

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Abstract

Purpose – To develop an analytical framework through which the organizational cultural dimension of enterprise resource planning (ERP) implementations can be analyzed.

Design/methodology/approach – This paper is primarily based on a review of the literature.

Findings – ERP is an enterprise system that offers, to a certain extent, standard business solutions. This standardization is reinforced by two processes: ERP systems are generally implemented by intermediary IT organizations, mediating between the development of ERP-standard software packages and specific business domains of application; and ERP systems integrate complex networks of production divisions, suppliers and customers.

Originality/value – In this paper, ERP itself is presented as problematic, laying heavy burdens on organizations – ERP is a demanding technology. While in some cases recognizing the mutual shaping of technology and organization, research into ERP mainly addresses the economic-technological rationality of ERP (i.e. matters of effectiveness and efficiency). We want to supplement and complement this perspective with a cultural approach. How do individuals in organizations define and experience ERP-standards? How and to what extent are management and working positions redefined in the process of developing and implementing ERP? In the paper, we highlight three perspectives from which ERP systems can be experienced, defined and analyzed. These perspectives are specified as the “constitution” of ERP, ERP as a “condition” of organizations, and the (unintended) “consequences” of ERP.

Keywords Manufacturing resource planning, Organizational culture, Standardization, Social factors

Paper type Conceptual paper

A demanding technology

A recent case description reports a major enterprise resource planning (ERP) implementation at Nestlé, a multinational Switzerland-based consumer goods corporation (see www.CIO.com, a web site for Chief Information Officers related to *CIO Magazine*). The implementation involves an initial \$200 million contract with SAP and an additional \$80 million for consulting and maintenance. With this investment Nestlé wants to centralize a conglomerate that owns 200 operating companies and subsidiaries in 80 countries. The report cites a business analyst who downgraded her recommendation on Nestlé stock. She is skeptical about a project of this magnitude, because “[I]t touches the corporate culture, which is decentralized, and tries to centralize it [. . .] That’s risky. It’s always a risk when you touch the corporate culture”. The responsible CIO of Nestlé also is very aware of the risky nature of ERP, and warns: “[I]f they go in with an attitude that there’s not going to be resistance and pain, they’re going to be disappointed”. This CIO has learned the hard way that “no major software implementation is really about the software. It’s about change management”. She stresses in particular that “when you move to SAP, you are changing the way people work [. . .] You are challenging their principles, their beliefs and the way they have done things for many, many years”.



This account of ERP stands in sharp contrast with the rhetoric that guided the introduction and distribution phases in the development of enterprise systems. In the mid-1990s, when many organizations jumped on the ERP bandwagon, ERP was advocated and welcomed as a cure-all for many major organizational problems (Davenport, 1998). ERP promised significant increases in management control, competitive advantage, reductions in the costs of business operations and flexibility in production and distribution processes. While these advantages are still the primary objectives of ERP, they are nowadays no longer naively presented as relatively simple and self-evident outcomes of a technological fix. Instead, ERP itself is presented as problematic, laying heavy burdens on organizations. This redefinition of ERP is informed by alarming stories about chronically exceeded budgets and deadlines and serious disruptions of business processes because of ERP. In short, the image of ERP seems to have changed from a highly promising into a highly *demanding technology*.

The Nestlé story not only draws attention towards transformations in the signification of ERP, it also points towards organizational culture as the primary factor responsible for the demanding character of this technology. Whether or not this claim is entirely accurate – it could well be that “culture” in some instances is used as a scapegoat, distracting from an underestimation of the complexity of ERP, from technical failures, financial miscalculations or bad management and power struggles – this claim strengthens our interest in the cultural conditions and consequences of ERP systems.

In this article we develop a cultural perspective on ERP and organizations. We want to clarify what can or should be taken into account in a cultural study of ERP. We are specifically interested in the interaction between new technologies and organizations (Ciborra and Lanzara, 1990; Orlikowski, 2000). First, three different but mutually related perspectives on ERP will be highlighted. This is relevant for defining ERP. Second, the standardization of ERP is identified as a key process in the relationship between organizational culture and the dynamics of ERP. From a cultural perspective it is important to study the process of standardization from the perspective of the life worlds of the various actors involved in the development and implementation of ERP. In particular, the role of intermediary ICT businesses in constructing ERP seems crucial.

Complex organizations and ERP

We start from the observation that ERP systems are not easy to define, certainly not if we want to take the actors’ point of view seriously. ERP systems are complex and dispersed within and between organizations. In a sense these systems are elusive – they are in constant flux and to be found everywhere (a little bit) and nowhere (entirely). Those involved in the (re)production of ERP will, depending on their position in the organization, have quite different views of and experiences with ERP. Individual or group definitions of ERP will vary according to their “awareness context”. In order to recognize these subjective standpoints towards ERP, an *a priori* definition of ERP is not very useful. Instead, we highlight three perspectives from which ERP systems can be experienced, defined and analyzed. These perspectives, which indeed apply to any technology and which in a way also represent historical phases in the development and study of technology (Stemerding, 1995; Silverstone and Haddon, 1996), will in this article be specified as the “constitution” of ERP, ERP as a “condition” of organizations, and the (unintended) “consequences” of ERP.

The constitution of ERP

First, the constitution of ERP. This perspective refers to the material, time-spatial appearance of ERP. It concerns the artefacts and persons ERP systems are made of, including scanners, PCs, cables, mainframes, software packages (with brand names like SAP, Peoplesoft, Baan, Oracle or JD Edwards), interfaces, reports and ERP consultants, programmers and operators. In the field of technology studies, Bijker's (1987) study of the bicycle may serve as a major example of the social construction of technological artefacts. He showed that and how the evolution of this vehicle could be understood by studying the interests and perceptions of the various actors involved in its use and development.

The ensemble of ERP components can probably never be grasped as a whole, but each individual that has to do with ERP will in one way or another interact with at least some parts of it. The constituent parts themselves as a rule already represent complex technologies of which in everyday working routines and specific incidents only certain aspects will be considered relevant for ERP. For instance, a PC used for the input of ERP data can perhaps also be used for e-mail and surfing the internet.

Just like the internet, the virtual character of ERP as a whole may obscure its physical foundations. Similar to the argument Downey (2001) makes for the internet, ERP workers can only be revealed if we consider technology, labor and space (and time) simultaneously. Therefore, a cultural study of ERP should devote serious attention to the material and geographical aspects of these systems. Moreover, anthropological conceptions of organizational culture usually not only refer to values and rules but also to material artefacts (Schein, 1992), which increasingly consist of ICT equipment. And artefacts are endowed with symbolic meaning. This makes the attribution of symbolic meanings crucial for conceptualizing ERP in terms of its constitution.

In studying the interactions between man and machine, the question of the redefinition of the workplace and the required knowledge, tasks and skills is particularly relevant. ERP, for instance, seems to imply a switch from a functional to a process orientation, due to the fact that software modules cut across traditional departmental lines (Gunson and de Blasis, 2002). But direct and unambiguous relations between specific ICT systems and working positions are difficult to discern. Krueger (1993), for instance, reported in a well-known article that people working with computers had significantly higher levels of education and significantly higher salaries than people working without them. This seems to confirm popular beliefs and policies about the relationship between computer skills and job opportunities. However, as Borghans and Ter Weel (2000) argue, different interpretations are possible and the causality can even be the other way around. It can be that people with higher wages have a greater chance of obtaining computers than people with lower wages. Also, the link between education and computer use does not have to refer to computer skills but can just as well refer to jobs that require complex analytical and social skills that are complementary to the tasks a computer can perform. It remains as yet an open question to what extent, and under which conditions, ERP generates more complex working relations and challenging work or generates de-socialized and de-skilled work and more standardized working routines. In this respect a study in the paper industry by Vallas and Beck (1996) might be revealing. They argued that the introduction of a computerized distribution control system, designed to enhance flexibility, led in their

case to the devaluation of traditional craft knowledge and constraints on the workplace of manual workers.

For that matter, a concern for the redefinition of the workplace also involves higher management. Martinsons and Chong (1999), for instance, point to changes in the ICT management paradigm, from primarily technology driven towards more user-driven approaches. A change in this direction could very well be reinforced by ERP, since the management of primary business processes is to an increasing extent mediated by the ERP system. In that case ICT will be prominently represented and discussed in the boardroom, because management objectives have to be translated into system requirements.

In general, the implications of ERP for working positions will probably vary according to the circumstances and the standpoints of those involved. Liker *et al.* (1999) conclude from their extensive survey of the literature on the impact of technology on work that this impact varies with different theoretical perspectives and is “contingent on a broad set of factors, including the reasons for its introduction, management philosophy, the labor management contract, the degree of a shared agreement about technology and work organization, and the process of technology development and implementation” (Liker *et al.*, 1999, p. 577).

ERP as a condition of organizations

Second, ERP as a condition of organizations. This perspective refers to the functional integration of (sub)systems by ERP. It concerns the infrastructure that results from the connections, laid by ERP, between various organizational networks, in particular functional divisions within organizations (like finance, marketing, procurement, warehousing, human and material resources planning) and between organizations (like various suppliers and customers). Indeed, within the history of ICT systems ERP is generally considered and defined on the basis of its capacity to integrate formerly segregated ICT systems. In this respect ERP represents a new phase in the informatization of organizations. In the field of technology studies, Hughes’s (1987) study of electrical system may serve as a major example of modern technologies as infrastructures. He stressed that technological systems do not simply comprise physical artefacts, but involve heterogeneous interactions between organizations, sciences, markets and state regulations.

ERP may contribute to the development of “network enterprises”, defined by Castells (1996, p. 187) as “that specific form of enterprise whose system of means is constituted by the intersections of segments of autonomous systems of goals”. This type of organization is rather flexible because it can both reallocate its means of production and change its goals. Network organizations can reconfigure themselves in reaction to changes in their environments. According to Castells, network organizations are facilitated but not determined by ICT. Other factors are equally important, notably economic forces driving towards greater flexibility of management and cultural forces stressing individual freedom of choice.

Literature on the interaction between ERP and organizations indicates that ERP systems are developed and changed by several independent actors without any explicit coordination (Ciborra and Lanzara, 1990). As a consequence these ICT systems appear as large, open-ended infrastructures. Ideally, these infrastructures make it possible to flexibly manage entire business cycles and global business relations in real time. In

this way ERP systems produce time-spatial relations. In order to speed up the turnover time of capital, they are directed at “time-space compression” (Harvey, 1989). For instance, formerly remote units appear nearby and formerly time-consuming procedures for gathering and comparing information from different locations and operations can be realized instantaneously. However, the spatial and temporal integration as promised by ERP does not automatically result from the implementation of these systems. The extent and specific forms of time-spatial reorganizations can vary considerably according to the contexts of application.

Castells’ concept of the network enterprise is closely related to that of the “virtual corporation” (Davidow and Malone, 1993). Information technologies that link employees, divisions and companies, and provide information any time and anywhere, enable and reinforce network structures. For those involved, organizations mediated by ERP assume a highly virtual character, because although the situations represented by the bits and bytes within the central database are real, they are not actually present (Shields, 2002). The stored information presents an image of the organization and adds to the transparency of organizations. The virtual images of organizations, extracted from organizations and represented by ERP, become relatively autonomous from the physical properties of organizations.

This virtualization also enhances the capacity of panoptic control and disciplinary power (Foucault, 1977), an architecture of power closely associated with ICT systems (Zuboff, 1988; Poster, 1990). Management can use the stored information to monitor and correct the performance of individuals and divisions. At the same time individuals can be empowered by the system and carry out their tasks with more responsibility based on their own insights, preferences and information from the system. However, Sia *et al.* (2002) studied the balance between control and empowerment in a hospital setting and concluded that ERP in this context tended towards the enhancement of managerial control.

In studying the disciplinary power, exerted through or on behalf of panoptic ICT systems, the standard protocols and implicit norms of ERP infrastructures are perhaps of greater relevance than the issue of the potential managerial surveillance of personnel. The connections within and between organizations necessitate close cooperation and the adjustment of successive business processes. This may effect the identity formation of individuals and groups within organizations, since identities refer to internal and external images of the “self” (Jenkins, 1996). Precisely the internal and external (hierarchical as well as functional) boundaries can be affected by ERP. The standard procedures of ERP contain a “script” for users, informing them about what actions should be undertaken, when, where and how (Akrich, 1992). This also implies instructions from the system in the workplace about how to organize activities *vis-à-vis* co-workers, management and other elements in the business cycle. These normative scripts are crucial for conceptualizing ERP in terms of infrastructures. It may operate in a similar self-evident way as roads in the traffic system do, guiding drivers towards their destinations.

The standard solutions, built into ERP by the major providers, are based on so called “best practices”, i.e. the ideal script for the most effective and efficient performance of certain business functions. But to what extent the standard solutions actually fit organizational requirements, or should be tailored to specific work environments, seems notoriously problematic (Davenport, 1998; Batenburg *et al.*, 2002).

In this respect Soh *et al.* (2002) offer an interesting typology of “misalignments in ERP implementation” based on four structural properties of ERP. They argue that the quest for the integration of business units, a process orientation, greater flexibility, and generalized solutions, creates tensions with opposite organizational forces demanding differentiation, a functional orientation, stability and domain-specific – for example nation- or region-specific – solutions.

In addition the whole idea of objective “best practices” seems problematic. Even on the level of total software packages this claim does not seem to hold. For instance, SAP is generally considered strong on financial management, Baan on logistics and Peoplesoft on human resources management. Moreover, these software packages are implemented in organizational contexts, like hospitals and universities, which seem to deviate considerably from the contexts in which these packages were originally developed. The interesting question here, of course, is to what extent this points towards a great flexibility of ERP software or to a homogenization of business models across a variety of organizational contexts.

The (unintended) consequences of ERP

Third, the consequences of ERP for organizational culture and the wider environment. This perspective refers to the actual effects of ERP, and concerns intended as well as unintended consequences. Here we have to take into account that technologies do not determine effects in a simple linear fashion. “Effects” are in many cases controversial and a product of power relations. Indeed, power balances seem crucial for conceptualizing ERP in terms of its consequences. It is therefore important to study the effects of technologies in terms of the mutual change of and interactions between technologies and their environments. In the field of technology studies, Cowan’s (1983) study of modern household equipment may serve as a major example of the unexpected consequences of technologies. She showed that instead of making domestic labor easier, technologies like the washing machine could also aggravate domestic labor for housewives.

Effects concerning the scaling-up and globalization of, and managerial control over, business processes seem particularly relevant for ERP. Firms operating in extended networks and global markets in some way have to control their global operations and manage networks in a coordinated manner.

ERP systems may contribute to globalization in roughly two ways. Firstly, as a software product they may lead to the proliferation of standardized business solutions based on the alleged “best practices” (usually based on Western capitalistic enterprises), more or less similar to the process of “McDonaldization” as described by Ritzer (1993). This raises questions about the displacement and rearrangement of former localized business practices, identities and labor markets. In addition, the standardization can make it relatively easy to move business units towards the most profitable regions, for instance those with relatively high levels of education or relatively low wages. This may influence local business networks and communities. But to what extent ERP actually leads to the transformation of historically grown business practices, or elicits local responses, will also depend on the power relations involved. In this respect scholars have argued that globalization in many cases can better be understood in terms of “glocalization” (Robertson, 1995). This concept refers to the blending of global standards and local situations, like in the Japanese business

strategy of *dochakuka*, a global outlook adapted to local conditions. The concept of glocalization challenges the widespread view that globalization and localization are separate and opposite ways of thinking.

Secondly, the backbone of business processes ERP systems may contribute to the coordination of businesses on a transnational level. After all, the main managerial objective behind ERP is to enhance control over processes within separate user organizations. However, in the context of globalization it remains to be seen to what extent managerial control over the implementation of ERP and over global business processes can actually be realized. In particular, Beck (1992) has argued that the relative autonomy of modern science and technology produces all kinds of uncontrollable risks and side effects. According to Beck (1992) the awareness of these risks strengthens the “risk society”, which is marked by a reflexive attitude towards the unintended consequences of business strategies and market mechanisms. The acknowledgment of risks may in turn change the conditions of their existence (Van Loon, 2002, p. 21).

Hanseth *et al.* (2001) have argued that the dynamics of the risk society apply to ERP systems. And increasing risk means decreasing control. The risks increase as ERP affects everybody and everything in and around a corporation. In addition, modern corporations also get more integrated with their environment (customers, suppliers, partners, stock markets), implying that such companies are affected more by events taking place in other companies. Hanseth *et al.* (2001) even argue that in their study of a global Norwegian oil company, the introduction of ERP has led to outcomes that are the opposite to the intended increase in managerial control. They suggest that ERP in the context of a global enterprise can be characterized as a runaway device, which behaves in unforeseen, erratic ways. Although they can be counter-productive, these erratic effects are not necessarily negative. For instance, the re-engineering of business processes within the oil company studied by Hanseth *et al.* (2001) appeared to be “self-reinforcing” – integration generating more integration – as a side effect of the ERP implementation. In this case ERP had similar unexpected consequences for other IT systems, like the hardware infrastructure and the use of Lotus Notes software. In particular, the introduction of Lotus Notes significantly improved the necessary collaboration throughout the company, which also affected the corporate culture.

ERP and organizational culture

In the previous section we concluded that whether we study the constitution of ERP, or consider ERP as a condition of organizations, or direct our attention towards the consequences of ERP, in each case the outcome of our analysis will be dependent on the perception of the actors involved and the organizational contexts. These complex relationships between ERP and organizations raise the question of how to study and manage cultural aspects of ERP systems. Analyzing ERP as an outcome of human actions and interactions can be done by connecting ERP to a body of literature that is known as “social shaping of technology” (SST) (Williams and Edge, 1996). In contrast with approaches that consider technological development in a deterministic way as an autonomous process that is taken for granted, this body of literature examines not only technical factors, but socio-economic factors as well. Though using a wide range of theoretical models and frameworks, the SST literature has in common that it studies the character and influence of shaping forces. Central to SST literature is that there are

choices made by individual actors or groups that influence the character of artefacts and the direction of technological development (the so-called innovation trajectories). This implies that the understanding of choices and social influences is crucial. When it comes to the implementation of ERP in an organization, this means that the technology and the organization (i.e. organization members) cannot be treated as independent and separate entities. According to the SST literature, it is the social setting of the organization that shapes technology and *vice versa* (Ciborra and Lanzara, 1990). Technologies do not come to us like “manna from heaven”, but are social and heterogeneous phenomena embedded in the social structures of organizations. Of particular importance are the interactions of people acting within these formal structures and in how they construct their own vision of reality. An analysis of the organizational context of actors should therefore be part of the analysis.

In our view, SST encompasses all the three perspectives on ERP as outlined above. These perspectives should not be considered as mutually exclusive but as alternative cross-sections of the same technology-organization constellation. Whereas questions related to the constitution of ERP tend to highlight the *meanings* attributed to ERP artifacts, and questions related to ERP as an organizational condition tend to focus on the *normative prescriptions* embedded in the operation of ERP, the questions related to the consequences of ERP highlight the *power relations* regarding ERP. The intellectual challenge here is to analyze how these three perspectives interact and can be combined in practice.

Organizational culture

It is at this point that we want to bring in the concept of organizational culture. In the literature concerning ERP, “culture” is – if it is referred to at all – often implicitly or loosely defined. But a cultural study of ERP should make culture more explicit. In general we propose a classical anthropological understanding of culture as a more or less shared system of symbols and meaning (Geertz, 1973). However, in the context of modern societies and formal organizations, two complicating processes should be taken into account.

First, the distinction between a life world and a systems approach of organizational culture (Tennekes, 1995). As can be derived from the formal definitions of Habermas (1989), a systems approach brings to the fore the instrumental actions of and within organizations, and stresses the coordination between people and divisions on the basis of hierarchical power relations and anonymous market mechanisms. Many studies of ERP dealing with the effectiveness and efficiency of ERP implicitly or explicitly approach ERP from such a systems point of view. In contrast with this, a life-world approach focuses on communicative actions and stresses the coordination between people and divisions on the basis of normative agreement and feelings of mutual understanding. A life-world approach can offer a detailed understanding of the motives and identities of the actors involved, in particular through the use of ethnographic methods and discourse and narrative analysis (Czarniawska, 1998). Alvarez and Urla (2002), for instance, applied a narrative analysis in a case study of a system requirements analysis regarding an ERP implementation. They remark that the narratives concerning the requirements for ERP also learn something about the culture of organizations. This is not surprising, because in stressing the importance of a life-world approach the systemic aspects of organizations should not be neglected.

They should rather be considered as two sides of the same organizational coin. It is the mutual relationship that has to be questioned. Technologies are part and parcel of organizational culture, and this culture is reproduced in everyday working routines.

It has already been argued that with the introduction of ERP the instrumental actions within and between organizations increasingly tend to be coordinated by ERP. Therefore, organizational cultures assume the character of “technological cultures”, i.e. cultures which are primarily mediated by technology. This can have serious consequences for organizational “sensemaking” (Weick, 1995). As defined by Weick (1995), sensemaking is both an individual and a social activity and does not only refer to the interpretation but also to the construction of meaning. Weick furthermore stresses the retrospective character of sensemaking. This makes sensemaking particularly relevant in situations where people are confronted with rapid changes, complex problems and unexpected outcomes of innovations. These circumstances force people literally to make sense of what is going on.

Second, the fragmentation of organizational culture. Organizational culture has often been described as a pattern of shared assumptions produced and manipulated by top management (Schein, 1992). However, the description of organizational culture as a set of shared assumptions is rather oversimplified and often misleading. Empirical research provides us with a far more complex picture and shows that tensions can grow and remain between the individuals’ interests and organization aims (Kunda, 1992). Therefore, organizational cultures should be studied in line with Martin’s theoretical observations (Martin, 2002). She argues that because of cognitive and normative diversity within an organization, the attribution of meaning (which is, as we have argued, an central part of the cultural process) is complicated and leads to integration as well as fragmentation, to unity as well as diversity. It is the actor’s reality that forms the basis for further action – people produce and reproduce organizations by means of actions and interactions on a daily basis (so-called routines).

From a structurationist framework it has been stressed, in particular by Orlikowski (2000), that individual actors are always situated actors. In using technologies actors reproduce at the same time important normative and power relations within and between organizations. Thus, linkages can be specified between on the one hand the meanings attributed to technologies and on the other hand the normative prescriptions and power relations of organizations. In this way it is possible to analyze culture in terms of “shared” meaningful work practices, while at the same time recognizing the existence of multiple working cultures dealing with ERP. More specifically, it seems important to emphasize the mutual development of organizational (sub)cultures and the technical (ERP) structure upon which they rely (Kawalek and Wood-Harper, 2002).

The standardization of ERP

The rise of ERP in organizations reflects a new phase in the informatization of organizations, integrating separate processes like accounting, production planning, marketing and human resource management. The intended integration of complex organizations makes ERP a very interesting case for studying organizational culture and ICT, because these ERP systems are dealing with the tuning of standardized solutions of specific routines within and between organizations (Holland and Light, 2001). In this sense, the standardization of ERP systems is part and parcel of

modernization processes, which are marked by processes of specialization and integration (Giddens, 1990; Beck, 1992).

The standardization of ERP is in our view reinforced by two basic processes:

- (1) ERP systems are generally implemented by intermediary business consultants mediating between the development of ERP standard software packages and specific business domains of application (this is the “vertical” integration of ERP);
- (2) ERP systems integrate complex networks of production divisions, suppliers and customers (this is the “horizontal” integration of ERP).

In order to study and manage the interaction between specialization and integration it seems of great importance to focus on those organizations and working practices that explicitly deal with the “vertical” and “horizontal” integration of ERP packages (see Figure 1). Whereas vertical integration refers to the standardization of ERP packages, the horizontal integration refers to the standardization of business processes by ERP. These forms of standardization are interdependent and should be studied in mutual interaction.

The vertical integration of ERP packages represents the “reproduction chain” of this type of enterprise system, whereas the horizontal integration represents the “value chain” of the production processes that are “informatized” by ERP. Characteristic of the specialization of the services regarding ERP systems is that the development and implementation of these software systems are relatively independent of each other. Because of this, specialized professions and organizations have originated which are dealing with the tuning of standardized solutions on specific organizations (Besson and Rowe, 2001). As a consequence, it may happen that the knowledge embedded in the ERP software is in conflict with existing knowledge in the organization (Van Stijn and Wensley, 2001).

An interesting approach to intermediary structures has been developed by Callon. Actors within the network are entities “that do things” (Callon *et al.*, 1992). Although the distinction between human and non-human actors is less interesting to Callon than the distribution chain itself, we would like to focus on intermediary firms. Intermediary

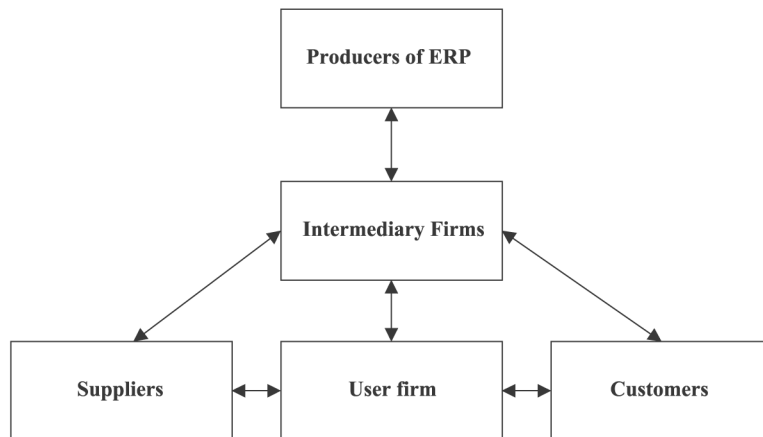


Figure 1.
ERP in the organizational
context

firms provide the missing link between the producers and users of ERP. Moreover, due to their specific role, they define (partially) the network itself. Actors within an intermediary IT corporation “translate” ERP packages into the production languages of the contexts of implementation, and therefore also change the ERP software. Following Callon we define an “intermediary” as anything that passes in between actors (in our case the producers, consultants and users) just to make transactions possible. Intermediaries are thus to be seen as the language of the techno-economic network – it can be a text, a protocol, a patent, a service, or money. Considering this definition, the way the actors interact in the techno-economic (ERP) network lies at the heart of our analysis.

To illustrate this point, we can refer to a striking example of the intermediary role of ERP in an empirical research project we recently started. One case study concerns the experiences with ERP of a relatively small (600 employees) factory in the automotive sector. At a certain moment in time within this factory the materials requirement planning (MRP) got out of control, and the production process almost came to a halt. There was a serious misalignment between on the one hand the actual presence of materials at the production lines and in the warehouses, and on the other hand the virtual representation of these materials within the ERP system. Although this misalignment was rather obvious, most of those responsible at the production lines and in the warehouses continued taking the information given by the ERP system seriously and continued acting upon this information, more or less irrespective of the consequences their actions had for the (dis)continuation of the production process. This seemingly “irrational” behavior can partly be explained by the “fallacy of centrality”, as discussed by Weick (1995, p. 3): the more advanced a technology is thought to be, the more likely are people to believe the information that comes out of it. In this way the perceptions of information technology can seriously influence the sensemaking of what is going on in organizations.

Conclusion

We started this paper with the observation that ERP has become a highly demanding technology. Managers as well as scientists in many cases attribute the problems associated with the development and implementation of ERP to aspects of organizational culture. However, in general – with some interesting exceptions cited in this article – culture has not yet been a topic of explicit concern in studies of ERP. Therefore we have given some guidelines for developing a cultural perspective on ERP.

First, in defining ERP from the actor’s point of view, three different but mutually related perspectives should be taken into account. These perspectives include the constitution of ERP (stressing processes of signification and the redefinition of work), ERP as a condition of organizations (stressing the virtualization of organizations and normative prescriptions of ERP) and the intended as well as unintended consequences of ERP (stressing the globalization of organizations and power relations). In the interaction between these three dimensions of ERP we may find the cultural forces shaping this technology and how this technology in its turn influences organizational cultures. Since many studies of ERP highlight the gaps that often seem to be experienced between the expectations and evaluations of ERP projects, special attention should be given to the retrospective character of cultural processes, as in the concept of sensemaking (Weick, 1995).

Second, in studying culture the actor's point of view is paramount, since culture refers to processes of meaning construction and sensemaking. The actor's point of view can be pursued by adopting a life-world approach. However, life-worlds should not be approached without taking the instrumental systems characteristics of ERP into consideration. It is important to specify how IT systems and life-worlds are connected, since cultural relations are reproduced together with the development and use of ERP-systems. System and life-world will have to be perceived as two sides of the same organizational coin. In this respect we have stressed the importance of "intermediary" structures and organizations. These structures, and the organizations specifically dealing with these structures, provide linkages between the producers and users of ERP. Accentuating intermediary structures, and intermediary roles of ERP, can also overcome the often arbitrary distinction between human and non-human "actors" (Callon *et al.*, 1992).

Third, the standardization of ERP systems is of interest in order to identify the relevant actors regarding ERP. In the standardization of ERP systems a distinction should be made between on the one hand the standardization of ERP, i.e. the vertical integration within the "(re)production chain" of ERP packages, and on the other hand the "value chain" standardized by ERP, i.e. the horizontal integration of business units and suppliers and customers. In managing these processes of standardization, intermediary ICT companies and other working practices that specifically deal with the connections between the various sub-systems of the ERP network occupy key positions in the social construction of ERP. Together they make up an organizational context for ERP, which has become a relatively autonomous force within and between organizations. This technological environment exerts considerable influence upon but does not determine organizational culture. It shapes a technological culture which management and researchers seriously have to reckon with.

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