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When the good times are over: Professionals encountering new technology

Ulla Eriksson-Zetterquist, Kajsa Lindberg and Alexander Styhre

ABSTRACT

Information and communication technologies play a key role in contemporary organizations. Supported by a longitudinal study of changes in purchasing practices, owing to the implementation of an e-business system at a large, global corporation, this article shows the interplay between the technology and the role of the users. We argue that the introduction of the e-business system increased the hierarchy and bureaucracy but also that the purchasers' professional identities and established work procedures were threatened by the technology being used. The results indicate how a technological artifact is by no means detached from the broader reformulating of managerial procedures and practices, instead reflecting and embodying some of the managerial virtues of predictability and hierarchy. Since technology is playing an increasingly key role in most industries and domains, it is also suggested that the intersection between technology and professions be examined in more detail.

KEYWORDS

e-business ▪ new technology ▪ professions ▪ skills ▪ work processes

Introduction

Organizations are increasingly being conceived of as assemblages of practices, which are embodied, materially mediated arrays of human activity

organized around shared practical understanding (Schatzki, 2001). This means that a perspective on organizations includes abstract resources such as ideologies, beliefs, assumptions, and institutions, as well as material resources such as artifacts and technologies. In most cases, the line of demarcation between the social and the material is a permeable and fluid one where the social shapes the material resources, and materiality strongly affects how the social is conceived of. In the formulation of Knox et al. (2007: 267), 'organization emerges as an ongoing accomplishment of dynamic and transformational contingency constituted out of multiple and interacting stands of subject-matter that materialize and de-materialize in long cycles of coalescence and dis-assembly'.

One domain of research wherein it is particularly complicated to draw this line of demarcation is the use of new technology and, more specifically, the use of information and communication technology (ICT). Some authors insist on viewing technology as an immutable mobile force that has some relatively stable, innate qualities, representing a so-called *internalist view* of technology (Gitelman, 1999; Nye, 2006) or a *techno-centric perspective* as Orlikowski (2007) has labeled it. Most analysts of technology conceive of technology as being strongly influenced by its use in a social setting and the day-to-day interaction between users and technology. This *externalist view* of technology, emphasizing the broader social network and the social ramifications of technology, is represented, for instance, by the social construction of technology (SCOT) tradition of thinking (Bijker, 1995; Bijker & Law, 1992; Bijker et al., 1987; Law, 2002; Law & Singleton, 2005; Mackenzie, 2005).

The externalist view repudiates technological determinism; technology is always in the hands of people whose ingenuity and ability to adapt technological artifacts to individual needs and demands make technology a fluid and malleable social and cultural resource (Oudshoorn & Pinch, 2003; Yates, 2006). Such a perspective also admits that the negotiated or enacted use of technology often differs from the prescribed, mechanical operation of technology (Orlikowski, 1996). The externalist view of technology allows a more dynamic and open-ended view of technology and couples material and social resources more tightly (Cowan, 1983; Leonardi & Barley, 2008; Slack & Wise, 2002; Wise, 1997). However, when it comes to practical uses of technology within organizations, studies suggest that no technology is ever fully flexible and adaptable and that no social system is completely detached from new technologies. Instead, social and technological systems mutually adjust and adapt to the point where a semi-stable equilibrium between the two resources is established (Boland et al., 2007; Spicer, 2005; Williams & Edge, 1996; Zammuto et al., 2007). Expressed differently, a change in a

technological system affects the pre-existing social system while a change in the social system entails consequences for the technological system.

This article reports on a case study of the implementation and use of a new e-business system, called eBIZ, by the purchasing department of a major automotive company in Scandinavia, CarCorp. Prior to the introduction of eBIZ, purchasers played a key role in negotiating with suppliers and monitoring and controlling the flow of components. The purchasers frequently travelled to visit the suppliers and had developed a strong professional identity. To support their work, the purchasers used a rather unsophisticated ICT system that still served its purpose since the purchasing work was regarded as a function that was not determined by technological systems, but rather based on social relations and personal contacts. When the eBIZ system was introduced, the day-to-day work of the purchasers was strongly affected: new routines and standard operation procedures were introduced and many of them felt their work had been substantially deskilled. However, the introduction of the eBIZ system did not come alone – it was accompanied by the introduction of new roles and changes to the organization. As the study suggests, new technology, among many other things, may pose a threat to professional identities and established work procedures, thereby violating the dominant discourse on ICT that promises anyone embracing the new technology a faster, happier, more creative, and more exciting future. This does not suggest that technology per se is capable of posing such a threat, but when it is supported by political, ideological, and practical changes in organization, technology may help to co-produce a situation whereby the roles of the community of purchasers change substantially. Thus, the implementation of eBIZ should be seen as a part of broader social and managerial changes.

In this article, we first discuss the co-construction and co-dependencies of technology organization and professional identities. We then explain the methodology of the study and present the empirical material. Finally, we conclude with a general discussion of our results and address some implications of our research.

The co-construction of technology, organization, and professional identities

Advanced technology, specifically information and communication technology, plays a key role in contemporary organizations. While Yates (1989) emphasizes the role of early ICTs, such as the typewriter and new filing systems, in the growth of large-scale organizations during the 19th century

(e.g. the American railroad companies), the computer-based technologies developed during recent decades represent an unprecedented change in communications opportunities, information storage, and information retrieval at low cost and in a timely manner.

The issue of technology has always been a source of concern for organization theorists. Contingency theorists such as Woodward (1965) and analysts of sociotechnical systems (e.g. Blauner, 1964), in addition to symbolic interactionist studies (Engesmo & Tjora, 2006; Prasad, 1993), ethnomethodological research (Ross & Chiasson, 2005), and narratological studies (Pentland & Feldman, 2007), all emphasize that technology shapes organization in many ways. For instance, the implementation of new technology often affects the social relations within a community of practice and/or the relationships between professional groups, or even departments. Barley (1990: 67) points to the need to carefully examine the implications of new technology:

> Technologies are depicted as implanting or removing skills much as a surgeon would insert a pacemaker or remove a gall bladder. Rarely, however, is the process so tidy. Events subsequent to the introduction of a technology may show that reputedly obsolete skills retain their importance, that new skills surface to replace those that were made redundant, or that matters of skill remain unresolved. In any case, groups will surely jockey for the right to define their roles to their own advantage.

What is at stake, suggests Barley (1990), is the status of various skills and competencies in the actual social setting. One of the consequences is that any scholar researching the uses of new technology will need to carefully examine how the targeted technology is adopted in practice, during day-to-day work: '[S]ince technologies exist as objects in the realm of action, one cannot hope to understand a technology's implications for structuring without investigating how the technology is incorporated into the everyday life of an organization's members' (Barley, 1986: 81). Not only does technology influence a communal order on the level of day-to-day work, it is also strongly shaped by its actual use. Orlikowski (1992: 406) consequently argues that '[t]echnology is physically constructed by actors working in a given context, and technology is socially constructed by actors through the different meanings they attach to it and the various features they emphasize and use'. Orlikowski (1992) thus represents an externalist view of technology, underlining its social embedding. For instance, in a review of the ICT literature, Orlikowski and Iacono (2001: 131) claim that there is no 'one-size fits all' conceptualization of technology since the very definition of technology is contingent on local conditions and practices. They suggest that:

> IT artifacts are always embedded in some time, place, discourse, or community. As such, their materiality is bound up with the historical and cultural aspects of their ongoing development and use, and these conditions, both material and cultural, cannot be ignored, abstracted, or assumed away.
>
> (p. 134)

Moreover, they suggest that the stability of a technological artifact 'is conditional because new materials are invented, different features are developed, existing functions fail and are corrected, new standards are set, and users adapt the artifact for new and different uses' (2001: 131). Orlikowski and Iacono (2001) thus decenter the IT artifact and render it a heterogeneous assemblage composed of many small and interrelated parts, all of which are subject to continuous modifications and displacements.

However, such a decentered view of technology and IT artifacts does not suggest that technology is impotent or incapable of influencing social systems. Perhaps it is precisely the heterogeneous and flexible nature of technology that makes it a strong factor in social and organizational change. In agreement with Kallinikos (2005, 2006), and using Heidegger's (1977) phrase, we believe technology 'enframes' the life world of human beings in contemporary society and in organizations. Kallinikos (2005: 189) defines technology in terms of a structure enabling predictable and coordinated action:

> I will portray technology as a structural form that supports human action in a world beset with contingencies of every sort. Thus viewed, technology emerges as a standardized and closed arrangement of artefacts/processes designed and deployed to produce a minimum platform of predictable relations, in an otherwise shifting and contingent world.

Consistent with Barley (1986, 1990) and Orlikowski (1992, 1996), Kallinikos (2004, 2005, 2006) emphasizes the social embedding of technology:

> Social agents are not disembodied sprits; instead, they are complex ensembles of skills, proclivities, and roles, some of which are brought into being by technology itself . . . Technology is not just an exterior force that encroaches upon local, technologically 'unspoiled' contexts, though it may be used that way; most of the time, technology partakes in the constitution of local contexts and agents.
>
> (Kallinikos, 2006: 144)

What Kallinikos suggests is that technology cannot be conceived of as a means of accomplishing collectively enacted goals but that technology, in

itself, is part of the very articulation of goals. Applying a garbage-can decision-making logic (March & Olsen, 1975), technology is not only used to handle problems, it also provides a series of ready-made and packaged solutions to problems.

The conception of technology put forth by Barley (1986, 1990), Kallinikos (2004, 2005, 2006) and Orlikowski (1992, 1996) underlines the open-ended and indeterminate nature of technology. Using new technology (and, more specifically, ICT), many possible scenarios may arise, and the uses of the technology may differ substantially across communities and occupational and professional groups. In this study, a new ICT system was implemented in a social setting strongly shaped by professional identities and standards.

The extensive literature on professions and professionalization[1] (Abbott, 1988; Ackroyd, 1996; Becker et al., 1961; Carr-Saunders & Wilson, 1933; Freidson, 1986; Halpern, 1992; Kosmala & Herrbach, 2006; Larson, 1977; Schleef, 2006; Strauss et al., 1964) suggests that professional identities and ideologies structure day-to-day work; such identities and ideologies prescribe what to do under certain conditions and how to relate to various aspects of day-to-day work. More specifically, in a field of expertise, professional authority and jurisdiction are accomplished by means of a number of mechanisms and procedures. First, professions are based on agreements regarding a 'cognitive base' for the respective profession and a 'predominant definition of professional commodity' (Larson, 1977: 211). That is, the professional domain needs to be carefully demarcated against other professions. Second, suggests Larson (1977), the 'rise and consolidation of national systems of education' further reinforces the professional status. Entry into a profession is thus carefully monitored and controlled by institutions issuing credentials to individuals qualifying for entry into that profession. Third, the work of the profession is subject to control and the regulatory bodies are responsible for monitoring that the codes of conduct are followed.

Even though the professions are the outcome of successful organizational projects (Freidson, 1986; Scott, 2008) – the establishment of professional schools and professional associations (Larson, 1977) – professional boundaries are always contested and subject to negotiation. As suggested by Abbott (1988), professionals are constantly participating in boundary-work whereby authority and domains of jurisdiction are always called into question. Thus, the professions are, in Lamont and Molnár's (2002: 178) formulation, 'an open, ecological system in which individual professions exists in interdependence'. As a consequence, in day-to-day practice, professionals mobilize a variety of resources, both tangible (e.g.

technology, tools) and abstract (e.g. theoretical frameworks, routines). 'Jurisdiction is contested through public, legal, and workplace claims, for control over task areas . . . These jurisdictional claims act to shift both relations between professional groups and the boundaries of their core work domains', claims Bechky (2003: 721). Rather than being static and invariable, a profession is that which is capable of being maintained and unified in a dynamic and changing milieu; small and incremental changes, as well as more comprehensive and broad-reaching ones, both internal and external to the organization, are regularly accommodated by the profession. In contemporary, late modern society, in particular, when professional authority largely derives from its performativity, its ability to accomplish desirable effects and outcomes (e.g. medical doctors curing patients), rather than being inscribed a priori, the ability to cope with constant change is an important professional skill. When, for instance, a new technology is implemented in a field, different professional communities make claims to the authority to interpret how that technology should be integrated into existing practices.

There is a substantial literature showing how the use of various technologies affects professional identities and boundaries and how the implementation of new technologies in a field of expertise restructures that field (e.g. Adler, 1986; Barley, 1986; Bertolotti et al., 2004; Burri, 2008; Burris, 1998; Johnson, 2007; May et al., 2001; Mclaughlin & Webster, 1998). For instance, when magnetic resonance imaging (MRI) was introduced into medical practice, radiologists, surgeons, and orthopedists had to renegotiate their respective domains of expertise; for the radiologists' part, their professional expertise lies in their ability to review the MRI plates and detect interesting features in the material. On the other hand, claimed a radiologist, if surgeons '[w]ant to see something, they see it' (cited in Burri, 2008: 48). Professional identities and boundaries are both shaped and formed by the use of technology, but technology per se is also shaped by its use within professional communities. The two categories are to some extent mutually constitutive. Previous studies also show that strong professional identities and ideologies protect the core of the profession from managerial interventions and practices. For instance, McGivern and Ferlie (2007) show that audits in the UK healthcare sector were used in a ceremonial manner that did not really affect the way work was conducted, and Bolton (2004) shows that nurses were not willing to compromise on how 'bed-side care' was organized when a major reorganization of the UK's National Health Service (NHS) was implemented. Professional identities and ideologies are not, however, immune to organizational and social change. As this case study of CarCorp suggests, the new eBIZ system strongly affected the way purchasing activities were organized.

In summary, depending on the relative strength and authority of the specific profession – ultimately residing in its internal organization – the ability to accommodate new technologies within the professional jurisdiction varies. In old and well-instituted and carefully organized professions (the entire field of medicine being a common example), new technology is generally not a threat to, at least, the core of the professional practices and identity (even though new sub-disciplines such as radiology, as in the case of MRI technology, may emerge). However, when professional groups are less integrated and organized, the implementation of new technologies may affect the entire professional field. In the case of professional purchasers, it was not possible to fully accommodate the new purchasing system within pre-existing procedures and thus the new technology changed this professional group's role.

Methodology of the study

This study focuses on the implementation of an e-business system and the subsequent changes to work practice accompanying that implementation at CarCorp, a major Scandinavian carmaker. The longitudinal fieldwork, conducted jointly by two of the authors, began in spring 2001 and ended in autumn 2006. The initial investigation concerned what occurs when an idea, in this instance e-business in general and eBIZ in particular, is promoted, spread and adopted into local practice. In order to encounter at close hand the everyday work experience of the users of the system and to obtain rich field material, ethnographic fieldwork techniques were used, for example, interviews, observations, document analysis (Kostera, 2007), and shadowing (Czarniawska, 2007).

At CarCorp, we interviewed managers on different levels within the organization, personnel working with the actual implementation of eBIZ, and purchasers. One limitation of the study is that we have not conducted interviews with personnel in other departments or units within the company, nor have we interviewed suppliers. Thus, our focus is on the purchasers' perceptions of changes to their work patterns.

The interviews have mainly addressed issues regarding how managers and purchasers were working before and after the introduction of eBIZ, their views on e-business in general and eBIZ in particular, and their expectations regarding the consequences of using eBIZ. The interviews, which were recorded and transcribed, lasted between 45 minutes and two hours. We also observed different kinds of project meetings, information meetings, and training sessions. In order to obtain a better understanding of the practice of

Table 1 Field material

Respondents	*Interviews*	*Observations of meetings and training sessions*	*Shadowing*
Managers at the purchasing department and on the eBIZ team	32	5	
Personnel on the eBIZ team	10		
Users, purchasers	35		3 purchasers, 5 half-days each

purchasing, we also shadowed purchasers in their day-to-day work. See Table 1 for fieldwork details of interviews, meetings, and shadowing experiences.

We analyzed the field material in the following two steps. First, we summarized the material by focusing on first-order description (Van Maanen, 1988) so that we would better be able to understand how an idea is translated into practice. New questions concerning how the purchasers perceived their work arose from this first-order description. During the second step, we coded and categorized the field material in accordance with the process recommended by grounded theory (Glaser & Strauss, 1967), particularly as described by Martin and Turner (1986). As our goal was to examine how new technology affects professional identities and established work procedures, we selected the following categories for presenting the field material: purchasing work before eBIZ, work procedures and the new technology, purchasing work using eBIZ, and the introduction of the new purchasing roles. Before discussing those categories, we begin by providing background information on CarCorp and a description of the ideas behind the new technology.

Introducing e-business

Since 1999, CarCorp has been a wholly owned subsidiary of the American Motor Company (AMC). When the AMC bought CarCorp, e-business and integration were fashionable business principles (e.g. Howcroft, 2001; Kalling et al., 2005; Yang et al., 2004), and the AMC had decided to implement an Internet-based e-business system. According to the plans, the e-business system (named eBIZ here) would replace more than 26 existing

electronic systems within the AMC group in order to achieve a single global business solution. For two reasons, CarCorp was the first company within the AMC group to test the system: that is, CarCorp was small enough to serve as pilot study and its purchasing systems were old and outmoded.

Implementation of eBIZ was expected to achieve a number of results: 1) the reduction of purchasing costs and administrative work tasks; 2) the standardization of work processes that would make purchasing consistent across all subsidiaries; and 3) the freeing up of time for more strategic thinking and other work activities. Thus, eBIZ was expected to contribute toward establishing routines and common work practices across all purchasing departments within the AMC group.

Purchasing work before eBIZ: Framing the situation and making decisions

At the time of the study, the purchasing department at CarCorp employed almost 500 people, most of whom were purchasers and technicians and the ones who evaluated the quality of the products considered for purchase. The department consisted of two sections: Direct Material (DM), which purchased the parts directly used in carmaking, and Indirect Material (IM), which purchased all other necessities, from printer paper to consultancy services. DM, whose products had a higher internal status, controlled some 80 percent of the overall purchasing budget. Thus, because IM was a much smaller and more easily managed section, the AMC decided to implement eBIZ within IM first.

CarCorp had a long tradition of delegating responsibility to its purchasers, allowing them considerable freedom and independence in their work. This tradition had its roots in the fact that most purchasers were highly trained engineers or business administrators, and the most experienced purchasers had been working for a long time in production and knew the specific car parts very well. Although the group of purchasers was heterogeneous in the sense that each purchaser had a different background (e.g. education and prior work experience), each had a strong identity and a high status at the company. Employment in the purchasing department was viewed as an attractive choice by students of business and engineering schools, as well as by employees in other departments at the company.

Typically, a new recruit in the purchasing department was assigned the responsibility for a basic range of products of minor importance to the production process; however, career-enhancing opportunities for dealing with more and more important ranges of products and with larger accounts came with experience. However, the new purchasers were told to make their

own decisions quite independently. One interviewed purchaser described this freedom:

> When I started working here, it took at least a year before I understood the business. I've heard others describing it the same way. The way you learn things here is by asking others. And they answer: 'Yes, you can do whatever you think best.'

The work practices used in the purchasing department evolved over time and the purchasers learned from each other. To a great extent, the purchasers preferred to use their own judgment when making decisions, rather than following routines developed and promoted by management. They also had the budgetary responsibility for the range they were working with. Each purchaser developed his or her own procedures and only reported the results, not the process, to management. It was the result, making a good deal, that mattered. If a purchaser made a good deal, then he/she was a hero. However, this situation also caused purchasing work to be rather fragmented; each purchaser had his or her own way of working, independently of the others. Additionally, the purchasers were allowed to decide – based on their own judgment – which suppliers they wanted to work with and, over time, they developed long-term relationships with suppliers. Another purchaser described this freedom:

> I have a, b, and c to chose from and I can add others if I want to. A purchaser chooses a supplier according to her/his own initiative. The philosophy here is: 'Do whatever you like, as long as it ends well'. This is a rather good philosophy where the responsibility is moved down the hierarchy to each purchaser, technician, and logistics worker in the organization.

Establishing and maintaining good relations with suppliers was an important part of the purchasing responsibility. This required purchasers to be in close contact with their suppliers, including on-site visits covered by the purchasers' expense accounts. A purchaser described this way of working:

> I work with purchasing for Direct Material and so I support two separate factories with products. I work closely with the suppliers, and I spend a lot of time negotiating with them. Typically, there are changes to the models every year, so that means changes to the products I work with. I have to work closely with both our R&D department and our suppliers in order to deal with these changes. I'm always trying to find

> ways to cut costs, including solutions that make the products cheaper. In addition to being in contact with the R&D department and the suppliers, I'm also in regular contact with the factories to make sure they're being provided with the materials they need. I also try to track the evolution of product quality, even though we have a quality manager who is chiefly responsible for that. All in all, I'm responsible for making the final deals with suppliers.

Many purchasers described their position in the company as 'the spider in the web', with their numerous contacts both inside and outside the company. However, the contacts they had within the company were with other departments and units, and they did not cooperate with each other within the purchasing department. Over time, they had developed extensive knowledge about the products, the suppliers, the market conditions, and other aspects of the outside world. They were thus able to frame the situation and had the mandate to make decisions. This knowledge, however, was connected to individual purchasers and not shared between them.

To support their purchasing work, the purchasers used different Electronic Data Interchange (EDI)-based purchasing systems, built by CarCorp technicians, which were customized to match the company's engineering tradition. However, most users agreed that the old systems – and more than one was mentioned – were not functional. The systems did not work in real time and were not integrated with other systems, for example, the inventory system. Moreover, there was no common database for storing information about previous deals, agreements, and statistics. As a consequence, the purchasers could not benefit from information and data acquired by other purchasers. Furthermore, under the systems in use, it was difficult to produce new statistics and compare outcomes. It was generally agreed that a new purchasing system was needed.

In sum, at CarCorp, the purchasers had been working quite independently and had taken on a great deal of individual responsibility. For example, an experienced purchaser might be responsible for an account of 500 million Swedish krona (over £40m). However, because the purchasers' work was rather autonomous prior to eBIZ, often being described as 'a one-man band', management had little insight into the purchasing processes.

Purchasing work using eBIZ: Formatting and standardizing procedures

In spring 2001, eBIZ was introduced to the employees of the purchasing department at CarCorp. In contrast to CarCorp's existing customized

purchasing system, the new system, eBIZ, was a standard platform that had been acquired from one of the largest software companies in the world. Because eBIZ had not specifically been designed for use in the automotive industry, a global team at the AMC's head office in the US developed and adjusted it to meet the corporation's needs. The purchasers at CarCorp were invited to information meetings at which visionary expectations regarding the consequences of the new technologies were presented using slogans like 'E-business Changes Everything' and 'E-business is Not Just a Technology Change – It is a Tool for Enhancing Our Business'. It was also claimed that investing in an e-business system was a strategic choice and a significant part of the AMC's corporate B2B strategy. In short, eBIZ was presented as a system with both universal applicability and the capability to solve virtually any problem. According to the manager responsible for introducing e-business at CarCorp:

> The purpose of the e-business system is to introduce a more modern way of working by means of e-tools. The basic idea is that the AMC will have a shared purchasing process worldwide. Once the system is introduced, everyone within the AMC group, all over the world will be able to work in the same way and use the same system.

It was thus assumed – by its proponents – that the eBIZ system would be suitable for all subsidiaries, or could be made suitable, without local adjustment. In the first version of eBIZ, the purchasers were able to purchase products whose prices had already been negotiated. In subsequent versions, other purchasing department functions, for example, the inventory system and supplier information metrics, would be added. The eBIZ system also had a database that could store information about all company purchases. This was supposed to make the purchasing procedures more transparent and easier to evaluate and control.

As an indication of the level of detail of the eBIZ system procedures, the following list shows the different steps required in eBIZ when making a purchase:

1) A Requisitioner (orderer) contacts – either face-to-face or via email – a Preparer who fills in a Request; that is, a standardized computer screen where all fields have to be filled in before moving to the next step. If the product is already listed in the catalogue, the Preparer selects the requested product and an order number and a price automatically appear.
2) The Request is sent to the Approver; that is, a manager responsible for the unit's budget.

3) The Approver approves the Request. A) If the price has been negotiated and is listed in the catalogue, a Purchase Order is sent directly to the supplier portal. B) If the price is not listed, the approved Request appears at the buyer portal.
4) The Buyer checks the Request and contacts suppliers (electronically) in order to solicit price quotations. The Buyer then chooses the 'best' alternative and a Purchase Order is sent first to the Approver and then to the Supplier.
5) The Supplier delivers the product.
6) The Requisitioner/Receiver confirms that the product has been received, an invoice is created, and the Supplier is paid.

The system relied on a 'what to do next' sequential formulation of the purchasing procedure. Moreover, the format of eBIZ introduced new designations to the users. Different user-groups were allowed to perform specific steps, although these steps had to be approved in order to execute the transaction. If a step was not properly performed, the process stopped. Thus, this sequence framed the work practice, functioning as a mechanism for coordination of all steps and for delegation that clarified the responsibility for tasks and the approval of transactions.

The purchasers' attitudes towards the new purchasing system were mixed. They recognized that the eBIZ system facilitated the purchasing process, but they also realized that this more controlled process decreased their work independence. One example of this was the approval procedure that was introduced into the new system. A purchaser had to send the order to someone higher up in the hierarchy for approval before sending it to the supplier. This hierarchy of approval, which was established in order to fit the steps in eBIZ, was based on a scale connected to various levels of budget responsibility. Different user groups became more visible as the hierarchy among them became evident.

Another example of dissatisfaction with the new system was the increased workload. The purchasers had to write reports on various aspects of their own performance. The new system was supposed to make reporting easier since all the information was in the database, but the purchasers felt that writing the reports took too much time. In addition, they did not think the reports were necessary, especially since they did not receive any feedback on these. The purchasers complained about the increased administrative workload that they believed lay outside the purchasing domain. The managers also experienced increased workloads. For example, they complained about the enormous number of emails received requiring them

to first verify the requests and then the purchase orders. One manager complained: 'In recent years, my workload has increased enormously due to all the bureaucracy. The administrative tasks are taking over.'

The consensus at CarCorp was that purchasers had to have personal relations as well as experience in, and knowledge of, the commodity field, its institutional conditions (e.g. the material properties of products and the tax rates related to various products), and the suppliers. The purchasers themselves believed they were working independently and according to their own rules of thumb.

Employees at CarCorp generally believed that the Swedish way of working differed from the US way and, in particular, that the old CarCorp systems were unsuited to the new environment, which required more audits and higher levels of internal control in order to satisfy new US accounting legislation (the Sarbanes-Oxley Act of 2002). These requirements negatively affected the purchasers' perceptions of the new e-business system. Even though, on some level, these purchasers knew that the accounting and auditing requirements were unrelated to eBIZ, they were quick to blame the system for this added workload. One purchaser acknowledged the irrationality of this response:

> Well, there's more order and clarity with this system and initially this was experienced as hard – and you couldn't see the difference between what came from the AMC and what came with the system. But regardless of the AMC, we would have needed this sooner or later.

Owing to CarCorp's new position as a US-owned subsidiary, plus the introduction of eBIZ, many of the new tasks of the carmaker had to do with reporting and controlling performance. As a result, while the purchasers had previously been working independently and with much less supervision, following the acquisition, the situation changed dramatically. One manager explained it thus:

> I think that they [the purchasers] became purchasers because they were good at business. Many of them had university degrees in engineering, but chose to do something less technical. OK, in the purchasing business, you have to know a lot about the different components you are buying, but these products are much the same if you stick to a certain range. Mostly, they became purchasers because they were really good at business and at negotiating, but when their work included punching the keys on computer keyboards, the job became less interesting.

The design of the purchasing procedures for eBIZ was such that personal contacts between CarCorp employees and suppliers could be avoided. Prior to the standardization of contacts and the codified procedures that the new system implemented, the purchasers had to maintain close, personal relationships with their suppliers and with employees in other departments at the company. Lock-step adherence to the eBIZ procedures discouraged the evolution of alternative ways of looking at events, and reacting to them. Thus, dealing with unforeseen events and solving problems, which were significant elements of purchasing work, were impossible using the standardized procedures. The implementation of eBIZ not only required changes to the work structures and procedures, it also introduced new purchasing roles.

Introduction of the new purchasing roles: De-skill and de-value

The AMC's acquisition of CarCorp also led to the introduction of new purchasing roles. The purchasing function was now divided into two positions: Product Buyer and Commodity Buyer. One argument in favor of this change was that it would better suit the structure of eBIZ while another was that dual purchasing roles already existed at the AMC. The basis for this concern was that the Commodity Buyers had been given complete responsibility for a group of products; they negotiated prices and terms and selected suppliers. Some of the previous features of purchasing work, for example, being in contact with suppliers and negotiating and making deals, were reassigned to the Commodity Buyers. Thus, the Commodity Buyers provided the system with input, but they had no real purchasing identity within the eBIZ system since they made no actual purchases. In addition, each Commodity Buyer was the group manager of three to four Product Buyers.

The Product Buyers, on the other hand, placed orders with previously approved suppliers. Although they worked jointly with the people developing and building the cars, they were only, in reality, the purchasers of the components being used in new car prototypes that the production people had already selected. Thus, the role of the Product Buyers had become largely administrative since a major part of their work was performed in the office and only had to do with filling in forms on computers. A manager described the situation:

> Today, you have to be quite good at typing, understanding commodity structures, and knowing how the system works. That's where it gets complicated today.

However, this was not – as many people had expected – silent and solitary work. Rather, the purchasers were constantly talking with other people and

phoning to check details. They discussed the technical aspects of problems, and different solutions. Thus, according to the purchasers, personal contact (chats, conversations, and meetings) influenced and improved the entire purchasing process.

New roles and the implementation of eBIZ changed the work of the purchasers – primarily the Product Buyers – who had university degrees in either business or engineering. Prior to the introduction of eBIZ, the Swedish purchasers at CarCorp were considered to be vital intermediaries between the producer and the supplier. Furthermore, their work was characterized by their special expertise, their personal accountability, and their professionalism, supplemented by their skills in strategic analysis and their strong interpersonal relationships with both suppliers and producers. However, division of the purchasing function into two different roles created disharmony among the CarCorp purchasers. Previously, the purchasers regarded themselves to be professionals of fairly equal status; however, following the change, a formal hierarchy was created among the purchasers. The Product Buyers had to report their activities to the group manager/Commodity Buyer on a regular basis. Most of the reports were not personal accounts but reports based on data from eBIZ. The concern was that the Commodity Buyers would have a management role while the Product Buyers would have only an administrative one.

One manager reflected on this situation:

> It [the work of the Product Buyers] does not, however, require academic knowledge or knowledge of the outside world. By employing a large number of assistants, the prestige of being a purchaser would increase once again.

Specifically, this manager noted that the Product Buyers did not need any knowledge of their outside world – in particular, their understanding of the commodity field with regards as to how suppliers thought of their products and make their decisions. Thus, Product Buyers, in giving up some of their ability to frame a purchasing situation, feared losing the professional status they had gained through their knowledge and experience. A Product Buyer described his view of the changes:

> We do not visit our suppliers any longer. If we do visit somebody, it'll be other companies in the AMC group. We are assigned to tasks like completing and updating range and price lists. We do this both individually and jointly. Compared to some colleagues, for example in Germany, we earn less and we work less with strategy. Also, in Germany, each purchaser has his or her own assistant.

The Product Buyers' request to have assistants indicated that they had noted the decline in their professional status. Four years after the introduction of eBIZ, and the new roles for the purchasers, several purchasers had left CarCorp and their positions had not been filled as there was – and still is – a staff freeze at the company. The purchasers who remained were under great pressure, many of them working 60 hours a week. They were disillusioned and skeptical about future changes. For example, one purchaser feared the total elimination of all Swedish purchasers through rationalization. As a result, the days when purchasers chose suppliers according to their own best evaluation and judgment were over. Now, the purchasers could expect to be replaced by globalized information systems, outsourcing trends, and changed ways of doing business.

Discussion

Implementing eBIZ was a precondition for achieving the goal of standardized work processes throughout the entire AMC group. eBIZ may be compared to the description of an Enterprise Resource Planning (ERP)-system given by Kallinikos (2004: 10) who suggests that 'ERP packages shape human agency at work by proactively stipulating the steps that have to be followed in order for a transaction to be properly executed.' Accordingly, the deployment of eBIZ introduced the procedural standardization of the purchase, and in that sense, the system was both normative and performative (Kallinikos, 2004). The different steps in eBIZ were not only descriptive; they also provided a normative 'guide' to how to perform a purchase. eBIZ was also normative in the sense that it regulates the contents of different kinds of reports.

The eBIZ goal of standardizing work processes was accomplished. The achievement of this goal also led to expanded forms of accountability and control since eBIZ made it possible to inspect and trace every step of every purchase at every moment. For example, eBIZ included both monitoring and account reporting features. Monitoring includes the observation of processes conducted by 'others', for example, inspections, reviews, assessments, and evaluations (Blomgren, 2007). Using eBIZ in day-to-day purchasing work gave managers a tool that could be used for gathering and then monitoring data related to the purchasing function. These data were useful when planning the work, as well as when presenting and legitimizing performance to top management, external auditors, and shareholders.

The process of standardizing the purchasing practice was further reinforced by the introduction of the new roles. In this situation, the new system, as well as other organizational changes resulting from the AMC's

acquisition of CarCorp, entailed consequences for the purchasers of CarCorp. The changes to the purchasers' work were technological with regard to the implementation of eBIZ and structural with regard to the new roles. eBIZ also introduced new work labels such as 'Requistioner', 'Buyer', and 'Approver'. The different user groups were distinguished by factors such as access to the system, hierarchies of budget responsibility and the right to attest invoices. Despite its deficiencies, CarCorp's old system had been supported by a raft of other activities, including a reliance on personal contact and supplier visits. However, the new system, which was more inclusive and comprehensive, largely diminished the importance of such socially embedded activities. Thus, the new system was not compatible with the practices already established.

May et al. (2001) found that implementing new technology in medical practice did not stress the necessity to 'be with' the patients or encourage any interaction or relationships with other mental health professionals. Similarly, at CarCorp, the new system did not value the purchasers' practice of 'being with' the suppliers, the internal construction processes, or interactions and relationships with other groups. Rather, the eBIZ system exemplified what Kallinikos (2005) described as a standardized and closed arrangement of artifacts/processes applied to provide predictable relations. However, it should be noted that some future actions by the purchasers were not structured or defined in relation to the system. The purchasers were not totally isolated when working with eBIZ since they continued discussing details, problems, and various solutions that helped them improve the purchasing process.

Perhaps the most salient effect of implementing eBIZ was the gradual hollowing out of the activities that made the purchasers' role meaningful and gave them status within the company. Rather than operating in a milieu of technical systems and social activities, eBIZ reduced the purchasing process to a set of operations determined by the structure of the ICT system. In addition, by instituting procedures not previously required, eBIZ reflected the more hierarchical structure of the AMC and thus brought a new occupational hierarchy to CarCorp, which strongly affected the existing social system there. For instance, all purchasing activities had to be approved by managers higher up in the organizational hierarchy. Thus, this change to the work structure of CarCorp's purchasing department shows how new technology may be incorporated into the day-to-day life of organizations (Barley, 1986), affecting both managers and purchasers. In this case, the new eBIZ system increased the bureaucratic procedures and added new hierarchies to day-to-day work. For example, the new approval procedures shifted the decision-making authority concerning purchases from the purchasers to the managers.

The relationship between new technology, knowledge, and the need for information is often negotiated between the social groups involved and related to their status and influence within the organization (Grint & Woolgar, 1997; Mclaughlin & Webster, 1998; Oudshoorn & Pinch, 2003). Often, a process of negotiation like this, as Mclaughlin and Webster (1998: 783) suggest, will 'weaken the social position of some groups, and, when this happens within organizations, traditional boundaries between occupations may be disrupted'. The ability of the purchasers at CarCorp to negotiate the use of the system was severely diluted as their new roles further decreased their influential position as 'the spider in the web'. In brief, the altered configuration of users, following adoption of the new technology and the standardized work process, created a new situation for the purchasers.

The results reported by CarCorp contribute to previous studies of professional work that either argue that professional workers may benefit from computerization, even if their independence decreases (Burris, 1998), or that professional analysts may become deskilled due to the computerization of their work (Adler, 1986). These studies suggest that it is difficult to draw any general conclusions about the upskilling/deskilling effects of technological changes to organizations (Bertolotti et al., 2004; Burris, 1998). Consistent with these findings, the deployment of eBIZ at CarCorp resulted in increased efficiency and accountability in the purchasing function; however, at the same time, it created problems among the purchasers, who felt their training and experience were being valued less. The professional status of CarCorp's purchasers came under threat when the new system was implemented, and the new roles of the purchasers also ultimately led to the deskilling of that profession. When adhering to an externalist view of technology, inscribing technology with no meaning or function a priori, we suggest that technology per se is incapable of producing such social effects. However, when technology is bundled with politics, ideology, and managerial procedures and practices, substantial organizational effects may be generated (Spicer, 2005). Taking this perspective, the case of eBIZ at CarCorp shows how technology, politics, ideology, and managerial practices jointly shape and influence professional communities. Professionals, as groups of experts capable of maintaining their jurisdiction within a specific domain, are thus never immune to such bundles of technologies and practices but recursively constituted by them during the very use of the technology. When new technologies are adopted, social changes such as new professional identities and roles may be created. In line with a general externalist tradition of thinking in technology studies, and more specifically a body of work in the interface between technology studies and organization

theory represented by, for instance, Barley (1986, 1990), Kallinikos (2004, 2005, 2006) and Orlikowski (1992, 1996), this study contributes to a more detailed understanding of how professional communities both shape and form technology.

The study also shows how technology, as a part of assemblages of technological artifacts, ideologies and managerial practices, strongly influences the jurisdiction and authority of professional communities. Professional jurisdiction/identities and technology-mediated managerial practices are two strong forces that shape day-to-day organizational work. The examination of professional or knowledge work, as affected by new technology, may provide a more detailed understanding of how technology is implemented or received by organizations (Spicer, 2005; Woolgar, 1991; Yates, 2006; Yeow & Sia, 2008). The study suggests that the professional jurisdiction and authority of the purchasers was not strong enough to fully accommodate the technology-mediated management system of eBIZ, the new hierarchical order within the organization, and the new managerial ideologies imposed on the community of purchasers. Consequently, the eBIZ system required a whole new set of organizational practices, which the purchasers largely saw in terms of deskilling their work. Although the new technology played a key role in this transformation of purchasing work, it was not detached from the broader social and managerial changes introduced at CarCorp by the AMC. Expressed differently, technologies are always in the hands of humans who can use such technologies positively or negatively, depending on their goals, perspectives, and methods.

Conclusion

This study illustrates how the implementation and use of new technology is dependent on the social system into which it is introduced. Such new technology also relates to other changes to the organization. The study shows how the work and roles of purchasers, and consequently their professional identities, may change when a new technology is implemented. The new technology deployed in the eBIZ case was part of a broader reformulation of managerial procedures, reflecting the managerial virtues advocated by the AMC, which included predictability, hierarchy, and clear lines of authority within the organization's tiers. Implementation of the system produced two significant results. First, the practice of purchasing was turned into a predictable and standardized procedure. Second, the deployment of eBIZ, because of the reconfiguration of the users' roles, decreased and delimited

the professional skills of the purchasers. The purchasers' expertise and personal contacts were no longer necessary for purchasing activities. The new technology thus affected how the purchasers viewed their work. Consistent with the externalist view of technology that assumes technologies are always used in political, economic, and cultural contexts (Gitelman, 1999; Spicer, 2005), the case of eBIZ shows that technology is constitutive of, as well as constituted by, broader social processes.

We conclude that it is important to focus on the relationship between technology and social system, and that this relationship should be studied over time and in situ. Moreover, we believe that professional skills and identities may be affected by the technologies used. Even if the implementation of computerized systems may result in both upskilling (Burris, 1998) and deskilling (Adler, 1986), the eBIZ case suggests that the implementation of a new computerized system may be disadvantageous to employees in purchasing departments who have previously enjoyed greater autonomy in their work environments. While some professional groups may be successful in protecting the core of their work, given similar conditions, other groups, such as the purchasers at CarCorp, may be unable to protect the work assignments that gave their work meaning and status. At present, the literature on professions and professionalization is relatively sparse as regards the issue of technology; however, since technology is playing an increasingly key role in most industries and other domains (e.g. Poster, 2006), the interface between technology and professions requires more attention, preferably through case studies or ethnographies of actual experiences.

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Note

1 Although purchasers do not belong to the 'classic categories' of professionals, which include medical doctors, lawyers, and university teachers, they demonstrate a number of characteristics qualifying them as a professional community. Purchasers have a well-defined but rather broad role in corporations and play a key role in many manufacturing and construction firms where raw materials make up a significant part of overall costs and competitive positions in the marketplace. In addition, at CarCorp, the purchasers perceived themselves, and were regarded by other professional groups, as a professional community. Given this key role of the purchasers, they are examined in this context as a professional community.

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Ulla Eriksson-Zetterquist (PhD, Gothenburg University), Associate Professor, works as a researcher at Gothenburg Research Institute, School of Business, Economics and Law, Gothenburg University. Her research interests and publications concern organizing, especially gender, technology, intersectionality and risk.
[E-mail: ulla.eriksson-zetterquist@gri.gu.se]

Kajsa Lindberg (PhD, Gothenburg University) works as a researcher at Gothenburg Research Institute, School of Business, Economics and Law, Gothenburg University. Her research takes a constructionist perspective on organizing.
[E-mail: kajsa.lindberg@gri.gu.se]

Alexander Styhre (PhD, Lund University) is Professor and Chair of Operations Management at Chalmers University of Technology, Gothenburg, Sweden. Alexander has published widely in journals concerned with innovation and knowledge-intensive organizations. His most recent books include *Managing knowledge in the construction industry* (Routledge, 2009) and *Perception and organization* (Palgrave, 2008).
[E-mail: alexander.styhre@chalmers.se]