



Technology, change, and management control: a temporal perspective

Louis Beaubien

Sobey School of Business, Halifax, Canada

Abstract

Purpose – This paper aims to analyze the implications of technology change on management control. Specifically, the paper seeks to examine the deployment of an enterprise resource planning system (ERP), and to apply a temporal perspective of practice as a theoretical tool to discuss the effects of the ERP on the organization's management control systems.

Design/methodology/approach – The research is based on a longitudinal case study of a North American Financial. Data were collected during the deployment of a new management control system. The paper introduces the temporal view of agency as a means of examining the practices involved in control system.

Findings – The observations suggest that ERP can create an illusion of control, and may jeopardize the systems they are meant to augment through the presence of practices meant to by-pass the control system and invisible work (work-arounds).

Originality/value – The paper seeks to augment existing studies of technology mitigated change through framing the analysis in a temporal practice perspective to offer insight into the paths of action individuals adopt: the how and why.

Keywords Practice, Temporal agency, Control systems, Enterprise resource planning, Case studies, Manufacturing resource planning

Paper type Research paper

Introduction

Chapman and Chua (2005) suggest the emergence of advanced and new forms of ERP are contributing to new forms of organizing. This will impact the ability to achieve effective organisational control, as “gaps” will emerge between how an organisation was structured and how its new structure unfolds. Scapens and Jazayeri's (2003) study of an SAP implementation substantiate this concept, observing the ERP was not only implicated in the “tightening” of organisational roles and control, but also in “opening up” various possibilities for individual action, giving rise to unintended consequences. There is still a lack of understanding of the interplay between ERP and management control (Granlund and Mouritsen, 2003), and Rom and Rohde (2007) charge there is little ongoing work examining this interface with accountability and technology. The importance of this understanding is reinforced in Dechow *et al's* (2007) assertion of the mutually constituting nature of accounting and information technology.

In a case study on an Italian firm, Pharmacon, Caglio (2003) addresses the ambiguous and often inconsistent application of ERP as a vehicle to exert management control. She cautions ERP present new possibilities for control schemes, however, she cautions the outcomes are not predictable based on existing norms and operations of the organisation (see also Jack and Kholeif, 2008). This is consistent with Schultze and Boland (2000) who note IT may be fundamental in shaping and localizing accounting



practices; partly because of the nature of the “expert systems” which are embedded in the technology are unquestioned and accepted without challenge by users (see also: Hyvonen *et al.*, 2006).

Organisations initiate management control systems (MCS) to coordinate and control activities as operational units are, “compelled to adopt standard rules and procedures, which increase the visibility of local business processes and align them with the global corporate strategy” (Cruz *et al.*, 2009, p. 94). Quattrone and Hopper (2001, 2005) point out the prevalence of standardised control systems (enabled by technology) used in multi-national firms as a way of decreasing time and distance between headquarters (HQ) and disparate local sites. However, centrality of control and uniformity of practice is not always achieved as local discretions sometimes deviate from the intended uses and prescriptions of the control systems – both technologically and procedurally (Quattrone and Hopper, 2005). Barrett *et al.* (2005) concur and point to the example of “localised” practices at offices of “Big 4” audit firms that both contribute to, and undermine, the effectiveness of control systems.

Dechow and Moursitsen (2005, p. 691) argue that, “control cannot be studied apart from technology and context”, and suggest control technologies create visibilities in local sites and HQ, which has a reciprocal effect of creating blind spots. As organisations commonly adopt a centred view of control, they rarely acknowledge the “gaps” between the HQ and local sites of the organisation, which typically emerge as practice differences in the implementation of new systems (Quattrone and Hopper, 2001, 2005). Dechow and Mouritsen (2005; see also Quattrone and Hopper, 2001, 2005) suggest that the analysis of management control as influenced by technology must not only be about what controls are enabled or disabled, but also about what new forms of control emerge.

The variance in success of the deployment of ERP and the realisation of an effective control system has been ascribed to outlooks that suggest the implementation and functionality of technology is substantially malleable. The resulting forms of systems are “shaped by commitments, capabilities and preoccupations of situated actors,” (Kallinikos, 2002, p. 287; see also Granlund and Malmi, 2002). Common across interpretive examinations[1] is a focus on the interaction between human agency, the social context in which it operates, and the material and inscribed aspects of technology (ERP). These perspectives provide insight into what practices are adopted and how the process of adoption unfolds and impacts the technology and control system. This study seeks to augment such perspectives, examining why, certain logics and values are accepted (and maintained), in contrast to competing rationales and procedures.

This paper will discuss the case study of an international financial services organisation to introduce a temporal perspective of agency (Emirbayer and Mische, 1998). Expanding on studies in the extant literature we address the question: Why are particular deviations from prescribed action adopted in favour of others? Additionally, the paper addresses a second phenomenon of how individuals are able to by-pass prescribed functions of an ERP and control system, creating non-standard modifications that could otherwise derail the efficient operation of the system. Yet, these individuals (or, networks of actors) are able to accomplish such non-standard actions, and still create a (seemingly) standard output. To better understand such

Change: ERP and control

Granlund and Malmi (2002) observe that ERP is often loosely coupled to the control systems of an organisation, thereby weakening effective control applications. However, studies focusing on management accounting and ERP-related change (Burns and Vaivo, 2001; Granlund, 2001; Busco *et al.*, 2007) argue that despite the inconsistency of the implementations, information technology is an important enabler of management control practices. The technology presents new possibilities for control, however outcomes cannot necessarily be predicted. Thus, the effectiveness of the control system cannot be modelled on existing norms and practices of the organisation (Caglio, 2003; Jack and Kholeif, 2008). This fosters questions about how much clout individuals possess in using and shaping technology.

Ahrens and Chapman (2007) highlight the considerable debate among theoretical perspectives regarding the balance of privilege between human agency and structure in analyses of accounting practice and management control. The use and outcomes of ERP as a component of control systems is examined in the academy through numerous theoretical positions that seek to balance the influence of individual action and social and technological structure, such as structuration theory (e.g. Caglio, 2003), actor-network theory (Quattrone and Hopper, 2005; Dechow and Mouritsen, 2005), and the interaction of practice and institutions (e.g. Beaubien, 2008; Oakes *et al.*, 1998), among others. Perspectives in this trajectory of research attempt to address the organisational context, as well as the technological and practice-related factors that that unfold in the deployment and use of control systems.

Burns and Scapens (2000) argue the changes that emerge with the introduction of new practices linked to the deployment of ERP-enabled control systems are, “grounded in the duality of action and instrumentation. . . although institutions shape behaviors, institutions are themselves the outcomes of individuals” (p. 22). The authors argue for a process, rather than outcome, view of change that suggests routines (informal tacit knowledge and assumptions) can shape actions to support or alter existing rules (formalized processes), which in turn can shape routines. Burns and Scapens (2000) seek to expand on Giddens’ (1984) concept of social structures, which bind the actions of knowledgeable actors to systems of social practice, through a reliance on institutional theory and the concept of institutions as shared taken-for-granted assumptions that shape and inform the perceptions and actions of individuals. Stability or change is a process whereby existing routines and assumptions are questioned and possibly altered. Thus, the analysis of accounting system change through the institutional lens (e.g. Burns and Scapens, 2000; Granlund, 2001; Ribiero and Scapens, 2006; Siti-Nabiha and Scapens, 2005) conceives of accounting practice as sets of rules and routines, and perceive change as alterations in the former impacts action in the latter, and *vice versa*. These perspectives implicitly frame their analyses at the middle-point between relativism and reification through a focus on the meaning users ascribe to technology. This creates an atomic view of individuals, with an abridged view of use and change, which may not recognise what is changing, or how use is unfolding (Ciborra, 2000; Andon *et al.*, 2007; Quattrone and Hopper, 2001, 2006) – the individual, the technology, or the relationship between the two.

The likelihood of stability, or the “denial of change,” can occur as a result of the deep embedding of perceptions and routines in the organisation (Granlund, 2001), but in some instances may also serve as, “continuity necessary to enable change,” (Granlund, 2001, p. 154). Thus, institutional influence, even when strong, may not serve as an impediment to change. It may in fact serve as a bridge between one mode of action and another, by providing a contextual frame of reference, connecting the new practices to the previous ones. In such a fashion, existing practice may play a role in the adoption of ERP-enabled control systems, even in the event that new procedures differ from past practice. Dirksen (2001) extends the discussion, arguing technology is not deployed into a void; it is in fact an emplacement of a new technology on top of some form of previous technology, regardless of how simple or technological. In other words, ERP deployments are not replacements of an old control system by a new system. The newer system is viewed, perceived and utilized in light of the values and knowledge that evolved through the use of the previous system(s). MCS are, “never merely diffused, adopted or implemented; they are adapted and translated and, at the same time, they are enrolled in a network that reconfigures other actors’ interests.” (Justesen and Mouritsen, 2011, p. 176).

Management control systems, themselves, are not ready made packages, but bundles of ideas, practices and technologies, which shift and are (re)shaped as they travel from one context to the next. Inscriptions (see Latour, 1999; Law and Singleton, 2005) in technology such as ERP are the translation of concepts of governance and control into practice (Miller, 1990). The inertia of past systems is the momentum carried forward as individuals engage a new system with a frame of reference associated with previous practices (Orlikowski, 2000; Boudreau and Robey, 2005; Quattrone and Hopper, 2005; Dechow and Mouritsen, 2005; van der Steen, 2009). The influence of inertia on the deployment and unfolding use of these systems has been addressed in a variety of fashions, including concepts of social learning (Boudreau and Robey, 2005), social ordering (Wagner and Newell, 2006) and institutional perspectives (Piotti *et al.*, 2006; van der Steen, 2011), resulting in an equally diverse set of conclusions. The heterogeneous nature of individual frames of reference suggests the possibility individuals can, “simultaneously enact multiple structures” (Orlikowski, 2000, p. 41) of control systems, having multiple sets of practices and outcomes (Quattrone and Hopper, 2006). However, such a primacy on the social construction of technology leads to a form of relativism in which the material aspects of the ERP would be immaterial to its use in practice, something that is clearly not the case. As Quattrone and Hopper (2006, p. 220) suggest ERP systems, “should be more than social construction (to avoid relativism whereby anything goes and humans are king) and less than realism (to avoid reifying objects and ignoring interpretive flexibility).”

Lounsbury (2008, p. 357, emphasis added) points out:

[...] the challenge in the institutionalism perspective is to understand *how* variation exists in extant practice makes possible the creation of something distinctly different ... Collective action needs to mobilize resources and meaning in support of the new activity.

Theories of practice, such as ANT, offer an analytical tool that draws attention to micro-level individual activity as well as shared practices, values and norms. The latter makes explicit the enduring structures that are more resilient than action at any given moment in time. The social practices in which individual action is embedded, and the

material aspects of artefacts (e.g. the capabilities of an ERP), support the reproduction of action and practice in given contexts. For example, Bloomfield and Vurdubakis (1997) posit an active role for technologies as means of surveillance and control and enforcing particular means of action. However, recent approaches to studying ERP adopt a more nuanced perspective of individual action and practice, as well as the social and technological structures in which they are embedded (Chapman, 2005; Hanseth and Braa, 2000).

Within the notion of accounting practice, multiple orientations to the nature of practice and how it unfolds in the organisational context are present. For example, Miller (2001, p. 379) describes management accounting as a “mode of action”, yet tends to circumvent discussion of actual management accounting activity. Actor-network theory (ANT) offers an analytic lens that focuses on the relational aspects of practice suggesting, “agency and an object’s identity reside neither in an individual nor a technology, but in a chain of relations” (Quattrone and Hopper, 2006, p. 216) of action and use. ANT analyses change as processes of translation, which is the, “displacement, drift, invention, mediation or creation a link that did not exist before” (Latour, 1999, p. 179). Robson (1991) applies this to the accounting context to suggest that translation is the articulation of accounting roles and techniques in such a fashion as to motivate and interest individuals to enact change. For instance, Chua and Mahama (1995; see also, Briers and Chua, 2001) discusses the diverse interests in an organisation that are mobilized and reconfigured as a management accounting system is enacted, connecting different actor groups and forming part of the larger organisational network. While ANT provides valuable insights for understanding the process(es) of change, ANT’s principal of symmetry does not accept the notion of a priori privilege within networks. However, the design and use of control systems have embedded central figures that do possess such privilege incorporating, “a bundle of practices and material arrangements” (Ahrens and Chapman, 2007, p. 9), which exemplifies asymmetry among actors. In such a fashion, the enactment of a control system (ERP enabled or otherwise) is a function of social order – individuals act within a set of rules intertwined with perceptions of the appropriateness of certain actions. This does not imply a reactive individual following routines, but rather a flexible interpreter of the various possibilities of how one might act in particular contexts. As such, the use of ERP is inter-related actions organized around practical understandings and arrays of activity.

A practice perspective also recognises the agency of reflective individuals in the ability to engage with a particular practice and seek to creatively reform or alter it to be consistent with local needs (Emirbayer and Mische, 1998; Weick, 1998). Rolland and Monteiro (2002), in a longitudinal case of a ship surveying company, discuss how initial deployments of a survey-reporting technology acted as a constraint on the ability for surveyors to perform their various tasks. However, over time surveyors altered the use of the technology to conform to their past experience, which allowed a more robust reporting function, leading to a deployment that management and users deemed successful. Thematically this is consistent with the conclusions of Quattrone and Hopper (2005), Robey and Sahay (1996) and Barley (1990) where technologies were opportunities for change; realized in human action. As with the reproduction of existing practice, the adaptation of new practices relies on associated social practices. Whittington (2011, p. 185) concisely summarises this notion arguing, “practices are the

negotiated products of agency, with some aspects defined quite firmly by the wider apparatus of their professions, some highly adaptive to local contexts and others richly permissive of individual improvisation.”

van der Steen (2011; see also: Englund and Gerdin, 2008) argues institutional perspectives present an argument supporting continuity, but have theoretical difficulty in explaining change, and as such often simplify realities (Mol and Law, 2002). Further, there is difficulty in understanding how use and practice actually arise (Coad and Cullan, 2006; van der Steen, 2011). Thus, an examination at close levels of abstraction offered by perspectives of practice is necessary to understand the intricate nature of organisational change. This engenders the question, how is individual action and practice related to routines, or more significantly – organisational change or stability, itself?

Emirbayer and Mische (1998) conceive of individual action as a means of maintaining social and technological structures, and as a means of altering them. The authors argue, if human perception and action is shaped, enabled and constrained by past experience and surrounding social structures how is it possible that there is any change or escape from existing structure? Boudreau and Robey (2005) point out this argument generates a new view of practice. It is one that is removed from the historical view of “institutional structures as the cause of routines and habits,” (Boudreau and Robey, 2005, p. 4); and focuses on individuals’ acknowledgment of the past (structure), and the parallel ability to evaluate variables in the present and imagine the future creatively. However, the past is not a static element, rather it is (re)interpreted as individuals gain new insight and face new “present” possibilities (Emirbayer and Mische, 1998). Elements that may have once been considered inviolable can be infringed upon, and vice versa. Emirbayer and Mische (1998) contend that even the most mundane, habitual and unquestioned actions are a function of agency in that it requires at least a minimal level of attention and effort, regardless of how unreflective or autonomic that might be. Thus, individual practice can uphold existing social structures, and also be a force that alters structure. The result being the lens offered by Emirbayer and Mische (1998) is drawn to ask how an individual knows to take an action?

Emirbayer and Mische (1998) conceive of practice as temporally situated human agency in which the “the interplay of habit, imagination and judgement” (Emirbayer and Mische, 1998, p. 970) are the basis for action. Chu and Robey (2008, p. 83) provide a more unadorned explanation describing the temporal view of agency as, “a temporally situated process in which actors simultaneously reflect on the past, present and future implications of their potential actions.” In considering present action, an individual is reflective in consideration of both past and future. This conception of agency and practice provides an analytical means to conceptualise how actors are influenced by past events, routines and social structures, but are still capable of embarking on a new path with “forward-looking” goals that breaks from the previous trajectory. It reinforces notions that while individuals do resist change in some contexts, they also seek it in others (Chu and Robey, 2008).

The analytic bracketing of the temporal view of agency has three mutually influencing elements (Emirbayer and Mische, 1998): the iterational (oriented toward the past), the projective (oriented toward the future), and the practical-evaluative (oriented toward the present). The iterational element of practice refers to the reflection and

“selective reactivation by actors of past patterns of thought” (Emirbayer and Mische, 1998, p. 971) and reflects influence of habitual action and structure in recreating prior practice. By contrast, the projective element of practice reflects the individual’s ability to alter and change practice through the “imaginative generation of possible future trajectories of action” (Emirbayer and Mische, 1998, p. 971). The projective element of practice is inter-related to the iterational element in that it is from the collection of past experiences that an individual is able to generate inventive possibilities of what might be. The knowledge of what has, and has not, worked in the past coupled with the possible pathways of the future are brought together in the practical-evaluative element of agency as individuals mull the contingencies of the present context. The enactment of present practice then, is a “practical judgement among alternative possible trajectories of action” (Emirbayer and Mische, 1998, p. 971). Through such a theoretical lens it is possible to direct analysis along the lines of questions of why and how particular practices emerged alongside the knowledge of the pathways of what practices emerged. A temporally informed perspective does not assert social and external structures as a priori forces that influence adoption of ERP, but focuses on how they are incorporated and inform the adaptation and use of ERP.

Research approach: the case of Abank

This paper reflects a three-year longitudinal case study of a large financial institution, Abank, focusing on the deployment of an ERP enabled control system. As part of a shift in business strategy at the time, Abank chose to consolidate management and harmonize operations and controls across 15 regional units, centralizing operations at headquarters. The organisation employed approximately 3000 individuals across the 15 territories, with approximately 100 branches and offices. The case study observations and analysis direct particular attention to activity at headquarters and two additional sites.

The research approach used in this study was an interpretive case study (Prasad, 2005). Observations and semi-structured and informal interviews comprised the bulk of data collected. Over the course of the study 20 respondents across three regions were interviewed formally. Additionally, 22 other members of the organisation were informally interviewed during immersive periods of observation, when time was spent observing employees during work and socializing after work. The interviewees came from both customer facing (e.g. customer service representatives, managers) and non-customer facing (e.g. accounting staff, internal auditors, IT personnel) sides of the organisation and occupied both managerial and non-managerial roles. The collection of data began in the operations units responsible for the implementation of the technological aspects of the system. From this point, “trails in the field” (Quattrone and Hopper, 2005, p. 697) were followed to sites in the organisation including human resources and training (HR); administrative offices; and, various non-customer facing and customer facing functions. The focus of the study was on the interaction of individuals with the control system and transactions that flowed through the organisation. Consistent with a focus on conducting research and collecting data from an emerging process perspective (Brignall and Ballantine, 2004; Ahrens and Chapman, 2006; Busco *et al.*, 2007; Johansson and Siverbo, 2009) in order for an interaction to qualify, the interaction had to involve more than one individual, and relate to people and practices that are affected by ERP. The process had to be in existence in some form

prior to the installation of the new control system in every territory; and, include a set of procedures in which the individual was required to enter, analyse, and to respond to, information in the control system.

Semi-structured interview questions were broadly structured around the topics of the study, such as, “Can you tell me what your work day is like?”; “How has [the system] changed how you work?” A more detailed listing of interview protocol questions can be found in Appendix 1. In addition to observations and interviews, data was collected in the form of internal documents (e.g. training manuals and memoranda), publicly available documents (e.g. year-end reports), press coverage, and consultant reports. Appendix 2 (Table AI) provides examples of data sources collected during the study.

The collection of data and the analysis and review of theory proceeded in an iterative fashion over the course of the study. This allowed for deeper theoretical exploration of concepts that evolved early in the study and the attenuation of data collection and analysis through the progression of the research project (Ahrens and Chapman, 2006; Prasad, 2005). The interplay of theory and data collection and analysis in this study was manifest in several fashions. Theory was used extensively in developing a useful analytic bracket in which to house this study, and in the development of theoretical concepts that would be brought to bear in forming the initial research questions, and in the empirical analysis. Additionally, material in the popular press and industry (practitioner) publications was reviewed.

The particular aspects of the organisation in which the data collection occurred, and the forms of data utilized, evolved over the study as a result of reflexive iteration during the course of the study between data, analysis and theory in its second role, as a sensitizing tool. Data analysis was performed initially by aggregating and coding data. Interviews were transcribed, as were notes and any material not in digital forms. These data were compiled in Hyper-Research and Filemaker databases with any digital material that could be encoded (e-mails, for instance). This aggregated set of data was then coded reflecting the presence of recurring themes, stated perceptions and meanings, practices, and other factors. Data were also coded to establish when multiple perspectives and data revolved around a single event, action, or other commonality. For instance, when different participants mentioned the same event, e.g. a training seminar; or similar perceptions, e.g. the meaning or value of system features. Data were re-sorted and re-analysed through multiple phases involving processes of coding and re-examination of theory in order to develop robust theoretical concepts and surface the complex relations of users, practice, technology and context (Cadili and Whitley, 2005).

Case analysis

Due to what Abank perceived as mounting competitive pressures, the decision was made that several regional entities spread across a wide geographic area would be consolidated in terms of management and operations. The shift from a largely distributed organisation to one with a centralized structure was thought by executives at the bank to be a difficult one. Four different information systems operated in the 15 geographical units. The development of a unified control system strategy built on the implementation of a single ERP was deemed to be a necessity, not only for competitive reasons, but, for effective internal control. The four ERP were analysed. One of the four systems, the Banking Information System (BIS)[2], was utilized in nearly half of the

territories (including the HQ) and was deemed to be the best choice. It was more ubiquitous than two of the remaining three systems, and had recently undergone a significant upgrade placing it technologically ahead of all the systems.

Although the commercial products and services were identical across the organisation, there was wide discrepancy in operations and controls. For example, the process of reviewing customer credit lines in one region differed substantially from another. In one location the account manager could review the customer account profile and access information on charges made against the account, with the exception of the most recent 24 hour period. If any anomaly was present a manager could research the charge further in the system, but more often sought advice from senior managers, and in some cases contacted the customer. By contrast an alternate system in place in another region of the bank required managers to review printouts of account activity to monitor the account, some of which could be up to one week old, and contacting the customer was essential to receive current information. Under the new control system, the ERP notified account managers of seemingly anomalous activity (the parameters of which are input at the central accounting unit), and managers pursue further information with customers based on this notification to determine the nature of irregularities. This represented changes for most regions in some form or other; some lost the autonomy of controlling an already robust system, and in other cases (as mentioned above) new work procedures had to be developed and adopted to accommodate the new controls in place.

As part of the harmonisation of the systems at Abank, the varied control processes in place in a number of territories were to be standardised. The perspective HQ adopted was of a singular set of practices that was aligned with the central office's notions of how the BIS and other core functions such as internal audits, and internal and external reporting should be performed. As the enterprise system chosen had been the system in place at the HQ prior to the consolidation efforts, a clear vision of appropriate work procedures and control based on the installed base of HQ practices was put in place. However, in the nine other territories there were also substantial in-place technologies and practices, consistent with the local history, technologies, practices and context. For example, the ERP that had been the second most likely candidate for adoption in the newly consolidated organisation had been in place in the same number (six) of territories as the BIS. The geographic footprint of the runner up was as sizable as the BIS and possessed a temporal footprint significantly larger (20 years as compared to 10). Thus, when new technologies such as the BIS were deployed in these nine territories, the system was an emplacement on what was the "known" method of operating, rather than the conceived replacement that might eliminate the past "unstandardised" practices. There was substantial iterative influence on how past practices might shape the use of the new system.

Details of the system: a preamble to impact on accounting and control

The initial reaction to the introduction of the BIS varied dramatically. Individuals that had been members of the units of Abank in which the BIS had operated generally viewed the introduction of BIS without reaction. However, some members of these units expressed frustration that attendance at training sessions was required. The implementation of the BIS and the integration of the control procedures for different units of Abank was planned to occur in several stages. Individuals that had

participated in early stages of the integration and had completed training often were involved in supporting and delivering training in later stages of the implementation.

Executives at Abank expected that users that had not been familiar with the BIS prior to integration would welcome the new system, as the BIS is considered an industry standard, and thought to be technologically advanced. This point, if not commonly known, was part of the introduction to all training sessions, as one manager related:

Comparing the [BIS] to how things had been done before. For most of us, this wasn't really new. Sometimes it might have changed a little [a work procedure]. But, I think it showed how much better off we are with the [BIS] compared to [the other legacy systems].

However, the acceptance of the value of the BIS was not guaranteed, nor was the system acceptance consistent with all individuals encountering the system for the first time.

The schedule for integration and implementation of the BIS was successfully met, and the system was operational within established time frames, with no visible interruptions to commercial operations. Training was accomplished through classroom-like settings used to introduce the new system, followed by on-site instructors from within the branch familiar with the BIS, and recently trained on any new procedures to be implemented.

Initiating the practice of control

The introduction of the ERP into the organisational narrative allows us to examine its impact on management control. In contrast to studies suggesting that technology will solidify the flexibility of non-technological systems, engendering a “black box” wherein variations in action and systems is settled and becomes homogeneous, unquestioned and unquestionable (e.g. McMaster *et al.*, 1998), the observations of Abank were consistent with those of Dechow and Mouritsen (2005) suggesting that practice remains flexible. In that flexibility, there is the possibility for what Quattrone and Hopper (2006) refer to as heterogeneity. Roughly analogous to the notion of equifinality, heterogeneity suggests that while non-standard actions may be taken up to create a heterogeneous environment, the appearance of homogeneity exists, as the systems outcomes appear as intended. Thus, individuals are able to by-pass prescribed functions of an ERP and control system, creating non-standard modifications and interstitial outputs that could otherwise derail the efficient operation of the system. Two case vignettes of Abank demonstrate the impact of the ERP on control.

The resolution of extraordinary item control

The control of extraordinary item transactions (EIT) is an example of a control procedure that varied widely across the organisation prior to the integration project. An EIT is a transaction that requires special attention, such as a disputed charge to a customer account, a late loan payment, or a charge of fraud. Divisions of the organisation using the BIS prior to the integration operated a standardised procedure, the focus of which was control and assurance. In simple cases, such as a customer disputing a charge to their account, the system could (in some cases) render an automatic decision. For instance, if a customer was deemed a “good customer” and

they disputed a small charge (such as an over-draft fee) the system would automatically waive the charge after relevant information and had been entered and a banker had executed the transaction. A managerial audit would see the waiver on the end-of-day report. More complicated cases, for instance the claim of fraud by a customer (e.g. fraudulent withdrawals by criminals), would require a manager to engage in the process at multiple stages. Depending on the nature of the issue, the manager may or may not interact directly with the customer.

For instance, a customer claim that involved a credit card being stolen and used would start with the CSR initiating a hold to prevent further transactions already in process from being posted to the card, and a closure of the account to prevent any further transactions from occurring with merchants. The CSR would record the relevant details of the theft – when/where it may have been stolen or lost, the last transaction the customer remembers, etc. – and the value of illegal transactions was summed. If the aggregate amount was below a certain value (for example, \$100) the CSR could recommend correcting the charges (though the credit department would conduct the actual review and waiver if warranted). Above this amount, the manager would have to recommend erasure of the charges. The manager's involvement consists of similar and sometimes more detailed questions to the customer directly, concerning the nature and timing of the charges made against the credit card. The alternative to recommending waiving the costs is investigation of the charges. This would involve scrutiny by the bank to ensure the charges were in fact fraudulent, and effectively delays the erasure of the charges. If this occurs, an individual cardholder is responsible for the monies owed until the investigation is concluded. There is also a value (for example, \$1,000) above which a manager must recommend investigation. The escalation from CSR to manager means the manager now allows (or, prevents) the cancellation of fraudulent charges as a transaction with the customer, rather than reviewing the cancellation made by the CSR (usually, at a much later period of time long after the customer has left).

While not uniform in divisions of Abank that did not use the BIS prior to the integration, there was some commonality to the procedures for handling EIT. For instance, in six divisions that shared an alternate system, whenever an EIT was initiated, information would appear in summary form at whichever terminal a manager was currently logged-in. The manager could remotely review and approve the transaction. Many individuals suggested this was a much superior approach as it was a far faster process and resulted in better customer service. Additionally, proponents of this alternative procedure suggested this method still provided proper controls and assurance over the approval of EIT. However, the manager often made these decisions without reviewing the context of the situation, seeing the customer, and on the basis of dramatically abridged information. Individuals not familiar with the standard BIS procedure of EIT processing generally found the procedure cumbersome. One manager explained:

The [CSR] used to perform most of the transaction and we [managers] would approve the complete transaction, at the end. Now, it takes up more of my time, because I have to walk through it with the [CSR]. It also takes up more of the customer's time.

By contrast, those individuals with historical knowledge of the BIS found the alternative practices to lack appropriate levels of control.

Following the adoption of the new control procedures and the BIS a number of varying alterations to the EIT control process emerged. In some instances these alterations were a lesser deviation from the intended process, in other cases the deviations occurred to a sizable degree. For instance, in one alteration managers provided CSR with authorisation codes. This allowed CSR to enter all the information required by the BIS, which did not generate invisible work off the system. Yet the approval process was different than intended. Rather than a manager reviewing information at multiple stages of the transaction, the CSR would request the manager review the final step of the process before executing the application to approve/deny the transaction. The ultimate judgment still resided with the manager, but the decision was made based on a short summary of information input into the system, rather than the full set of data the BIS recorded. A manager not comfortable with these alternate approaches stated:

You might miss something in the details. That is why it is designed so you check all the details not just the end [result]

Some managers were conscious of the breach in protocol caused by sharing their authorisation codes. However, they felt sufficient attention and assurance was possible when they had the opportunity to review the “summary screen” of the transaction for approval. The general indication was the belief that CSRs would not take advantage of using the codes for any inappropriate purposes, as it would be too easy to track down. Other alterations of the process involved varying degrees of inclusion of the manager in the procedure, relying to greater or lesser extent on individual CSR’s judgment for approval/denial depending on the degree of manager involvement. The (unintended) flexibility of the BIS allowed managers to choose to delegate the assurance responsibility to those whose work the managers were intended to oversee and monitor (e.g., CSRs). In these instances, multiple calculations and judgements were made without being recorded in the BIS. The BIS calculation algorithms (e.g. maximum loan for a level of assets/collateral) were also avoided. This constituted work unseen by the BIS, and thus invisible to the executive management, and control and audit functions of the bank.

Individuals at Abank understood the BIS as a system capable of accessing and managing customer records in an efficient fashion. Generally speaking, the system was perceived to be the “state of the art” and idealized as the best way a bank could operate (projective agency). However, the experience of individuals at Abank can be bifurcated along the lines of those units in which the BIS had previously been used, and those units in which a different system had been used. As individuals engaged the system and became familiar with its functionality they became aware of how the system of controls operated and where alterations were possible. Encountering these dilemmas some individuals were able to circumvent the system of controls, and drawing on experience (iterational agency) were able to reshape the control function to one more closely aligned to their notion of how the system could operate (practical-evaluative). This resulted in multiple approaches to satisfying the control system requirements. The required outputs of the BIS were generated creating an illusion of effective control at the level of the BIS; that is, the heteromogenic desired effect of a completed transaction (Quattrone and Hopper, 2006). These re-creations were constructed in light of known end requirements of the control system, and knowledge of possible pathways in which the prescriptions of the ERP might be avoided that would still allow the system’s needs to appear to be met. For a summary analysis, see Table I.

Table I.
Temporal elements of
EIT control practices

Element	Past users of BIS	New to BIS
Iterational	A singular form of practice consistent with BIS design/past experience	Multiple perspectives of possible practices including past experience and training on BIS
Projective	Continued BIS prescribed practice	Multiple forms: the intended procedures of the BIS, possible (re)use of old system, possible alterations to BIS procedures
Practical-evaluative	No perceived dilemma	Inconsistency perceived in "known" best work practices and those prescribed by the BIS – how can judgement be (re)inserted in the system
Resolution/action	Adopted BIS prescribed practice	System work-arounds were developed that mimic the proper function of the BIS, created the appearance of proper inputs being used; yet allowed for localized adaptation of system

Operational audits

In the case of internal audits, there was similar variety across different units of the organisation as found in the EIT controls. In some regions, the branch audit was a simple process involving a count by the customer-service representatives (CSR) of transactions, a secondary count by a branch manager, and then submission of all transaction records and financial instruments (loans, cash, cheques, etc) to the central accounting unit (CAU) where a final count was made. The CSR compared the individual workstation count to a count the information system registered; and, the branch manager compared the aggregated branch counts to the aggregated count by the information system. Finally, the CAU compared the count of actual instruments to the submitted count (by managers and CSR). The count information came on a daily basis by way of a note in the internal mailbag (closed but unsealed), which also was the same mechanism for transport of the financial instruments (including cash). One manager more familiar with the BIS-inscribed process completed by customer-facing personnel commented on this approach:

They would do the count. Sign a sheet, put the sheet in the bag with the deposits and then the deposits would get picked up and sent to the CAU. The next day the CAU would compare the written count in the bag to what was in the bag. Now, what is to stop you from opening the bag, taking out \$10,000 and lowering the count by \$10,000.

The audit/control function was restructured with the integration of the BIS. Individual stations compared their individual financial instrument count to the count the BIS recorded. If correct, it would go to the manager, who would count the aggregated financial instruments and compare to the BIS count, and additionally check each individual station count. The financial instruments and counts would be sent to the CAU (via separate sealed bags), where the CAU would do a count on an individual station basis, and compare it to the BIS count as written down by the manager, but also as accessed by the CAU directly using the BIS. Then the CAU would aggregate their own count, compare it to the submitted counts and check this against the branch count as accessed directly from the BIS. The CAU would then compile an aggregated

regional count. The amended process following the integration was progressively more work intensive as the audit process culminated, which was in contrast to the prior system, where intensity decreased as the process culminated at the CAU.

As in the case of the EIT it was possible for work-arounds to emerge. It was entirely possible for managers to accept the count of the CSR and enter this figure as their manual count. However, this was not done. Managers and individuals, both in branches and at the CAU followed the prescribed mode of practice that was introduced for the audit and assurance procedures. Although both the opportunity and sentiment existed at various points in the audit sequence for modification, individuals indicated there were no alternate practices in place. For a summary of analysis see Table II.

In summary, there was no uniform, nor complete acceptance of the BIS audit/assurance function expressed by individuals at Abank. Individuals that had used the system in the past, in general were happy with the choice, if not the system. There were no expressions for alternate choices made. For individuals that had previously been operating on one of the alternate systems, opinions varied between seeing the BIS as an improvement, a non-event, or a poor choice. Some individuals found the BIS a good choice in some aspects of work, for example, control functions for new accounts, but had negative opinions about the BIS in terms of other applications, such as the EIT approval process. In such a case individuals sought to recreate the processes and end-results with which they had come to believe to be correct from past experience. The reliance on past perceptions and modes of work is an enactment of the inertia of the past, and the ability to creatively (re)imagine how practice might be enacted in the present knowing what the future might hold (e.g. a state equifinality). A summary of the two analyses at Abank is detailed in Table III.

Discussion

The diverse objectives that span an organisational divide between “local” and “global” foster tensions of interpretation. A focus on the interplay between technology and individual action has been underexplored in the accounting information system literature (Dechow and Mouritsen, 2005). The integration of these disparate sets of goals is often knit together through a series of “working arrangements across the entire scale of the global and local” (Dechow and Mouritsen, 2005, p. 698), such that local needs can be accommodated and coupled to the act of satisfying global requirements. This bricolage of working arrangements across the global/local span typifies the fist

Element	Past users of BIS	New to BIS
Iterational	A singular form of practice consistent with past audit process	Many approaches to the audit acknowledged
Projective	Continued operational audit practice	Vocal expression of alternate procedures did exist, but none were taken into practice
Practical-evaluative	No perceived dilemma	Acknowledged inconsistency; but new approach is accepted
Resolution/action	Adopted BIS prescribed practice	Adopted BIS prescribed practice

Table II.
Temporal elements of
operational audits

	EIT		Internal audit	
	Past users of BIS	New to BIS	Past users of BIS	New to BIS
Projective	Organization will establish appropriate standards and controls	BIS state of the art system	Extension continuance of effective system	Insertion of ERP technology into context in which it was not (substantially) present
Iterative	“Best Practices” inscribed in an efficient. Effective system	Past practice was effective and efficient – the best choice for “smooth operations” with respect to maintaining customer satisfaction	“Best Practices” inscribed in an efficient. Effective system	Dramatically increased levels of work and intricacy of procedures. Perceived to be rigid but increased control is acknowledged
Practical evaluative	Challenge to existing patterns of work. Some procedures were altered to maintain organization unity. But, generally, work practices were maintained when possible	New system initiated numerous tedious work changes. However, system could be by-passed – resulting in changes to work practice	Existing patterns of audit/control were maintained	Despite overall poor impression of new system; changes were deemed appropriate and adopted

Table III.
Elements of agency and practice at Abank: EIT and internal audits

question postulated in this paper, Why are particular deviations from prescribed action adopted in favour of others?

The ERP at Abank was deployed as means to both integrate the disparate systems of an organisation and to provide a technology on which an integrated system of controls could be laid. As Dechow and Mouritsen (2005, p. 726) discuss, integration is an ongoing process by which the ERP is “associated with (organizational) hope, procedure and technology.” In this fashion, observations were consistent with those of Quattrone and Hopper (2005), in their discussion of TimeCorp and SpaceCorp where Control and structure are social constructs rather than physical or material matters, and, “the ERP implementation reproduced and reinforced existing distances and kept the organization structure.” (Quattrone and Hopper, 2005, p. 752). ERP is a temporally instantiated artefact of the organisation – it represents a projective view of how the organisation might operate and how control might be enacted; it possesses an iterational component of practices and procedures inscribed by its designers and managers; and, there is a practical-evaluative component in the flexibility of how the system might be enacted (as intended, or otherwise) in the face of vague parameters or dilemmas that are in some fashion open to interpretation.

Cooper and Kaplan (1998; see also Kirk and Mouritsen, 1996) argue, an ERP is a technology of control, but something unable to provide a complete panoptic view of an organisation. There remains outside of the view of the ERP, work that is performed in

manual fashions, and other work that side-steps the intended inputs of the ERP to achieve a desired end-goal. Although the effects may not be immediately visible, information technology configuration will have significant influence in defining managerial control and what can and cannot be done with the system in practice (Dechow and Mouritsen, 2005). Chapman and Chua (2003) concur on the limit in scope of actions of local information systems, and the possibility that work “off the system” may drift (Hanseth and Braa, 2000; Andon *et al.*, 2007). In other words, new practices may emerge and be created to compensate for perceived failings of the old system, and may produce invisible work.

Invisible work is a flexible form of the management of the organisation – whether known at all levels of the organisation or not – that can create “blindspots” (Dechow and Mouritsen, 2005) wherein the ERP cannot “see,” or enforce control. Blindspots in Dechow and Mouritsen’s (2005, p. 701) study are, “created by path dependencies, which are, the residues of the past which turn out to set serious constraints to the future development of managerial control.” However, at Abank, instances of invisible work were creative acts of sense-making and improvisation (Weick, 1998; Zack, 2000) that engage what Dechow and Mouritsen (2005) suggest is a trading zone, a space where differing enactments of the technology are taken up. They are reflective of the ill-defined space, which occurs between global standards and localised interpretations. However, for invisible work, and these new enactments to be taken up – whether they recreate and past “end result” or not, requires an imaginative engagement with projective aspect of practice – a reflection on what the future might be. This requires one to mindfully deviate (Caron and Turcotte, 2009) from what is the known path. As invisible work emerges in the evaluative stage, it becomes part of the new history of “how things get done” at an organisation.

Once incorporated, invisible work becomes an essential part of the ability to reach the equifinal state – the required result is achieved and concerns over the variances in the pathway to that state are lessened, in favour of the aggregated result. Methods of practice, create, “a ‘local’ universe with its own space and time at odds to that in HQ” (Quattrone and Hooper, 2005, p. 756) where flexible actions allow the local site to, “control the controller by exploiting gaps.” Similar to Quattrone and Hooper’s (2005) observations of TimeCorp and SpaceCorp, the Abank HQ is unaware of the specifics of local variations in practice (though they may know some occur) because the “closing balance” and end-results appear as expected. Invisible practices become influential as arrays of activity that shape the functioning of the ERP. The orientation of work practices and the organisation itself shift to accommodate these improvisational adaptations.

Success of a control is typically based on the measurement and testing of end results – if things appear as they should, little further investigation occurs. Similarly, with knowledge of how the results of various controls test should unfold, it is possible to ensure compliance is achieved at these interstitial points, without procedures being followed exactly. It is within the frame of this invisible work that the notion of integration as a means of making data accurate, portable and available must be questioned. Thus, the ERP can reshape the organisation as users take up new uses of the technology to supplement or circumvent the intended designs of reporting and different forms of input may generate the appearance of the correct output. As Dechow

and Mouritsen (2005, p. 727) express, “this is suggestive of a changing set of premises for management control.”

The observations at Abank show that ERP is involved in the intended integration of control systems, but, is subject to the ongoing interpretation of individuals – both in terms of the control systems and the technology itself. The intended information pathways of the ERP influences the ways in which individuals (inter)act. It requires they engage the technology in different manners than in the past and have different levels of contact with fellow employees in different contexts. This framing of action is the iterational element of the practice(s) at HQ that sought the ERP integration as a means of control. However, the processes as constructed by the intended control system, are as open to interpretation as is the technology itself. Quattrone and Hooper concur in their 2005 study, suggesting, “paradoxically an implementation to integrate business functions and to increase control and accountability had the opposite effect as it became difficult to match responsibilities to accountability” (Quattrone and Hooper, 2005, p. 760).

The second question posed in this paper, “how do individuals know how to act” such that the deviations from action still achieve a state of equifinality – where the end results appear as expected? An answer is reflected in the observation that despite the presence of seemingly concretized technological artefacts and the inertia of historical practice, there is always the opportunity for the creative (re)imagining and enactment of possible future practices. This inherent flexibility of practice is associated with the material constraints of the technology, the knowledge of what was and reflection on the contingencies of the present. And thus, is an aspect of individuals’ knowledge of how to use the system to achieve desired aims.

The vignette describing the controls applied to EIT demonstrates the resilient nature of the iterational element of agency. Individuals engage in reflection, not only of what would occur should they proceed in the intended course, but also what alternative actions might be taken. Projective imagining is akin to sensemaking, in which individuals seek to understand the current situation and formulate actions to navigate disruptions and “resume interrupted activity and stay *in action*,” (Weick *et al.* 2005, p. 409 *emphasis added*; see also: Weick, 1998). It requires that individuals are aware of the institutional and environment in terms of constraints and liberties and are able to act in order to satisfy their needs and meet their own strategic goals – even if the reflection is at a less than conscious level (Seo and Creed, 2002; Emirbayer and Mische, 1998). Their actions can support change and usurp existing institutions or avoid change through adherence to past institutions. It is the act itself that is the creative accomplishment, and one chosen to reach a goal.

Path dependency is a recognition that, “History Matters” (Kay, 2005) and represents, “the residues of the past which turn out to set serious constraints to the future development of managerial control” (Dechow and Mouritsen, 2005, p. 701). Thus, the trajectories of action in the present constrain future choice sets (North, 1990). Consistent with the influence of iterational, or historic practice, this suggests that changes in the control systems and associated procedures are consistent with individuals’ understanding of what the requirements and results of the system should be, rather than those inscribed in the new system. As van der Steen (2011) points out, variations in practice may not be random. In fact, the observations at Abank suggest that variations were reflective and creative approaches to re-aligning the control system to perceptions of how it should operate.

Thus, the notion of path dependence may be larger than action patterns that are evoked by a form of “trigger” (Becker, 2004; Barnes *et al.*, 2004) or as a durable set of arrangements that are enacted to resolve ambiguity (Dechow and Mouritsen, 2005). Path dependence may be a resource (or set of resources) that can be assembled to produce information that informs decision making and can be mobilized in the practical-evaluative and projective phases of practice to foster the creation of new practices and actions. These new practices may be reconstructions of past pathways, or they may be extrapolations of known practice that contain wholly new elements. The sum of path dependencies, rather than the individual “parts” of a pathway, taken together and creatively engaged are the mechanisms through which individuals can imagine a “new” action to take, given the context in which they are immersed.

The inconsistency between the prescribed and desired actions creates a dilemma in which the individuals at Abank considered a variety of contingencies, and ultimately chose a path of action. In some cases the actions taken maintained the integrity of the EIT control system, both in form and function. For instance, manager’s were willing to give CSRs their passwords, however, in other instances individuals (re)constructed a set of practices which in their estimation maintained the spirit if not the letter of the prescribed controls. The resolution of this dilemma at the practical-evaluative stage is coupled to the heterogeneous nature of the iterational elements of different groups of individuals. As these improvisational adaptations to the control system are flexible, they are ongoing interactions between individuals that emerge as they implicitly negotiate how to perform the task. The requirements of the control system are satisfied within the constraints of the material capabilities of the BIS. As discussed earlier, this phenomena converges with past studies of routines and institutions. However, understanding the interaction between historical and present contingencies and the possible future (projective) action allows us to posit the mechanisms of an individual’s knowledge of how to act to achieve and given and targeted end-state.

In contrast to the vignette of EIT, the discussion surrounding internal audits at the branch level demonstrates that in some instances the control system was initiated as intended, and consistent with design. Although the new sets of practices associated with the internal audit function were thought to be onerous by many not familiar with the new system, there was no evidence of alteration of the working practices prescribed by the technology. The iterative and projective orientations toward the operational audit function were different with many individuals at Abank. Rather than seeing it as a functional aspect of “doing business,” the perception of the internal audit function was one of protecting the organisation (and one’s job). Thus, the projective aspect was consistent with most individuals at Abank – seeing the audit process as one that should be rigid, and perhaps onerous. As in the case of Quattrone and Hopper’s (2005, p. 753) study, the ERP may have “speeded up information flows and diffused best practices, but it became an exercise in stretching modern control.” Effectively, the ERP serves to preserve existing controls with re-designed business practices.

The iterational orientation to practice might have suggested easier forms of audit existed (i.e. other known pathways for internal audit could be chosen), however, of greater influence was the concept of the audit as sacrosanct. The corridor of contingencies and possible future actions is particularly narrow in the practical evaluative element. Individual action is constrained and actions are inclined to follow the prescriptions of the ERP “best practice.” Thus, it may not be a factor of how deeply

embedded a practice might be, but the form of coupling of particular practices to particular situations.

These two vignettes demonstrate control systems may appear integrated and standardised by virtue of the deployment of an ERP as the integrating catalyst. This illusion is the result of the appropriation of technology outside of its intended purpose. The malleability of technology is not a new insight in the academy. However, the contribution this paper offers is a theoretical tool to discuss how such appropriations and sense-making occur, and the insight that these appropriations are not always “random-walks” or malicious repurposing of technology. An understanding of practice informed by a temporal view of agency reveals some aspects of practice in control systems that are not captured in other perspectives. Individuals encounter “problems” in the accomplishment of everyday organisational life. How they resolve these issues in light of the influence of past practice, the intentions for the future and the deciphering of the contingencies of present context demonstrates how pressures and persuasions of past experience and future anticipations may strengthen or alter current practice. Previous studies of practice provide valuable knowledge on the nature of arrays of activity (or, scripts of action) that can be enacted, however, a temporal perspective of practice allows us to examine how and why action-scripts or reactions might be initially formed, and then relied on in the future.

The stability of some practices, or the resistance of individuals to changing them is based on shared practices and similar understandings among a network of actors as to what was necessary for successful performance of the bank. The prescriptive requirements articulated by executive management and inscribed in the system for new procedures to be adopted were implausible in the minds of individuals, as existing shared assumptions of what was correct and valuable of existing practices was the dominant conviction. The further encroachment of the new practices encouraged individuals to share and discuss the practices they were adopting, not as consistent with the new procedures of the ERP, but practices developed to circumvent the control system. Thus, individuals were enrolled in increasing numbers in the informal project of subverting the control system in some operations, rather than sustaining it.

“Creativity and Fabrication continue when a system travels into new settings where it acts and is acted on by individuals” (Justesen and Mouritsen, 2011, p. 171), and while the past is important and inertial influences may be substantial, “an accounting system is not a homogenisation process because systems are translated differently, depending on the specific setting” (Justesen and Mouritsen, 2011, p. 171). In other words, while inertia might have significant influence (van der Steen, 2009), the particularities of context may cause otherwise similar enactments of ERP and developments of practices to “pivot” in different fashions. Path dependence refers to the inertia of existing institutions and practices, which can reveal the importance of the organisation’s history but does not fully explain the process of organisation change (Stack and Gartland, 2003; Caron and Turcotte, 2009). In order to understand how situated change occurs, there must also be reflection on the mindful deviation (or creative action) that is developed with the benefit of the past as a lens through which to view present circumstance and envision possible action (Caron and Turcotte, 2009; Zack, 2000).

The concept of path dependency (see Dechow and Mouritsen, 2005) provides insight on the iterational influence that might form the basis of how the current circumstance is evaluated but, does not shed light on how different experiences in the present might

shape different enactments of the ERP, and thereby the ongoing application of control in the organisation. However, a temporal perspective would draw equal attention to the process of reflection on the practical-evaluative aspect of practice that engages with the present, and the projective aspect, through which individuals are able to reflectively and creatively imagine possible actions and scenarios and adopt a set of actions, which they believe will provide the best end result.

The material aspects of an ERP enable and constrain what is visible, and thereby what is controllable. The system itself is malleable, but choices in favour of adopting one action may make adopting another action impossible. This effectively leads to the creation of “blind spots” or, areas of ambiguity in which the control system is silent. In such circumstances individuals are left to make their own interpretation of “what to do next.” The notion of path dependency would suggest that the constraining elements of inertia would result in different individuals developing parallel pathways to mitigate the blindness. However, Dechow and Mouritsen (2005; see also, Quattrone and Hopper, 2005; Chua and Mahama, 2007; Justesen and Mouritsen, 2011) argue there are great amounts of variability in the actions chosen, as this form of sense-making and interpretation is individualistic. The heterogeneity of technology use in ERP and control system implementation then, is less certain, “and may not produce stable organisational practices” (Justesen and Mouritsen, 2011, p. 174).

As the implementation process unfolded, the variations from practice were given little attention as managers assumed, as one manager described it, as:

The growing pains with a new system. We assumed there would be some issues. But, we thought it would decrease over time.

However, it did not decrease. As the deployment continued, the entrenchment of variations in the control system increased, as did their form and number. As a result, the legitimacy and reliability of the system was brought into question: if the controls could be breached in a fashion to allow the localisation of practice to suit local approaches, in what other ways could it be circumvented?

As Dechow and Mouritsen (2005, p. 728) suggest, “ERP requires actors to speak up about their control problems in order to make them a part of the system’s capability.” Management control may thus not develop by inventing new and more dimensions of control, but through the examination and assembly of existing practices.

Conclusion

The deployment of ERP coupled to a control system, “brings a residue of the past” (Dechow and Mouritsen, 2005, p. 729) that contributes to the inexact nature of the implementation of the system. An individual will encounter issues in the present, with all the associated contingencies that might accompany them. These possible actions will be coupled to the restraints of new technological and procedural. A temporal perspective of practice provides insight into the conflicts individuals encounter as they seek to act in the face of the inertia of the past, whether inscribed in technological artefacts or instantiated in their own behaviours; the emerging contingencies of the present and the prospects of the future. The inclusion of a temporal orientation to the examination of individuals’ actions and practices fosters reflection on the ability of individuals to be judicious in repeating, initiating and modifying work behaviours as they encounter new situations.

The processes of change are not always clear. Prasad (1994; see also Prasad and Prasad, 2000) discusses the use of “invisible work” in health care organisations a case of changed initiated by an information system implementation. The invisible work was constituted as employees maintained a set of records in addition to the official one. The deliberate introduction of new rules did create new routines, but did not necessarily enact an intended change. The tacit understanding of individuals was critical in their sense-making of how to act and resolve a perceived ambiguity. The taken-for-granted assumptions that are bound up in the performance of routines are not readily identifiable. However, by tracing the actions of individuals, insight as to how and why certain actions are taken may help to unravel how and why actions are taken that impact the process of change in management control environments.

Although new procedures may be incorporated into the control systems of an organisation – and even inscribed in technology – the possibility for these new requirements to result in successful change only emerges in the acceptance of these procedures by individuals (acceptance, in one form or another). As Chu and Robey (2008) point out, the capacity of human agency is to accept, alter or even reject rules and applications regardless of any touted benefits. To the extent that the systems are malleable and individuals are able, the system may be enacted in a fashion outside of the pathway of past inertia and prescribed actions. The systems appear to function as the end goal is accomplished, but it is done so through the repurposing of action and the inclusion of invisible work that is not seen or framed by the control system or the technology. However, these actions are developed and enacted through the reflective practice of individuals that, while attending to past knowledge and future hopes, evaluate present contingencies for the potential freedom to manoeuvre and maintain (or if necessary, change) patterns of action.

The research case of Abank extends the work of studies of ERP and control systems, and demonstrates that control systems and the technology in which they are described are not discrete from individual practice. The actions of individual in the work place evolve and adjust in light of changes in both technology (ERP) and control systems, and as such control systems cannot be studied in the absence of the ERP which communicate their procedures and the individuals who enact and are subject to their rules. In addition to reflecting on the impact of change in organisations, the concept and mechanisms of change in the accounting context are brought to the forefront in the preceding discussion. This study extends, and provides added depth and breadth, to perspectives of practice, such as those offered by Ahrens and Chapman (2007), and further develops the theoretical and practical applications for work in this tradition.

Notes

1. Exemplar interpretive studies examining practice, technology and control include a variety of theoretical perspectives have been used to examine the malleability of technology in organizations, including, but not limited to, power and politics (Kholeif *et al.*, 2007), structuration theory (Kholeif *et al.*, 2008; Caglio, 2003), the influence of institutional forces (Cruz *et al.*, 2009; Modell, 2009; Beaubien, 2008; and, Dillard *et al.*, 2004), Actor-network theory (Quattrone and Hopper, 2005; Dechow and Mouritsen, 2005) and accounting practice (Ahrens and Chapman, 2007).
2. Disguised at the request of the organization.

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Corresponding author

Louis Beaubien can be contacted at: Louis.Beaubien@smu.ca

Appendix 1

Semi-structured interviews were conducted in the study of Abank.

Terms in the interview protocol as described below have been disguised to maintain anonymity and confidentiality.

Interview protocol

- (1) You and the organization:
 - Can you tell me about your role at Abank?
 - How long have you been at Abank?
 - Can you tell me about the unit(s) you have worked in?
 - Can you tell me about working with other unit(s)?
 - Can you tell me about the [information system] you used?
- (2) You and the integration and the BIS:
 - Can you tell if you had a role in the integration?
 - Can you tell me about the integration process?
 - Can you tell me about the BIS?
 - What functions of the BIS do you use?
 - How was coordination handled in the integration?
 - Were/are there any challenges in the integration?
 - Are there any challenges in using the BIS?
 - Have there been any changes in how you do work?
- (3) You and training
 - Can you tell me about your training/education prior to coming to Abank?
 - Can you tell me about your training/education at Abank?
 - Can you tell me about the training/education during/following integration?

Data type	Case definition	Collection	Example
Text	Organizational memos such as training manuals and mission statements; public documents such as government documents; newspaper and popular press articles	All material was collected digitally if possible so that it could be imported into Hyper-Research and Filemaker for analysis If text could not be taken in any form, notes were utilized, in a fashion acceptable to the organization, and this was included in the digital database	Articles from the popular press were included in the data, such as "Senior Corporate Banking Team Changes At [RB]" from December of 2004, discussing the change in organizational leadership Internal documents such as Patriot Act Certification for [RB] in February 2004, signed by the General Counsel of FB (rather than a counsel from RB)
Observations	Observations at meetings of individuals during the course of their everyday work, and occasionally in social settings such as at dinner	During observations notes were taken. In all possible instances notes were taken <i>in situ</i> . When this proved inappropriate, notes were taken at the first possible instance	Notes from day journals; <i>M-04-B-8</i> : Bill [pseudonym, a manager] mentioned today that things worked more smoothly using the previous system. He wants to get a certain "set" of information on one report, the new system does not do that. He prints off multiple reports, literally cuts out the portions he wants, tapes them together, photocopies the form so it appears as a single sheet and then files that form. Don't know how the auditors can make sense of that? Interview <i>J-06-TB-2</i>
Interviews	Semi-structured interviews were conducted in the workplace, typically in that individual's office. Several informal interviews or conversations also occurred during the period of my time spent at FB	In all cases digital recording of interviews were sought. In the instances when the interviewee was made uncomfortable by the recording, notes were taken <i>in situ</i> . If notes were compromising to the conversation, they were taken immediately following the discussion 20 formal interviews were recorded.	... Q: And what was your opinion about the BIS1? A: Well, it was easier than XIS, something that takes one step in BIS1 would take two or three or more steps in XIS Q: Was there any advantage in XIS then, why was it chosen? A: Money. FB had sent a lot of money updating the BIS2 which was essentially XIS, and it would cost more to update BIS1 – I mean it was the same as when it was put in ten; fifteen years ago. Basically, anyway

Table AI.
Data

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