Association for Information Systems
AIS Electronic Library (AISeL)

CONF-IRM 2016 Proceedings

International Conference on Information Resources Management (CONF-IRM)

2016

Towards an understanding of the integrative relationship between Business Process Management and Enterprise Resource Planning Systems

Malcolm Garbutt
University of Cape Town, grbmal002@myuct.ac.za

Joachim Schuler
Pforzheim University, joachim.schuler@hs-pforzheim.de

74. Towards an understanding of the integrative relationship between Business Process Management and Enterprise Resource Planning Systems

Malcolm Garbutt
University of Cape Town
grbmal002@myuct.ac.za

Joachim Schuler
Pforzheim University
joachim.schuler@hs-pforzheim.de

Abstract

Lack of clarity regarding the scope and integration of business process management and enterprise resource planning are recurring themes. This results in difficulties in understanding relationships between the two constructs. Business processes are constellations of activities fundamental to organizations and must be managed like all other organizational resources. Continual changes in organizations' environments make it imperative that business processes constantly adapt at the strategic level in order to execute organizational strategies at the operational level. At both levels managed process-oriented activities are believed to reduce operating costs, increase customer satisfaction and enable faster response to changes in the organizations' environment. When considering enterprise systems it is necessary to take into account business process management together with enterprise resource planning. They are not inseparable but to talk of just one is to see only half the picture. The objective for this paper is to explore the desired integration between business process management and enterprise resource planning systems under the lens of several relevant theories.

Keywords

Business process; business process management; business process change; business process orientation; enterprise resource planning; enterprise systems; sociomaterial; activity; activity theory.

1. Introduction

Business processes are of prime importance when considering enterprise resource planning (ERP) systems. Research into key competencies required by enterprise systems consultants ranked business process management (BPM) skills highest of the requisite technical skills (Scholtz, Cilliers, & Calitz, 2011). At the same time ERP is regarded as the automating mechanism of BPM (Sonteya & Seymour, 2012). However lack of clarity regarding the scope and integration of BPM (Bandara, Harmon, & Rosemann, 2011; Ko, 2009) and ERP (Møller, 2005) are recurring themes and the relationship between them inadequately described. Classification of the relationship between BPM and ERP varies from tight integration (Davenport, 1998; Davenport, Harris, & Cantrell, 2004) to separate entities (Møller, 2005). The dilemma is further complicated when ERP and BPM are linked separately under the umbrella of ERP II (Møller, 2005).

Central to all systems are processes which are described as a series of activities producing outputs from inputs. All active organizational systems comprise sets of process activities

(Taxén, 2009) commonly known as business processes (Harmon, 2007). Business process concepts have been around for more than a century although they have only gained priority with the introduction of enterprise systems such as ERP and customer relationship management (CRM) (Harmon, 2007). The combination of process-oriented activities and information technology has been recommended for overcoming the frequently cited business-information technology gap (Davenport in Bandara, Indulska, Chong, & Sadiq, 2007). Even so the nature of the integration of business processes and ERP remains unclear. Enterprise systems have aggravated this situation by incorporating BPM tasks thereby increasing the complexity of implementing the system and posing "immense challenges" in organizations (Taxén, 2009:2). In this regard Taxén (2009) recommends the use of theoretical frameworks for taking informed action.

The aim for this paper is to explore the integrative relationship between business process behaviour and enterprise systems informed by theory. The question explored in the paper asks what integrative relationship exists between business process management and enterprise resource planning systems. In the following section potential theoretical frameworks for investigating this interaction are outlined followed by reflections on BPM and ERP. The penultimate section considers the combination of BPM and ERP systems prior to concluding.

2. Theoretical Framework

Organizational processes are sets of activities (Taxén, 2009) comprising individual actions undertaken by agents whether human or non-human. Systemically there is little difference between human and non-human agents although inherent differences have been highlighted and explored by several authors and researchers. The result is a dualism that has pervaded the information systems research landscape (Brown & Grant, 2010; Orlikowski, 2007). The concept of information systems is generally associated more closely with technology than with social structures. One of the leaders in the call for recognition of the integrated nature of social aspects and technology is Orlikowski who has been promoting a socio-technical view of information systems for over two decades (Orlikowski & Baroudi, 1991). She has extended the technology aspects to include all forms of materiality in an integrated (or constitutive entanglement) view of human agents and the material agents (Orlikowski & Scott, 2008). In this understanding of sociomateriality, social and material are inseparable and ontologically based on Barad's agential reality (Orlikowski & Scott, 2008). Inseparability has been criticised because the very concept suggests at least two distinct elements which are counterintuitively incapable of being separated (Kautz & Jensen, 2013). From a systems approach this represents emergence resulting from the combination of the two elements. Leonardi's concept of imbrication is in line with the emergent concept of sociomateriality. Imbrication is based on the Greco-Roman roof tiling system which uses two distinct types of tile (tegula and imbrex) to provide a water-proof covering. Tegula are flanged tiles laid side by side with the flanges covered by the semicircular imbrex. While the tegula alone provides protection it is completed through the imbrication process. The imbrex may have other uses for example as guttering. Thus each part can be used separately but when joined together exhibit emergent properties. The philosophical basis for Leonardi's stance is critical realism which is associated with systems thinking (Mingers, 2004). Leonardi's sociomaterial view can also be associated with the Habermassian third world where social and material (subjective and objective) worlds combine to produce activities (Mingers & Willcocks, 2014).

The fundamental similarities and differences between the sociomaterial views may be better understood by examining their philosophical stances with regard to action and activities. Orlikowki's agential realism combines historical and future views of the social and material as co-developing. These views are observable through their interactions which are "entangled" and cannot be readily separated. On the other hand Leonardi takes the view of social and material as pre-existing and knowable through the events generated by them only some of which are observable (Mingers, 2004). Both philosophies recognize activities and communication (practice and discourse) as fundamental outcomes (Mingers & Willcocks, 2014; Orlikowski & Scott, 2015). Practice and discourse are at the heart of activity theory with the subject preforming meaningful actions on a work object towards an outcome through communication (Taxén, 2009). The integration of multiple work objects allows an organization to be perceived of as a "constellation of activities" (Taxén, 2009:2).

The view of organisations as an integrated set or constellation of activities provides the opportunity for business processes to be explored using activity as the unit of analysis (Taxén, 2009). Integrated environments provide cognitive challenges which may be better understood from a narrative view using linguistics and semiotics (Davis & Comeau, 2004). Two areas of linguistics need to be comprehended to be useful: semantic comprehension and reference. The first makes sense of the relevant signs and symbols while the latter seeks to understand the object to which the symbol points. An ERP for example can be regarded as a model of an organization in which each construct indicates a real aspect of the organization. A person who understands the organizational functions will readily comprehend the narrative presented by the underlying business processes. Analysis of narration is important as abstracts, overviews, synopsises and summaries may tell the gist of a story but lose essential details (Hendricks, 1973). In the context of business processes a simplistic view of outcomes precludes the ability to understand the workings and nuances of the process activities. This significantly lessens the ability to understand the process and establish efficiencies and effectiveness of the outputs. Through acknowledging the narratives involved during the conversion of input to output a richer picture emerges. The emergent rich picture can be more fully understood and managed.

One may take an Orlikowskian sociomaterial view (Orlikowski & Scott, 2008) and declare business processes constitutive entanglements. This would set the focus on the activities between the social and material. However this will fail to explain changes or transitions between the material and social agents. Using a system of agential cuts will separate the social and material and yet still fail to provide an understanding of business processes. However shifting focus from interactions onto discourse over time may be useful in understanding changes in practice (Orlikowski & Scott, 2015). Discourse meanwhile retains the essence of the Leonardian perspective. Although Leonardi's critical realist approach perceives materiality of business processes and components as *a priori* his social view includes activities that cause interaction between materiality and discourse (Leonardi, 2013). Furthermore discourse in the form of communication is central to business process orientation. This is highlighted in the view of poor communication being a major factor in business process change failures (Chong & Rosemann, 2010).

3. Business Processes

Processes govern all activities undertaken by humans whether as individuals or as groups such as those organized as business enterprises (Ko, 2009). In business enterprises the sets of activities that comprise business processes range from simple to extremely complex.

Consequently automation by means of information technology to manage business processes may be beneficial (Bandara et al., 2007). Business processes have been variously described as can be seen in Table 1. Whereas commonalities regarding action and outcome are observed in these quotes concepts such as input, output, measurement and agency are mentioned to differing degrees.

Definition of Business Process:	Citation
"a set of logically related tasks performed to achieve a defined business outcome"	(Davenport & Short, 1990)
"a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer. A business process has a goal and is affected by events occurring in the external world or in other processes."	(Hammer and Champy (1993) in Ko, 2009)
"a structured, measured set of activities designed to produce a specified output for a particular customer or market. It implies a strong emphasis on how work is done within an organization, in contrast to a product focus's emphasis on what. A process is thus a specific ordering of work activities across time and place, with a beginning, an end and clearly identified inputs and outputs: a structure for action."	(Davenport (1993) in Ko, 2009)
"a series or network of value-added activities, performed by their relevant roles or collaborators, to purposefully achieve the common business goal."	(Ould (1995) in Ko, 2009)

Table 1: Examples of business process definitions.

Combining the concepts from Table 1 with communicative processes (Chong & Rosemann, 2010) as narratives (Pentland & Feldman, 2007) to describe patterns of action, business processes may be more fully described as follows:

> *A business process is a measurable set of organizational activities aided or constrained by processes external to the current process that converts inputs into outputs though a narrative process between collaborators in order to supply outcomes to customers in fulfilment of organizational goals.*

In the absence of a taxonomy of business processes Ko (2009) provides two perspectives of business processes: a level perspective; and a core competency perspective. The level perspective is similar to the traditional organizational chart with strategic planning at the apex, followed by management control and operational control at the lowest level. These three levels correspond to the Harmon (2007) process change triangle's strategic/enterprise level, process level and implementation level. The core competency perspective comprises core business processes, management business processes and supporting business processes which are organised by function rather than responsibility. Core business processes generate revenue while management business processes ensure that the core processes operate efficiently and in accordance with corporate policy. Support type business processes are important for achieving business goals but are non-revenue-generating (Ko, 2009). This view is comparable to the value chain of Porter as described by Harmon (2007).

Irrespective of the perspective taken business processes need to be coordinated. Coordinating, managing, prioritizing and monitoring of business processes is better known as business process management (Harmon in Bandara et al., 2011). The requirement for management is highlighted in the set of principles of process management defined by Hammer (2015) who maintains that (i) all work is process work, (ii) any process is better than no process, (iii) a good process is better than a bad process, (iv) one process version is better than many, (v) even a good process must be performed effectively, (vi) even a good process can be made better and (vii) every good process eventually becomes a bad process. Therefore management is required to create, coordinate, improve and simplify processes and to monitor them in order to recognise when they must be replaced. Caution however must be taken when creating and managing processes to recognize that they are activities and not objects. Managers need to be aware that processes must produce and coordinate patterns of action and not create artifacts (Pentland & Feldman, 2008).

4. Business Process Management

The management of business processes is not only the execution of tasks but an organizational capability according to Rosemann and vom Brocke (2015). Ko (2009:14) regards BPM as a cross-discipline theory-in-action founded upon statistical process control and quality principles which seeks to eliminate variations (Hammer, 2015). Contrary to popular belief it is neither business process reengineering nor workflow alone. It is also not only process modelling although it includes all of these capabilities (Ko, 2009). According to van der Aalst, ter Hofstede and Weske (2003:4) BPM supports "business processes using methods, techniques and software to design, enact, control and analyze operational processes involving humans, organizations, applications, documents and other sources of information". Subsequently van der Aalst (2013:1) defines BPM as "the discipline that combines knowledge from information technology and knowledge from management sciences and applies this to operational business processes". Confusion nevertheless persists in comprehending differences between terminologies such as BPM and workflow management, business process reengineering (BPR), business process modelling, business process orientation and business process change. (Berente, Vandenbosch, & Aubert, 2009). Accordingly Trkman (2010) describes BPM as a complex field with operational challenges originating in organizational, managerial, technology and social domains.

Rosemann and vom Brocke (2015) define six core elements of BPM: strategic alignment, governance, methods, information technology, people and culture. The inclusion of information technology entrenches the view of technology as a prerequisite for BPM. While this may be valid within environments where technology is ubiquitous in others such as third world countries information technology may not be critical. Successful BPM systems must be aligned with the organization's strategy and governed in order to ensure accountability from its people and within its culture. BPM may be enhanced through the use of information technology. Extreme forms of information technology integration may disadvantage the overall business process operation. Routines that involve human-to-human interactions are infinitely variable while they give rise to knowledge creation. Artifact-to-artifact interactions (as between information technologies) on the other hand are "rigid, mindless and can be explicitly stored" (Pentland & Feldman, 2008:240). These are dead routines and cannot change to suit swiftly changing environments and do not create knowledge.

Business process change is inherent in BPM. Organizations have four main reasons to undertake business process change initiatives according to Harmon (2007:xxviii-xxix) (i) cost-saving initiatives, (ii) new software technologies, (iii) redesigning a specific process or (iv) to manage the organization's core processes. These reasons can be linked to the Harmon (2007) process change triangle indicated previously with reason (iv) referring to the strategic/enterprise level, reasons (ii) and (iii) to the process level and reason (i) to the implementation level. For this paper the preferred term is business process change which addresses the debate regarding BPM versus BPR. Business process change incorporates the incremental changes of business process management as well as the drastic transformations of business process reengineering (van der Aalst, 2013). To avoid confusion, the term BPM is used to refer to operational process management and business process change to refer to dedicated times of business process change irrespective of the level of that change.

Central to business process management is business process modelling (van der Aalst, 2013). When combined with analysis, business process models have been observed to benefit

organizations through increased visibility of activities, improved ability to identify bottlenecks and potential areas for optimization, reduction in lead-times, enhanced definition of duties and roles and for fraud prevention and compliance (Ko, 2009:13). Benefits of BPM can be viewed at the operational level and at the strategic level. Operational benefits include lower operating costs, reduction of waste and increased customer satisfaction derived from consistency, lower cost, increased speed, improved quality and better service. Strategic benefits are the result of faster response times in rapidly changing environments (Hammer, 2015).

To understand both fundamentals and instantiations of BPM it is recommended to begin with the BPM life-cycle (Ko, 2009; van der Aalst, 2013). Although a number of BPM life-cycles exist (Ko, 2009) such as Hammer's essential process management cycle (Hammer, 2015), van der Aalst's (2013) latest iteration depicted in Figure 1 is used here as it is comprehensive yet concise. The model comprises three phases: (re)design, implement/configure and run and adjust. The process starts with the design of a process model which is used to instantiate the use case. Configuration and implementation follows the design phase prior to running the process. During the run phase the process can be adjusted by reconfiguring available controls. Data is collected for analysis during the run and adjust phase in order to identify inefficiencies and waste. This analysis is passed into the redesign phase where model-based analysis (what-if scenarios) can be used to examine the redesigned model before reconfiguration and implementation (van der Aalst, 2013). This cyclical and incremental approach is a departure from BPR even though the initial iteration may have been radical.

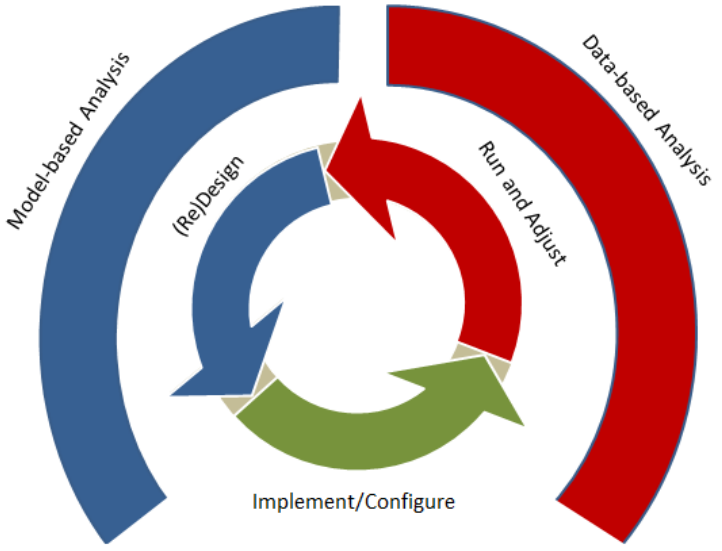

Figure 1: Business Process Management Lifecycle (W. M. P. van der Aalst, 2013)

The model goes beyond workflow particularly in the inherent use of process analysis (Ko, 2009). Accordingly BPM techniques are limited neither to workflow management, BPM, nor to business process reengineering. The techniques used in BPM extend to process-aware information systems (PAIS) (van der Aalst, 2013). PAIS include BPM information systems and workflow management information systems as well as ERP and CRM systems. As the focus of this paper is on describing the relationship between BPM and ERP PAIS content will be restricted to ERP for the balance of the paper.

5. Enterprise Resource Planning

Definitions of ERP systems are not as diverse as with BPM. While some authors use the terms ERP and enterprise systems interchangeably (Davenport et al., 2004) others include systems such as CRM (Harmon, 2007). Traditional ERP consists of integrated business modules organized around a centralized database. These modules include financials, sales and distribution, logistics, manufacturing and human resources (Møller, 2005) seamlessly integrated through information flows (Davenport, 1998). Another definition describes ERP as a packaged information solution that connects and manages information flows within and between organizations with the aim of providing accurate information for decision-making (Davenport, Harris, & Cantrell, 2004). These definitions take a technological stance separating the social from the material. Gable (in Al-Mashari, Al-Mudimigh, & Zairi, 2003) offers a more holistic view when considering ERP as seeking to integrate business processes and functions in order to view the organisation from a single informational and technology perspective. Møller (2005) further divides the technological aspects by separating functional modules from the database. His model comprises four layers shown in Table 2: core components (foundation layer); central component (process layer); corporate components (analytical layer); and collaborative components (e-business/portal layer). The Møller model integrates technology at the foundation layer with the social which extends from the process layer through the analytical layer and into the portal level where technology is reintegrated. Social aspects are displayed as a range of intensity of human activities from individual to organization (for example Employee lifecycle management to Business-to-employee) and inter-organization to intra-organization (such as BPM to Business-to-business).

Layer	**Components**	
Foundation	Core	Integrated database (DB) Application framework (AF)
Process	Central	Enterprise resource planning (ERP) Business process management (BPM)
Analytical	Corporate	Supply chain management (SCM) Customer relationship management (CRM) Supplier relationship management (SRM) Product lifecycle management (PLM) Employee lifecycle management (ELM) Corporate performance management (CPM)
Portal	Collaborative	Business-to-consumer (B2C) Business-to-business (B2B) Business-to-employee (B2E) Enterprise application integration (EAI)

Table 2: The four layers of ERPII (Møller, 2005).

The focus for this paper is the central process layer which may extend beyond single organizations to suppliers and customers. Inter-organizational connections make use of web-services and service-oriented architecture technologies interlinked with BPM. This inter-organizational model is crucial for reaping benefits from ERP. However the dependence on processes remains an issue according to Møller (2005). Management of internal process changes are not fully understood and inter-enterprise integration is in the early stages of development. Consequently there remains many research challenges for inter-organizational business process integration (Møller, 2005:495).

Taxén (2012) views integration from a communication perspective linking it to coordination enabled through activity modalities which are derived from activity theory. This permits the use of activity as the unit of analysis for ERP (Taxén, 2009). Taxén (2009) uses ERP in his title but specifies process models when describing coordinative outcomes (Taxén, 2009:7). Hence his concept of activity modalities described for ERP may also be applied to the larger

topic of BPM. Activity modalities are interdependent and comprise motivation, objectivation, contextualisation, spatialization, temporalization and transition (Taxén, 2012). From the activity modality perspective an organism is motivated (motivation) to attend to some object (objectivation) from which relevant objects and their spaces are cognitized (spatialization) and evaluated for potential alternative actions. Executing an action (temporalization) may or may not be successful. Successful activities are repeated (stabilization) within a given context (contextualization) which may be extended to a further target (transition). Process models are fundamental to activity modality integration and the coordination of processes which are clearly applicable to enterprise systems. Furthermore this provides a grounding for learning (Taxén, 2012). However consideration must be taken of the level of use of the artifact lest the process become "dead" (Taxén, 2009) and thereby unable either to stabilize a process or to transition the process to a different target.

Benefits of stabilized and transition-abled ERP systems include the ability to automate complex transaction processes and reduce costs (Davenport et al., 2004). Benefit is also derived from the opportunity to completely reengineer the current business processes (Al-Mashari et al., 2003). Although to date this has only had limited success (Davenport et al., 2004). Al-Mashari et al. (2003) list further benefits of automating processes including cost reduction, cycle-time reduction and improvements of productivity, quality and customer services together with management and planning improvement and improvement of strategic alignment. Finally benefits may also accrue from organizational learning and empowerment. This view however appears to be more influenced by significant process changes rather than inherent benefits of the ERP system.

6. Business process management and enterprise resource planning

From the introduction of ERP the necessity to make changes to business processes has been recognized as fundamental (Davenport, 1998). However the envisaged drastic changes were contentious and difficult to implement (Davenport et al., 2004). Complete process reengineering (Hammer, 1990) is disruptive, complex and resource intensive (Davis & Comeau, 2004) frequently resulting in failed and non-completed implementations (Davenport et al., 2004). Organizations regularly take significantly longer to implement the system than anticipated resulting in the view that implementation is an on-going practice. This has forced the revision of the link between BPM and ERP with preference for slower yet consistent changes. Davenport et al. (2004) for example, propose a view of this relationship closer to the quality movement's incremental change. At the same time they incorporate aspects of knowledge management. They suggest that value from ERP is driven by integration, optimization and informating. Organizations need to integrate their systems, data and processes both internally and externally. Following this they must standardize and optimize their processes to fit their strategic direction using data from the enterprise system to informate their decision making and "transform work" (Davenport et al., 2004).

The key element in the relationship between BPM and ERP is integration. According to Seethamraju (2011) business process orientation is the cognizance of interdependencies and cross-function information sharing. Similarly Berente et al. (2009) assert that integration underlies business process orientation. Paradoxically the cross-functional nature of business process orientation violates the notion of division of labour (Seethamraju, 2011). Integrated processes also lead to a concern that bad information can proliferate rapidly through the

system. In less integrated systems problems of this nature are localized and more readily controlled (Davis & Comeau, 2004).

BPM is considered essential for realising potential benefits from ERP. However business process understanding must precede enterprise wide implementations (Umble, Haft, & Umble, 2003). This is clearly shown in research into the acquisition of business process understanding of students through ERP experience (Rienzo & Han, 2011). The findings of Rienzo and Han (2011) show a positive correlation between business process comprehension and ERP software experience and yet they observed no evidence that business process understanding improved. This is exemplified by Ravesteyn, Batenburg and de Waal (2008) who consider technology as supporting BPM and not vice versa. In similar vein vom Brocke et al. (2014:533) encourage the appropriate use of technology for BPM which must not be an "after-thought". The possibility of not using technology clearly reveals that BPM is not dependent on technology.

7. Conclusion

The aim of this paper was to explore the integrative relationship between BPM and ERP. Perceiving BPM from a lifecycle perspective (Ko, 2009; van der Aalst, 2013) the concept of activity is entrenched in understanding processes. Likewise ERP systems have been viewed from an activity perspective (Taxén, 2009). This view however focusses on processes which reinforce the observation of enterprise systems as automation of business processes. Although BPM is important for providing ERP benefits and in turn may be enhanced by technology, BPM is not dependent on the technology. Regarding BPM as a predominantly social construct and ERP as primarily technological, the integrative sociomaterial view is more suited to imbrication as proposed by Leonardi (2013). Though capable of standing alone BPM and ERP together produce emergent properties. While repeatedly cited as a critical factor to ERP success BPM must precede ERP (Rienzo & Han, 2011; Scholtz et al., 2011; Trkman, 2010). Thus although BPM is not limited to ERP to leverage benefits, BPM has to acknowledge the technical possibilities which ERP can provide. Consequently when considering enterprise systems it is difficult to conceive of ERP without also taking into account BPM. ERP and BPM are integrated and are not inseparable. They constantly redefine each other through on-going change. In this way their integration is more suited to "constitutive entanglements" (Orlikowski & Scott, 2008). To talk of only one is to see just half the picture.

Integration thus may be discerned as a key element in the relationship between BPM and ERP. Business process orientation takes cognizance of interdependencies and cross-functional information sharing. ERP in turn incorporates software modules with the purpose of integrating business processes and functions. ERP is seen as an enabler of business processes which are automated through the ERP software. The goal of this integration is to view the organisation from a single informational and technology perspective thereby effectively integrating the social and the technological. However combining social and technical is problematic both practically and philosophically. This raises questions that need further consideration, such as: Are social and material ontologically separable or inseparable? How can proliferation of poor information be restricted in integrated systems? How is division of labour protected in cross-functional systems? And, how can automation retain the responsive "live" attributes of human reaction without impairing optimised operational processes?

The need for further research into integration of enterprise systems is supported by Taxén (2009) in his call for investigation into the theoretical foundations for BPM and ERP. The very concept of "integration" itself needs further clarification (Taxén, 2009:15). Davenport et al. (2004) indicate that value from ERP is driven by integration, optimization and informating. However Møller (2005) stresses that many research challenges for business process integration remain. He asserts that management of internal process changes is not fully understood and inter-enterprise integration is in the early stages of development.

References

Al-Mashari, M., Al-Mudimigh, A., & Zairi, M. (2003). Enterprise resource planning: A taxonomy of critical factors. European Journal of Operational Research, 146(2), 352–364.

Bandara, W., Harmon, P., & Rosemann, M. (2011). Professionalizing business process management: Towards a body of knowledge for BPM. In Business Process Management Workshops (pp. 759–774). Berlin, Heidelberg: Springer.

Bandara, W., Indulska, M., Chong, S., & Sadiq, S. (2007). Major issues in business process management: an expert perspective.1240-1251. Proceedings ECIS 2007 - The 15th European Conference on Information Systems, St Gallen, Switzerland.

Berente, N., Vandenbosch, B., & Aubert, B. (2009). Information flows and business process integration. Business Process Management Journal, 15(1), 119–141.

Brown, A. E., & Grant, G. G. (2010). Highlighting the Duality of the ICT and Development Research Agenda. Information Technology for Development, 16(2), 96–111.

Chong, S., & Rosemann, M. (2010). Towards a framework for BPM communication (pp. 1–13). Presented at the 7th itAIS Conference, Naples, Italy.

Davenport, T., H. (1998). Putting the enterprise into the enterprise system. Harvard Business Review, 76(1), 121–131.

Davenport, T. H., Harris, J. G., & Cantrell, S. (2004). Enterprise systems and ongoing process change. Business Process Management Journal, 10(1), 16–26.

Davenport, T., & Short, J. (1990). The new industrial engineering: Information technology and business process redesign. MIT Sloan Management Review, 31(1), 11–27.

Davis, C. H., & Comeau, J. (2004). Enterprise integration in business education: Design and outcomes of a capstone ERP-based undergraduate e-business management course. Journal of Information Systems Education, 15(3), 287–300.

Hammer, M. (1990). Reengineering work: Don't automate, obliterate. Harvard Business Review, 68(4), 104–112.

Hammer, M. (2015). What is business process management? In vom Brocke, J., Roseman, M. Handbook on business process management 1: Introduction, methods and information systems. (2nd Edition, pp. 3–16). New York: Springer.

Harmon, P. (2007). Business process change: a guide for business managers and BPM and six sigma professionals (2nd Edition). Amsterdam; Boston: Elsevier/Morgan Kaufmann Publishers.

Hendricks, W. O. (1973). Methodology of narrative structural analysis. Semiotica, 7(2), 163–184.

Kautz, K., & Jensen, T. B. (2013). Sociomateriality at the royal court of IS. Information and Organization, 23(1), 15–27.

Ko, R. K. (2009). A computer scientist's introductory guide to business process management (BPM). Crossroads, 15(4), 11–18.

Leonardi, P. M. (2013). Theoretical foundations for the study of sociomateriality. Information and Organization, 23(2), 59–76.

Mingers, J. (2004). Real-izing information systems: Critical realism as an underpinning philosophy for information systems. Information and Organization, 14(2), 87–103.
Mingers, J., & Willcocks, L. (2014). An integrative semiotic framework for information systems: The social, personal and material worlds. Information and Organization, 24(1), 48–70.
Møller, C. (2005). ERP II: a conceptual framework for next-generation enterprise systems? Journal of Enterprise Information Management, 18(4), 483–497.
Orlikowski, W. J. (2007). Sociomaterial Practices: Exploring Technology at Work. Organization Studies, 28(9), 1435–1448.
Orlikowski, W. J., & Baroudi, J. J. (1991). Studying information technology in organizations: Research approaches and assumptions. Information Systems Research, 2(1), 1–28.
Orlikowski, W. J., & Scott, S. V. (2008). 10 Sociomateriality: Challenging the Separation of Technology, Work and Organization. The Academy of Management Annals, 2(1), 433–474.
Orlikowski, W. J., & Scott, S. V. (2015). Exploring Material-Discursive Practices: Exploring Material-Discursive Practices. Journal of Management Studies, 52(5), 697–705.
Pentland, B. T., & Feldman, M. S. (2007). Narrative Networks: Patterns of Technology and Organization. Organization Science, 18(5), 781–795.
Pentland, B. T., & Feldman, M. S. (2008). Designing routines: On the folly of designing artifacts, while hoping for patterns of action. Information and Organization, 18(4), 235–250.
Ravesteyn, P., Batenburg, R., & de Waal, B. (2008). In search of competencies needed in BPM projects. Communications of the IIMA, 8(2), 23–30.
Rienzo, T., & Han, B. (2011). Does ERP hands-on experience help students learning business process concepts? Decision Sciences Journal of Innovative Education, 9(2), 177–207.
Rosemann, M., & vom Brocke, J. (2015). The six core elements of business process management. In Vom Brocke, J., Roseman, M. Handbook on business process management 1: Introduction, methods and information systems. (2nd Edition). New York: Springer.
Scholtz, B., Cilliers, C., & Calitz, A. (2011). Critical competencies for South African ERP consultants. 1–25. Presented at the 5th International Business Conference, Curepipe, Mauritius.
Seethamraju, R. (2011). Enhancing student learning of enterprise integration and business process orientation through an ERP business simulation game. Journal of Information Systems Education, 22(1), 19-29.
Sonteya, T., & Seymour, L. (2012). Towards an understanding of the business process analyst: an analysis of competencies. Journal of Information Technology Education: Research, 11(1), 43–63.
Taxén, L. (2009). An inquiry into ERP systems from an “activity” perspective. In Akademin för svensk affärssystemforskning: Utveckling och användning av affärssystem i privat och offentlig sektor, Linköpings universitet, Linköping, Sweden, 1-17.
Taxén, L. (2011). The activity domain as the nexus of the organisation. International Journal of Organisational Design and Engineering, 1(3), 247-272.
Taxén, L. (2012). Conceptualizing enterprise systems from an integrationist perspective. In Fjärde nationella workshopen om svensk affärssystemforskning, Linköping, Sweden.
Trkman, P. (2010). The critical success factors of business process management. International Journal of Information Management, 30(2), 125–134.
Umble, E. J., Haft, R. R., & Umble, M. M. (2003). Enterprise resource planning: Implementation procedures and critical success factors. European Journal of Operational Research, 146(2), 241–257.

van der Aalst, W. M. P. (2013). Business Process Management: A Comprehensive Survey. ISRN Software Engineering, 2013, 1–37.
van der Aalst, W. M., ter Hofstede, A. H., & Weske, M. (2003). Business process management: A survey. In Business process management (pp. 1–12). Springer.
vom Brocke, J., Schmiedel, T., Recker, J., Trkman, P., Mertens, W., & Viaene, S. (2014). Ten principles of good business process management. Business Process Management Journal, 20(4), 530–548.