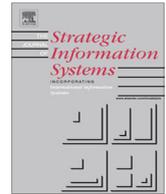




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# The tension between business process modelling and flexibility: Revealing multiple dimensions with a sociomaterial approach



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## ABSTRACT

Business process modelling has contradictory effects on flexibility: on the one hand, recent approaches to process modelling in organisations have been used to pursue flexibility as a strategic goal. On the other hand, the display of organisational practices in models and adherence to these models might reduce the degree of organisational flexibility. In order to shed new light on this paradox, this article adopts a sociomaterial analytical approach based on the Actor-Network Theory to develop a multidimensional understanding of flexibility as a relational effect of sociomaterial networks. A case study, carried out of a process modelling project within a large aircraft maintenance corporation, shows that the influence of process modelling on flexibility is not confined to the elements explicitly modelled in the diagrams ('what'), but also span informal aspects of work practices ('how') and the extent of accountability in the organisation ('who'). Therefore, the relative degree of flexibility that emerges from process modelling should be analysed along each dimension produced within the sociomaterial networks of the organisation.

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## Introduction

In recent decades, the concept of 'business process' has gained popularity and become widespread as a basic construct for structuring organisational work in conjunction with information systems. The process-based approach attracted a great deal of attention in the 1990s, when radical business process re-engineering was associated with Enterprise Resource Planning systems (Davenport, 1990; Hammer, 1990). However, it was often observed that business process reengineering achieved contradictory results (Boudreau and Robey, 1996) and paid insufficient attention to flexibility (Fitzgerald and Siddiqui, 2002; Melao and Pidd, 2000). As a result, in recent years there has been the dawn of a so-called 'third wave' of Business Process Management (BPM) (Chang, 2006; Smith and Fingar, 2003; Weske, 2007). This more recent generation is attempting to draw on the combined benefits of past process management approaches by relying upon Business Process Management Systems (BPMS) to model and manage processes with a view to improving the flexibility of organisations, i.e. their capability to adapt to new conditions and situations (Pentland et al., 2012).

One of the core activities in BPM projects is the modelling of work practices in the form of diagrams, which is mostly carried out by using a flowchart-like, graphical notation such as the Business Process and Modelling Notation (OMG, 2011). These diagrams define the activities of a process and their mutual relations in a way that allows the prescribed activity

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sequencing to establish restrictions that must be observed in social practice. As a result, the effects of process modelling on flexibility appear to be paradoxical: on the one hand, recent approaches to process modelling in organisations have clearly given prominence to flexibility as a strategic goal (Chang, 2006; Pentland et al., 2012; Smith and Fingar, 2003; Weske, 2007). On the other hand, the display of organisational practices in models and adherence to these models, whilst reducing complexity by improving transparency and efficiency, can also reduce the degree of flexibility (Cobb, 2005; Rolf, 2008; van der Aalst et al., 2009). This is because the fixed nature of the process activities that results from modelling, can prevent the organisation from responding to new and unforeseen situations. This paradoxical role of process-based Information Systems as enablers and disablers of change (Boudreau and Robey, 1996) is related to the classic topic in organisational research of the contradictory desire of increased flexibility and decreased complexity (to improve efficiency) (Tienari and Tainio, 1999; Weick, 1979), and was approached by several recent studies on information systems in organisations (Boudreau and Robey, 1996; Fitzgerald and Siddiqui, 2002; Hanseth et al., 1996; Pentland et al., 2012).

However, whilst most of these existing studies seek to account for the role of 'Information Technology' or 'Information Systems' in general, the focus of this article lies in specifically investigating the role played by business process diagrams, also called business process models, with regard to their implications for organisational flexibility. This follows recent calls for more nuanced and 'sociomaterial' views on the role of artefacts in organisational practices (Cecez-Kecmanovic and Galliers, 2014; Leonardi, 2011; Orlikowski and Scott, 2008). Given the limited knowledge that exists on how the goal of flexibility can be reconciled (or not) with the modelling of business processes in the organisational praxis, this article aims at bringing further understanding to the following central question: *what are the effects of process modelling on organisational flexibility from a sociomaterial perspective?*

In pursuit of this goal, the Actor-Network Theory (Akrich, 1992; Callon, 1991; Latour, 1999, 2005) is adopted as a sociomaterial lens to conduct an empirical study of a process modelling project within a large aircraft maintenance corporation. It is argued here that the analysis of the actor-networks built around process models can provide an improved understanding of the relationship between process modelling and flexibility. This study builds upon preliminary works (de Albuquerque, 2012; de Albuquerque and Christ, 2012, 2014), extending them by further elaborating on the analytical approach and presenting a more detailed analysis of the case, thus seeking to make three key contributions to the literature. Firstly, it presents a sociomaterial analytical approach that draws on the Actor-Network Theory (ANT) to understand the effects of process modelling on flexibility with a specific consideration of the role of process diagram artefacts. Secondly, it provides a multi-dimensional understanding of flexibility as a relational effect of sociomaterial networks, which is able to account for the contradictions observed in practice. Thirdly, the analysis of the case reveals that the effects on flexibility may go beyond the explicit content of the process diagrams and alter the extent of accountability in an organisation.

The remainder of the article is structured as follows: Section 'The paradox of business process management: the tense relationship between process modelling and flexibility' sketches the background for this research, whereas Section 'Actor-network theory as a sociomaterial lens to understand process modelling and flexibility' presents the Actor-Network Theory and lays down the analytical approach for this research. Section 'Research approach and empirical setting' describes the research design and methodology employed, as well as the case study carried out. Section 'Case findings' presents and analyses the findings. Section 'Discussion' discusses the results obtained *vis-à-vis* extant research as well as their implications for practice. Lastly, Section 'Conclusion' concludes the study with some final remarks.

## **The paradox of business process management: the tense relationship between process modelling and flexibility**

Business process diagrams (BPD), also called business process models, are often used to depict work practices as a basis for automation, which is operated by different types of computerised information systems (notably, Enterprise Resource Planning and Business Process Management Systems). Taking this into account, process diagrams can be considered to form the missing link between the 'social world' of organisational routines, and the 'technical world' of IS artefacts (de Albuquerque and Christ, 2014). Correspondingly, process modelling has often been studied either from a technical perspective (e.g. to define workflow methods and software tools), or a social perspective (e.g. in the study of organisational routines). The discourses about flexibility in business process modelling can thus be found both in more technically-oriented areas, as well as in socially-oriented approaches. These discourses are discussed in the next section, as a basis for understanding the more recent move towards a sociomaterial perspective.

### *Flexibility as a 'technical' or 'social' property*

In the technically-oriented research community, several authors have sought to analyse in what way flexibility can be achieved in business process management (Nurcan, 2008; Regev et al., 2006; Soffer, 2005; van der Aalst et al., 2009). The way flexibility is understood in this research community is defined well by Nurcan (2008, p. 378) as reflecting "the ability that the support systems have to take into account business changes". Therefore, these technical studies (Nurcan, 2008; Regev et al., 2006; Soffer, 2005; van der Aalst et al., 2009) tend to adopt a technological view of flexibility, i.e. flexibility is considered to be a property of the technical artefacts, which must provide appropriate features for supporting it. However, this view fails to take into account broader organisational and social implications.

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