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IT OPERATING MODELS IN PRACTICE AND RESEARCH: AN ANALYSIS OF THE STATE OF KNOWLEDGE

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Abstract

An IT operating model is a combination of organizational structure and processes that comprehensively covers the IT department. It spans the whole IT lifecycle from IT strategy, architecture, demand and supply management, project management, infrastructure to support services such as accounting and HR. In essence, it is how the IT organization is set up to serve its users, the business.

Chief Information Officers (CIOs) and IT executives are facing constant pressure to optimize their IT operating model to fit the ever changing business models of their users. The guidance information systems (IS) research provides on this issue is scarce. The IS literature contains little specific advice on how organizations should develop and adapt IT operating models. While the literature has extensive studies on components of IT operating models, such as enterprise architecture, research on IT operating models as a whole is surprisingly sparse.

This paper analyzes the available academic and practitioner literature on IT operating models and identifies areas for future research. It specifically identifies research on internal alignment within an IT department ("inward alignment") as an area of urgent need.

Keywords: IT Operating Model, IT Management, IT Operations, Enterprise Architecture, Business Alignment of IT.

1 INTRODUCTION

CIOs need to adapt their organisations to the ever changing demands of their users, the business units. They face demands to control costs, be flexible, and industrialise reliability. They address these requests through a robust and adaptable IT operating model. An IT operating model is a combination of organisational structure and processes that comprehensively covers the IT department. CIOs use it to organise their IT department, align their IT organisation with the business organisation(s) and communicate with their executive peers.

IT operating models are critical IT artefacts for practitioners. However, information systems journals and conferences make few explicit references to the topic. Only through a search for the attributes of IT operating models, such as process, structure and alignment, does a substantial body of research emerge. However, the research does not integrate the components into an operating model. The aim of this paper is to provide an overview of the current state of scientific knowledge and to identify areas for future research.

The structure of the paper is as follows. Section 2 introduces and defines IT operating models and their components. Section 3 presents the need for IT operating models in practice and some practical examples. Section 4 explores the existing research on IT operating models from both academically- and practically-oriented literatures. The review is concept-centric in addressing IT departments' processes, structures and the alignment of structure with process. On completion of the findings, Section 5 identifies gaps in the research. Evaluation of this review shows its strengths and limitations. The conclusion calls for further research.

2 IT OPERATING MODEL STRUCTURE AND COMPONENTS

2.1 The need for an IT operating model

Operating models are central to a CIO's role. It is how the CIO structures the IT department and defines the roles and responsibilities. It serves as an important communication tool for the business to improve IT alignment with the business. Dibbern et al (2008, p.351) provide a useful illustration of how a German financial services organization saw changes to its IT operating model: "*They even changed the operating model and decided to regain the lead for all tasks except programming, which was still done in India.*"

In practice, CIOs use IT operating models for two reasons. A good operating model explains what IT does and the interfaces with business executives. This adds transparency to the relationship and helps IT-savvy CEOs, CFOs and other executives to engage with IT and influence IT outcomes (Peppard, 2010). The other use that a CIO has for an IT operating model is as an internal organising framework for the IT department. In this way, the CIO uses the operating model to communicate with the IT staff and help establish new structures and processes or simply clarify existing roles and responsibilities.

As such an IT operating model is both an organisational structure for the IT department and the top level of operating processes. The combination of structure and process in one integrated model is powerful as it enables alignment of the IT department's organisational design with its processes. This paper defines an IT Operating Model as *the organizational structure and processes through which the IT department delivers its services to the business.*

The CIO's dual use of an operating model, to explain and to organise, requires tight vertical alignment. There must be sufficient abstraction that the CIO's executive business peers do not need to learn unfamiliar vocabularies as found in ITIL (van Bon, de Jong, Kolthof, Pieper, Tjassing, van der Veen, and Verheijen, 2007) and comparable models. However, the model must be specific and actionable for the IT managers and IT staff to implement the model. The ideal operating model achieves a balance between explanatory abstraction and specifics of structure and process.

2.2 Inside the IT Operating Model

The IT operating model needs to combine several elaborated concepts of IT management to form a comprehensive enterprise-wide model for IT. It needs to cover at least the core IT management processes that the general management literature identifies (Boynton et al., 1992). For IT these are IT strategy, demand and supply management, service management, project management and architecture management (Bruls et al., 2010). In addition support processes such as accounting and HR need coverage.

Figure 1 presents a holistic IT operating model. It consists of the respective processes, organizational structures, methods and tools for each component as well as the integration of these components. The building blocks are enterprise architecture management, infrastructure management, service management, demand and supply, project management, IT performance management and support services such as HR and accounting. These blocks need to align internally within a consistent IT strategy. Facing the business operating model it needs to align with the overall business strategy.

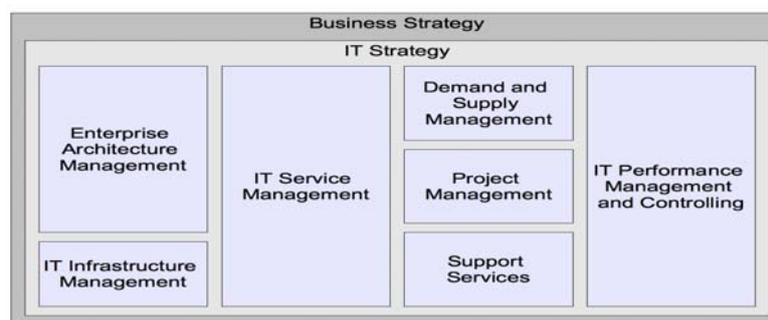


Figure 1: Structure and components of an IT operating model

For some of these components well defined solution frameworks exist, e.g. for enterprise architecture management the Zachman (Zachman, 1992) or The Open Group Architecture Framework (TOGAF) (Urbaczewski and Mrdalj, 2006) or the IT infrastructure library (ITIL) for IT service management (van Bon et al., 2007).

In particular, enterprise architecture has extensive studies in the literature. There has been extensive development since Zachman's original work (Urbaczewski and Mrdalj, 2006), this includes feasibility studies (Pereira and Sousa, 2004, Rohloff, 2005). This has led to various improvements and additions (Winter and Fischer, 2007, Buckl, 2009). The management perspective of enterprise architecture frameworks is as a means of alignment between business and IT (Pereira and Sousa, 2005, Jonkers et al., 2006, Lindström et al., 2006, Xueying et al., 2008).

The literature also examines concepts and frameworks for IT service management (Conger et al., 2008). It presents case studies of actual implementation of these frameworks (Bartolini et al., 2006). However, enterprise application frameworks and IT service management only form separate components of an IT operating model.

With each component receiving separate studies, their combination and interplay in the context of a comprehensive IT operating model remains unexplored. Only in the context of service-orientation and service-oriented architectures (SOA) are the first attempts emerging (Zhao and Yao, 2010; Crawford et al, 2005, Niemann et al., 2008).

Much literature has been published on the importance of IT aligning with the business ("external alignment") (Chan and Reich, 2007). Although this literature is relevant for the IT operating model alignment it is also important within the operating model ("inward alignment"). Having an IT department whose structure and processes are 'in alignment' or 'fit' improves organisational performance (Miles and Snow, 1978). The latter aspect of alignment is widely neglected in the IS literature.

Similar to how enterprise architecture frameworks derive the IT architecture from the business architecture (Jonkers et al., 2006), so there is a need for a more general framework for the systematic derivation of an IT operating model from the overall business model.

3 IT OPERATING MODELS IN PRACTICE

IT operating models are of great interest to practitioners. Every organization has an IT operating model, at least implicitly. In most cases organisation charts and process maps explicitly define the IT operating model. Consulting firms are active in this area, as their clients seek to adopt ever evolving global best practices. Figure 2 presents an example from KPMG (Bishop, 2009), which is a rather abstract model providing specific recommendations in the project area, but reducing emphasis on infrastructure services.

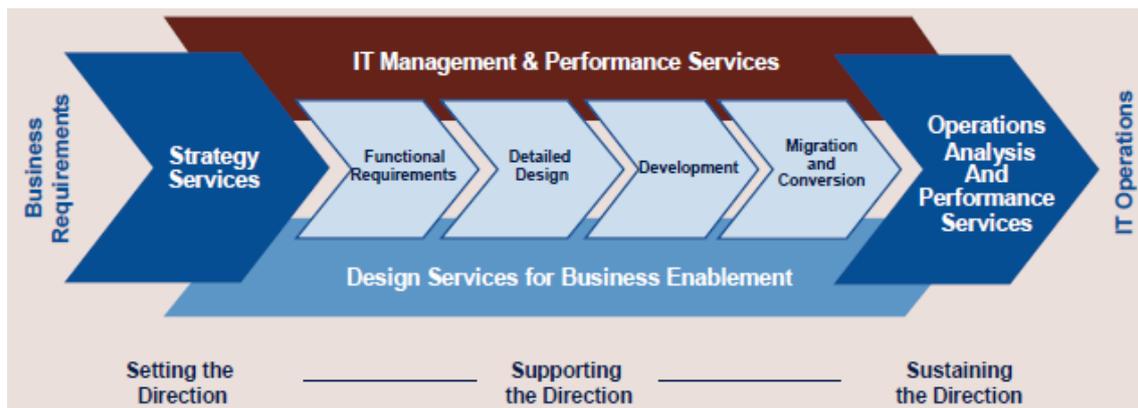


Figure 2: KPMG's IT operating model (Bishop, 2009)

Figure 3 illustrates an example of Accenture's IT operating model customized for one of their clients. It includes the interfaces with suppliers and to the business across projects and infrastructure.

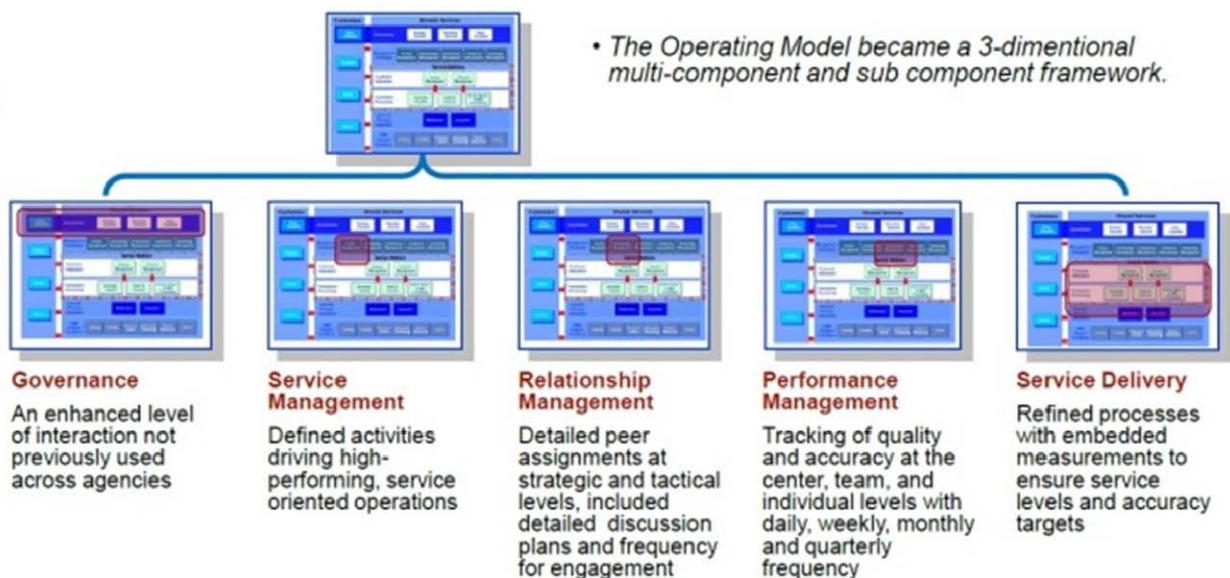


Figure 3: Accenture's IT Operating Model (Metnick and Wozniak, 2011)

It is impossible to give a complete review of the thousands of operating models in practice. There are many heterogeneous models in use today.

4 IT OPERATING MODELS IN THE LITERATURE

This section presents the results of an IS literature review of IT operating models. The review began by selecting the Senior Scholar’s basket of journals (Saunders, 2007). Initially the search was through key words only and searching for any references to “IT operating model” and “operating model”. This did not identify papers. So the search expanded to include all text in the articles. The searches through the basket of eight journals ran over a period ranging from 1977 through to 2011. It identified only five papers as Table 1 depicts.

Journal	Database	“IT Operating Model”	“Operating Model”
European Journal of Information Systems	Proquest (delayed one year)	0	0
Information Systems Journal	EBSCO Host Business (from 1998 delayed by 1 year)	0	0
Information Systems Research	Proquest (from 1999; delayed 2 years)	0	0
Journal of AIS	EBSCO Host Business (from 2003)	0	0
Journal of Information Technology	Proquest (from 1996; delayed 1 year)	0	0
Journal of MIS	EBSCO Host Business (from 1984)	0	0
Journal of Strategic Information Systems	Elsevier SD Freedom Collection (from 1995)	0	4
MIS Quarterly	EBSCO Host Business (from 1977)	0	1

Table 1: Literature search for IT Operating Model

These five papers examine the various theoretical lenses rather than the core subject itself. Only one paper by Bose et al refers to an IT operating model in the framing that a practitioner would recognise. Bose and Luo (2011) define an IT operating model as governance and structure when they discuss Green IT implementation.

The four other papers refer to business operating models rather than IT operating models. For example, Krell and Matook (2009) use the term “Operating Model” but they intend it as a business operating model. Soh and Sia (2004) use operating model to refer to the business operating model inclusively of the IT department and describe how a poor operating model leads to poor alignment. Tallon (2007) uses the term to refer to business operating model.

Due to the sparse results, the search extended to cover alternative terms such as “IT Management”, “IT Management Framework”, “IT Governance Framework” and “IT Operations”. However, on reading the abstracts, no further papers were identified discussing an IT operating model.

Extending the scope of the search to further IS journals found no suitable papers. Journals analysed included BISE, MIS Quarterly Executive, Information Technology and Management, and others. The search included the AIS electronic Library and IEEE Explore. Due to the low number of research papers, the search widened to incorporate journals closer to practice. This included MIT Sloan Management Review, California Management Review and the databases of Science Direct (Elsevier) and Springerlink but without success.

The literature review found four papers on IT operating models despite the importance of this topic in practice.

5 A CALL FOR RESEARCH ON IT OPERATING MODELS

There is a gap in the literature when it comes to IT Operating Models. Research so far has examined how to get IT to fit the business. It examines this from the perspective of strategy, structure, process, technology and people. However, there is little on inward alignment of IT. There is insufficient material advising the CIO about what to do with internal arrangements of the IT department. For IT operating models, the focus would be on the strategy execution, structure and process inside the IT group.

Reframing the IS literature to examine not the external alignment with the business but the inward alignment within IT, would be a valuable contribution to theory and practice. Just as enterprise architecture frameworks provide a means to develop the IT architecture from the business architecture, so a more general framework would develop an IT operating model from the business operating model. To frame this call for research, we explicate our findings on structure and process of the IT department in the following sections.

5.1 The structure of IT departments

The literature on structure concerns the centralization and decentralization of IT. For example, Hodgkinson (1996) examines IT structure using Goold and Campbell's (1987) corporate strategy styles and Earl's (1996) typology of IT structure to determine a balance. Superior performance is contingent on alignment between corporate strategy style and IT structure. Brown (1997) extends this research to describe the emergence of hybrid structures across strategic business units. The challenge is that centralized direction and co-ordination is in conflict with the need for local discretion, which would disperse IT throughout the organisation (Boynton and Zmud, 1987; Burlingframe, 1961; Garrity, 1963). Governing from the centre reduces local agility, whereas allocating power to the local business units leads to a form of anarchy (Weill and Ross, 2004).

Attempts to overcome these limitations include hybrid structures (Brown and Magill, 1994; Olson and Chervany, 1980). A significant example is Hodgkinson's federal model (1996) that uses matrix management to reach a compromise between the centralised and decentralised ideal types. Under this model, each business unit has a CIO reporting both to the centre and to the business unit head. These 'mini-CIOs' have input and decision rights over corporate projects. However, the federal structure is not robust, having a tendency to emphasise first one and then the other of the underlying ideal types. Organisations then resort to elaborate balancing mechanisms in an attempt to achieve both goals reliably (Brown and Ross, 1996).

A separate stream of research identifies contingencies in the selection of structures (Brown and Grant, 2005). The logic is that specific types of structure fit certain situations, improving organisational performance. Some contingency variables, for example, structure and size (Ein-Dor and Segev, 1982; Olson and Chervany, 1980), receive inconsistent support. Other contingency variables require complex analyses of interrelationships between, for example, corporate governance, scope and absorptive capacity (Sambamurthy and Zmud, 1999).

5.2 The processes of IT departments

There are two generic top level processes in IT – running the business and changing the business (Kerger, 2005). CIOs tend to see this as IT infrastructure and IT projects. In this section we first address infrastructure processes and then project processes.

The UK government developed Information Technology Infrastructure Library (ITIL) to capture the best practice processes for IT service management (van Bon et al., 2007). ITIL underpins the abstract processes in an IT operating model but it does not go down to the specific work instructions. For example, it does not describe how to repair breakdowns but it does describe the incident management process that delegates incidents to a break-fix process or another process such as a request to change services.

ITIL adopts a viewpoint that IT services are simply whatever delivers value to a customer. In this way, it uses terms such as warranty and utility to specify a service from the business point of view. This aligns with the research that Weill et al (2002) published in "Building IT Infrastructure for Strategic Agility". ITIL outlines the processes involved all of the way from supplier interfaces through to business interfaces. These processes are kept at the current best practice with an annual review.

Infrastructure has a tendency to fragment and become inefficient as a process. Ciborra (2000) identifies the process by which this happens through a paradox of control. Attempts to regain control

over IT infrastructure also include processes that take strategic context through to business maxims, IT maxims and integrates these with the inevitable deals that vendors offer (Broadbent and Weill, 1997). Another adopts an enterprise architecture process to establishing the IT infrastructure for business execution (Ross, Weill, and Robertson, 2006).

In IT Projects, PRINCE 2 is a set of tools and the “closest thing we have to a methodology” (Lindblom, 2011). Complementing PRINCE 2 is the Project Management Institute’s PMBOK. This is a set of skills and capabilities that practitioners need in order to operate the PRINCE 2 tools. There have been attempts to integrate the PMI and OGC efforts but without success. The trends in project management are twofold. One is towards incremental delivery during project execution. This is what Feeny (1997) calls “Dolphins not Whales”. The other trend is a slowly developing professionalism in project management.

Against this background, Schwalbe (2007) identifies project life cycles of concept, planning, execution and closeout. Boehm (1976) and Hughes and Cotterell (2002) explores system development processes such as waterfall, iterative, spiral and incremental. Agile methods are adopting an alternative process for delivering software (Cleland, 2004; Highsmith, 2002).

5.3 Aligning IT structures and processes

IT alignment is a perennial major concern for IT executives (Luftman, 2004; Luftman, 2005; Prewitt, 2004; Ware, 2003) and is critical to achieving high organisational performance (Miles and Snow, 1978). The IS literature on alignment is extensive (Chan and Reich, 2007). The early research began by examining the link between business plans and IT plans. The two did not link well together because of the time scales involved in IT investments (Ciborra, 2000). There are challenges to achieving IT alignment including knowledge gaps, locus of control being in different places and on-going changes in the business. One challenge is that communication between business units and the IT department has been so poor that Weill and Broadbent (1998) describe it as a dual monologue.

The alignment literature frames the challenges as alignment of the business and IT. One view is that IT should mirror the business (Sauer and Yetton, 1997). Another is that there are four components: business strategy, IT strategy, business infrastructure and IT infrastructure (Henderson and Venkatraman, 1993). In this way, one dimension is functional integration. It analyses alignment between business and IT strategies and between business infrastructure and IT infrastructure. Aligning IT and the business would require changes to strategy and / or infrastructure.

The other dimension, strategic fit, explores the gap between an organisation’s current capabilities and its future needs. It first examines the differences between business infrastructure and business strategy. Deficiencies indicate the effort required to improve capabilities, or indicate a strategy that needs better grounding in operational limitations. Similarly, this dimension then compares the differences between an IT infrastructure and IT strategy.

One analogy that practitioners find accessible is that “strategic alignment is everyone rowing in the same direction” (Abraham, 2006). Chan (2007) describes four dimensions of strategic alignment. One is the strategic or intellectual dimension. Another is the structural, which refers to the centralisation or decentralisation of IT (Earl, 1989). Social dimensions relating to the alignment of the CEO and CIO are also of concern. Finally, Earl explores there is cultural alignment as another dimension.

6 LIMITATIONS

Our findings indicate a severe lack on literature focussing directly on IT operating models. However, we saw that the majority of papers address either the topic indirectly or just parts of the operating model. Therefore the reader needs to interpret our findings carefully as it may be that this topic is discussed in books (which we not analysed) or that the topic is analysed under a different headline and as such cannot be found using a structured literature review.

7 CONCLUSION AND FUTURE RESEARCH

This paper identified a gap in academic literature concerning an issue that many CIOs and IT executives require guidance on. Though academic publications are available to address parts of the problem, management consulting firms are filling the gap with practitioner-driven frameworks to address their clients' needs.

The next step of future research needs to be to develop an integrated operating model that learns from the publications discussed above. A Delphi technique may be appropriate for iterating with CIOs, consultants and academics until a valid operating model emerges that integrates both theory and practice (Lau, 1997). In a similar fashion to the study by Schmidt et al (2001), this could allow a comparison between Hong Kong, Singapore and Australia with requirements in Germany and the UK. There are cultural and legislative needs that may require alternative operating models.

The aim must be to develop a robust model generalizing the ideas that enterprise architecture frameworks already providing today for IT architecture management.

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