

Winter 12-31-2017

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## Recommended Citation

Andersen, Peter; Svejvig, Per; and Heeager, Lise T., "Ambidextrous IT Governance: The Art of Balancing Exploration and Exploitation in IT Governance" (2017). *Selected Papers of the IRIS, Issue Nr 8 (2017)*. 2.  
<http://aisel.aisnet.org/iris2017/2>

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# Ambidextrous IT Governance: The Art of Balancing Exploration and Exploitation in IT Governance

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**Abstract.** Through a case study at a global technology company, we investigate how organizations can adapt their IT governance approach to the information system at hand. This is done by considering the degree of information system integration and whether the system is related to supporting operational efficiency (exploitation) or innovation (exploration). Based on the findings of the case study, we introduce the concept of ambidextrous IT governance to describe how IT governance can be adapted to fit the dual needs of both exploration and exploitation through the use of IS.

**Keywords:** IT governance, ambidexterity, information systems, case study

## 1 Introduction

Organizations use Information Systems (IS) to achieve various goals. They can act as platforms for innovation e.g. [1], [2] support operational excellence e.g. [3], [4], and they can constitute a marketplace for customers and buyers e.g. [5], [6]. Information Technology (IT) governance is the discipline mainly concerned with how business value can be delivered through IS [7]. However, with a few exceptions e.g. [8], [9], IT governance literature has largely neglected how the IT organization can organize IT governance in different ways to serve the various purposes of systems related to, for example, innovation and efficiency. Instead, the classical discussion about IT governance design has primarily revolved around centralized versus decentralized decision-making e.g. [10]–[12].

In general, the field of IS tends to abstract from the technology in question e.g. [13], [14]. Consequently, many questions are left unanswered in relation to how IT managers can balance the tradeoff between achieving operational excellence, supporting business innovation, and engaging with consumers and customers, and how the specific technology might influence which IT governance practices might be adequate.

Drawing on ambidexterity theory and a recent case study conducted at a global technology company (TechCo), we seek to unravel how the IS as such influence IT governance practices, and how people within the IS organization adapted their IT governance practice according to the system at hand. This is done by studying the exact same system from a functional perspective – an online e-commerce solution

before and after the underlying system design was changed. Through this investigation, we show how changing the design of the underlying IS influenced IT governance practices concerning the system at hand. By considering the degree of IS integration and the purpose of the system, we develop a model showing how the IS organization can serve the dual need of supporting both innovation and organizational efficiency. In general, our study also stresses the importance of being specific about the technology when drawing managerial and scientific implications from IS research.

The case study was guided by the research question: “How can IT governance support both organizational efficiency and innovation?”

The remainder of the paper is organized as follows. First, we conceptualize our view on organizational ambidexterity and IT governance. This is followed by an account of our methodological approach with regard to the case study. Then, the case findings are presented and followed by a discussion of the findings in relation to the theory of ambidexterity. Based on the analysis and discussion, we move towards a conceptualization of ambidextrous IT governance and also propose a preliminary model of the concept. Lastly, we offer some concluding remarks on the study, its limitations, and new avenues for research.

## **2 Organizational Ambidexterity and IT Governance**

Organizational ambidexterity is essential for competitive advantage due to an escalating pressure to serve customers through innovative goods and services, but at the same time, organizations also keep an ever-increasing focus on operational efficiency [15]. Studies show a clear pattern, namely that ambidexterity positively affects organizations’ performance, innovation and market valuation [16].

The simultaneity and tension of innovation and efficiency have long been recognized [15] and are well described by March [17, p. 71] as exploration and exploitation in organizations:

*Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution.*

Innovative and adaptive organizations that focus mostly on exploration, thereby playing down exploitation, might suffer the cost of experiment without gaining its benefit, while organizations focusing on exploitation might gain short-term performance, yet sacrificing long-term performance. The challenge is thus to find a viable balance between exploitation and exploration [15], [17]. Based on this brief discussion of the concept, we define ambidexterity in this paper as follows [15, p. 320]:

*Ambidexterity is the ability to both use and refine existing knowledge (exploitation) while also creating new knowledge to overcome*

*knowledge deficiencies or absences identified within the execution of the work (exploration).*

McKinsey has addressed organizational ambidexterity arguing that organizations should focus on both agility and stability expressed by the idiomatic sentence “Agility: it rhymes with stability” – the idea being that organizations can become more agile by designing their organizations to drive speed as well as to create stability [18]. There has been an increasing focus on moving towards organizational agility in many organizations [19], [20]. As a response to this pressure, some organizations have tried to act quickly creating a flexible ring that has fenced off from the rest of the organization in order to work in a more agile and explorative way in this part of the organization. However, according to McKinsey [18], this is not sufficient to resolve the tension between innovation and efficiency. Hence, we have to look for more deep-seated mechanisms for managing ambidexterity outlined as organizational capital, social capital and human capital and operating at multiple levels (organization, team and individual) [15], which could be linked to the development of dynamic capabilities [21].

Organizational ambidexterity and agility are thus vital for competitive success as mentioned above, and one of the key platforms to achieve this is utilizing digitized processes, knowledge and design capital [22] where information technology resources are important ingredients in building dynamic capabilities in organizations [23]. Lee, Sambamurthy et al. [22, p. 398] verbalize IT ambidexterity as “the ability of firms to simultaneously explore new IT resources and practices (IT exploration) as well as exploit their current IT resources and practices (IT exploitation)”.

Ross, Sebastian et al. [9] suggest that organizations can turn IT ambidexterity into practice by focusing on two backbones labelled operational backbone and digital services backbone. The operational backbone enables operational excellence (exploitation, efficiency and stability) while digital services backbone enables rapid innovation (exploration, innovation and agility) [9], and the coexistence of backbones enables IT ambidexterity [24]. This is elaborated in Table 1 below [adapted from 8, p 12]:

**Table 1.** Characteristics of Operational and Digital Services Backbone.

Backbone type	Operational Backbone (exploitation, efficiency and stability)	Digital Services Backbone (exploration, innovation and agility)
Management objective	Business efficiency and technology reliability	Business agility and innovativeness
Architecture principle	Standardized end-to-end business processes; transparency into systems; data access	Plug and play business technology components (micro services)
Data	Single source of truth for transactional data	Massive repositories of sensor / social media / purchased data
Key roles	Process and data owners	Product or service owners
Project Methodology (delivery method)	Plan driven (fast waterfall, regular software releases, SaaS adoption)	Agile methods (agile and DevOps; MVP, constant enhancements)

Funding	Major project / program investment	Continuous funding by business owners
Architecture principle	Standardized end-to-end business processes; transparency into systems; data access	Plug and play business technology components (micro services)
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Table 1 shows the relevant characteristics of the two complementing backbones for realizing digital strategies. The operational backbone is the carefully designed and operated backbone for enterprise-wide integration and standardization while the digital services backbone is the opposite supporting rapid development and is bricolage oriented [9].

The two backbones in Table 1 relate to IT governance, and focusing on IT ambidexterity as a goal leads to a new way of thinking about IT governance, which traditionally has been monostic. IT governance can be seen as the management processes, tools, and methods related to overseeing and managing IT. By strategically designing the IT function, IT governance ensures that an organization's IT initiatives sustain and extend the business' strategies and objectives [25]. As organizations increasingly began to integrate their IS, scholars began to explore how organizational structures could be adapted to IS integration [26]–[28]. This led a range of researchers to explore various types of governance design addressing the organizational need for centralization versus decentralization of IT decisions and structures [11], [29]–[31]. As a result, IT governance designs are described as representing either centralized, decentralized or hybrid (federal) structures [32]. These IT governance designs have shown to be the result of various contingency factors [10], [11], [33], [34] that relate to organizational structure, business strategy, industry, and firm size [34]. These studies did not explore new forms of IT governance, but limited their research to investigating contingency factors for applying existing, archetypical governance designs focusing on centralized versus decentralized decision-making, accountabilities and structure e.g. [31]. In relation to this, we propose a new avenue for IT governance research, exploring how a decentralized IS can lead to fundamentally new approaches beyond the basic centralization–decentralization issue of IT governance. More precisely, our findings show how IT governance can be designed to exploit key characteristics of a decentralized IS while also ensuring stable operations of the centralized IS in the organization. This type of IT governance design distinguishes itself from the traditional conceptualization of IT governance by simultaneously enabling innovation and efficiency.

### 3 Research Setting and Methodology

This research takes place at TechCo, which is a global leader of electronic equipment offering solutions to professionals and consumers. TechCo employs about 5,400 people worldwide and operates in more than 90 countries. The challenge for TechCo has been to deliver projects faster in general and especially to develop digital services faster, which can support the thinking behind continuous delivery and constant enhancements.

To answer our research questions, we conducted a case study [35] of four projects at TechCo; we conducted six semi-structured interviews and gathered relevant project documents as well as public documents about TechCo [36]. The interviews lasted from one to two hours. The four projects all relate to the development of digital services; especially two of them had a focus on high agility. The unit of analysis is projects and the change they create, but the level of analysis is the organization [37] where we want to understand how IT governance can be shaped to accommodate future requirements.

We adopted a contextualized, interpretive research approach [38] that attempts to understand phenomena through the meaning that people assign to them [36]. We acknowledge that access to reality is through social constructs such as language, consciousness and shared meanings [39].

The data analysis followed the interpretive tradition [38] using hermeneutics [36], [40], where IT ambidexterity concepts represented in Table 1 by operational and digital services backbone [9] were used deductively to support the coding and analysis process [35, p. 110-111].

### 4 Findings and Analysis

Our findings reported here highlight how TechCo redesigned the underlying IS supporting online sales to consumers for one of its major brands, and how the redesigned system resulted in changing IT governance practices.

#### 4.1 From tight to loose system integration

Over the years, TechCo had developed a large integrated IS for their online platform. Because of the tight, integrated structure of the applications in the IS, it was hard to make changes in a flexible manner. The tight integration of the IS also led to process breakdowns across the platforms due to the failure of a single service.

*The old platform was a gigantic monolith where everything was integrated. For example, product support, product information, product sales, and the ecommerce solution itself. The integration of all these elements made it a nightmare to make changes to the monolith. Every time we made a change, we would have breakdowns somewhere else, but nobody had a clear picture of the entire thing. We wouldn't know*

*what caused the breakdown and we didn't dare try to fix it because that might cause a breakdown elsewhere if we just changed one line of code. We ended in a limbo where fixing one issue would lead to new issues. After firefighting for more than six months, we realized we had to build a new platform. – (Interview #2 Marts 2017)*

In turn, the many breakdowns and difficulties when making changes to the IS affected the overall business flexibility. Meanwhile, online consumers' demands had changed over the years. In order to keep up with competition, TechCo needed to deliver an enhanced consumer experience through increased customization, faster time-to-market, decreased webpage load time, and improved availability. In order to alleviate the issues with the current IS and to improve consumer experience, in May 2015 TechCo started to build a new IS over the duration of approximately six months (Interview #1 November 2016). The project had much senior management attention and several senior leaders as stakeholders. The company's Senior Executive Officer even headed the steering group. As the project was politically important to the Senior Executive Officer, the project was considered too big to fail.

The idea behind the new IS was to rethink the design of the IS and use new frameworks and technologies such as microservices based on loose integration and separation of services. The project was seen as a challenge as it involved new technologies and a different system design. At the same time, the responsible IT managers were considering new IT governance methods for the new IS that would be more in line with the fast-paced delivery which the new IS would enable (Interview #1 November 2016).

The new IS consisted of around 50-60 loosely integrated microservices that would serve different purposes. These services could be changed independently and combined in different ways to continuously deliver new functionality to TechCo consumers. By changing the design of the IS to be more loosely integrated, the solution would become more flexible and enable new online innovations for consumers in a manner that was both faster and cheaper. Through the loose integration, it was possible for services to continue running despite a potential error in one service. New services could also be introduced without causing any downtime to the entire IS.

In this way, the new IS distinguished itself from TechCo's other IS such as enterprise resource planning and supply chain management systems. To offer efficient and stable operations, these systems relied heavily on tight integration and interdependency of large applications to enable tracing of products and costs across the business and supply chain. What TechCo had realized was that a more loosely integrated customer facing IS would enable the company to deliver better offerings to their customers much faster. At the same time, TechCo's existing systems, which were based on tight integration, would enable efficient underlying operations. But in order to drive benefits from the new IS related to improved consumer engagement and innovation, the people involved with the microservice system started to develop new IT governance methods for the new IS. As highlighted by an IT manager, the existing IT governance approach was just not adequate to govern the new IS.

## 4.2 IT governance for loose integration

While IT governance around the company's traditional IS was centered on centralized control and accountabilities, where the IT management had to approve even minor changes to these systems, the new IS implemented at TechCo required a different type of IT governance to manage the microservice IS.

Due to the loose integration of the IS, the IS did not have one single owner. Instead, the IS had a total of four different owners (online sales, support, online marketing and the people maintaining and improving the IS). Using the agile SCRUM method [41], each of these owners would add or change functionality on their part of the IS without causing downtime of the entire IS.

From the perspective of governing the IT projects related to the new IS, it made little sense to use traditional waterfall methods, fixed project scope and stage gate meetings. However, because of the organizational culture, many of the business stakeholders insisted that the people working on the microservice IS utilized traditional project governance methods. As the business stakeholders experienced the benefits of the new way of governing the microservice platform and project delivery in this connection, the business stakeholders started to accept the different way of working.

*They are starting to see the advantages of the agile way of working. Now, instead of expecting delivery on August 24 on the dot, they get to see the solution being developed, and by doing so, quickly discover whether the features live up to their expectations. The mindset and culture need to mature over time as we have no formal mandate to govern the system in another way. – (Interview #2 Marts 2017)*

Although the overall culture of the IT organization was unchanged, the IT leadership did recognize that there was a divide between the microservice system and the traditional systems (related to the operations of the company). Not only was the microservice platform technically different, it also involved different governance practices and was directed towards the company's consumers – rather than the internal operations. As a result, a new organization was established around the microservice platform dubbed "Digital Business Development".

*We are self-governed now. Not officially, but the traditional IT department has a type of governance that makes them incredibly slow which does not fit our platform – (Interview #2 Marts 2017)*

Within the new organization, a total of four different teams would govern each their own set of the 50-60 microservices. Each team consisted of approximately three developers, one SCRUM Master leading the team, and a product owner from the Digital Business Development organization. One of these teams was called the "Digital Transformation Squad". This team would be responsible for connecting different physical projects with new technologies such as Internet of Things and Machine Learning. This team was experimental and used methods such as prototyping (a prototype is an early prototype) to test new ideas. But in order to test new ideas and



changes fast enough, this team could not rely on the governance approach of the traditional IT organization since it could take months to just get minor changes approved. One potential drawback of this approach was that the many rapid changes to the system could result in system inefficiencies.

*Being self-governed allows us to move faster. On the negative side, the large amount of prototyping can also lead to chaos within the system, this can negatively influence costs – (Interview #2 Marts 2017)*

While each microservice had to be documented, there was no overall governing of the total collective system. The governance and decision on, for example, the granularity of each service, was decided upon within each of the four different teams. In this way, the highest management level within the Digital Business Development organization was the SCRUM masters and the product owners.

*We do have an architect role formally, but in principle, the teams are the ones making the IT architecture decisions in collaboration – (Interview #2 Marts 2017)*

In the following, we will discuss our findings in relation to literature on ambidexterity and the implications for IT governance in the light of our findings.

## 5 Discussion

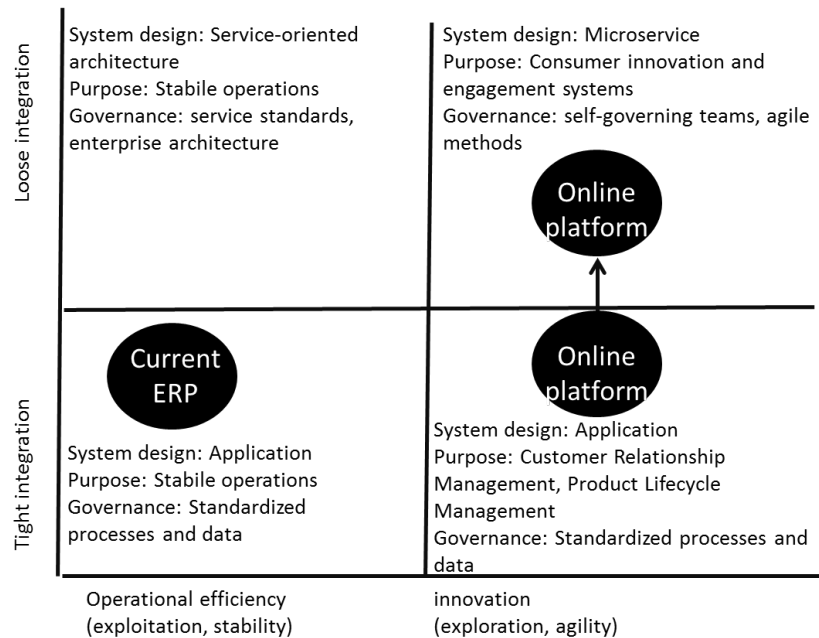
Our case study at TechCo shows how organizations can choose different types of IT governance depending on the underlying system design as TechCo governed their microservice IS differently than other systems. Table 2 below shows how IT governance of the microservice platform was distinct from how TechCo usually conducted IT governance. The table is an adapted version of the Table by Ross et al. [9] and our empirical data.

**Table 2.** Adapted from Ross et al. [9] and data analysis.

IT governance aspect	IT governance of operational systems (exploitation and stability)	IT governance of microservice system (exploration and innovation)
Management objective	Business efficiency and technology reliability	Business agility, time-to-market, and innovativeness
Centralized versus decentralized	One business owner; even minor changes are approved by IT management	Separation of concern (a separate team governs each of the areas of the system)
Improvements through	Business transformation (process improvements and data management)	Digital transformation (exploring how new digital technologies could be utilized for new business opportunities)

Architecture management	Standardized end-to-end business processes; transparency into systems; data access	Plug and play micro services and coordination between SCRUM teams
Data governance	Single source of truth for transactional data	Massive repositories of sensor / social media / purchased data
Key roles	Process and data owners	Product owners and SCRUM masters
Project Methodology (delivery method)	Plan driven and fixed project scope (waterfall method, regular software releases, SaaS adoption)	Agile methods and flexible scope (agile and DevOps; MVP, continuous improvements)
Funding	Major project / program investment	Continuous funding by business owners

As it can be seen from Table 2, our findings largely correspond with the findings outlined by Ross et al. [9] which clearly show how the IT organization can govern its systems in two different ways. Thus, our findings supplement existing IT governance literature which often highlights how an IT organization must choose one single IT governance approach [11], [31], [42], [43] whereas our study highlights how organizations can choose between two different IT governance approaches. In this way, we argue for a new type of IT governance design – beyond the traditional monolithic design – which we refer to as ambidextrous IT governance – a pluralistic IT governance design enabling both exploitation and exploration. We also argue that another key difference of the studied microservice system was that it enabled an online consumer platform – rather than supporting the internal operations of TechCo. In this way, the case illustrates the importance of considering both the degree of system integration and whether a given system is targeted at efficiency or innovation. Figure 1 below illustrates how the degree of integration, efficiency and innovation can be used to categorize different IS. This is based on our knowledge of how the IS supporting the online platform was changed regarding its underlying design, and how the current enterprise resource planning (ERP) system is designed and governed with a focus on data and process standardization to enable efficient and stable operations [3]. Although further research is needed in order to identify in more detail how IT governance can change in accordance with each system and its purpose, our model provides an initial understanding of how IT governance can be carried out in different ways within the same IT organization, depending on the system at hand.



**Fig. 1.** Towards a model of ambidextrous IT governance

As Figure 1 indicates, based on the degree of IS integration and whether the system supports innovation or operations, one could image a total of four different types of IT governance within the same IT organization. While some argue that the organizational need to address both efficiency and innovation through, for example, bimodal IT [44], two-speed IT [45], or two distinct backbones [9], our analysis suggests that it might be relevant to employ an even more pluralistic approach when the degree of IS integration is taken into consideration together with the overall purpose of the IS. Thus, while ambidextrous IT governance does indeed enable the IT organization to serve the dual need of the business, we believe that this should not necessarily be done through a dualistic approach. IT governance should instead be tailored in accordance with both the degree of IS integration and whether the system at hand is aimed at either exploitation or innovation. This is illustrated through our case study showing how ambidextrous IT governance at TechCo enabled stable operational efficiency as well as governance of a new platform delivering a range of additional benefits such as faster time-to-market, higher customer satisfaction, and improved user experience. These benefits are in line with those identified for organizational ambidexterity [16].

## 6 Conclusion

Through our case study, and by drawing on ambidexterity theory, we show how an IT organization can choose between different types of IT governance depending on

whether the system at hand supports exploring and developing new innovations (exploration) or whether the system exploits current systems to drive the efficiency of the company (exploitation). In addition, a loosely integrated IS also affords more decentralized IT governance.

The contribution of our study is an extended view on IT governance (ambidextrous IT governance) beyond the traditional, monolithic view. We believe that by adapting the IT governance approach to the IS at hand, ambidextrous IT governance can help IT managers alleviate many of the top IT management problems such as agility/flexibility, time-to-market, innovation, productivity, IT value, and cost reductions [46]. In this way, the IT organization is capable of handling the simultaneity and tension between innovation and efficiency [15].

The research reported here is still in its initial phase. As such, it is relevant to collect further data in order to give a more detailed account of how the IT organization can be organized to serve the dual need of delivering organizational efficiency as well as innovative solutions, and in order to get a more detailed understanding of the role of the IS in this context. This could imply further involvement at TechCo to study how IT governance develops longitudinally, but we also believe that further case studies, possibly combined with an expert survey, are needed to ensure the transferability of our findings [47], [48].

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