

THE AGILE STRATEGIES IN IT GOVERNANCE: TOWARDS A FRAMEWORK OF AGILE IT GOVERNANCE IN THE BANKING INDUSTRY

Research paper

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Abstract

Digital transformation has changed corporate reality and, with that, firms' IT environments and IT governance (ITG). As such, the perspective of ITG has shifted from the design of a relatively stable, closed and controllable system of a self-sufficient enterprise to a relatively fluid, open, agile and transformational system of networked co-adaptive entities. Related to this paradigm shift in ITG, this paper aims to clarify how the concept of an effective ITG framework has changed in terms of the demand for agility in organizations. Thus, this study conducted 33 qualitative interviews with executives and senior managers from the banking industry in Germany, Switzerland and Austria. Analysis of the interviews focused on the formation of categories and the assignment of individual text parts (codings) to these categories to allow for a quantitative evaluation of the codings per category. Regarding traditional and agile ITG dimensions, 22 traditional and 25 agile dimensions in terms of structures, processes and relational mechanisms were identified. Moreover, agile strategies within the agile ITG construct and ten ITG patterns were identified from the interview data. The data show relevant perspectives on the implementation of traditional and new ITG dimensions and highlight ambidextrous aspects in ITG in the German-speaking banking industry.

Keywords: agile IT governance, ambidexterity, agile strategies, qualitative analysis

1 Introduction

Digital transformation has fundamentally changed corporate reality. The role of information technology (IT) in business is now pervasive. Whereas the dominant logic of the Industrial Age was linear and product-oriented, the Digital Age is nonlinear and service-oriented (Collin *et al.*, 2014). This broad paradigm shift in logic is also reflected in changing IT environments and, consequently, in firms' IT governance (ITG). The perspective has shifted from the relatively stable, closed and controllable system of a self-sufficient enterprise to the relatively fluid, open, agile and transformational system of networked co-adaptive entities (Kotter, 2014). Thus, the agile strategies in ITG have become more important to enterprises.

Existing studies have recognised efficiency and stability as core concepts in ITG design (Peterson, 2004). This makes sense as the “old” world was characterized by a stable, placid environment, in which neither the core technology nor the markets in which companies were operating changed drastically over time. Thus, organizations could afford to use “command-and-control” mechanisms to govern IT (Peterson, 2004). As stated by Peterson (2004) and Weill and Ross (2004), the ITG framework comprises a mixture of structures, processes and relational mechanism dimensions. In this context, many proposed methodologies, reference guides, sets of best practices (e.g. COBIT), and frameworks such as the IT Infrastructure Library (ITIL) have emerged and developed in recent years. However, the adoption of such ITG models, or so-called conventional or traditional frameworks, does not necessary yield the desired return in the context of digital transformation (Luna *et al.*, 2010). In general, conventional frameworks are based on slow processes that require high investments for implementation in a company (Luna *et al.*, 2010). Furthermore, ITG methods and tools are too inflexible (Awais and Gill, 2016). However, with the business imperatives and new enterprise logic of strategic flexibility and dynamic stability, the traditional ITG dimensions no longer seem viable, nor prudent (Peterson, 2004).

By contrast, agile strategies have evolved in the past years, especially in the area of software development (Cheng *et al.*, 2009; Qumer, 2007). Independent of the business area, these agile strategies can “add value” to business organizations, through a process in which the principles of communication and collaboration are essential (Fruhling *et al.*, 2008). Thus, adopting the agile principles, values and best practices to the context of ITG can bring even more meaningful results to organizational management. Their benefits can lead to an increase in the speed of decision making, the insurance of business processes, organizational competitiveness and other aspects (Luna *et al.*, 2010). Thus, agile ITG has become highly relevant to keep up with competitors in today's dynamic world.

To date, the broad scientific community has not analysed the impetus of agile strategies on ITG (Almeida *et al.*, 2015; Luna *et al.*, 2010; Aguillar *et al.*, 2017). However, research interest in this topic is growing (Sommer *et al.*, 2014; Zimmer *et al.*, 2012; Cheng *et al.*, 2009). Current research offers only scant insights into proper agile governance mechanics on a holistic level. Therefore, a more detailed emphasis on the agile strategies within ITG is required. As such, this study aims to investigate the agile aspects of effective ITG for today's dynamic world, which yields the following research question:

RQ: *How is the concept of an effective ITG framework changing in response to the demand for agility in organizations?*

To answer this RQ, we analysed several traditional and agile aspects of governance dimensions gleaned from qualitative interviews in the banking industry. In doing so, we were able to elicit major patterns for ITG dimensions in the digital world. Strategies used to implement an agile ITG can be grouped under the same general dimensions as in the conventional ITG literature, which enables us to compare traditional and agile dimensions and to derive patterns for the effectiveness of an agile ITG framework. Such patterns help explain “real-world” problems because they capture and allow for reuse of experiences of best practices in a specific professional domain (Schadewitz and Jachna, 2007). Thus, the contribution of this paper is threefold. First, the study uncovers agile ITG dimensions that complement the traditional elements of ITG; second, it provides an overview of agile strategies used within the governance construct; third, it elicits patterns for effective ITG dimensions.

The paper is structured as follows: In Section 2, we discuss the theoretical background for this study. In Section 3, we describe the research method, after which, in Section 4, we provide the data analysis. Finally, we outline the discussion and conclusion in Section 5.

2 Theoretical background

2.1 ITG and its dimensions

The term ITG began appearing in the literature in the late 1990s (Bhattacharjya and Chang, 2010). Since then, many researchers and practitioners have investigated ITG from different perspectives. As such, several definitions have been proposed. While some definitions such as those from Peterson (2004) and Weill and Ross (2004) focus on the decision-making process within the ITG framework and do only address role aspects indirectly, other definitions such as those from van Grembergen and de Haes (2005) and IT Governance Institute (2007) adequately address objectives, objects and subjects of ITG decisions (Vejseli and Rossmann, 2017). We argue that an ITG definition should include both structure and process aspects. Therefore, enhancing the definition of the IT Governance Institute with Weill and Ross's characterization should help cover the most relevant dimensional concepts of current ITG research, leading to the following definition:

ITG is the responsibility of executives and the board of directors and consists of the leadership and organizational structures and processes that ensure that the organization's IT sustains and extends firm strategies and objectives. ITG represents the framework for decision rights and accountabilitys to encourage desirable behaviour in the use of IT.

With this definition, implementing ITG effectively requires a set of ITG instruments to gain congruence with the firm's mission, strategy, values, norms and culture (Ali and Green, 2012; van Grembergen, 2013; de Haes and van Grembergen, 2005; Herz *et al.*, 2012; Huang *et al.*, 2010), which in turn leads to desirable IT behaviours and governance outcomes (Weill and Ross, 2004). However, implementing ITG is a complex issue because it is contingent on a variety of sometimes conflicting internal and external factors (Brown, 1997; Sambamurthy and Zmud, 1999; McKay *et al.*, 2003; Weill and Ross, 2005; de Haes and van Grembergen, 2004). In the literature, several studies have argued that organizations should use ITG dimensions (van Grembergen, 2004; de Haes and van Grembergen, 2005; Weill and Ross, 2004). Therefore, consistent with the previous definition and the literature, implementing an effective ITG requires a framework based on three major dimensions (Symons, 2005).

Structure. The framework needs to answer the following questions: Who makes the decisions? Which organizational units will be created? Who will take part in these organizational units? What responsibilities will they assume (Burtscher *et al.*, 2009)? Examples of traditional structures are the institutionalization of IT steering committees, IT project steering committees and IT strategy committees and structures that enable CIOs/COOs to report to CEOs (de Haes and van Grembergen, 2005).

Process. The process aspect targets the following questions: How are IT investment decisions made? What are the decision-making processes for proposing, reviewing, approving and prioritizing investments? Conventional processes, for example, contain portfolio management, IT budget control and reporting, project governance methodologies or information systems planning (Almeida *et al.*, 2013).

Communication/relational mechanisms. The aspects dealing with communication and relational mechanisms pose the question of how the results of ITG processes and decisions will be monitored, measured and communicated. Also required are mechanisms to communicate IT investment decisions to the board of directors, executive management, business management, IT management, employees and shareholders (de Haes and van Grembergen, 2009). Examples of traditional communication/relational mechanisms are a shared understanding of business/IT objectives, cross-functional business/IT training and collaboration between principal stakeholders (Peterson, 2004).

Thus, deploying ITG in a firm means using a mixture of various structures, processes and relational mechanisms. Therefore, in the past decades, several frameworks that support the implementation of ITG have been created. Some of the most familiar frameworks are COBIT and ITIL. However, no

comprehensive framework covers all structures, processes and relational mechanisms for a comprehensive ITG approach (Gottschalk, 2005). Depending on a firm's structure, a combination of different elements is required (van Grembergen *et al.*, 2004).

To gain a consistent view on traditional ITG dimensions, we adopt the framework of Almeida *et al.* (2013) and its dimensions as a template for further research. The framework of Almeida *et al.* (2013) is based on an extensive literature review (Pereira *et al.*, 2014); however, because of space limitations, we refer readers to the original study as well as to the work of de Haes and van Grembergen (2015) for a more detailed description of single ITG dimensions.

2.2 Ambidexterity of ITG

The ability to align governance structures to existing capabilities and environmental conditions is an important success factor for digital transformation, and the alignment procedures need to be agile. As Gersick (1991), Romanelli and Tushman (1994) and Greiner (1997) showed, successful organizations alternate between two states in their organizational development. The first state is characterized by a phase of environmental stability, in which firms strive for optimization within their existing business logic by focusing on minor, incremental adjustments in operational efficiency and benefit from economies of scale (Gersick, 1991; Tushman and O'Reilly, 1996). The second state is characterized by fast-changing and highly volatile environmental conditions, in which major organizational adjustment are required to successfully manage the change (Tushman *et al.*, 1986). This view of organizational development is referred to as the *punctuated equilibrium theory*. Depending on which state the organization is in, it should design adequate governance dimensions to deal successfully with the specific challenges of each state (Dunphy and Stace, 1988). Thus, the distinction of these two states is important for the design of an appropriate governance structure and the execution of measures and mechanisms (Gersick, 1991). Adequate governance structures are a crucial factor for company success, especially when the economy, society, technology and regulations undergo fundamental and highly complex changes (Higgs and Rowland, 2005). The adequate choice of governance measures is also dependent on the status of the external environment and internal capabilities (Gersick, 1991).

One way for organizations to deal with these two types of states is by becoming an *ambidextrous organization* (Tushman and O'Reilly, 1996); here, organizations have the ability "to both explore and exploit – to compete in mature technologies and markets where efficiency, control, and incremental improvement are prized and to also compete in new technologies and markets where flexibility, autonomy, and experimentation are needed" (O'Reilly and Tushman, 2013, p. 324). During the exploitation state, the organization focuses on activities to improve efficiency and reduce variance, while it concentrates on discovery and innovation activities in the exploration state. Especially incumbent organizations can benefit from taking an ambidextrous approach to organizational development (Markides, 2013). The challenge of becoming ambidextrous lies in the organization's ability to balance the two opposing state characteristics in existing business activities to sufficiently monetise them, while exploring new market opportunities to stay competitive in the future (March, 1991). Tushman and O'Reilly (1996) define organizational ambidexterity as a concept of structurally separated business units with distinct organizational responsibility. However, Markides (2013) and Markides and Charitou (2004) criticise this view for not considering the positive impact of potential benefits from synergies within business units in its assumption of strict separation. Consequently, researchers have introduced ambidexterity models with less strict separation. This contextual dimension of ambidextrous organizations is also manifested in the dual operating system formulated by Kotter (2012). Traditional hierarchical governance structures alone are not able to cope with the increase in speed of change. Thus, traditional hierarchical governance structures should be complemented by network-like governance structures that can react quickly to changes in the organization's environment. The following sections follow the mindset of the *punctuated equilibrium theory* by referring to agile ITG as traditional ITG dimensions complemented by agile approaches.

2.3 Towards an agile ITG

Many researchers have argued that business agility is required to survive the voracity of the market (van Roosmalen and Hoppenbrouwers, 2008; Cummins, 2009; Sloane *et al.*, 2008). Agility is important to change the direction of the environment and respond efficiently and effectively to such changes (Luftman *et al.*, 1993). Consequently, in recent years the term “agile” has gained much attention from practitioners and academics because of its importance to the innovation and competitive performance of firms in contemporary business environments (Sambamurthy *et al.*, 2003). As business agility is a complex, multidimensional and context-specific concept, the literature has proposed several different concepts, frameworks and metrics for defining and explaining it (Sherehiy *et al.*, 2007). Some empirical literature argues that enterprise agility is a kind of dynamic capability that enables a firm to reconfigure, assemble and integrate resources, information, processes and technologies that are embedded in different activities within an enterprise or its subsidiaries (Yang and Liu, 2012). Using this ability enables a firm to create synergies and additional competitive advantages that enhance firm performance (Sambamurthy *et al.*, 2003; Atuahene-Gima, 2003; Chen and Chiang, 2011). Other research argues that agility involves a firm’s capabilities related to interactions with customers, orchestration of internal operations and utilization of its ecosystem of external business partners (Sambamurthy *et al.*, 2003; Goldman *et al.*, 1995).

However, limited research has combined agile capabilities with governance frameworks. Qumer (2007) introduced a first definition of agile governance, focusing on agile software development. He presents a summary of exploratory reviews and analysis to identify the related concepts, key aspects and importance of ITG. A second definition was presented by Cheng *et al.* (2009), who introduced a list of measurement and control aspects in agile governance frameworks and validated this view with three case studies. The third definition of agile governance was proposed by Luna *et al.* (2010), who specifically focused on ITG. In another study, Luna *et al.* (2013) presented a fourth definition on a holistically and widely agile governance. The study of Luna *et al.* (2014) offers an overview of nascent research with respect to agile strategies within governance and is grounded in a systematic literature review. We adopt the approach of Luna *et al.* (2010) on the definition and the agile strategies in ITG because it specifically focuses on ITG and is the most comprehensive framework provided in the literature. In their research, Luna *et al.* (2010) present a new concept of agile ITG in which principles, values and practices of the agile paradigm from software engineering are translated into the context of ITG. In this study agile ITG is defined as

“.....the process of defining and implementing the IT infrastructure that will provide support to strategic business objectives of the organization, which is jointly owned by IT and the various business units and instructed to direct all involved in obtaining competitive differential strategic through the values and principles of the Agile Manifesto”.

Hence, the authors suggest enhancing the ITG dimensions by the values and principles of the agile manifesto of software engineering introduced by Beck *et al.* (2001). They further argue that it is enough to adjust the focus of existing traditional practices, such as COBIT and ITIL, to agree with the principles and values supported by the agile manifesto and with the application of best practices that can be adapted from agile software engineering. Madi *et al.* (2011, p. 424) provide a list of the extracted values from the agile manifesto. This list is based on the foundation of agile practices and principles and contains the following values: “1) Collaboration, 2) Communication, 3) Working software, 4) Flexibility, 5) Customer-centric, 6) Incremental, 7) Iterative, 8) Motivation, 9) Respect, 10) Trust, 11) Feedback, 12) Speed, 13) Technical excellence, 14) Simplicity, 15) Self-organizing, and 16) Learning”.

The manifesto and all its values and principles represent the philosophy behind agile strategies and ideally should be present in all practices proposed by various agile methods (Fernandes and Almeida, 2010). Several agile strategies are available in agile practices and variations such as Scrum, eXtreme Programming, behaviour-driven development, lean software development, Kanban, design thinking, feature-driven software development and dynamic systems development methods, to name a few. Such practices focus on various aspects of agile strategies. With regard to the concept of Luna *et al.*

(2010), implementing agile strategies by such agile practices can complement the agile principles within traditional ITG. Thus, agile dimensions derived from implementing agile strategies in the context of ITG can encompass variants of activities that determine lean team structures, short decision-making processes, fast information flows and communication efforts related to projects. Such agile strategies can help improve communication and collaboration, which often result in better business/IT alignment and responsiveness to business changes (Moore and Barnett, 2004). As such, premised on the *punctuated equilibrium theory*, the governance of IT could address traditional as well as agile dimensions without significant disruption. Figure 1 provides an overview of the interrelationship between traditional ITG and the application of agile strategies.

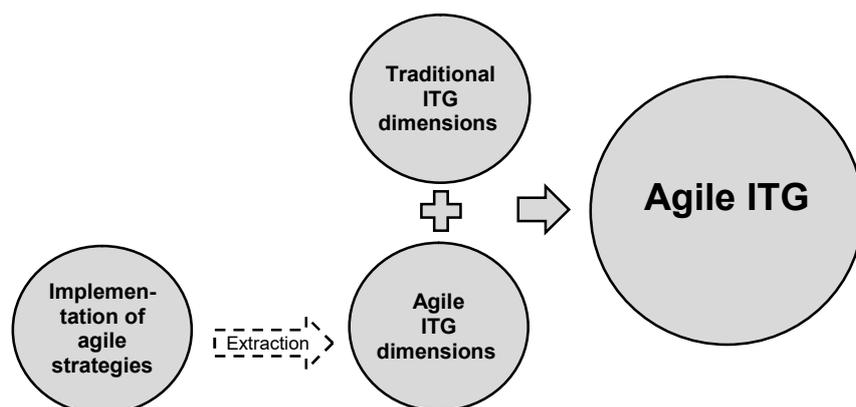


Figure 1. Interrelationship between traditional ITG dimensions and agile strategies.

Source: Adapted from Luna et al. (2010).

Therefore, the goal of the current study is to try to obtain traditional dimensions as well as agile dimensions and agile strategies put in place in firms, to identify how the concept of an effective framework is changing with respect to the demand for agility in organizations. Then, to elicit ITG patterns, the traditional dimensions and agile strategies must be set in context to some control variables. This is important because determining the right ITG dimensions is a complex endeavour, and it should be recognised that what strategically works for one company does not necessarily work for another (van Grembergen *et al.*, 2004; Patel, 2004). Therefore, to elicit some ITG patterns of success, this study uses control variables such as firm size, IT strategy and regional differences in context, as also highlighted in the approaches of Pereira and Mira da Silva (2012), Weill (2004) and Sambamurthy and Zmud (1999).

3 Research method

This study follows a qualitative approach in which we conducted semi-structured interviews with top management executives in the German-speaking banking industry. According to Benbasat *et al.* (1987), a qualitative research approach is useful for addressing the "how" question in the exploratory stage of knowledge building. This is particularly applicable to the exploration of (1) relevant governance constructs and (2) differences between traditional and agile governance dimensions from an empirical standpoint. Therefore, according to the formulated RQ, this work can be classified as exploratory research (Gil, 2009). Interviews with experts are a well-established method to conduct exploratory research (Saunders *et al.*, 2009).

The first stage of research entails development of a semi-structured questionnaire to provide an interview guideline. Workshops with researchers at University of St.Gallen and Reutlingen University were conducted to formulate a first draft of the questionnaire. To ensure the suitability of the questions, five pre-interviews with top management executives in German-speaking banks were conducted by telephone. All interviews were recorded and fully transcribed. The discussion of the transcripts during the first stage led to adjustments according to the output of this stage.

In the second stage, a database with banks in Germany, Switzerland and Austria was prepared in order to send a letter of solicitation to the targeted industry. On the one hand, the banking industry is appropriate for research on ITG in digital transformation because many banks are currently redesigning their governance frameworks. On the other hand, business models in the banking industry are not fundamentally different from bank to bank. Therefore, a focus on this industry allows for an investigation of a well-defined context under comparable conditions within the whole sample. More than 1,800 e-mails were sent out, leading to initial contacts with more than 50 banks. Furthermore, it was important to identify the top executive of each bank mainly responsible for digital transformation to be included in the interview procedure. This step resulted in a final sample size of 33 executive interviews with banks in Germany, Switzerland and Austria. Table 1 presents an overview of the companies, the position of the interviewee, the country and the number of employees. The names of the financial institutions and the interviewee were confidential, so we refer to the companies as "Bank 1" through "Bank 33".

Bank	Position of Interviewee	Country	Em- ployees	Bank	Position of Interviewee	Country	Em- ployees
Bank 1	CIO	Switzerland	1200	Bank 18	Deputy of CEO	Switzerland	173
Bank 2	Member of the Executive Board	Germany	67	Bank 19	CEO	Germany	293
Bank 3	IT Director	Switzerland	245	Bank 20	CEO	Switzerland	1400
Bank 4	Member of the Executive Board	Germany	256	Bank 21	CDO	Germany	99740
Bank 5	Head of Innovation Lab	Switzerland	892	Bank 22	Head of Digitalization	Austria	2974
Bank 6	CEO	Germany	494	Bank 23	Head of IT	Switzerland	230
Bank 7	Member of the Executive Board	Germany	8395	Bank 24	Head of Digital Banking	Austria	50000
Bank 8	COO	Switzerland	788	Bank 25	CEO	Switzerland	56
Bank 9	Head of Digitalization	Germany	50	Bank 26	COO	Austria	12471
Bank 10	COO	Germany	258	Bank 27	CEO/COO	Austria	352
Bank 11	Member of the Executive Board	Germany	80	Bank 28	CFO	Switzerland	36
Bank 12	CEO	Switzerland	455	Bank 29	Head of Privat Banking	Germany	150
Bank 13	Managing Director	Switzerland	6026	Bank 30	Head of IT	Austria	893
Bank 14	Head of General Office	Austria	2380	Bank 31	CEO	Switzerland	1331
Bank 15	CEO	Germany	366	Bank 32	CFO	Switzerland	550
Bank 16	Member of the Executive Board	Switzerland	56	Bank 33	Head of Application Mgmt.	Austria	729
Bank 17	Head of Application Mgmt.	Switzerland	280				

Table 1. Overview of the interviews.

Accordingly, in stage three, the 33 interviews were conducted by telephone. Before each interview, the questionnaire was given to the interviewee to serve as a guide. Furthermore, all respondents gave permission to have the interview digitally recorded. Thus, all 33 semi-structured interviews were conducted and audio-recorded by two members of the panel. Voice recording is essential because it saves the recorded information at hand, thus ensuring accurate information of the data (Saetang and Haider, 2013). Each interview session took approximately 30 minutes. All the interviewees were at managerial levels and held executive or senior managerial positions (see Table 1) with decision rights to define digital transformation projects.

In stage four, the audio records were fully transcribed to enable analysis of the data set. The transcribed source texts were first analysed case by case, to set the basis for the development of a system of categories for a structured evaluation of the text material. In doing so, the overall approach corresponds to the approach of a qualitative data analysis (Kuckartz *et al.*, 2008). From a methodological standpoint, the qualitative data analysis is based on the formation of categories and the assignment of individual text parts to these categories. To support the encoding of the data, analysis software MAX QDA was used. The transcribed texts were first imported into MAX QDA, and then individual text parts (= codings) of the transcribed interviews were assigned to the defined categories. When necessary, the main categories were further differentiated into subcategories, so that the data could be organized and interpreted in a category-based manner. In doing so, the quantitative evaluation referred to the quantity of the codings per category. Consequently, the data per category were quantitatively evaluated and qualitatively interpreted. The thematic codings allowed us to highlight the links and concepts related to the organizational integration of governance dimensions in the Digital Age. Many dimensions, especially the traditional ITG dimensions, were confirmed by the literature mentioned previously. However, our analysis led to several new elements of ITG, mainly in the context of agility.

4 Data analysis

Data analysis uncovered several traditional and agile ITG dimensions mentioned by the respondents. Table 2 provides an overview of the bank characteristics and control variables. We included firm size, degree of agility, duration of strategic focus on digital transformation, and regional differences as control variables in our questionnaire. Different categories of banks are well distributed on all control variables, with a slight focus on small and medium-sized banks (<500 employees). A differentiation between subsamples and categories per control variable extends the scope of this paper but opens a fruitful avenue for further analysis.

Control Variables		Banks																																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	
Firm size	Small (<500 employees)	x	x	x		x			x	x	x	x			x	x	x	x					x		x		x	x	x						
	Medium-sized (500–2000 employees)	x			x																		x										x	x	x
	Large (>2000 employees)							x							x	x																			
Degree of agility in ITG	Very agile	x	x		x		x	x	x						x								x	x	x										
	A little agile	x				x				x	x		x	x																					
	Not agile				x										x																				
IT Strategy focus on digitalisation since	<3 years	x	x								x	x																							
	3–4 years	x		x		x	x	x		x																									
	>4 years					x																													
Regional differences	Germany	x		x		x	x		x	x	x																								
	Switzerland	x		x																															
	Austria																																		

Table 2. Bank characteristics and control variables.

Table 3 lists all the information gathered from the 33 banks regarding different ITG dimensions. Overall, 47 dimensions for ITG appear in the sample. The ITG dimensions used by the firms are grouped into the categories “structures”, “processes” and “relational mechanisms”. To group the dimensions into the three mentioned categories, the study of Almeida *et al.* (2013) served as a template. Many other studies, such as that of de Haes and van Grembergen (2015) and Symons (2005), use this type of framework to structure ITG dimensions. Moreover, we subdivided the dimensions into “traditional” and “agile” to differentiate between these two subcategories. To identify traditional ITG dimension, we used the framework of Almeida *et al.* (2013).

Regarding the agile ITG dimensions, we found no corresponding template in the literature. Therefore, a section in the questionnaire specifically asked the respondents about the agile strategies within the ITG dimensions to identify elements in this domain. Furthermore, the principles of the agile manifesto were mapped onto the uncovered agile dimensions (see Table 4). This allowed us to recognise if an uncovered dimension was agile or not.

In Table 3, we set the following specifications: If a dimension does not exist, the cell is empty; when the dimension is implemented or there is some evidence that it is used, the cell is marked with a capital “X”. If a subgroup exists, the cells of the corresponding subcategories are marked with lowercase “x”. Furthermore, in the last column of Table 3 we provide the sum of codings per dimension.

As a brief explanation of how the text parts were coded and the patterns elicited, consider the following sentence (Bank [12]): “Decisions of the steering committee will then be [dependent] on the bank and the board, which are mainly responsible for the financial conditions”. Here, the bank is referring to the “boards and committees” dimension, so we assigned the bank one coding on this dimension.

4.1 ITG dimensions and agile strategies

The interviewees reported on how the goals were inherent in their business strategy and how they strived to manage digital transformation projects. In total 22 traditional and 27 agile dimensions were mentioned. While the traditional dimensions can be retrieved from literature, the agile dimensions represent new additional mechanisms towards a framework of agile IT governance (see Table 3).

ITG Dimensions		Banks																											Codings										
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27		28	29	30	31	32	33				
Structures	Traditional	1	CIO/COO on executive committee	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	26						
		2	Boards and committees	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	25						
		3	Project steering committee	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	18						
		4	IT organization structure	x			x			x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	17						
		5	Business/IT relationship managers	x			x								x													x	x				5						
		6	CIO on Board																										x	x			3						
	Agile	7	Digital transformation units	x	x		x	x	x	x			x	x										x	x	x					x	13							
		8	Short and flexible decision paths			x	x			x	x						x	x	x					x	x	x				x	x	x	13						
		9	Interdisciplinary/small project teams	x			x	x	x	x							x							x	x	x	x						x	13					
		10	Lean project structures	x	x	x	x											x	x												x		11						
		11	Delegating decision making	x		x							x	x																		x		6					
		12	Matrix organization structures	x																														3					
Processes	Traditional	13	Portfolio management	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	32							
		14	IT budget control and reporting	x	x																													20					
		15	Project governance	x	x																													20					
		16	Strategic information systems planning	x	x	x																												16					
		17	Project tracking	x	x																													15					
		18	Benefit management			x	x	x																										8					
		19	Demand management	x																														6					
		Agile	20	Using agile practices (Scrum, Devops, design thinking, lean start-ups etc.)	x	x																												x	20				
			21	Taking higher risk (trial and error)	x	x	x																												x	17			
	22		Fast/agile decision-making processes	x	x	x																													x	15			
	23		Using innovative key performance indicators (KPIs)																																x	10			
	24		Lessons learned processes	x	x																														x	10			
	25		Innovation processes			x	x																													x	10		
	26		Prioritizing processes	x																																x	8		
	27		Evaluation processes for innovation	x	x	x																															x	7	
	28		Project and budget monitoring																																		x	6	
	29		Coordination processes	x	x	x																																x	4
	Relational Mechanisms	Traditional	30	Regular internal communication	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	27			
			31	Management give the good example	x	x	x	x	x	x																												x	17
32			Business/IT collocation	x	x	x																															x	16	
33			Shared understanding of business/IT	x	x																																x	15	
34			IT leadership	x																																		14	
35			Informal meetings of executives		x																																x	10	
36			Senior management announcements																																		x	10	
37			Knowledge management																																			x	8
38			Cross-functional business/IT training																																			x	7
Agile		39	Transformational leadership	x	x	x																																x	18
		40	Open communication and participation																																			x	18
		41	Lean communication structures																																			x	12
		42	Use social/digital media																																			x	12
		43	Regular trainings and teamwork	x																																		x	9
		44	Cross-functional trainings	x																																		x	7
		45	Specific innovation rooms/meetings	x	x																																	x	6
		46	Management dialogues and campaigns	x																																		x	6
		47	Collaboration with	x	x	x																																x	25
		a	- Start-ups	x	x	x																																x	17
b	- Business partners																																			x	14		
c	- Outsourcing partner																																			x	6		
d	- Research partners	x	x																																	x	5		
e	- Internal teams	x																																		x	7		

Table 3. Traditional and agile ITG dimensions.

Furthermore, the respondents were specifically asked about agile elements within the ITG dimensions to identify relevant items in this domain. This allowed us to assign the principles from the agile manifesto to the explored agile ITG dimensions (see Table 4).

	Agile ITG dimensions	Agile manifesto principles assigned	
Agile Structures	7	Digital transformation units	Communication, Customer-Centric, Collaboration
	8	Short and flexible decision paths	Flexibility, Speed, Simplicity
	9	Interdisciplinary/small project teams	Collaboration, Flexibility, Trust, Learning, Simplicity
	10	Lean project structures	Communication, Flexibility, Trust, Speed, Simplicity
	11	Delegating decision making	Motivation, Trust, Speed, Self-Organizing
	12	Matrix organization structures	Speed, Self-organizing, Collaboration, Flexibility
Agile Processes	20	Using agile practices	Collaboration, Communication, Working software, Flexibility, Customer-centric, Incremental, Iterative, Motivation, Respect, Trust, Feedback, Speed, Technical excellence, Simplicity, Self-organizing, Learning
	21	Taking higher risk (trial and error)	Learning, Self-organizing, Iterative, Incremental
	22	Fast/agile decision-making processes	Speed, Flexibility Incremental, Feedback, Speed, Incremental
	23	Using innovative KPIs	Learning, Feedback, Technical excellence, Incremental
	24	Lessons learned processes	Learning, Motivation, Feedback
	25	Innovation processes	Incremental, Iterative, Flexibility, Speed, Technical excellence
	26	Prioritizing processes	Iterative, Flexibility, Speed, Technical excellence, Customer-centric
	27	Evaluation processes for innovation	Iterative, Flexibility, Speed, Technical excellence, Customer-centric, Collaboration
	28	Project and budget monitoring	Learning, Communication, Feedback
29	Coordination processes	Flexibility, Speed, Simplicity, Collaboration	
Agile Relational Mechanisms	39	Transformational leadership	Motivation, Respect, Trust, Feedback, Learning
	40	Open communication and participation	Motivation, Respect, Trust, Feedback, Learning, Self-Organizing
	41	Lean communication structures	Communication, Flexibility, Trust, Speed, Simplicity
	42	Use social/digital media	Technical excellence, Simplicity, Communication, Working software, Feedback
	43	Regular trainings and teamwork	Speed, Collaboration, Flexibility, Learning, Self-Organizing
	44	Cross-functional trainings	Speed, Collaboration, Flexibility, Learning, Self-Organizing
	45	Specific innovation rooms/meetings	Collaboration, Communication, Flexibility, Customer-centric, Feedback, Speed, Learning
	46	Management dialogues and campaigns	Communication, Respect, Trust, Feedback, Learning
	47	Collaboration (47a – 47e)	Collaboration, Communication, Flexibility, Speed, Learning

Table 4. The agile strategies within the agile ITG dimensions.

4.2 Traditional ITG dimensions

In exploring the traditional ITG dimensions implemented by the banks we identified 22 traditional ITG dimensions (six structure elements, seven processes and nine relational/communication mechanisms; see Table 3). Many of the elements are also confirmed in the literature (Almeida *et al.*, 2013).

In terms of structure, the most frequently mentioned element was “CIO/COO on executive committee”. Of the 33 interviewees, 26 noted that the CIO or COO is a full member of the executive committee or has a direct reporting structure to the CEO. This situation allows a firm to ensure that IT is a regular agenda item and reporting issue for the board of directors. Furthermore, boards and committees (25 codings) are formed to help align business and IT and determine business priorities in IT investments. To prioritise and manage IT projects, project steering committees (18 banks) and IT organization structures (17 banks) are primarily used. Surprisingly, in few institutions is the CIO a member of the executive board (3 codings). The following text highlights the most important aspects of how banks are adopting traditional structures in their organizations:

For the implementation of the content of a project, we have two committees, on the one hand, there is a technical committee that assesses and approves the technical implementation and there is a business steering committee, as we call it, which defines the portfolio of individual measures. But the process or the driving [leading the projects] is in my responsibility and that happens to me. How the budget will be decided will be decided by this steering committee, but I will be responsible for ensuring that it [the budget] will not be exceeded and that it is respected. (CIO, Bank 1)

Regarding traditional processes, portfolio management was highlighted as the most essential element. Of the 33 interviewees, 32 mentioned that within portfolio management, in which business and IT are involved, IT investments and projects are prioritised. In terms of controlling, monitoring and reporting projects, most banks use the processes “IT budget control and reporting” (20 codings), “project governance” (20 codings) and “project tracking” (15 codings). Formal processes to define and update IT

strategy are implemented in almost half the institutions (process: strategic information systems planning; 16 codings). In relatively few banks are the processes of benefit management (8 codings) and demand management (6 codings) implemented. The executive of Bank 24 highlights some insights in his bank as follows:

We have set up a few committees and boards at the customer level to promote the transfer of know-how. We have also occupied these cross-functional teams, from business and IT side. They are responsible for releasing their roadmaps and releasing their associated IT budgets, and we have a central project portfolio where we monitor and track the IT projects that are relevant to digitization and prepare them for these sessions. (Head of Digital Banking, Bank 24)

Communication in the financial institutions is crucial. Of the 33 interviewees, 27 highlighted the importance of regular internal communication. Here, leadership aspects play a key role. Seventeen interviewees indicated that management should give good examples in communicating. Furthermore, 14 executives mentioned IT leadership as important to articulate a vision for IT's role in the company and to ensure that this vision is clearly understood by managers throughout the organization. The following interviewee brings this point to the fore:

For larger topics, we have a staff meeting or we do what is very successful, a management board call. Here you either explain the quarterly reports or if there are any essentials, then we invite the employees a quarter hour before opening the bank [to a short meeting] and here they [the employees] have the chance to get everything. They get the second level of the management [middle management], so to speak, or the interpretation that would otherwise come, they get well circumvented and all feel informed right away. This helps. (Member of the Executive Board, Bank 4)

To ensure that business and IT work together, more than 50% of the firms locate business and IT close to each other (business/IT collocation; 17 codings). Only seven banks use cross-functional business/IT training instead. Ten banks use informal meetings of executives and senior management announcements. Finally, seven interviewees mentioned practicing knowledge management in their firms.

4.3 Agile ITG dimensions

This subsection presents the analysis of the bank executives' perceptions of the agile ITG dimensions. From their answers to the questionnaire, we identified six structure elements, ten process dimensions and nine relational/communication mechanisms.

Regarding structures, executives from 13 banks each mentioned the dimensions "digital transformation units", "short and flexible decision paths" and "interdisciplinary/small project teams". Similarly important, executives from 11 banks mentioned the dimension "lean project structures". The respondents noted that the setup of new dedicated units for digital transformation allows for better communication and more intensive collaboration. Relatively few institutions use matrix structures (3 codings). In general, such units are created from organizational structures and include various positions from other units, as the following interviewee highlighted:

We have set up a new organizational unit called PAI [product and application innovation] combined from the units AM [application management] and PM [product management]. This unit cannot be found in the organizational structures, because the organizational structures only include linear hierarchical structures shown from top to bottom. (Head of Application Mgmt., Bank 33)

However, short and flexible decision paths are important for speediness and flexibility in several processes. Such aspects are also reflected in the dimensions "interdisciplinary/small project teams" and "lean project structures". Overall, such structure elements should be kept simple to allow agile decision making.

In terms of processes, the respondents noted to use agile practices (20 codings). Many bank executives indicated that they used agile strategies such as from scrum, design thinking, lean approach, and so on, as the following CEO noted:

[With] scrum now we're in the newest project, we're off to sprints, so two, three weeks' sprints with mockups, with customer survey, we do not project on 12 to 18 months and then see if it flies or not,

but incrementally to evolve... We also use design thinking methods. But [with] scrum, mockups with pilots, with such things we are starting to work now. And that's amazing what's possible, amazing. (CEO, Bank 12)

The executives further noted that taking higher risks by following trial-and-error processes (17 codings) might enhance the company's agility. Such processes stimulate people to act in self-organized ways and ensure continuous learning. Furthermore, respondents highlighted fast and agile decision-making processes (15 codings) as significant to act in a flexible and speedy manner when making decisions. Moreover, 10 banks use innovative key performance indicators (KPIs), such as conversion rates or online client feedback, to improve their processes. Equally important were the introduction of lessons learned and innovation processes (10 codings). Few executives mentioned using more flexible and faster prioritizing, coordination or project monitoring and evaluation processes.

One of the most relevant dimensions, in terms of relational mechanisms, the respondents highlighted was external collaboration. Seventy-six percent of the executives agreed that collaboration (25 codings) with external partners (e.g. start-ups, business partners, outsourcing partners and research partners) had become increasingly important to achieve their strategic goals. For example,

Cooperation is our linchpin ... because most FinTechs [start-ups] just do not take all the value chain, but only focus on individual steps on the customer interface; then we act as the partner in the background. This is something we live and have always lived [by], that's why we have no fear of contact there, we do a lot. (COO, Bank 10)

Furthermore, transformational leadership (18 codings), and open communication and participation (18 codings) play key roles in empowering employees and being transparent in communication. The comments from the following executive bring this to the fore:

In terms of transformational leadership, trust is a key factor. But this is not enough. Employees must also be moved. They are still in the old leadership method and they must also take this responsibility and be able to carry out these competences. It just needs this transformational leadership, in which one involves the employees; it promotes, coaches, evolves and [is] not simply, [giving] transactional orders. (Deputy of CEO, Bank 18)

Moreover, executives from 12 banks regard the setup of lean communication structures (12 codings) and the usage of social and digital media (12 codings), such as enterprise social networking, Twitter, Facebook, Webex, and so on, in their communication initiatives as a way to engage people. A few bank executives also mentioned mechanisms such as regular trainings and teamwork (9 codings), cross-functional trainings (7 codings), specific innovation rooms/meetings, and management dialogues and campaigns (6 codings) as improving the communication and transparency within their companies.

4.4 ITG Patterns

In addition, following key patterns were elicited in connection to the control variables (see Table 5):

1	ITG in German firms appears more agile than ITG in banks from Switzerland and Austria.
2	Banks from Austria perceive their ITG as not very agile.
3	Banks with an IT strategy focusing on digitalization for longer than four years view their ITG as very agile.
4	Banks from Switzerland and Austria use both traditional dimensions (e.g. 15, 17, 37) and new dimensions (e.g. 7, 25, 26, 42).
5	German and Austrian banks mainly engage in collaboration with external partners (dimension 47).
6	Banks from Germany use new ITG processes (dimensions 43 and 47b).
7	Very agile firms use new dimensions, including 10, 20, 44, and 47d.
8	Large companies use new dimensions, including 7, 9, 20, 21, 23, 40, 44, and 47a.
9	Large and very agile firms use the dimensions 20, 44 and 47.
10	Small and very agile banks from Germany use dimension 1, 15, 30 and 47.

Table 5. Key ITG patterns elicited.

5 Discussion and conclusion

The main objectives of this paper were to conduct a qualitative analysis to identify agile aspects of the governance construct and to elicit major patterns of ITG dimensions in the digital world. Uncovering the traditional and agile dimensions implemented in the banking industry to master digital innovations allows us to identify how the concept of an effective ITG framework has changed with regard to the demand for agility (RQ). As indicated in the “Data analysis” section, the analysis identified both traditional and agile ITG dimensions. Furthermore, it outlined agile characteristics of the uncovered agile mechanisms and offered several key ITG patterns.

Weill and Ross (2004) illustrated the importance of implementing an effective ITG framework by means of the three major dimensions - structural, processual, relational - of ITG in an organization. They showed that up to 40% higher returns could be generated by using effective ITG processes. However, because of sweeping changes in the new and fast-moving economy, leading to new requirements in and expectations of IT, the task of aligning business and IT remains a prime challenge, even though ITG frameworks are being implemented. Today's firms need flexible, complementary, adaptive and collaborative ITG dimensions to be put in place, if they are to prosper in a turbulent environment, in which the challenge for firms is to sustain value realization from IT instead of restraining its importance by emphasizing control. Therefore, what is required in the Digital Age is the underlying capability to flexibly adapt to changing business environments and requirements, to select and adopt promising new technologies, to effectively anticipate future needs, and to ensure that the potential residing in IT is proactively communicated within the firm, thus ensuring its effective exploitation (Schlosser, 2012). Hence, the digital era demands a culture of speed and collaboration, if it is to differentiate and deliver extraordinary customer service to drive business growth. In this era, the rise of mobility and the velocity to deliver differentiated business processes is critical to success, which calls for a more agile ITG dimensions (Vejseli and Rossmann, 2017). With regard to the understanding of the agile strategies within the governance construct, the respondents all believed that implementing agile strategies helps improve their agility. Therefore, 25 agile dimensions were identified. The most frequently employed agile mechanisms are the ITG dimension of the processes and the relational/communication mechanisms. Moreover, our study also indicates that traditional ITG dimensions are important for sustaining control. In this way, 22 traditional ITG dimensions were uncovered. In the context of the *punctuated equilibrium theory*, the concept of an effective ITG framework changing in response to the demand for agility in organizations calls for more ambidextrous approaches. The two systems—traditional and agile—should work together, with a constant flow of information and activity between them (Kotter, 2014). In other words, to be effective an agile ITG governance must work seamlessly and organically with traditional ITG, as well as agile ITG dimensions, so that the whole organization is both ensuring that tasks are completed with efficiency and reliability, constantly and incrementally improving itself, and handling today's increasingly strategic challenges with speed and agility. Therefore, the interaction between the traditional and the agile dimensions needs to be optimized in managing strategies to impact positively on the agility of a company.

Finally, this study is not without limitations. First, the scope of the data collected is restricted to firms from Germany, Switzerland and Austria. Considering other geographic locations could provide additional insights. Second, the analysis is limited to the banking industry. As such, understanding might be advanced from investigating other sectors. Third, we mainly interviewed bank executives. Use of different group, such as employees working in IT and business, could lead to further relevant insights.

In conclusion, our interview data provide relevant perspectives of traditional and new ITG dimensions implemented within the banking industry of the German-speaking part of Europe, which highlights the ambidextrous aspect within the governance construct. Moreover, the study assigned the principles of the agile manifesto to each new uncovered ITG dimension to provide an overview of the agile strategies within the explored elements. Finally, we presented and discussed ten possible ITG patterns. Future research focusing on other sectors, countries and factors could enhance knowledge building in the domain of agile ITG. As such, the current study helps stimulate further investigation into combining agile capabilities with governance capabilities.

References

- Aguillar, D.A.M., Murakami, I., Junior, P.M. and Jr., P.T.A. (2017), "IT Governance Program and Improvements in Brazilian Small Business. Viability and Case Study", in *Proceedings of the Federated Conference on Computer Science and Information Systems (ACISIS)*, 03.09.2017 - 06.09.2017, IEEE, pp. 961–964.
- Ali, S. and Green, P. (2012), "Effective information technology (IT) governance mechanisms. An IT outsourcing perspective", *Information Systems Frontiers*, Vol. 14 No. 2, pp. 179–193.
- Almeida, N.H.R. de, Magalhaes, E.M.C. de, Moura, H.P. de, Teixeira, F.J.G.d.A., Cappelli, C. and Martins, L.M.F. (2015), "Evaluation of a Maturity Model for Agile Governance in ICT Using Focus Group", in *Proceedings of the Annual Conference on Brazilian Symposium on Information Systems: Information Systems: A Computer Socio-Technical Perspective - Volume 1*, Brazilian Computer Society, Porto Alegre, Brazil, Brazil, 3:15-3:22.
- Almeida, R., Pereira, R. and Mira da Silva, M. (2013), "IT Governance Mechanisms: A Literature Review", in *Proceedings of the 4th International Conference on Exploring Service Science (IESS)*, Springer Berlin Heidelberg, pp. 186–199.
- Atuahene-Gima, K. (2003), "The Effects of Centrifugal and Centripetal Forces on Product Development Speed and Quality. How Does Problem Solving Matter?", *Academy of Management Journal*, Vol. 46 No. 3, pp. 359–373.
- Awais, M. and Gill, A. (2016), "Enterprise IT Governance: Back to Basics", in Gołuchowski, Pańkowska, M., Barry, C., Lang, M., Linger, H. and Schneider, C. (Eds.), *Proceedings of the 25th International Conference on Information Systems Development (ISD2016)*, University of Economics in Katowice, Katowice, Poland.
- Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R. and others (2001), *The agile manifesto*, available at: <http://agilemanifesto.org/> (visited on 11/15/2017).
- Benbasat, I., Goldstein, D.K. and Mead, M. (1987), "The Case Research Strategy in Studies of Information Systems", *MIS Quarterly*, Vol. 11 No. 3, p. 369.
- Bhattacharjya, J. and Chang, V. (2010), "Adoption and implementation of IT governance. Cases from Australian Higher Education", in *Strategic Information Systems: Concepts, Methodologies, Tools, and Applications*, Igi Global, pp. 1308–1326.
- Brown, C.V. (1997), "Examining the Emergence of Hybrid IS Governance Solutions. Evidence From a Single Case Site", *Information Systems Research*, Vol. 8 No. 1, pp. 69–94.
- Burtscher, C., Manwani, S. and Remenyi, D. (2009), "Towards a Conceptual Map of IT Governance: a review of current academic and practitioner thinking", in *Proceedings of the UK Academy for Information Systems Conference*, AISeL, p. 15.
- Chen, W.-H. and Chiang, A.-H. (2011), "Network agility as a trigger for enhancing firm performance. A case study of a high-tech firm implementing the mixed channel strategy", *Industrial Marketing Management*, Vol. 40 No. 4, pp. 643–651.
- Cheng, T.-H., Jansen, S. and Remmers, M. (2009), "Controlling and monitoring agile software development in three dutch product software companies", in *Proceedings of the ICSE Workshop on Software Development Governance*, IEEE Computer Society, Washington, DC, pp. 29–35.
- Collin, J., Halén, M., Helenius, M., Hiekkänen, K., Itälä, T. and Korhonen, J.J. (2014), "IT Leadership in Finnish Organizations and Digital Transformation", Alto University.
- Cummins, F.A. (2009), *Building the agile enterprise: With SOA, BPM and MBM*, Morgan Kaufmann, Burlington Mass.
- de Haes, S. and van Grembergen, W. (2004), "IT governance and its mechanisms", *Information Systems Control Journal*, Vol. 1, pp. 27–33.
- de Haes, S. and van Grembergen, W. (2005), "IT Governance Structures, Processes and Relational Mechanisms: Achieving IT/Business Alignment in a Major Belgian Financial Group", in *Proceedings of the 38th Annual Hawaii International Conference on System Sciences (HICSS)*, Los Alamitos, CA, 237b–237b.

- de Haes, S. and van Grembergen, W. (2009), “An Exploratory Study into IT Governance Implementations and its Impact on Business/IT Alignment”, *Information Systems Management*, Vol. 26 No. 2, pp. 123–137.
- de Haes, S. and van Grembergen, W. (2015), *Enterprise governance of information technology: Achieving alignment and value, featuring COBIT 5, Management for professionals*, 2. ed., Springer, Cham.
- Dunphy, D.C. and Stace, D.A. (1988), “Transformational and Coercive Strategies for Planned Organizational Change. Beyond the O.D. Model”, *Organization Studies*, Vol. 9 No. 3, pp. 317–334.
- Fernandes, J.M. and Almeida, M. (2010), “Classification and Comparison of Agile Methods”, in Abreu, F.B.e. (Ed.), *Proceedings of the 17th International Conference on the Quality of Information and Communications Technology (QUATIC), 2010*, IEEE, Piscataway, NJ, pp. 391–396.
- Fruhling, A., McDonald, P. and Dunbar, C. (2008), “A Case Study: Introducing eXtreme Programming in a US Government System Development Project”, in *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS), Waikoloa, HI, USA*, IEEE, p. 464.
- Gersick, C.J.G. (1991), “Revolutionary change theories. A multilevel exploration of the punctuated equilibrium paradigm”, *Academy of Management Review*, Vol. 16 No. 1, pp. 10–36.
- Gil, A.C. (2009), *Como elaborar projetos de pesquisa*, 4. ed., Atlas, São Paulo.
- Goldman, S.L., Nagel, R.N. and Preiss, K. (1995), *Agile competitors and virtual organizations: Strategies for enriching the customer*, Van Nostrand Reinhold, New York.
- Gottschalk, P. (2005), *E-business strategy, Sourcing and Governance*, Igi Global.
- Greiner, L.E. (1997), “Evolution and Revolution as Organizations Grow. A company's past has clues for management that are critical to future success”, *Family Business Review*, Vol. 10 No. 4, pp. 397–409.
- Herz, T.P., Hamel, F., Uebernickel, F. and Brenner, W. (2012), “IT Governance Mechanisms in Multi-sourcing--A Business Group Perspective”, in *Proceedings of the 45th Hawaii International Conference on System Science (HICSS)*, IEEE, Piscataway, NJ, pp. 5033–5042.
- Higgs, M. and Rowland, D. (2005), “All changes great and small. Exploring approaches to change and its leadership”, *Journal of Change Management*, Vol. 5 No. 2, pp. 121–151.
- Huang, R., Zmud, R.W. and Price, R.L. (2010), “Influencing the effectiveness of IT governance practices through steering committees and communication policies”, *European Journal of Information Systems*, Vol. 19 No. 3, pp. 288–302.
- IT Governance Institute (2007), *Cobit 4.1: Framework, Control Objectives, Management Guidelines, Maturity Models*, Meadows, IL, USA.
- Kotter, J. (2012), “How the most innovative companies capitalize on today’s rapid-fire strategic challenges-and still make their numbers”, *Harvard business review*, Vol. 90 No. 11, pp. 43–58.
- Kotter, J.P. (2014), *Accelerate: Building strategic agility for a faster-moving world*, Harvard Business Review Press, Boston MA.
- Kuckartz, U., Dresing, T., Rädiker, S. and Stefer, C. (2008), *Qualitative Evaluation: Der Einstieg in die Praxis*, 2., aktualisierte Auflage, VS Verlag für Sozialwissenschaften / GWV Fachverlage GmbH Wiesbaden, Wiesbaden.
- Luftman, J.N., Lewis, P.R. and Oldach, S.H. (1993), “Transforming the enterprise. The alignment of business and information technology strategies”, *IBM Systems Journal*, Vol. 32 No. 1, pp. 198–221.
- Luna, A.J.H., Costa, C.P., Moura, H.P.d., Novaes, M.A. and do Nascimento, C.A. (2010), “Agile governance in Information and Communication Technologies. Shifting paradigms”, *Journal of Information Systems and Technology Management*, Vol. 7 No. 2, pp. 311–334.
- Luna, A.J.H.d.O., Kruchten, P., E.Pedrosa, M.L.G.d., Almeida Neto, H.R.d. and Moura, H.P.d.M. (2014), “State of the Art of Agile Governance. A Systematic Review”, *International Journal of Computer Science and Information Technology*, Vol. 6 No. 5, pp. 121–141.
- Luna, A.J.H.d.O., Kruchten, P. and Moura, H.P.d. (2013), “GAME. Governance for Agile Management of Enterprises: A Management Model for Agile Governance”, in *Proceedings of the 8th In-*

- ternational Conference on Global Software Engineering workshops (ICGSEW), Bari, Italy, IEEE, Piscataway, NJ, pp. 88–90.
- Madi, T., Dahalin, Z. and Baharom, F. (2011), “Content analysis on agile values. A perception from software practitioners”, in *Proceedings of the 5th Malaysian Conference in Software Engineering (MySEC)*, IEEE, Piscataway, NJ, pp. 423–428.
- March, J.G. (1991), “Exploration and Exploitation in Organizational Learning”, *Organization Science*, Vol. 2 No. 1, pp. 71–87.
- Markides, C. and Charitou, C.D. (2004), “Competing with dual business models. A contingency approach”, *Academy of Management Executive*, Vol. 18 No. 3, pp. 22–36.
- Markides, C.C. (2013), “Business Model Innovation. What Can the Ambidexterity Literature Teach US?”, *Academy of Management Perspectives*, Vol. 27 No. 4, pp. 313–323.
- McKay, J., Marshall, P. and Smith, L. (2003), “Steps towards effective IT governance. Strategic IS planning, evaluation and benefits management”, in *Proceedings of the Pacific Asia Conference on Information Systems (PACIS)*, AISel, p. 65.
- Moore, S. and Barnett, L. (2004), “Offshore outsourcing and agile development”, *Forrester Research, Inc.*
- O’Reilly, C.A. and Tushman, M.L. (2013), “Organizational Ambidexterity. Past, Present, and Future”, *Academy of Management Perspectives*, Vol. 27 No. 4, pp. 324–338.
- Patel, N.V. (2004), “An Emerging Strategy for E-Business IT Governance”, in van Grembergen, W. (Ed.), *Strategies for Information Technology Governance*, Igi Global, pp. 81–98.
- Pereira, R., Almeida, R. and da Silva, M.M. (2014), “IT Governance Patterns in the Portuguese Financial Industry”, in *Proceedings of the 8th International Symposium on Service-Oriented System Engineering (SOSE)*, IEEE, Piscataway, NJ, pp. 4386–4395.
- Pereira, R. and Mira da Silva, M. (2012), “Designing a New Integrated IT Governance and IT Management Framework Based on Both Scientific and Practitioner Viewpoint”, *International Journal of Enterprise Information Systems*, Vol. 8 No. 4, pp. 1–43.
- Peterson, R.R. (2004), “Integration Strategies and Tactics for Information Technology Governance”, in van Grembergen, W. (Ed.), *Strategies for Information Technology Governance*, Igi Global, pp. 37–80.
- Qumer, A. (2007), “Defining an integrated agile governance for large agile software development environments”, *Agile Processes in Software Engineering and Extreme Programming*, pp. 157–160.
- Romanelli, E. and Tushman, M.L. (1994), “Organizational transformation as punctuated equilibrium. An empirical test”, *Academy of Management Journal*, Vol. 37 No. 5, pp. 1141–1166.
- Saetang, S. and Haider, A. (2013), “The impacts of IT governance implementation. A case study on banking industry in Thailand”, in *Proceedings of the Portland International Center for Management of Engineering and Technology (PICMET)*, IEEE, pp. 2619–2627.
- Sambamurthy, V., Bharadwaj, A. and Grover, V. (2003), “Shaping agility through digital options. Reconceptualizing the role of information technology in contemporary firms”, *MIS Quarterly*, pp. 237–263.
- Sambamurthy, V. and Zmud, R.W. (1999), “Arrangements for Information Technology Governance. A Theory of Multiple Contingencies”, *MIS Quarterly*, Vol. 23 No. 2, p. 261.
- Saunders, M., Lewis, P. and Thornhill, A. (2009), *Research methods for business students*, 5. ed., Financial Times Prentice Hall, Harlow.
- Schadewitz, N. and Jachna, T. (2007), “Comparing inductive and deductive methodologies for design patterns identification and articulation”, in *International Design Research Conference IADSR 2007 Emerging Trends in Design Research, 12-15 November 2007*, Hong Kong.
- Schlosser, F. (2012), “Mastering the Social IT/Business Alignment Challenge”, in *Proceedings of the 18th Americas Conference on Information Systems 2012 (AMCIS)*, AIS Electronic Library, pp. 1843–1849.

- Sherehiy, B., Karwowski, W. and Layer, J.K. (2007), "A review of enterprise agility. Concepts, frameworks, and attributes", *International Journal of Industrial Ergonomics*, Vol. 37 No. 5, pp. 445–460.
- Sloane, E., Beck, R. and Metzger, S. (2008), "AGSOA - Agile Governance for Service Oriented Architecture (SOA) Systems. A Methodology to Deliver 21st Century Military Net-Centric Systems of Systems", in *Proceedings of the 2nd Annual IEEE Systems Conference*, IEEE, pp. 1–4.
- Sommer, A.F., Dukovska-Popovska, I. and Steger-Jensen, K. (2014), "Agile Product Development Governance - On Governing the Emerging Scrum/Stage-Gate Hybrids", in Grabot, B., Vallespir, B., Gomes, S., Bouras, A. and Kiritsis, D. (Eds.), *Advances in Production Management Systems. Innovative and Knowledge-Based Production Management in a Global-Local World: IFIP WG 5.7 International Conference, APMS 2014, Ajaccio, France, September 20-24, 2014, Proceedings, Part I*, Springer Berlin Heidelberg, Berlin, Heidelberg, pp. 184–191.
- Symons, C. (2005), "IT governance framework", *Forrester Research*.
- Tushman, M.L., Newman, W.H. and Romanelli, E. (1986), "Convergence and Upheaval. Managing the Unsteady Pace of Organizational Evolution", *California Management Review*, Vol. 29 No. 1, pp. 29–44.
- Tushman, M.L. and O'Reilly, C.A. (1996), "Ambidextrous Organizations. Managing Evolutionary and Revolutionary Change", *California Management Review*, Vol. 38 No. 4, pp. 8–29.
- van Grembergen, W. (Ed.) (2004), *Strategies for Information Technology Governance*, Igi Global.
- van Grembergen, W. (2013), "Introduction to the Minitrack "IT Governance and its Mechanisms"", in Sprague, R.H. (Ed.), *Proceedings of the 46th Annual Hawaii International Conference on System Sciences (HICSS)*, IEEE, Piscataway, NJ, p. 4394.
- van Grembergen, W. and de Haes, S. (2005), "Measuring and improving IT governance through the balanced scorecard", *Information Systems Control Journal*, Vol. 2 No. 1, pp. 35–42.
- van Grembergen, W., Haes, S. de and Guldentops, E. (2004), "Structures, processes and relational mechanisms for IT governance", *Strategies for information technology governance*, Vol. 2 No. 4, pp. 1–36.
- van Roosmalen, M.W. and Hoppenbrouwers, S. (2008), "Supporting corporate governance with enterprise architecture and business rule management. A synthesis of stability and agility", in *Proceedings of the International Workshop on Regulations Modelling and Deployment (ReMoD'08)*, CEUR-WS.org, pp. 13–24.
- Vejseli, S. and Rossmann, A. (2017), "The Impact of IT Governance on Firm Performance A Literature Review", in *Proceedings of the 21st Pacific Asia Conference on Information Systems (PACIS)*, AIS Electronic Library.
- Weill, P. (2004), "Don't just lead, govern. How top-performing firms govern IT", *MIS Quarterly Executive*, Vol. 3 No. 1, pp. 1–17.
- Weill, P. and Ross, J. (2005), "A matrixed approach to designing IT governance", *MIT Sloan Management Review*, Vol. 46 No. 2, p. 26.
- Weill, P. and Ross, J.W. (2004), *IT governance: How top performers manage IT decision rights for superior results*, Harvard Business School Press, Boston, Mass.
- Yang, C. and Liu, H.-M. (2012), "Boosting firm performance via enterprise agility and network structure", *Management Decision*, Vol. 50 No. 6, pp. 1022–1044.
- Zimmer, M., Baars, H. and Kemper, H.-G. (2012), "The Impact of Agility Requirements on Business Intelligence Architectures", in *Proceedings of the 45th Hawaii International Conference on System Science (HICSS)*, IEEE, Piscataway, NJ, pp. 4189–4198.