

Diminishing the Gap Between IT Governance Maturity Theory and Practice: Renewing the Approach

Daniël Smits, Twente University, Enschede, Netherlands

Jos van Hillegersberg, Twente University, Enschede, Netherlands

ABSTRACT

IT governance research suggests the existence of a gap between theoretical frameworks and practice. Although current ITG research is largely focused on hard governance (structure, processes), soft governance (behavior, collaboration) is equally important and might be crucial to close the gap. The goal of this study is to determine what IT governance maturity models are available and if there remains a mismatch. The authors conducted a systematic literature review to create an overview of available IT governance maturity models. The study shows five new IT governance maturity models were introduced. Only one of the new IT governance maturity models covers hard and soft IT governance in detail. This model and corresponding instrument was used to illustrate its usability in practice. The authors demonstrate that combining the instrument with structured interviews results in a usable instrument to determine an organization's current maturity level of hard and soft IT governance.

KEYWORDS

Collaboration, Design Science, Informal Organization, IT Governance, IT Governance Maturity, Leadership, Organizational Culture, Soft Governance

INTRODUCTION

IT governance is a relatively new topic (Van Grembergen, 2004), with the first publications appearing in the late 1990s. The number of IT governance publications began to grow from 2006/2007 (Smits & van Hillegersberg, 2014a). It is widely acknowledged that corporate governance and IT governance are related. However, little is known regarding how this relationship actually works. Corporate governance is of “enormous practical importance” (Shleifer & Vishny, 1997). Various publications suggest that IT governance constitutes an integral part of corporate governance (ITGI, 2003; Lainhart & John, 2000; Van Grembergen, De Haes, & Guldentops, 2004). Corporate governance issues cannot be solved without considering IT (Van Grembergen et al., 2004). We define IT governance as the structures, process, cultures and systems that engender the successful operation of the IT of the (complete) organization, an adaptation of the corporate governance definition of Keasey and Wright (1993). Thus, IT governance is not restricted to the IT organization.

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The frameworks used for IT governance vary considerably, as can be seen in several global surveys from the ITGI addressed to 749 CEO-/CIO-level executives in 23 countries, and summarized in Table 1 (ITGI, 2008, 2011). To illustrate the diverse nature of these frameworks, we added the column 'Content'. Unfortunately, the most recent global survey from 2016 does not include a question concerning the use of IT governance frameworks.

With 13% growth for Six Sigma, 12% growth for PMI/PMBOK, 11% growth for security frameworks, 4% growth for ITIL, 3% growth for TOGAF (from 0), and a 1% decrease for COBIT in a period of four years, there is no clear leader. Furthermore, it is clear that more general frameworks like Six Sigma are fast growers, too. The relationship with project and portfolio management frameworks like PMI/PMBOK and PRINCE2 as well as architecture frameworks like TOGAF can be illustrated with cases found in academic research in which IT governance is implemented using portfolio management and architecture (Wittenburg, Matthes, Fischer, & Hallermeier, 2007).

The latest COBIT version is COBIT 2019, released at the end of 2018, shortly after the literature review in this study (ISACA, 2018). The penultimate release is COBIT 5.0 (ISACA, 2012). COBIT uses a classification consisting of five focus areas: strategic alignment, value delivery, resource management, risk management and performance measurement.

Previous research indicated a mismatch between the IT governance literature and practice (ITGI, 2011; Smits & van Hillegersberg, 2013, 2014a). These studies are based on surveys and systematic literature reviews using abstract and citation databases until spring 2013. New IT governance maturity research covering this gap might have been published. This review was intended to determine if new IT governance maturity models have become available recently.

Table 1. Use of IT governance frameworks (ITGI, 2008, 2011)

Framework	Content	2011	2007	2005
ITIL or ISO/IEC 20000	Service management	28%	24%	13%
ISO/IEC 17799, ISO/IEC 27000 or other security frameworks	Information security	21%	10%	9%
Internally developed frameworks	Unknown/differ		14%	33%
Six Sigma	Quality	15%	2%	5%
COBIT (ISACA)	IT governance	13%	14%	9%
PMI/PMBOK	Project management	13%	1%	3%
Risk IT (ISACA)	Risk management	12%		
IT assurance framework (ISACA)	IT assurance	10%		
CMM or CMMI	Software development or process improvement	9%	4%	4%
ISO/IEC 38500	IT governance	8%		
BMIS (Business Model for Information Security, ISACA)	Information security	8%		
PRINCE2	Project management	6%	2%	
Val IT (ISACA)	Enterprise value (IT investments)	5%	0%	
TOGAF	Enterprise architecture	3%	0%	
COSO ERM	Enterprise risk management	2%	1%	4%

Hard and Soft Governance

Hard governance can be seen as the organizational perspective and soft governance as the social perspective on IT governance. Contemporary IT governance literature is mostly directed at the hard part of governance, focusing on organizational structures and processes and on relational mechanisms (Smits & van Hillegersberg, 2014b). We relate soft governance to human behavior, collaboration and organizational culture. Relational mechanisms are related to soft governance too but more narrowly defined (see Table 2).

The division of governance into hard and soft governance has been made in the past (Cook, 2010; Moos, 2009; Tarmidi, Abdul Rashid, & Abdul Roni, 2012; Tucker, 2003; Uehara, 2010). For instance, Moos (2009) differentiates between legislation and “softer” forms of governance based on persuasion and advice or obligation, precision and delegation (Tucker, 2003). Related to participatory governance, Cook (2010) writes that “rules and structures” are “far less effective” than soft governance. Uehara (2010) and Tarmidi et al. (2012) separate hard and soft IT governance using the soft power theory.

Joseph Nye (1990) founded the soft power theory, pertaining to “intangible power resources such as culture, ideology, and institutions.” The basic concept of power is the ability to influence others to get them to do what you want. According to Nye (2004), this can be achieved in one of three major ways: threaten them with sticks; pay them with carrots; or attract them or co-opt them, so that they want what you want. If you can attract others to want what you want, it costs you much less in carrots and sticks.

Nye’s research attended to world politics, but the same is true on a much smaller scale. Parents of teenagers know that if they shape their children’s beliefs and preferences, they have greater and more enduring power than if they merely rely on active control. The same is true for members of an organization. In “The Bases of Social Power”, French et al (1959) describe six bases of power: rewarding (carrots), coercive (sticks), legitimate (functions or roles), referent (soft power), expert (knowledge and science) and informational (relevant information or argument). Referent power concerns the association between individuals or groups and is strongly related to soft governance.

Thus, frameworks which lack sufficient attention to the social aspects of IT governance are incomplete. In a systematic literature study Smits and van Hillegersberg could not find a maturity model for IT governance that covers process, structure, human behavior and organizational culture (2013). They conclude “there is a need for a framework and/or an IT governance maturity model which combines elements like process, structure and planning as can be found in current frameworks with elements related to social aspects like behavior, collaboration and culture” (Smits & van Hillegersberg, 2014a). The previously mentioned systematic literature study was conducted based on data available in abstract and citation databases until May 2013. In the systematic literature review that forms part of this study we added some overlap and selected papers from 2012 until the present day (spring 2018).

Table 2. Structures, processes and relational mechanisms for IT governance, adopted from van Grembergen et al. (2004)

Structures	Processes	Relational Mechanisms
<ul style="list-style-type: none"> - Roles and responsibilities - IT strategy committee - IT steering committee - IT organization structure - CIO on Board - Project steering committees - e-Business advisory board - e-Business task force 	<ul style="list-style-type: none"> - Balanced (IT) scorecards - Strategic Information Systems Planning - COBIT and ITIL - Service Level Agreements - Information economics - Strategic Alignment Model - Business/IT alignment models - IT Governance maturity models 	<ul style="list-style-type: none"> - Active participation by stakeholders - Collaboration between stakeholders - Partnership rewards and incentives - Business/IT colocation - Shared understanding of business/IT objectives - Active conflict resolution - Cross-functional business/IT training - Cross-functional business/IT job rotation

Maturity Models

The maturity concept emerged out of quality management. The concept of maturity stages was introduced by Crosby” (1979) with his “quality management process maturity grid”. Maturity models essentially represent theories concerning how organizational capabilities evolve in a stage-by-stage manner along an anticipated, desired or logical maturation path (Pöppelbuß & Röglinger, 2011). The concept of organizational capabilities is based on the resource-based-view used in the strategic management literature (Ulrich & Smallwood, 2004; Wernerfelt, 1984). An organization’s capability is “the ability of an organization to perform a coordinated set of tasks, utilizing organizational resources, for the purpose of achieving a particular end result” (Helfat & Peteraf, 2003). The maturing entities in this research are organizational capabilities.

Maturity models can be seen as artefacts to determine a company’s status quo and as “deriving measures for improvement” (Becker, Knackstedt, & Pöppelbuß, 2009). The most well-known maturity model in the IT sector is CMM, of which version 1.0 was published in 1991 (Paulk et al., 1991). CMM was developed by the Software Engineering Institute (SEI) at Carnegie Mellon University. Interest in maturity emerged from quality management (SEI, 2010). In the 1930s, Walter Shewhart (1931) began his work on process improvement with his principles of statistical quality control. Since the launch of CMM, hundreds of maturity models have been launched across a multitude of domains by researchers and practitioners (De Bruin, Freeze, Kaulkarni, & Rosemann, 2005). CMM also has its critics (Bach, 1995; Ngwenyama & Nielsen, 2003), who especially argue that it places too much emphasis on processes, and that in order to improve organizations, attention must be paid to other aspects such as people, culture or leadership as well.

The answer to the question “What makes organizational capabilities mature?” depends on which rationale is embraced, and tends to focus on the leverage points used in organizational change initiatives (Maier, Moultrie, & Clarkson, 2012). We adopt the definition of Becker et al. (2009) of the maturity model: “A maturity model consists of a sequence of maturity levels for a class of objects. It represents an anticipated, desired, or typical evolution path of these objects shaped as discrete stages. Typically, these objects are organizations or processes”. The aims of maturity models are “raising awareness” of what is going wrong, and “benchmarking” to compare results across organizations (Maier et al., 2012). Therefore, maturity models are helpful in finding better solutions for change. However, in order to be made useful, they must be applied to a substantial number of companies for valid comparison.

Purpose

The purpose of this study was to answer the following two research questions:

RQ1: Which new IT governance maturity models are available in the literature?

RQ2: Is there (still) a mismatch between IT governance maturity practice and theoretical frameworks?

This paper is organized as follows. This section introduces the topics of this study. The next section presents the research method. The results of the systematic literature review and a case study example using a new IT governance maturity model are described in the results section. The discussion section includes a review of each of the eight groups of maturity-related papers we found during the systematic literature review as well as a discussion of the use of one of these maturity models in a case study. The last section includes the conclusion, limitations and implications for future research.

Research Method

Our research process was as follows:

1. Conduct a systematic literature review to locate recent literature on ITG maturity;
2. Create an overview of available ITG maturity models for hard and soft governance;

3. Demonstrate the use of a maturity model for hard and soft governance in a case study;
4. Evaluate the results of the study.

This section describes the systematic literature review and the case study protocol applied in this study.

Systematic Literature Review

A systematic literature review is a methodologically rigorous review of research results. It is also intended to support the development of evidence-based guidelines for practitioners (Kitchenham et al., 2009). This research is partly based on previous research, and as such we conduct a systematic literature review, as used in IS and the social sciences (Kitchenham, 2004; Petticrew & Roberts, 2006).

Early research on IT governance included contingency studies from the organization sciences (Brown, 1997; Sambamurthy & Zmud, 1999). Method engineering provided frameworks and processes to assemble IS development methods from existing methodologies and inventories (Brinkkemper, 1996).

Our systematic literature review on IT governance was set up and conducted using Scopus. Scopus is the world's largest abstract and citation database and includes scholarly journals and book publishers.

Previous research indicated a mismatch between the IT governance literature and practice (ITGI, 2011; Smits & van Hillegersberg, 2013, 2014a). These studies are based on surveys and systematic literature reviews using abstract and citation databases until spring 2013. To avoid missing relevant papers, we added some overlap and selected papers from 2012 until the present day (spring 2018).

In Scopus, we first selected papers related to "IT governance", "governance of IT", "IS governance" or "enterprise governance" in the title, abstract, or author keywords. Within this large set of papers, we selected papers related to "mature" or "maturity". A manual selection was used thereafter to determine which papers were in scope. To be included in scope, the paper had to satisfy the following rules: (a) the topic must be IT governance (b) the keyword "mature" or "maturity" must be used relating to IT governance (c) the publication year must be 2012 or later (d) the paper must be written in English, German or Dutch (e) claims must be justified or based on research and (f) duplicate studies were excluded.

Case Study and Case Study Protocol

During the systematic literature review we found five (relatively) new IT governance maturity models partly based on previous research. Only two of these groups are based on frameworks covering hard and soft IT governance: COBIT 5.0 in a holistic way and the MIG model in a more practical way. The MIG model is a focus area maturity model for hard and soft IT governance designed using design science. The MIG model is discussed in detail in the discussion section as one of the groups of maturity-related research papers.

In this study, we use the MIG model and the corresponding MIG assessment instrument (Smits & van Hillegersberg, 2014b; Smits & van Hillegersberg, 2015). In the current state, the instrument must be used combined with semi-structured interviews to create useful results. For the application of the MIG assessment instrument, we used a case study protocol. The protocol used for the application of the instrument was as follows:

1. A group of participants in a strategic role from business and IT were selected and invited to participate in the study;
2. Each participant was asked to fill out the MIG instrument before the interview;
3. The researcher created the results sheet using the instrument and brought it as a handout to the interview;

4. During the semi-structured interview, the results for each focus area were discussed. Where relevant, the results were changed based on the opinion of the interviewee. Besides the focus areas. The interviews lasted an average of one hour and were recorded;
5. Following the interviews, the results were summarized and sent to every participant for validation;
6. A report summarizing the results of the study were written, presented and discussed with the client and the participants;
7. The participants were invited to fill out a short evaluation questionnaire.

Having completed the interviews, the results were combined and analyzed. The results of the analysis, conclusions and recommendations were anonymized, summarized in a report and presented to the sponsor of the case study within the organization.

The evaluation form used was created based on an evaluation template for expert reviews of maturity models (Salah, Paige, & Cairns, 2014). The participants were invited to fill out the evaluation questionnaire after the interview.

RESULTS

The Systematic Literature Review

Previous research resulted in a set of 659 documents (Smits & van Hillegersberg, 2014a). The update was conducted between January and April 2018 and resulted in an additional set of 471 documents. After removing duplicates and other types of documents (no research papers), a set of 1,094 documents remained. Having applied the other selection criteria and removing the papers previously found, a set of 245 new papers remained.

The Complete Set

The oldest documents in our complete set of 576 documents came from 1995 but the vast majority were published from 2006 (see Table 3).

Documents from 2017 and 2018 were limited owing to the time of the selection and the fact that it always takes some time before publications are added to the databases.

New IT Governance Maturity Papers

The update of the systematic literature review was conducted between January and April 2018. This resulted in an initial list of 70 new papers discussing IT governance maturity between 2012 and 2018.

After implementing the selection criteria, 34 papers remained. For each paper, we determined which framework or model was used. The results of this analysis are summarized in Table 4.

As shown in earlier reviews, COBIT was used in the largest proportion of papers (13) and in five additional papers was combined with other frameworks. A detailed discussion of each group is included in the discussion section. In the literature review we found five (relatively) new IT governance maturity models partly based on previous research: group 3 until 7. All groups are discussed in the next section.

Results of the Case Study Example Using the MIG Model

The case study was conducted at a central department of a large ministry in the Netherlands. The number of employees in full-time equivalents is 110,000. The central department is located in The Hague and has many other branches throughout the country. This organization was known very well by one of the researchers because he has been working for this organizations as an employee for a few years at the time of the assessment. Thus, besides the results of the assessment and the interviews we already knew a lot about the strong and weak points of the organization. This was very useful when interpreting the results, deciding on the topics to go in depth during the interviews and when

Table 3. Year of publication of the documents

Year	Previous	New	$\Sigma\#$	%
1995–2002	12		12	2
2003–2005	21	2	23	4
2006	24	2	26	5
2007	21		21	4
2008	35	4	39	7
2009	41	5	46	8
2010	55	5	60	10
2011	67	1	68	12
2012	50	10	60	10
2013	5	45	50	9
2014		59	59	10
2015		33	33	6
2016		35	35	6
2017		33	33	6
2018		12	12	2
<i>Total</i>	<i>331</i>	<i>245</i>	<i>576</i>	<i>100</i>

Table 4. New papers describing IT governance maturity-related research

#	Model/Framework Found	#	List of the Papers Found
1	COBIT 4.0; 4.1 and 5.0.	13	(Ateşer & Tanriöver, 2014; Ibrahim & Nurpulaela, 2016; Ishaq et al., 2017; Janahi, Griffiths, & Al-Ammal, 2015; Joshi, Bollen, Hassink, De Haes, & Van Grembergen, 2018; Kosasi, 2015; Putri, Lestari, & Aknuranda, 2017; Safari & Jiang, 2018; Seyal, Poon, & Tajuddin, 2016; Spremić, 2012; Surya & Surendro, 2014; Tambotoh & LATUPERISSA, 2015; Vucec, Spremić, & Bach, 2017)
2	COBIT 4.1 or 5.0 combined with other frameworks.	5	(Dalipi & Shej, 2012; Ngoma & Erasmus, 2017; Ningsih, Sembiring, Arman, & Wuryandari, 2013; Wahab & Arief, 2015; Wijayanti, Setiawan, & Sukanto, 2017)
3	M2A3-IT governance model.	2	(de Moraes, 2013, 2014)
4	Nine IT governance categories.	2	(Shaw, Cheng, & Shih, 2013; Shaw, Cheng, Shih, & Chang, 2013)
5	Green IT governance model.	1	(N. K. S. Putri & Muljoredjo, 2014)
6	IT governance and operation framework.	1	(Zhu & Li, 2014)
7	MIG model.	4	(Smits & van Hillegersberg, 2013, 2014b; Smits & van Hillegersberg, 2015, 2017)
8	Other types of maturity related research.	6	(Alagha, 2013; Albayrak & Gadatsch, 2012; Bianchi & Sousa, 2015; Elagha, 2014; Saetang & Haider, 2012; Yaokumah, Brown, & Adjei, 2015)
	Total	34	Papers

assessing differences between the results of the participants of the study and our experiences as a member of the organization.

Seven participants were invited to participate in this case study. All participants were working in the same central department (CIO office) and were involved in strategic business and IT discussions with respect to the entire organization. Three managers (the managers of the advice, the project and the risk departments) and four specific roles (the coordinator for internal policies, the coordinator for enterprise architecture, a program manager and a project manager).

Table 5 displays the results before and after the interviews for the department and the corporate view.

The results summarize the responses from seven participants. The numbers before and after the interviews are separated by a semicolon. The number of available levels is contingent on the focus area. An example for continuous improvement: in the department view the result of the assessment indicated level A on seven occasions. During the interviews six participants agreed with level A. One participant explained why it should be level B. Empty fields reflect levels that were absent from the results sheet of the assessment and the corrected results following the interviews.

In general, there were considerable variations in the results, as demonstrated by the assessments and opinions of the participants for the soft governance part compared to fewer variations for the hard governance part. The motivation for the changes provides some idea of the ways in which participants interpreted the focus areas. Some participants changed their opinion after an additional explanation of the focus areas, partly accounting for the changes.

In Table 6, Min, Max, Avg. and σ are the minimum, maximum, average and standard deviation of the values/percentages between the participants' answers, respectively. "Agree" and "Not agree" illustrate whether the participants agreed with the result of the assessment.

The participants agreed with almost all values shown in the result sheets. Only for "culture" there were some minor remarks regarding the values (each remark is counted separately in Table 6). Three out of seven participants considered some culture-values a little too high or too low: the value for Market was considered too high (2x) or too low (1x); Adhocracy and Clan were considered too low and hierarchy too low (1x) or too high (1x).

DISCUSSION

In part A of this section we will discuss each of the eight groups of maturity-related papers. COBIT was used in the largest proportion of maturity-related papers (group 1) and in five additional papers it was combined with other frameworks (group 2). In the literature review we found five (relatively)

Table 5. Results of the hard and soft governance (before; after)

Governance/Focus Area		Department View						The Entire Organization					
		A	B	C	D	E	F	A	B	C	D	E	F
Soft governance	Continuous improvement	7;6		0;1				7;6	0;1				
	Leadership	1;0	0;1	0;1	3;3	0;1	3;1	4;1	3;3	0;2			0;1
	Participation	6;3	1;3		0;1			7;5	0;2				
	Understanding and trust	4;0	1;3	2;3	0;1			6;4	1;2	0;1			
Hard governance	Functions and roles	4;0	0;4	1;1	2;2			4;3	1;2	1;1	1;1		
	Formal networks	4;1	1;2	1;3	1;1			5;1	1;3	1;3			
	IT decision-making	6;3	1;2	0;2				7;4	0;1	0;2			
	Planning	5;1	2;4	0;2				5;2	2;4	0;1			
	Monitoring	4;2	2;2	1;3				5;3	2;2	0;2			

Table 6. Results of the context, after the interview

Governance/ Focus Area		Department View						The Entire Organization					
		Min.	Max.	Avg.	σ	Agree	Not Agree	Min.	Max.	Avg.	σ	Agree	Not Agree
Context	Culture												
	- Clan	17.5	60.0	33.7	8.9	7	0	12.2	32.5	23.4	7.5	6	1
	- Adhocracy	12.4	28.0	22.2	3.4	6	1	9.2	24.2	16.0	4.8	6	1
	- Market	5.8	27.4	14.6	7.4	5	2	5.0	37.5	17.2	11.0	5	1
	- Hierarchy	8.4	42.4	29.6	10.2	7	0	26.7	61.7	43.4	12.1	5	2
	Informal organization	26%	54%	41%	8%	7	0	23%	60%	38%	14%	7	0

new IT governance maturity models partly based on previous research: M2A3-IT governance model (group 3); Nine IT governance categories (group 4); Green IT governance model (group 5); IT governance and operation framework (group 6); the MIG model (group 7). The final group consists of other types of maturity-related research (group 8).

The third step in this study was demonstrating the use of a maturity model for hard and soft governance in a case study. The MIG model covers hard and soft IT governance in a practical way. Part B of this section covers a discussion of the case study conducted using the ITG maturity model described in group 7.

COBIT

The largest part of the set papers is based on COBIT (13) or COBIT combined with other frameworks (5). ISACA first released COBIT in 1996. There have been several iterations of the COBIT framework to the current version of COBIT 5. COBIT has transitioned from an IT auditing framework towards a broader IT governance and management framework with management tools including metrics, critical success factors, maturity models, and tools. Most papers are based on COBIT 4.1 (14 out of 18). Although COBIT version 5 has been published, COBIT 4.1 remains in widespread use in most organizations (Ateşer & Tanrıöver, 2014). Some authors use this as a motivation to select version 4.1 (Ishaq et al., 2017), whereas others do not make an explicit distinction and use the version implemented by a corporation (Vucec et al., 2017).

Besides other changes, COBIT 5.0 now includes a separation between governance and management, integrates the best practices of COBIT 4, Val IT, and Risk IT, and has an improved assessment of process maturity, a core metric in COBIT, and is aligned with international standards (De Haes, Van Grembergen, & Debreceny, 2013). The new governance domain in COBIT 5.0 has five processes that would be in the hands of the board and the most senior management.

Currently (end-2018) the most important IT governance framework for practice is COBIT. The primary focus of COBIT is hard governance. New versions of COBIT display a gradual increase in attention to the soft side of IT governance. In COBIT 5 a first holistic attempt was made to include the soft side. In COBIT 2019 (ISACA, 2018) the component “Culture, Ethics and Behavior” was included as a management objective, adding a soft dimension to the process model of the COBIT framework. Thus, it seems the soft side of IT governance receives more attention. However, human behavior is not only process or structure related. Because COBIT 2019 was released at the end of 2018, the systematic literature review does not include papers based on COBIT 2019.

COBIT Combined With Other Frameworks

The research papers using COBIT combined with other frameworks are very diverse. In these papers COBIT was combined with the service management framework: ITIL (Dalipi & Shej, 2012; Ngoma

& Erasmus, 2017), the open group architecture framework: TOGAF (Ningsih et al., 2013; Wahab & Arief, 2015), a specific IT governance framework used in South Africa: DIPSA (Ngoma & Erasmus, 2017), total quality management: TQM (Dalipi & Shej, 2012) and the business balanced scorecard: BSC (Wijayanti et al., 2017).

M2A3-IT Governance Model

The M2A3-IT governance model is a Maturity Model for Analysis of Alignment of Activities related to IT governance and presented in De Moraes' thesis (2013). The twelve fields of action are a research model to "assess the degree of effectiveness of IT actions to meet the expectations of the Strategic Plan of the Organization" (de Moraes, 2014). The focus of the M2A3-IT governance model is the Assessment Maturity Level. The indicators constructed by the model are "direct, relevant and practical result" indicators (de Moraes, 2013). The twelve fields of action of IT are auditing, compliance, development, knowledge, management, planning, production, project, quality, requirement, security and testing.

In the M2A3-IT governance model, 51 result indicators are defined for these fields of action.

The model defines three maturity levels for a result indicator A until C, in which A corresponds with a "Complete match", B with a "Match with restrictions" and C as "No match" with respect to the expectations of the corporation.

Nine IT Governance Categories

The nine IT governance categories form a research model to investigate the effects of IT governance categories on governance performance (Shaw, Cheng, Shih, et al., 2013), and based on the proposed nine IT governance implement categories of Itakura's (2007) IT governance organizational capabilities view. The nine IT governance categories are: user support, decision-making of top management, review and evaluation IT tasks, ability and evaluation of IT department, risk management, CIO authority, budgeting process, outsourcing and IT project development management. In order to measure the governance performance, Weill and Ross' (2004) formula was used (2004). This formula measures four effects ("cost-effective use of IT", "effective use of IT for growth", "effective use of IT for asset utilization" and "effective use of IT for business flexibility") on a scale of 1 ("Not important") to 5 ("Very important"). This resulted in a minimum and maximum possible governance performance of 20 and 100, respectively.

Green IT Governance Model

The green IT governance model is a research model for private higher education institutions, developed in the capital region of Jakarta, Indonesia (DKI Jakarta) for use in private higher education institutions to minimize energy consumption (pull) and money (push) (N. K. S. Putri & Muljoredjo, 2014). The push model – focusing on vertical activities – was adopted from material resource planning. It uses calculation and production schedule for every level, based on sales forecast. The pull model – focusing on horizontal activities – originated in the just-in-time (JIT) system used in manufacturing. In JIT, production is triggered by customer demand: the users are pulling what they need.

A consortium of leading organizations from industry, the non-profit sector and academia (the Innovation Value Institute) has developed a framework to improve sustainable IT capabilities: the Sustainable ICT-Capability Maturity Framework (Donnellan, Sheridan, & Curry, 2011), based on the IT Capability Maturity Framework (IT-CMF).

The green IT governance model is based on Sustainable ICT-Capability Maturity Framework and the four basic sustainable IT postures of Curry et al. (2012): the cost center, the service center, the investment center and the value center. This results in four horizontal activities: IT data center; IT efficiency technique; facility efficiency technique; integration efficiency technique; and vertical activities depending on material elements, comprising printing-paperless, reuse-recycle and rules-policy.

IT Governance and Operation Framework

Zhu and Li (2014) have designed an IT governance framework, operating model and IT maturity model for IT transformation design. For the governance framework, four mechanisms have been identified and integrated: organization, processes, compliance and transformation. This design was developed based on industry best practices and standards such as COBIT, Val-IT and ITIL. The IT operating model covers IT functional structure, IT operational processes, consistent matching and transformation management.

The IT maturity model was designed based on preliminary findings in a survey involving more than 100 large-scale chemical enterprises between 2008 and 2013. It covers an IT and a business side with five levels each: (1) Technology-driven – customer follows, (2) Controlled – customer chooses, (3) Service-oriented – customer decides, (4) Customer-driven – customer owns, (5) Business-driven – customer directs. The research paper is rather short (four pages), and so provides minimal details about the design process and the survey.

The MIG Model

The MIG model is a focus area maturity model for hard and soft IT governance. A focus area maturity model is a specific type of maturity model in which an incremental improvement is based on the improvement of a collection of focus areas. Focus area maturity models differ from previous approaches by defining a specific number of maturity levels for a set of focus areas, which embrace concrete capabilities to be developed, to achieve maturity in a targeted domain (Sanchez-Puchol & Pastor-Collado, 2017). Focus area models are much less common than fixed-level models. We share the view that different dimensions have different maturity levels and the assumption of the existence of generic maturity levels is an oversimplification.

There is always debate concerning whether higher levels of maturity are better than lower levels (Andersen & Henriksen, 2006). This might not be true for all levels, especially for the highest. This is an issue that will be discussed and eventually solved in a later stage.

Focus area maturity models do not distinguish a fixed number of generic maturity levels, but instead define specific maturity levels for each focus area. A distinguishing characteristic of a focus area maturity model is that it also defines the interrelated ways in which focus areas grow in maturity (see Figure 1).

Figure 1. Focus area maturity model

Domain	Focus area	1	2	3	4	5	6	7	...
Domain 1	Area 1		A		B			C	
Domain 1	Area 2	A				B			
Domain 2	Area 1			A			B		C
Domain 2	Area 2				A			B	
Domain 2	Area 3		A			B	C		D

The first two columns are the domains and focus areas that are relevant to the topic of the maturity model. The number of maturity levels is usually somewhere between 10 and 20. Focus area maturity models do not distinguish a fixed number of generic maturity levels, but instead define specific maturity levels for each focus area. The capabilities are numbered A, B, C and D. The overall maturity of an organization is expressed as a combination of the specific maturity levels. The arrows in the right part of the Figure show the interrelated way in which the capabilities can grow between the focus areas.

The MIG model v. 1.0 is shown in Table 7. The MIG model is a maturity model consisting of three parts: soft governance, hard governance and the context (of an organization). The maturity part of the MIG model consists of hard and soft governance. The MIG model consists of four focus areas for soft governance: continuous improvement, leadership, participation, and understanding and trust. The five focus areas for hard governance comprise: functions and roles, formal networks, IT decision-making, planning and monitoring. There are three focus areas in the context: culture, informal organization and sector. The context is placed outside of the maturity part.

Most maturity models only enumerate maturity levels without considering the situational aspects of the organizational designs (Mettler & Rohner, 2009). Several studies have found that IT governance is situational (ITGI, 2011; Rogers, 2009; Sethibe, Campbell, & McDonald, 2007). This implies that a one-size-fits-all approach to IT governance may not work in all circumstances (Brinkkemper, 1996). Situational maturity models are configured specifically for the (type of) organization or sector at hand (Mettler & Rohner, 2009). The context of an organization can be divided into the internal context (within the organization) and the external context (the environment). Some of the focus areas could be deemed value-free. If a focus area is value-free, it is not possible to improve or grow because the direction of the improvement cannot be determined. These focus areas should be added to the context component as the situational part of the maturity model, as proposed by Mettler and Rohner (2009).

In order to be able to use the MIG model in practice, a corresponding assessment instrument was designed. We used version 3 which includes two views of an organization: department and entire organization.

Table 7. The MIG model version 1.0 (end result)

Governance	Domain	Focus Area	Maturity Model Used
Soft	Behavior	Continuous improvement	Bessant et al. (2001)
		Leadership	Collins (2001)
	Collaboration	Participation	Magdaleno et al. (2011)
		Understanding and trust	Reich and Benbasat (1996)
Hard	Structure	Functions and roles	CMM (Paulk et al., 1991) (used for all five focus areas)
		Formal networks	
	Process	IT decision-making	
		Planning	
		Monitoring	
Context	Internal	Culture	Quinn and Rohrbaugh (1983)
		Informal organization	Using the nine hard and soft governance focus areas.
	External	Sector	Sections of NACE Rev. 2 (Eurostat, 2008)

Other Types of Maturity-related Research

An overview of the rest of the research papers not specifying or using an IT governance maturity model.

A theoretical study using data from 20 Emirati organizations to evaluate how a firm's five governance domains affect the level of IT governance maturity and how a firm's five proposed governance mechanisms shape the overall effectiveness of IT governance (Alagha, 2013). In this research, Dahlberg and Kivijärvi's (2006) five IT governance domains are used: (1) Alignment of business and IT, (2) Monitoring of IT resources, risks and management, (3) Monitoring of IT performance measurement, (4) Evaluation of value delivery, (5) IT governance development. Albayrak and Gadatsch (2012) describe an integrated reference model for IT performance measurement based on a life-cycle model and a performance-oriented framework. The reference model does not include a maturity model.

Bianchi and Sousa (2015) describe the intended design science approach to develop an IT governance model with structures, processes and relational mechanisms suitable for public sector universities with guidelines for effective and efficient IT governance. A short paper – 3 pages – describing a study based on data from 20 organizations within financial services, telecommunications, manufacturing, and public service as identified the most influential IT governance domain for increasing the level of IT governance maturity (Elagha, 2014). It makes use of partial least squares path modelling and finds monitoring of IT performance measurement to be the most influential IT governance domain, and the implementation of a corporate communication systems as the most influential IT governance mechanism.

Saetang and Haider (2012) have developed a research framework for investigating effective IT governance implementation using the Duality of Technology (Orlikowski, 1992) and the Adaptive Structuration Theory (DeSanctis & Poole, 1994). This is interesting because they can be considered alternative representations of hard and soft governance. The Duality of Technology model concerns the dualism between objective, structural features of organizations and subjective, knowledgeable action of human agents. In other words: the interplay between the types of structures inherent to technologies and the structures that emerge in human action as people interact with these technologies.

A study using a survey questionnaire to determine the status of IT governance in universities in a developing country (Ghana) through assessing the drivers and barriers to pursuing formal IT governance has measured the extent to which universities align IT goals with academic and business objectives in order to determine the IT governance maturity level (Yaokumah et al., 2015).

DISCUSSION OF THE RESULTS OF THE CASE STUDY EXAMPLE

Part B of this section covers a discussion of the case study conducted using the MIG model and MIG assessment instrument described in group 7. The results sheet of the MIG assessment instrument was helpful during the semi-structured interviews in discussing the focus areas. Because the organization was well-known by one of the researchers we already knew a lot about the strong and weak points of the organization. During the interviews it emerged that the participants need further or better explanations of the semantics/terms used in the assessment as well as the result-sheets.

The results of the assessment were shared with the participating organization in a so-called MIG report. The MIG report was kept as simple as possible using the data from the assessments and the interviews.

The report structure was as follows:

1. **Introduction:** A short introduction to hard and soft governance maturity and a description of the assessment process;

2. **Summary, conclusion and recommendation:** An anonymous summary including conclusions and recommendation based on the next maturity level based on an estimation of the general maturity level for each focus area;
3. **Results:** A detailed anonymous overview of assessment results (see Figure 2);
4. **Appendices:** All other information such as a summary of the assessment process, an overview of the participants, etc.

We didn't notice substantial differences between the results of the interviews and our own experiences within the organization. This might however be the result of searching for affirmation of our own experiences during the interview, although we kept ourselves strictly to the case-study protocol.

Evaluation of the Case Study

Last step in the case study protocol was an invitation to the participants of the case study to fill out a short evaluation questionnaire. The evaluation form used was created based on an evaluation template for expert reviews of maturity models (Salah et al., 2014). The participants were invited to fill out the evaluation questionnaire after the interview. The questionnaire was returned by six out of seven participants (86%).

The questionnaire used a six-point Likert scale ranging from “Disagree completely” (valued as one point) to “Agree completely” (valued as six points). The self-reported average expertise with IT governance was high: 5.8 on a scale of one to seven (see Figure 3).

The participants were rather positive about the usefulness and usability of the results of the instrument (in most cases being between 4.5 and 5.2 on a scale out of 6). Furthermore, the evaluation scores indicate that combining the instrument with interviews consistently results in higher scores.

The evaluation survey among the participants yielded positive results regarding the usefulness and usability of the results of the instrument and the participants responded positive on the usability of the result sheet. Thus, the MIG instrument can be used in practice, but further improvements are required to reduce the deviation between the results of the instrument and the opinions of the participants, as well as to fix certain deficiencies.

Figure 2. Results of the interviews (simplified end-results, anonymous)

Period: 24-04-2017 until 27-06-2017

[View: Department](#)

Focus area		1	2	3	4	5	6	7	A	B	C	D	E	F
Soft	Continuous improvement	A	A	C	A	A	A	A	6		1			
	Leadership	B	C	D	D	E	F	D		1	1	3	1	1
	Participation	B	B	D	A	B	A	A	3	3		1		
	Understanding and trust	B	C	D	B	C	C	B		3	3			
Hard	Functions and roles	B	D	C	B	B	D	B		4	1	2		
	Formal Networks	B	D	C	A	B	C	C	1	2	3	1		
	IT decision-making	A	C	C	A	B	A	B	3	2	2			
	Planning	B	B	C	B	A	C	B	1	4	2			
	Monitoring	B	B	C	A	C	C	A	2	2	3			
Context	Culture								Min	Max	Avg	Std		
	Clan	33,3	38,3	24,2	30,5	60,0	31,7	17,5	17,5	60,0	33,7	8,9		
	Adhocracy	23,3	20,0	25,0	28,0	23,4	23,3	12,4	12,4	28,0	22,2	3,4		
	Market	8,3	5,8	10,0	15,3	8,4	26,7	27,4	5,8	27,4	14,6	7,4		
	Hierarchy	35,0	35,8	40,8	26,2	8,4	18,3	42,4	8,4	42,4	29,6	10,2		
	Informal organisation								Min	Max	Avg	Std		
	Average soft governance	63%	45%	33%	43%	45%	70%	38%	33%	70%	48%	11%		
	Average hard governance	40%	46%	21%	30%	40%	42%	30%	21%	46%	36%	7%		
Average hard and soft governance	50%	46%	26%	36%	42%	54%	33%	26%	54%	41%	8%			

Figure 3. Evaluation of the use of the MIG instrument

Evaluation of the use of the MIG instrument					
Statement	Disagree Completely		Agree Completely		Score (1 .. 7)
Self-reported comfort with IT governance: (on a 7-point scale)			3	1 2	5,8
Statement	Disagree Completely		Agree Completely		Score (1 .. 6)
The MIG instrument is useful for conducting assessments			3	2 1	4,7
The MIG instrument is useful for the practice in my organization			4	1 1	4,5
The MIG instrument combined with interviews is useful for the practice in my organization			2	1 3	5,2
The results of the MIG instrument can be used in practice in my organization		1	2	2 1	4,5
The results of the MIG instrument combined with interviews can be used in practice in my organization			2	1 3	5,2

CONCLUSION

This section summarizes the answers to the research questions:

RQ1: Which new IT governance maturity models are available in the literature?

The systematic literature review revealed 34 new papers discussing IT governance maturity since 2012. COBIT was used in 13 papers, while five others combined it with other best practice frameworks. In the literature review we found five (relatively) new IT governance maturity models, partly based on previous research: the M2A3-IT governance model, the Nine IT governance categories, the Green IT governance model, the IT governance and operation framework and the MIG model. With one exception, none of the selected maturity model-related papers focused on social or (more specifically) the soft governance-related focus areas included in the MIG model. One exception was the research paper by Saetang and Haider (2012), who selected the Duality of Technology (Orlikowski, 1992) and the Adaptive Structuration Theory (DeSanctis & Poole, 1994) to develop a research framework to investigate effective IT governance implementation. Both can be seen as alternative representations of hard and soft governance. However, the research framework does not include a maturity model.

RQ2: Is there (still) a mismatch between IT governance maturity practice and theoretical frameworks?

Previous research indicated a mismatch between the IT governance literature and practice (ITGI, 2011; Smits & van Hilleegersberg, 2013, 2014a). Besides specific IT governance frameworks like COBIT and ISO/IEC 38500 in practice all kind of frameworks are used (see column 'content' in Table 1). Until recently IT governance frameworks are mostly directed at the hard part of governance. Soft governance is part of everyday practice and needs greater attention. This study revealed five new IT governance maturity models. We found two frameworks covering hard and soft IT governance: COBIT 5.0 in a holistic way and the MIG model in a more practical way.

None of the selected papers demonstrated a practical means of using COBIT 5.0 to measure or improve hard and soft governance. Aside from the MIG model, social elements like collaboration, behavior and culture are not included in these frameworks. Thus, it would appear that as of summer 2018, hard and soft IT governance are covered by COBIT 5.0 in a holistic way and in the MIG model in a more practical way. Applying the MIG model is likely to help narrow the gap between IT governance maturity theory and practice.

The case study example we conducted demonstrated the use of the MIG model and instrument to determine the hard and soft IT governance maturity level of an organization. In general the participants agreed that the instrument is usable when combined with interviews. The MIG model is largely based on frameworks from the appropriate literature (see Table 7). The study demonstrates a way to reduce

the mismatch between hard and soft IT governance maturity theory and practice. Applying the MIG model results in a new approach with a focus on hard and soft IT governance maturity.

LIMITATIONS

The systematic literature review was conducted using Scopus. Scopus is the world's largest abstract and citation database but not always complete and up to date. There might be papers missing. The MIG model and the MIG assessment instrument are designed and used (primarily) in the Netherlands. This also applies to the validation, which was limited to organizations in the Netherlands and large multi-nationals, varying widely in size and industrial sector. It would be interesting to use and validate the model in other countries.

FURTHER RESEARCH

The MIG model is likely to help narrow the gap between IT governance maturity theory and practice, however the model is not yet complete. The MIG model is a focus area maturity model, but dependencies between the identified capabilities and a positioning of the capabilities in a matrix are missing. This also applies to the availability of standard or suggested improvement actions to the maturity levels of the focus areas. The MIG instrument was created in Excel, an online version of the instrument might be easier to use.

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Daniël Smits is an independent management consultant and chairman of Dutch KNVI department Governance (the Dutch association of ICT-professionals). He is specialized in governance, enterprise architecture and portfolio management. In 2019 Daniël completed doctoral research at the University of Twente on governance maturity and effectiveness.

Jos van Hillegersberg is a full professor of Business Information Systems at the School of Behaviour, Management and Social Science, University of Twente. He is head of department of the Industrial Engineering and Business Information Systems Group (IEBIS). He is leading several research and university-industry consortia. His research interests include IT Management, Supply chain innovation, Data Science and AI such as multi-agents for B2B integration.