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Dimensions and Operationalisations of IT Governance: A Literature Review and Meta-Case Study

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Abstract
This paper seeks to tackle the current confusion about the constituent dimensions of IT Governance (ITG) and inconsistent operationalisation approaches inhibiting advances in research and organisational ITG practice. Through a structured literature review of ranked high-quality publications augmented by a meta-case study with five underlying projects, we find nine distinct dimensions of ITG. The input-oriented dimensions Compliance Management, IT Investment Management and ITG Improvement have received little attention in earlier conceptualisations, while the more output-oriented dimensions Business/IT Alignment and Business Value Delivery have featured more often in related studies. Scope and application of ITG may depend on the organisational context and the intentional use, such as regulatory or strategic. Depending on the context, more research seems to be warranted to develop context-dependent measurement constructs of ITG that can be compared over studies.

Keywords
IT Governance, IT Risk Management, IT Compliance, IT Operationalisation, IT Measurement Construct, IT Maturity Model, Citation Analysis, and Bibliometrics.

1. Introduction
The increasing complexity of Information Systems (IS), the negative impact of individual defective behaviour, and resulting legal requirements such as the Sarbanes–Oxley Act caused organisations to invest in IT Governance (ITG). However, high expectations of increased transparency and control are often not met (Damianides 2005, p. 77). IS research should provide the valid instruments required by organisations to assess ITG effectiveness for closing this "IT Governance gap" (Raghupathi 2007, p. 95). Current work on ITG cannot satisfy this demand, because it is plagued by an ambiguous definition which facets comprise ITG (Willson & Pollard 2009, p. 98). Second, there is a lack of comprehensive operationalisation approaches capturing all dimensions of ITG. ITG does not exclusively deal with the optimal locus of IT control (centralised / decentralised) (Peterson 2004, p. 9), it includes more dimensions such as managing IT risks and performance (Webb et al.

2006). Another myth is that ITG is a part of IT management (Sohal & Fitzpatrick 2002, p. 98). This leads to our first research question, (i) which dimensions comprehensively cover all facets of ITG?
Measurement is a necessary pre-condition for the effective management of any process (Humphrey 1988, p. 74). Except traditional 6-stage maturity models (see Section 2.2 for difficulties), comprehensive operationalisation of all ITG dimensions is either hardly known or not available. Thus, our second research question asks (ii) which constructs do exist to operationalise ITG and its dimensions? For which dimensions can a lack of constructs be identified?
ITG depends on the organisational situation, or as Xue et al. (2008, p. 70) postulate: "The nature of IT Governance is contingent on the nature of the decision and the context in which the decision is made". Thus, it is expected that organisational context influences ITG operationalisation. As a consequence, our third question enquires (iii) which organisational context variables are used together with the operationalisation of ITG?
This works offers several contributions. First, a comprehensive view on ITG consisting of nine dimensions is developed. Second, an overview of existing and required ITG operationalisation approaches is given. Third, it is demonstrated how publication rankings as well as citation analysis can be combined for scoping. A simple impact score formula applicable with Google Scholar is presented.

2. Related work

Instead of reviewing all work trying to define ITG, only those contributions that endeavoured to decompose ITG and unify definitions are presented. As Webb et al. (2006, p. 7) put it, compiling and delimiting which dimensions are part of ITG and finding an all-embracing view is difficult, because many isolated concepts need to be composed. Second, two basic types of operationalisation used for ITG are discussed: maturity models and indicator constructs.

2.1 Conceptualising IT Governance

Some attempts to conceptualise the core dimensions of ITG have been made. In an analysis of twelve definitions, Webb et al. (2006) found five facets: strategic alignment, business value delivery, performance management, risk management, as well as control and accountability. There is an important difference between elements that define and describe ITG. While defining facets (e.g., risk management) are part of the ITG concept itself, describing elements (e.g., structures, processes) are only related to its application, implementation, and development (Webb et al. 2006, p. 4). Later, Willson & Pollard (2009) add "capability management" as a sixth facet. IT capabilities are "combinations of IT-based assets and routines that support business conduct in value-adding ways" (Sambamurthy & Zmud 2000, p. 108).
Fröhlich et al. (2007) list five ITG domains (strategic alignment, value delivery, resource management, risk management, and performance measurement), which are accompanied by three IT principles: decision rights, organisation, and roles and accountability. Similar to the findings in this study, the ITG domains have different roles. They are connected in a means-end hierarchical pyramid, with value delivery as top goal supported by strategic alignment and risk management. Resource management is at the base of the pyramid. Performance measurement connects the other four domains by assessing their quality.

Attempting to better integrate different views on ITG, Dahlberg & Kivijärvi (2006) identified the following dimensions: resource management, risk management, performance management, alignment of business and IT, IT Governance development, business value delivery, decision rights, legal compliance, and IT service management. Robinson (2005) identifies three objectives (regulatory and legal compliance, operational excellence, and risk management and optimisation) as well as five functions (value creation, value delivery, value preservation, resource management, performance management, and oversight) as ITG dimensions.

2.2 Operationalising IT Governance

Maturity models are a common approach for estimating the achieved ITG quality levels. Processes under constant statistical control require measurement and appropriate maturity metrics (Humphrey 1988). The COBIT framework slightly adopted the original capability maturity model (ITGI 2007, p. 19). Based on the degree of measurability, five process maturity levels can be identified: non-existent, initial/ad hoc, repeatable but intuitive, defined, managed and measurable, and optimised (Humphrey 1988, ITGI 2007, p. 175).

Maturity models enable the fast identification of ITG improvement areas. Applying technology to control these priority areas can provide superior value (Humphrey 1988, pp. 74, 79). However, a disadvantage is the inconsistent measurement quality across different governance processes and missing transparency on how different maturity indicators are aggregated. Maturity scores are subjective judgements which should be complemented by objective metrics (Simonsson & Johnson 2008, p. 436). Luftman (2003, p. 12) recommends to include the "organization's cultural and social environment" into maturity assessments, because the maturity models' 0-5 scales provide poor means to interpret the results in the light of organisational context.

While maturity models are a practitioner tool, scholars rely on indicator constructs for operationalisation. Not directly observable (latent) constructs are measured by attaching one or many manifest indicators to them (Bentler 1980, p. 420). For instance, Tiwana & Konsynski (2010) operationalise ITG decentralisation by two further formative constructs, IT specification decentralisation and IT implementation decentralisation, which consist of five respectively nine indicator items each (second-order measurement model).

Organisational contingencies are frequently operationalised by mediator and moderator variables. A mediator constitutes and explains the relationship between an independent and a dependent variable. In contrast, a moderator modifies the direction or strength of a relationship (Baron & Kenny 1986). For example, organisational size could be a moderator that increases the contribution of IT risk management to ITG for larger organisations.

3. Method

A structured and bibliometric literature review has been conducted (Harzing & van der Wal 2008). Considering only high impact publications reveals the prime conceptualisations (search track 1) and operationalisations (search track 2) of ITG. Further support is provided by a case study with a domain expert from a major IT consultancy. A meta-view on the experts' client projects is gained, leveraging numerous diverse organisational contexts.

3.1 Literature review

The literature search is restricted to a period of 10 years and 10 months from 2001 to 2011, thus avoiding outdated ITG conceptions. Using Google Scholar (English), the search was conducted in November 2011. Google Scholar is appreciated for its comprehensive

coverage of conference proceedings and openness allowing everyone to replicate results (Harzing & van der Wal 2008). Conferences should be ranked in the ARC's Excellence in Research for Australia conference list (ERA 2010). Journals should be listed in the ABS's Academic Journal Quality Guide Version 4 (ABS 2010). Our work focuses on rigorous academic publications and thus ITG frameworks such as COBIT and ITIL are excluded. A cumulative keyword phrase search is performed (see Table 1). The stop-word phrase 'SOA XBRL "data governance" ' was used to exclude not ITG-relevant documents related to Service Oriented Architecture governance, the eXtensible Business Reporting Language (XBRL), and data governance. A pre-test with three phrases revealed that the system relevance is heavily diminished between retrieval-positions 25 and 27. Thus, for each keyword phrase, all n relevant documents out of the first 24 hits have been selected.

Keyword phrase	n	Keyword phrase	n	Keyword phrase	n
"IT Governance" definition *	10	Defining "IT Governance"	3	"IT Governance" measurement	2
"IT Governance" moderator *	6	"IT Governance" mediator	3	"IT Governance" assessment *	1
"IT Governance" operationalisation	5	"ICT governance" definition	2	"IT Governance" maturity assessment	1
Aspects of "IT Governance"	3	"Information technology governance" definition	2	"IT Governance" organisational context	1
Defining "IS/IT Governance"	3	"IT Governance" construct	2	Measuring "Information technology governance"	1

* Phrases used in relevance pre-test

Table 1: Keyword phrases and retrieved documents

For each relevant document (1) author(s), (2) publication year, (3) title, (4) outlet, (5) publication type (journal / conference), (6) track relevance (1 / 2 / both), (7) ranking, and (8) number of citations have been recorded. With (2), (7) and (8) an impact score[1] in the interval [0,1] has been calculated for each document.

The impact score decreases linearly with publication age and increases linearly with the collected citations (most cited document: 173), since older publications less reflect recent developments and had a longer opportunity to get cited. The different rating schemes (ABS (2010), ERA (2010)) have been transformed into a comparable rank value with 0 representing the worst and 1 the best rating, considering the general lower rigor conference publications. Only the 10 highest impact documents of each search track (see below) have been selected for in-detail analysis.

3.2 Case study

In order to validate and explain the ITG dimensions and operationalisation approaches found in the literature analysis, a single-case study with a domain expert from a major international IT consultancy was conducted. Based on the highest number of relevant ITG client projects conducted, the expert was selected. In the semi-structured interview, five large European companies have been referenced. The open questionnaire with 18 questions was focusing on the (1) expert's role, (2) concept of ITG, (3) organisational context, (4) dimensions of ITG and (5) operationalisation. The nine retrieved ITG dimensions were shown to the expert, who was requested to highlight the three most and discard the three least relevant ones. A tenth nonsense dimension "Requirements Engineering" was hidden among the other dimensions and accurately detected by the expert.

[1] impact = $\frac{1}{30}(\text{year-2001})+\frac{1}{3}\text{rank}+\frac{1}{3}\left(\frac{\text{citations}}{\max(\text{citations})}\right)$ with rank transformation ABS (2010): 1→0; 2→0.3; 3→0.6; 4→0.9; 4*→1 and ERA (2010): A→0.8; B→0.4; C→0.

Data analysis followed Eisenhardt (1989), who closely links the analysis to the data. A code-category system was employed to group similar observed phenomena. Comparing the results of the case study and literature review increases the result's confidence, internal validity, generalisability and conceptual level (Eisenhardt 1989, p. 544).

4. Results

4.1 Literature review

The literature search revealed 45 results in total, of which 19 have been selected for further review (see Table 2). On average, an impact score of 0.4293 was reached (maximum 0.7813, minimum 0.1308). Compared to 26 documents in track 2 (operationalisation), only 9 documents in track 1 (ITG conceptualisation) and 10 documents covering both could be retrieved. A two-sided t-test revealed that the track 2 documents (average impact 0.447) have a greater impact than track 1 documents (average impact 0.385) (T=17.348, df=34, p=0.000). Supposedly, articles providing an operationalisation are more likely to be accepted in high-quality publication outlets. Out of 45 results, 24 are journal articles and 21 conference publications.

Rank	Author (Year)	Publication	Track*	Ranking	Citations	Impact
1	Tanriverdi (2006)	Journal	2	4*	146	0.7813
2	Tiwana & Konsynski (2010)	Journal	2	4*	18	0.6680
3	Weill & Ross (2005)	Journal	both	3	173	0.6667
4	Xue et al. (2008)	Journal	2	4*	38	0.6399
5	Bradley & Pratt (2011)	Conference	2	A	0	0.6000
5	Lazic & Heinzl (2011)	Conference	2	A	0	0.6000
7	Schlosser et al. (2010)	Conference	2	A	1	0.5686
8	Simonsson & Johnson (2008)	Conference	2	A	20	0.5385
9	Heier et al. (2009)	Conference	2	A	1	0.5353
10	De Haes & Van Grembergen (2008)	Conference	2	A	18	0.5347
13	Simonsson & Johnson (2006)	Conference	1	A	31	0.4931
14	Peterson (2004)	Journal	both	2	152	0.4929
17	De Haes & Van Grembergen (2006)	Conference	both	A	29	0.4892
19	Dahlberg & Lahdelma (2007)	Conference	both	A	5	0.4763
20	Raghupathi (2007)	Journal	1	3	29	0.4559
21	Bhattacharjya & Chang (2006)	Conference	1	A	7	0.4468
22	Racz et al. (2010)	Conference	1	B	5	0.4430
23	Luftman (2003)	Journal	both	2	142	0.4403
26	Schwarz & Hirschheim (2003)	Journal	both	3	72	0.4054
…	…	…	…	…	…	…

* 1=ITG conceptionalisation, 2=ITG operationalisation

Table 2: Selected results of literature ranking

Considering the selected papers, 12 preliminary ITG dimensions were found. We did not consider IT Infrastructure choices as an ITG dimension. It primarily deals with specific technology, hardware, and software choices (Sohal & Fitzpatrick 2002, p. 98). In addition, some dimensions were merged. IT Resource Management and IT Capability Management are closely related since organisational IT capabilities are formed by the firm-specific combination of IT resources (Makadok 2001, p. 388). IT Quality Monitoring (only Raghupathi (2007)) can be seen as a sub-function of IT Performance Measurement. Finally, 9 dimensions of IT Governance remained (see Table 4).

19 operationalisations of the ITG dimensions have been extracted in the detailed review (see Table 3). Six metrics could not be assigned to a single dimension, but refer to multiple dimensions or *IT Governance* as a whole. Remarkable is the set of internal and external metrics of Simonsson & Johnson (2008), which can be aggregated by a weighted additive formula. Using a Bayesian network, an overall maturity score with a confidence level can be predicted for the organisation. Because the internal metrics are measured by six maturity levels and the external ones by 5-point Likert scales, Simonsson & Johnson (2008) give a prototype example of how to combine indicator constructs with maturity models. Bradley & Pratt (2011) assess *IT Risk Management* with four items related to the risk increasing novelty and complexity of IT in the organisation. Out of the five operationalisation approaches that could be assigned to the *IT Decision Authority and Responsibility* dimension, three refer to the traditional locus of IT control notion (de-/centralised IT Governance mode) (Tanriverdi 2006, Tiwana & Konsynski 2010, Xue et al. 2008). *IT Investment Management* is only operationalised by Xue et al. (2008) who record the path of organisational actors involved in an IT investment decision (e.g., administrative group – IT professionals – top management). *IT Performance and Quality Measurement* can be measured by the IT Governance Performance metric assessing the quality of services delivered by IT to business (Weill & Ross 2005, p. 29).

Four different operationalisations of the *Business/IT Alignment* dimension have been detected, focusing on strategic alignment (Tanriverdi 2006), explicit (Tiwana & Konsynski 2010), implicit (Schlosser et al. 2010) and combined (De Haes & Van Grembergen 2008) alignment characteristics. *Business Value Delivery* is operationalised by Heier et al. (2009) who employ the three item construct IT Governance Outcome Business Value Creation as dependent variable. Concluding, applied constructs are very different in scope and nature. A comprehensive and integrated ITG operationalisation approach exceeding the rigor level of simple maturity models as well as allowing easy comparison of results is not available.

While most of the 15 retrieved ITG contingency factors deal with the organisation in a narrower sense (e.g., IT agility, IT-line interunit ties, IT unit's business knowledge, line function's technical knowledge, diversification level, cultural strength), Xue et al. (2008) also consider external influences. Only Lazic & Heinzl (2011) include technology-oriented context, such as commonly used IT resources across business units (IT Relatedness). In contrast, Business Process Relatedness measures the degree of commonly used business processes across business units (Lazic & Heinzl 2011). Demographic information (firm size, age of IT unit) is considered by Tiwana & Konsynski (2010).

Dimension	Author (Year)	Construct	Type	Scale	Level	Role*	Items
IT Governance (as a whole)	Bradley & Pratt (2011)	IT Governance	construct	7-point	ordinal	A	4
	Simonsson & Johnson (2008)	Internal Metrics	maturity model	6 levels	ordinal		4
	Simonsson & Johnson (2008)	External Metrics	construct	5-point	ordinal		8
	Heier et al. (2009)	IT Governance processes	construct	5-point	ordinal	Me	3
	De Haes & Van Grembergen (2008)	Perceived effectiveness	maturity model	6 levels	ordinal		10+11+12
	De Haes & Van Grembergen (2008)	Perceived ease of implementation	maturity model	6 levels	ordinal		10+11+12
IT Risk Management	Bradley & Pratt (2011)	IT Risk Management	construct	7-point	ordinal	C	4
IT Decision Authority and	Tanriverdi (2006)	IT Governance mode	trinary variables	3 states	nominal	Mo	

Responsibility	Tiwana & Konsynski (2010)	IT Governance decentralization	formative construct	7-point	ordinal	Mo	5+9
	Xue et al. (2008)	Centralization	interviews / organizational charts				
	Lazic & Heinzl (2011)	IT Governance				A	
	Schlosser et al. (2010)	Control processes	construct	5-point	ordinal	Me	3
IT Investment Management	Xue et al. (2008)	IT Governance	semi-structured interview	4 actors	nominal		3
IT Performance and Quality Measurement	Weill & Ross (2005)	IT Governance Performance	construct	5-point	ordinal		4
Business/IT Alignment	Tiwana & Konsynski (2010)	IT Alignment	construct	7-point	ordinal	C	6
	Schlosser et al. (2010)	Alignment	construct	5-point	ordinal	A	3+3+3
	De Haes & Van Grembergen (2008)	Business/IT Alignment maturity	maturity model	5 levels	ordinal		22
	Tanriverdi (2006)	Relatedness of IT-Strategy-Making processes	reflective construct	5-point	ordinal	A	4
Business Value Delivery	Heier et al. (2009)	IT Governance Outcome Business Value Creation	construct	5-point	ordinal	C	3
Organisational context	Tanriverdi (2006)	Diversification level	metric variable		cardinal	Mo	
	Tanriverdi (2006)	IT agility	construct	7-point	ordinal	Me	6
	Tanriverdi (2006)	IT-line interunit ties	construct	7-point	ordinal	A	3
	Tanriverdi (2006)	IT unit's business knowledge	construct	7-point	ordinal	A	5
	Tanriverdi (2006)	Line function's technical knowledge	construct	7-point	ordinal	A	6
	Tanriverdi (2006)	IT unit age	metric variable	metric	cardinal	A	
	Tanriverdi (2006)	IT investment intensity	construct	7-point	ordinal	A	1
	Tanriverdi (2006)	Firm size	metric variable	metric	cardinal	A	
	Xue et al. (2008)	IT investment characteristics	variable	4-point	ordinal		
	Bradley & Pratt (2011)	Culture strength	construct	7-point	ordinal	Mo	
	Heier et al. (2009)	Implementation factors	construct	5-point	ordinal	Mo	3
	Heier et al. (2009)	Environmental contingencies	construct	5-point	ordinal	Mo	3
	Xue et al. (2008)	External influence	semi-structured interview	6 factors	nominal		4
	Lazic & Heinzl (2011)	IT Relatedness				Me	
	Lazic & Heinzl (2011)	Business Process Relatedness				Me	

*A = antecedent, Mo = moderator, Me = mediator, C = criterion (dependent variable)

Table 3: Operationalisation approaches

Dimension		Definition	Literature support
Input	IT Compliance Management	assurance that IT meets legal, regulatory, and policy requirements, deviations are analysed and deficiencies are managed	Damianides (2005), Racz et al. (2010), Raghupathi (2007)
	IT Risk Management	formal process of identifying and assessing risks as well as treating them reasonably in accordance with the organisation's risk appetite	Bradley & Pratt (2011), Dahlberg & Lahdelma (2007), Racz et al. (2010)

	IT Decision Authority and Responsibility	organisational structures, roles, and authority for decision making and connected responsibilities	Bhattacharjya & Chang (2006), Peterson (2004), Simonsson & Johnson (2006)
	IT Performance and Quality Measurement	valid measurement and monitoring of IT performance and solutions quality in accordance with business requirements	Bhattacharjya & Chang (2006), Raghupathi (2007), Sambamurthy & Zmud (2000), Weill & Ross (2005)
	IT Investment Management	ensuring consistent management of IT priorities and minimal IT investment misguidance	De Haes & Van Grembergen (2006), Luftman (2003), Raghupathi (2007)
	IT Resource and Capability Management	oversight of the allocation of IT resources, routines and operations that enable value delivery	Dahlberg & Lahdelma (2007), De Haes & Van Grembergen (2006), Schwarz & Hirschheim (2003)
	IT Governance Improvement	structures, activities, and relational mechanisms by which the IT Governance capabilities dynamically evolve and improve	Dahlberg & Lahdelma (2007), Peterson (2004), Schwarz & Hirschheim (2003)
Output	Business/IT Alignment	process of balancing IT with business strategies and functions	Henderson & Venkatraman (1993), Luftman (2003), Reich & Benbasat (2000)
	Business Value Delivery	contribution to and realisation of business value by IT	Dahlberg & Lahdelma (2007), Peterson (2004), Raghupathi (2007)

Table 4: Dimensions of IT Governance

In none of the five companies referenced by the expert, the reviewed ITG operationalisation approaches or any other form of ITG measurement is employed. Since ITG is perceived as too complex for measuring it with a small number of indicators, and the creation of success visibility by measurement is not trusted, implementation costs for a measurement system are believed to be too high.

Regarding organisational context, the characteristics (Xue et al. 2008) and intensity (Tiwana & Konsynski 2010) of IT investments are frequently tied to the legal entities of a group of companies. While Heier et al. (2009) consider implementation and environmental factors for IT Governance software, the case suggests process integration as driving factor. Not covered in the literature, IT budget was identified as most important context factor in the case, followed by firm size (Tiwana & Konsynski 2010). Moreover, the IT strategy has direct influence. In addition, it is suggested by the case that technical contingency factors such as the IT Relatedness (Lazic & Heinzl 2011) or IT agility (Tiwana & Konsynski 2010) are seldom considered.

5. Discussion

Implementing ITG is hindered by a blurred understanding of its facets. In this study we intended to (i) comprehensively identify the constituent dimensions of ITG, and give an overview of existing operationalisation approaches of (ii) ITG and (iii) related organizational contexts. 19 out of 45 journal and conference publications having the highest impact have been analysed and a combined explanatory and exploratory meta-case study has been conducted. The findings reveal nine ITG dimensions while only for Business/IT Alignment, IT Decision Authority and Responsibility, and organisational context numerous operationalisation approaches exist.

The results of the literature review leads to a comprehensive conceptual overview of IT Governance (see Table 4), which is generally supported by our case study. The first seven dimensions are ordered by significance for ITG as indicated by the case analysis, while the last two represent the result of successful governance initiatives in an outcome view. Achieving a higher level of excellence in each of the seven input dimensions, is supposed to eventually lead to an overall improvement of ITG. In *Compliance Management* all IT

activities need to be in accordance with applicable law, regulations, standards and policies, which is at the core of ITG (Raghupathi 2007). This also includes compliance with non-binding and ethical standards (Damianides 2005). Deviations should be detected early and managed effectively so that excelling compliance can be turned into a competitive advantage (Damianides 2005, Racz et al. 2010). As found in the case, compliance improvements since the last audit are measurable through auditor checks, although not always integrated into a formal ITG procedure. In *IT Risk Management* a formal procedure should assure that risks originating from IT are constantly identified, assessed according to pre-defined metrics, and properly treated (Bhattacharjya & Chang 2006, Bradley & Pratt 2011, p. 3). The risk exposure should be within the risk appetite of the organisation (Racz et al. 2010). Moreover, the authority for deciding about risks should be defined (Luftman 2003, p. 11). According to the case, primarily business continuity risks are evaluated, but without support of IT risk management software. Regarding *IT Decision Authority and Responsibility* Management the static structure of the organisation (e.g., ITG council, project office), as well as dynamic roles and responsibilities (e.g., supervisors, segregation of duties) must ensure that IT decisions can be carried out effectively (Simonsson & Johnson 2006). It should be defined who is authorised to take which decisions, and which stakeholders carry responsibility (Peterson 2004). The case study reveals that very few companies have well-defined decision rights. Sometimes steering committees and boards are in place, although it is usually the CFO, and not the CIO, who makes the actual ITG implementation decision. *IT Performance and Quality Measurement* provides assurance that IT service outcomes correspond to the required performance and quality levels (Dahlberg & Lahdelma 2007, p. 238). Valid measurement can be achieved with IT and business metrics (Raghupathi 2007, p. 96) reviewed in this paper. Through *IT Investment Management* IT projects in the project portfolio should be prioritised consistently with the organisation's strategic objectives (Weill & Ross 2005, p. 30) and formally assessed for their value contribution (Luftman 2003). Effective controls should be in place that prevent the misguidance of IT investments (Raghupathi 2007, p. 96). However, the case explains that usually no such processes are established and power trades dominate when IT investments are decided by executives. *IT Resource and Capability Management* strives for allocating resources to critical IT infrastructure services in an accountable and verifiable way (Weill & Ross 2005, p. 30). An atmosphere allowing that IT resources (ITGI 2007) can be effectively combined to unique firm-specific IT capabilities must be created (Makadok 2001, p. 388). Capability management should develop new IT capabilities and is tied to organisational learning. *IT Governance Improvement* provides the structural, process and relational IT capabilities to achieve satisfactory ITG itself (Peterson 2004). In an environment with rapidly changing technology, business and legal pressures ITG skills should develop at a similar pace (Schwarz & Hirschheim 2003). However, the case suggests that ITG improvement is virtually inexistent in companies.

Moreover, two dimensions are connected to the "output" of ITG. *Business/IT Alignment* ensures that IT can realise its full business potential, aligning IT with the organisation's overall goals. Not only strategies (Peterson 2004, Simonsson & Johnson 2006), but also IT and business operations should be brought into harmony (Dahlberg & Lahdelma 2007, Henderson & Venkatraman 1993). Finally *Business Value Delivery* seeks to evaluate and optimise benefits and costs as well as opportunities and risks of IT to ensure maximum value creation (Dahlberg & Lahdelma 2007, p. 238, Peterson 2004). ITG should assure business value realisation which is the ultimate goal of all IT usage in organisations (Heier et al. 2009). However, due to the prevailing cost centre view, few organisations can actually measure the value IT generates.

Ensuring that changes to the IT can only be authorised and conducted following a formal change management process could be regarded as an important facet of ITG keeping the risks connected to changes under control (Wickboldt et al. 2009). However, change management was not existent in the results. This missing observation in the data might be explained by the circumstance that the IT Decision Authority and Responsibility dimension already contains rights to decide on changes. A gap between important ITG dimensions suggested by the case and existing operationalisation exists. While for Compliance Management no constructs have been found, only the metric of Bradley & Pratt (2011) is available for IT Risk Management. In contrast, numerous approaches exist to operationalise Business/IT Alignment as well as IT Decision Authority and Responsibility. Noticeable is that cardinal measurement of ITG dimensions are not promoted, because of a reliance on ordinal measurement. However, the usage of cardinal key performance indicators would be desirable for the output dimensions.

Organisational context is frequently operationalised, but this is not considered in maturity models. Considering the *organisational context* is vital for designing ITG arrangements. The case made clear that often *"IT Governance is not embedded into business practice"*, because it is charged with negative emotions. It is perceived as a static artefact impeding organisational change. The concept may be handled more as dynamic concept linked with the currently almost non-existent ITG Improvement dimension. It makes a difference whether ITG is a *"strategic investment or a […] regulatory investment"*. If treated as a "regulatory investment" little would change in its diffusion in the next two years. The case perceives a holistic approach and stakeholder support as crucial. All nine dimensions should be considered across all participants and parts of the organisation. The organisational context should impact on the ITG construct needed.

Limitations of the study are that only ten documents per track were selected for the detailed analysis and that other papers may have been missed. Thus not all operationalisation approaches were potentially considered. Google Scholar does not index all academic publications (Harzing & van der Wal 2008, p. 5). The single-case approach excludes a cross-case analysis, which limits the generalisability of the case findings (Eisenhardt 1989, p. 540).

6. Conclusion and future work

This work gives evidence that IT Governance is a multi-facetted concept involving more dimensions than considered in earlier conceptualisations (Fröhlich et al. 2007, Willson & Pollard 2009). It highlights the inclusion of Compliance Management, IT Investment Management, and IT Governance Improvement into a set of nine ITG dimensions. The dimensions may not have equal significance for ITG and have different natures. While the first seven dimensions have an input effect on IT Governance, the Business/IT Alignment and Business Value Delivery dimensions can be seen as representing the outcomes of ITG. Operationalisation approaches for the dimensions are underdeveloped, but many organisational context metrics are available.

In order to measure ITG from a holistic perspective and foster its improvement, we plan to build upon existing approaches to develop and validate a more comprehensive set of metrics, which comprehensively targets all nine dimensions Moreover, future work will extend the analysis to a larger set of publications. Further studies should elaborate on measurement for ITG dimensions where poor operationalisation is available.

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