An Integrated Framework for IT Governance and the Development and Validation of an Assessment Instrument

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Abstract

Our paper presents a new IT governance framework and introduces an assessment tool designed to measure its effectiveness. The framework builds on the integration between the structural and processes perspectives of IT governance, business-IT alignment, and senior executives' needs. The framework is aimed to help board members, general managers, business line and IT executives to understand, measure, and manage IT governance in their respective organizations as a part of corporate governance. In the paper, special attention is paid to the conceptual validation of the framework and respective assessment instrument.

1 Introduction

IT governance has been the focus of increased attention from both practitioners and researchers. At least the following developments seem to lie behind this phenomenon: (1) Practitioners wish to improve the accountability of IT resource usage. They want to ensure that IT delivers value to business and is aligned with the achievement of the organization's goals. (2) Demands are placed to improve IT disclosure reporting and to comply with new corporate governance reporting requirements such as Sarbanes-Oxley, (3) Corporate governance and performance measurement practices have led to demands that IT should follow the same practices as other functions, such as provide support to organizations' strategy execution and balanced scorecard (BSC) reporting. (4) IT service providers and their customers need to measure and manage the service levels, costs, risks, etc. of IT services. To address these ambitious requirements practitioners – professionals backed by consultants, auditors and researchers - have developed several new frameworks and tools for IT governance, including, most notably, COBIT and ITIL.

In approach and desired outcome, new IT governance frameworks differ from a large body of relevant academic research or require re-interpretation of this knowledge. In academic literature, IT governance – or governance of IT - has mainly been investigated from a structural perspective. Typical research questions include: how to organize the IT function, how to allocate decision rights for main IT decisions, how to align business and IT, and what the antecedents to or consequences of alternative governance and alignment arrangements are. In contrast, COBIT and ITIL approach IT governance from a process perspective (IT service, management, and/or control processes). Process frameworks usually include the organization of the IT function and business-IT alignment but are not limited to structural issues. Rather, organizational structures and decision rights are seen to change with evolving strategy, corporate governance and business needs. Some IT governance researchers have also proposed alternative process approaches and/or the integration of structures and processes [22], [33]. We reason that an IT governance framework should be integrative and include both IT governance process and structure perspectives.

Another feature of the new IT governance frameworks is their strong potential role in advocating the alignment of business with IT. Recent IT governance literature suggests that IT governance is an integral part of corporate governance and meaningful only in this context [14], [19]. IT governance literature provides basis for the link between corporate and IT governance, emphasizing the importance of IT to business execution, IT's relatively large share of corporate investment, and the dependence of organizations on IT. It is noteworthy that similar claims are rare in corporate governance literature. Although business-IT alignment has been investigated to a great extent by researchers, this issue has not been identified explicitly as the fundamental requirement or the basis of IT governance or IT decision-making rights. We argue that an integrative IT governance framework should build upon the alignment of business and IT.

IT governance literature underlines the importance of the role and responsibilities of boards and other senior executives in IT governance and in the importance of aligning business and IT. We argue that an integrative IT governance framework should address the needs of senior executives if IT governance is considered to be an integral part of corporate governance.

The contributions of our paper are that it presents a new

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IT governance framework, a related assessment instrument, and conceptually validates them. Our framework is a system model, which builds on the integration of structures and processes, business-IT alignment, and senior executives' needs. We regard IT governance, notably the integration of IT governance processes and structures and the alignment of business and IT, primarily as an organizational and managerial coordination process. Our framework is aimed at helping board members, general managers, business line and IT executives to understand, measure, and manage IT governance in their respective organizations as a part of corporate governance[1].

To present the proposed framework, instrument, and their conceptual validation we first review the theoretical background of the framework (Section 2). We then illustrate the framework and explain its parts (Section 3). Next we describe how the validation process was conducted and how the framework was used to design an IT governance assessment tool (Section 4). Finally, we discuss the contributions and limitations of our paper (Section 5).

2 Theoretical Background of the Framework

IT has been used in large organizations since 1950s or 1960s, first for internal and then also for external purposes. Technologies, applications, services, professions, and the management of IT have changed profoundly several times over the years. IT was for a long time a domain governed mainly by IT professionals. At the latest during the 1980s or 1990s, the business critical nature of IT had grown so significantly that senior executives were – if nothing else - forced to consider the role of IT in conducting the business (e.g., products, services, activities, processes, risk management, etc.) of their organization or unit. Although it is possible to claim that IT governance has existed as long as IT, the concept has emerged only in recent years.

IT governance, however, has several definitions (see e.g. [33], [19], [36]). We follow the definition of the IT Governance Institute: "IT governance is the responsibility of the board of directors and executive management. It is an integral part of enterprise governance and consists of the leadership and organisational structures and processes that ensure that the organisation's IT sustains and extends the organisation's strategies and objectives" [14].

According to Weill [36], organizations may increase their return on IT investments by as much as 40 % with the help of well-organized IT governance. The COBIT board briefing [14, pages 6-9] describes IT governance motives and results generically. It states that top management is beginning to realize the significant impact that IT has on the success of the enterprise. As this impact depends largely on the way IT is operated and that IT leverages business value, boards and executives need to extend governance to IT and provide necessary leadership, organizational structures and processes. In doing so, top management and "successful enterprises understand the risks and exploit the benefits of IT, and find ways to deal with:

- Aligning IT strategy with the business strategy
- Cascading IT strategy and goals down into the enterprise
- Providing organizational structures that facilitate the implementation of strategy and goals
- Creating constructive relationships and effective communications between the business and IT, and with external partners …"

As these issues have been investigated for some time by IS researchers, it may be worth asking, what is new with the "emerging IT governance paradigm", a term used by Peterson [19]? As with any new paradigm, the emerging IT governance paradigm tries to develop better theories and tools to understand and monitor this phenomenon. As IT governance addresses an established phenomenon, practitioners and researchers can also benefit from the re-analysis of research findings with new insights.

2.1 Integration between the Structural and Process Perspectives of IT Governance

There is a significant amount of research on how to organize and control the IT function and IT decision rights. These topics have mainly been investigated as organizational structures with a more recent label of "IT governance arrangements". For example, according to Sambamurthy and Zmud, IT governance arrangements refer to the patterns of authority for key IT activities in business firms [24]. Weill [36] defines IT governance as specifying the framework for decision rights and accountabilities to encourage desirable behavior in the use of IT.

This line of research dates back to at least 1970s, especially on the topic of whether or not IS/IT organizations (governance arrangements) should be centralized, federal/hybrid, or decentralized (see e.g., [17], [11], [38],

[1] The framework is developed in a multi-organization research project funded by 27 large Finnish organizations and the Finnish Technology Agency. The project started in May 2004 and ended in December 2005. Participating organizations provided input and feedback to the project via workshops and organization-specific meetings. The practical goal was to design a tool for IT Governance, which supports IT governance monitoring and communication between senior executives. The tool is aimed to support the use of COBIT or ITIL by facilitating executive level holistic IT governance reviews. Cross-reference type compliance with COBIT and ITIL allow for its use as an input for more detailed level IT Governance assessments. Differences in frameworks and in the aggregation level of measurements may limit compliance. The tool was used to collect data on IT Governance in the 27 initial participating organizations and later in other organizations. Data is stored in a database to be used for reporting, benchmarking, and in research. One of the aims of the project was to design the tool from a scientifically justified and conceptually validated framework.

[7], [24]). Weill extends the centralization vs. decentralization classification into six IT governance archetypes: business monarchy, IT monarchy, feudal, federal, duopoly, and anarchy [36]. With governance arrangements or archetypes, organizations can better agree on how general, business line and IT managers are involved in key IT activities or decisions and also what those key IT activities or decisions are. Sambamurthy and Zmud [24] summarize research and propose that the key IT activities are IT architecture, IT use, and project management. Weill [36] argues for the centricity of IT decisions instead of activities. He also proposes that IT principles, IT architecture, IT infrastructure strategies, business application needs, and IT investment and prioritization decisions should be the key IT decisions. Weill further divides rights into input and decision rights. Input rights are rights to provide information into key IT decisions.

The two main research questions seem to be: what factors impact the selection of an organization/decision right model, and what are the outcomes of various models in terms of success factors (of IT activities) or desired behavior (of IT use). The latter research question could be reformulated into the question: what IT governance structures should or could be selected to achieve desired business value from IT.

Brown and Magill [7] and Sambamurthy and Zmud [24] used contingency theory with multiple contingencies to consolidate the findings and to describe the selection of alternative governance arrangements. The impacting contingencies, antecedents, or determinants of the modes of IT governance arrangements are corporate governance (overall governance mode, firm size), economics of scope (diversification mode, diversification breath, exploitation strategy for scope economies), and absorptive capabilities (line IT knowledge) [24]. A trend towards the federal arrangement has been detected in many studies. Interestingly, however, same contingency factors can lead to alternative arrangements. In addition, Weill [36] found that the federal archetype was the most popular, especially as the input right archetype. He noticed that the variation in IT governance archetypes was based mainly on the following five factors: strategic and performance goals, organizational structure, corporate experience, size and diversity, and industry and regional differences.

Structural studies typically investigate what factors impact the governance arrangement selection but rarely examine whether or not these arrangements deliver financial or other value to business. These studies often only note that the goal is to provide an effective arrangement for the execution of key IT activities [7], [24]). The study of Weill [36] provides an exception. He introduced top IT governance performer and top financial performer concepts to describe the impact of successful IT governance arrangements. He defined top IT governance performers as organizations whose CIOs rate IT governance as effective in terms of being able to achieve four objectives: (1) cost effective use of IT, (2) effective use of IT for asset utilization, (3) effective use of IT for growth, and (4) effective use of IT for business flexibility. He also defined top financial performers as organizations with high profit (ROE), growth (% change), and asset utilization (ROA) rates over a period of three years.

Based on the reviewed literature, we concluded that there is not enough evidence to postulate how specific IT governance arrangements and business value delivery of IT are related. The achievement of IT governance performance objectives, on the other hand, seems to be related to the business value delivery of IT.

Peterson [19] has been especially critical of traditional structural research, which he calls the "old IT governance paradigm," for paying too much attention to identifying the best way to organize the IT function. He claims that the old paradigm focuses too much on control, authority and efficiency issues from the CIO perspective with an outdated idea of homogenous IT. In the "emerging IT governance paradigm," control is replaced with collaboration, authority with competency, and efficiency with flexibility. Organizations have to respond to faster, more turbulent, increasingly global and digital competition. Organizations need to satisfy complementary, even conflicting value creating drivers, master competence development, and inter- and intra-organizational collaboration. In this environment, the key issues are what complementary business and IT competencies an organization possesses, how it can integrate these competencies, and how the organization can realize and sustain business regardless of the source (see also [25]).

The structural perspective of IT governance needs to be augmented with the process perspective. The process perspective is inherent in several IT governance frameworks or models (see e.g. [14], [22], [18], [33], [15]) and also in the IT governance definition we apply. Processes describe IT decision-making and monitoring processes, and the mechanisms that support IT governance [33].

Figure 1 shows the COBIT IT governance framework model. Similarity to organizational planning process models is evident. First, objectives are set. Set objectives provide direction to the organization and execution of activities. Then the outcomes of activities and decisions are measured. The measured performance is then compared to set targets and improvement activities may take place if results fall short of the set objectives. The objective for the next process round could also be the sustenance of an achieved excellence level.

As an organizational planning process model, Figure 1 follows the classical definition of Fayol (1949) and provides a well tested base for an IT governance framework. The COBIT model of Figure 1, however, has weaknesses. The model provides examples over what kind of objectives could be set, but does not indicate the input factors (antecedents) that impact this activity. Moreover, COBIT documentation describes stakeholder value drivers as the input to the setting of objectives. We regard stakeholder

value drivers a too vague of a concept whereas the structural IT governance literature and the "emerging IT governance paradigm" offer several potential factors for framework design. Thus, our framework replaces the setting of objectives with business-IT alignment. Business-IT alignment captures not only the setting of objectives but also the purpose, context, and organizational structures of this activity. Our framework suggests that three specific contingency factors and the perceived (measured) status of IT governance impact business-IT alignment, and consequently as a part of the alignment, the objectives that are set. Figure 1 would be more powerful had it been drawn as a system model with clear planning, operating, evaluation, and feedback factors. Our framework does that and suggests that the outcome of business-IT alignment impacts how IT operations are organized and how IT operations are measured. The outputs of IT operations and measurement are: business value delivered by IT and opportunities provided by IT. These outputs have feedback links to IT operations and measurement, and to the input of the process.

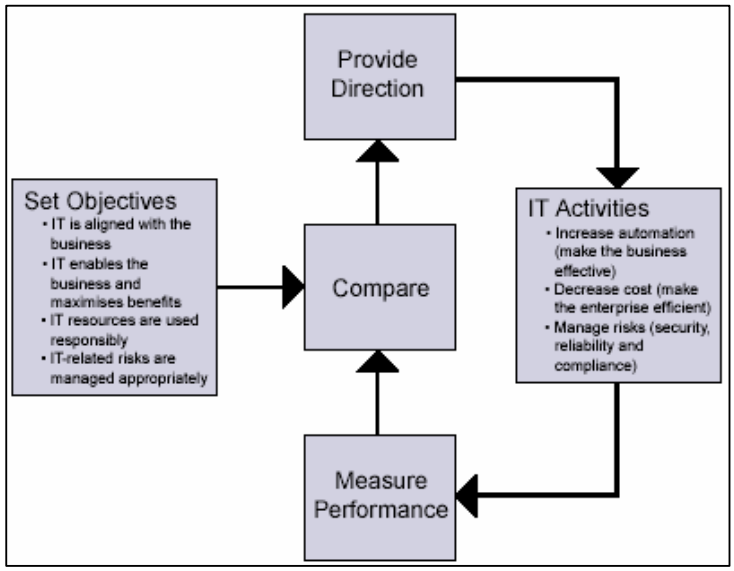

Figure 1 COBIT IT governance framework model

To summarize, we present the following three propositions:

1. ***There is a need for an integrative IT governance framework, which incorporates the structure and process perspectives of IT governance.***
2. ***The integrative IT governance framework should follow a generic system model with clearly stated process planning, operating, evaluation, and feedback factors.***
3. ***The primary factors that impact the planning phase of the framework (business-IT alignment) are strategic goals and the competitive strategy of the organization, beliefs and attitudes towards IT, and corporate governance, and the organizational culture accompanied by the feedback impacts. The impacts of other contingency factors, such as the size, industry, or geographical structure of the organization, are moderated by these primary factors.***

2.2 Alignment of Business and IT

Research on the alignment of business and IT started in 1980s (e.g. [34]) but research findings regarding business and IT alignment are inconclusive and mixed. This may result from differences in the definitions of business-IT alignment, differences in the formulation of alignment objectives, and differences in the research frameworks. We follow the definition of Luftman [15], according to whom business-IT alignment refers to applying IT in an appropriate and timely way and in harmony with business strategies, goals and needs. As Luftman points out his definition covers how IT is aligned with business and how business is aligned with IT. Studies seem to address mainly three research questions: (1) What antecedents, contingency factors or enablers/inhibitors impact business-IT alignment? (e.g. [7], [20], [21], [3], [16], [23]) (2) How is alignment carried out? (e.g. [34], [12], [37], [15], [33], [27]), and (3) What are the outcomes of alignment or how are these outcomes measured? (e.g. [10], [8], [23], [31], [32]). We limit our paper to the first and the third research questions.

Brown and Magill [7] divided the antecedents of business-IT alignment into overall organization, IS organization, IT investment and external factor items. They proposed that these antecedents impact how IT is organized through business-IT alignment. In a series of studies, Basselier, Benbazat and Reich investigated what social dimension factors impact business-IT alignment [20], [21], [3]. Reich and Benbazat [21] divided social antecedents and practices into shared domain knowledge between business and IT executives, successful IT history, communication between business and IT executives, and into connections between business and IT planning. Impacts on alignment behavior were investigated both in the short- and the long- term. In the short-term, the impacting factors were communication between business and IT executives, connections between business and IT planning, and short-term business direction. Knowledge and experience influenced communication between business and IT executives. In the long term, impacting factors were shared domain knowledge and long-term business direction. Sabherval and Chan [23] investigated how the type of business strategy impacts business-IT alignment and the results of that alignment. Since our framework is a system model with feedback factors, the business-IT alignment will also be impacted by the delivered business value of IT, the

business opportunities provided by IT and IT governance development. .

Alignment research has also investigated how the business-IT alignment impacts the performance of organizations. Earl [10] discovered that organizational approaches, where IT decisions are made through continuous integration between the IT function and organization, produce the best results. Chan et al. [9] and later Sabherval and Chan [23] found that the alignment of business and IT strategy positively affects business performance. Similar results were reported by Tallon et al [29]. Slegianowski and Luftman [27] noticed that improved business-IT alignment maturity increased the ability of a case organization to launch a new business strategy. In section 2.1 we reviewed literature, which indicated that systematically governed IT results improved performance [36]. These rather consistent results are in contrast to the overall findings concerning the impacts of IT, by e.g. Chan [8]. She summarizes the findings of articles published in four main IS research journals between 1993 and 1998 concerning IT value delivery, and, more specifically the "IT productivity paradox" (see also [32]) and found that no overall productivity increase has been reported.

How does business-IT alignment impact organizational performance? Similarly to most business-IT alignment models and other earlier studies (e.g. [12], [7], [29], [15], [27]) we see that business-IT alignment impacts how IT is organized. We conclude that this alignment impacts organizational performance in two ways: directly and more importantly mediated by IT resource, risk and management activities/operations, IT measurement activities, and the interaction of these activities.

To summarize, we make the following three propositions:

1. ***There is a need for an integrative IT governance framework, which builds on the alignment of business and IT.***
2. ***Business-IT alignment is the starting point of the IT governance process. Alignment is impacted by primary contingency factors - strategic goals and the competitive strategy of the organization, beliefs and attitudes towards IT, and corporate governance and organizational culture - accompanied by the feedback impact of delivered value of IT, business opportunities provided by IT, and IT governance development. The impacts of other contingency factors, enablers and inhibitors, such as senior executive support and business-IT partnership, are moderated by the primary factors.***
3. ***Business-IT alignment impacts how IT is organized, resourced and managed, what risks are identified and mitigated, and what targets and measures are set for IT. Through this mechanism, business-IT alignment impacts the value delivery of IT indirectly in addition to its direct impact on value delivery.***

2.3 Senior Executives and IT Governance

IT governance literature underlines the important role of boards and C-level executives (CEO, COO, CFO, etc.) But what are the tasks or responsibilities of senior executives? Weill [36] proposes that they are the five key IT decisions from IT principle to IT investment prioritization. The IT Governance Institute's COBIT board briefing identifies five IT governance focus areas, which are strategic alignment, value delivery, risk management, resource management, and performance measurement**.** Our framework has six IT governance factors / managerial responsibility areas presented as system process model. These factors / managerial responsibility areas are: alignment of business and IT; monitoring of IT resources, risks and management; monitoring of IT performance measurement; evaluation of business value delivery (benefits-costs); evaluation of business opportunities (opportunities-risks); and IT governance development (see Figure 2 in section 3).

Van Grembergen et al. present a hierarchical IT governance balanced scorecard (BSC) to be used for IT performance measurement reporting. Similar to the original Kaplan-Norton BSC, the IT BSC has four perspectives: the user, operational excellence, business contribution and future orientation perspectives [33], [14].[2] We apply the idea of hierarchical assessment in our framework and the related instrument. With hierarchical assessment we recognize/propose, that senior executives assess and evaluate IT governance with aggregated measures and need a holistic overview of IT governance whereas professionals also need more detailed operational level assessment information over their responsibility areas.

Do current frameworks and tools, especially COBIT and ITIL, provide such aggregated holistic information? Anecdotal evidence suggests that on conceptual level yes – COBIT especially – but, on a practical level, COBIT and ITIL have been criticized by some users for being too labor-intensive and/or detailed – particularly for the needs of senior executives. COBIT consists of 34 processes with 318 control objectives, each objective with 7 possible information criteria and 6 maturity levels. ITIL consists of 8 main processes, including 120 evaluation questions, and addresses mainly the governance of IT services (e.g., help desks, service centers, application management). From a senior executive perspective, the issue is not only how to consolidate and aggregate senior executive reports but also whether or not it is economically and otherwise feasible to measure in detail all 34 (COBIT) or 8 (ITIL) processes with 318 (COBIT) or 120 (ITIL) evaluation targets. Anecdotal evidence also suggests that COBIT and ITIL are usually applied to measure and govern only the most important processes in a specific organization. Moreover, full COBIT or ITIL implementation may also take years. However, the target of our paper is not to criticize COBIT or ITIL. Rather,

[2] IT Governance Institute's COBIT Board Briefing recognizes both BSC and IT BSC as powerful performance measurement tools.

we try to explain the properties that an integrative IT governance framework and an instrument should have in order for them to be applicable to senior executives.

To summarize, we propose that there is a need for an integrated IT governance framework which is designed for senior executives and which provides them holistic aggregated information relevant for IT governance evaluation, guidance, and control as a part of corporate governance.

3 The Framework

Our framework is shown in Figure 2. The framework builds on propositions presented in Section 2. The framework shows IT governance as a holistic management system (process). The process includes the IT governance structures (arrangements) behind the process. The framework implies that IT governance should be assessed as a whole and through its parts.

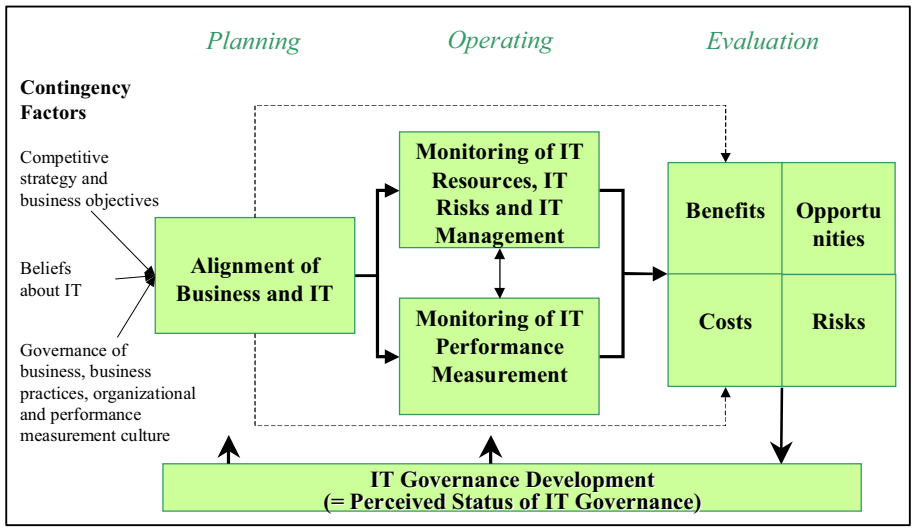

Figure 2 Proposed Integrated IT Governance Framework

The IT governance process starts with business-IT alignment (planning phase). We define business-IT alignment as *the activities and structures by which an organization aligns its business and IT, sets targets for IT, defines principles for organizing IT activities, resource usage, risk management, governance structures and performance measures*. The alignment of business and IT is impacted by an organization's competitive strategy and business objectives (e.g., strategy analysis and strategy thinking, resources and target positioning), beliefs concerning IT (e.g. IT knowledge, attitudes and past experiences), corporate governance and organizational culture (e.g. corporate governance practices and structures, performance measurement culture such as BSC, corporate history), and by the perceived status of IT governance (perceived value and business opportunities delivered by IT). Our definition suggests that business-IT alignment is a two-way and possibly multilayer activity. Moreover it may involve the alignment of strategies, policies and principles, plans and planned activities, governance structures and roles, business and IT architectures, business and IT needs, and other alignment needs.

Business-IT alignment also has a guiding impact on how managerial and operative level IT activities and service processes are organized, how resources are allocated to those activities and processes including investments, what risks are identified and mitigated, and how IT is managed. We define this area of IT governance as the monitoring of IT resources, IT risks and IT management and define the concept as *the activities, processes and structures by which an organization monitors its IT resources, risks and management*. In addition to business-IT alignment the monitoring of IT resources, IT risks and IT management is impacted by the monitoring of IT performance measurement (the results that IT activities and processes produce) and by the perceived status of IT governance (whether or not IT delivers value and new opportunities to business).

Business-IT alignment also guides how IT targets are cascaded down in the organization, how the performance outcomes of IT activities and processes are measured, and how performance measures are used in the monitoring of IT resources, IT risks and IT management. We term this area of IT governance as the monitoring of IT performance measurement and define the concept as *the activities, processes and structures by which an organization measures its IT resource, IT risk and IT management performance*. Note that our framework includes the use of measures for two different types of purposes. Performance measurement monitoring measures reflect IT resource, IT risk and IT management activities and processes accompanied by the guiding impact of business-IT alignment, and are used to manage these activities and processes. IT governance assessment measures, on the other hand, indicate what the status of IT governance is as a whole and by factor. Monitoring of IT resources, IT risks and IT management, and monitoring of IT performance measurement form the operating phase of IT governance, as shown in Figure. 2.

Business-IT alignment, the monitoring of IT resources, IT risks and IT management, and the monitoring of IT performance measurement all impact what business value and what future business opportunities IT delivers. We use the following definition: *IT may deliver strategic, economic, risk management, technical, social, and quality benefits*

(revenues minus costs) to business. IT may provide future business opportunities (opportunities minus risks) for the development of current and new business. Business value delivery and future opportunities form the evaluation phase of the IT governance process as shown in Figure 2.

The final phase of the IT governance process is feedback. We term this phase as IT governance development (i.e., the perceived status of IT governance) and define the concept as those *activities and processes by which IT governance is improved and supported by IT governance feedback and evaluation information.*

4 Validation of the Measurement Instrument

4.1 Methodology Used

In our project a number of validation methods are used to ensure the quality of the developed instrument. We have paid particular attention to content and construct validity, pretests, and pilot surveys. Although a significant amount of work has been completed, the validity process will continue with statistical validation in the future when more data becomes available.

Content validity refers to the ability of a measurement instrument to represent the domain of interest and it assures the substantive validity of an instrument. The concept of content validity is defined by the following four elements [26]: domain definition, domain relevance, domain representation, and appropriate instrument construction procedures.

The content validity of an instrument is not a unique feature of an instrument but rather must be evaluated with respect to the instrument's specific measurement purpose. Therefore, the domain of the interest must be clearly defined. Each concept of the domain needs to be uniquely defined, and in the case of IT governance, each definition should be consistent within the IT governance field [35]. The domain of this project was discussed theoretically in sections two and three. The instrument is developed from the framework presented in section three, including its earlier versions.

Sireci [26] classifies the procedures to facilitate and evaluate content validity as judgmental and statistical. With judgmental methods, 'subject matter experts' are used to evaluate instrument items and 'evaluate them according to their relevance and representativeness to the content domain tested'. The outcome of judgmental methods is typically summarised by a quantitative index, reflecting the degree to which the content of the instrument is relevant and representative to the predefined domain.

Perhaps the most important element of content validation is determining the appropriate procedure by which to construct the instrument. Tenopyr [30] emphasises this process-oriented conception of content assessment by arguing that content validation is not 'validity' but rather an assessment of the construction process.

Construct validity asks "whether the measures chosen are true constructs describing the event or merely artifacts of the methodology itself" [28]. It is the degree to which the operationalization of a concept measures the original concept that it is intended to measure. "The focus in construct validity is on whether the selected items 'move' together in such a way that they can be considered as an intellectual whole" [5].

A pretest is a preliminary trial of some or all aspects of the instrument aimed at ensuring that there are no unanticipated difficulties in the final measurement [1]. Pretests can be administrated by personal interviews, telephone interviews, or mail self-reports [13]. Today, emails, the Internet, and even mobile technologies can be used to catch the respondents' reactions and hesitations, and potential problems in the content or format of the instrument.

Pilot surveys are brief preliminary surveys aimed to validate the instrument empirically before the final larger survey is implemented.

Next, the procedure that we use to construct our measurement instrument for IT governance is described. The instrument development follows the development of the framework. Note that the data shown in this section may reflect earlier versions of our framework.

4.2 Procedure to Construct the Instrument

The objective of our research project is to develop and validate a tool for IT governance. For this purpose we have developed and operationalized an instrument to measure the effectiveness of IT governance. In each phase of the development process, special attention is paid to the validity aspects of the tool. In Table 1, the procedure for constructing the instrument is described.

The project group responsible for the development consists of seven persons: two professor level information systems scientists, two consultants working in the IT governance area, and three researchers.

The validation of the instrument was begun at the same time as the project was initiated. Selection of the experts to the project and the supporting organizations has certainly significant effects on the quality of the developed tool. However, the actual instrument construction started with the initial domain definition. By reviewing theories and theoretical models, models used by practitioners, and through the project group's own experience, we investigated and evaluated the status of IT governance, and searched for key concepts, models and frameworks of IT governance. At the same time, in a very early phase of the project, initial items to be measured were proposed in the form of questions.

Cumulatively, 27 organizations from the private and public sectors committed to the project by supporting the project financially and by participating actively in the development process. The representatives of those organizations form a group that we call the "focus group" in

Phase	Time	Method	Parties involved	Input	Outcome
Phase I: Initial domain specification	May-June 2004	- Literature review - Expert judges	Project group	- Theoretical models - Experience	- Key concepts and domain definitions, initial framework - 48 questions
Phase II: Pretest	August 2004	Questionnaire	Focus group	- Key concepts and domain definitions - 48 questions	- 30 responses - Importance of the areas
Phase III: Domain extension	September-October 2004	- Brain-storming with GSS - Group discussions	Project group	- Importance of the areas - 48 questions	- Conceptual framework - 93 questions
Phase IV: Pilot survey	November 2004	Preliminary survey	Focus group	- Conceptual framework - 93 questions	- 34 responses - Index of importance
Phase V: Construct validity	January 2005	Exploratory Factor Analysis	Project group	- 93 questions	- Factor loadings, - Eigenvalues
Phase VI: Domain concentration	February-March 2005	Group discussions	Project group	- 34 responses - Index of importance - Factor loadings	- Validated framework - Revised 27 questions
Phase VII: Conceptual assurance	April 2005	GSS meeting	Focus group	- Validated framework - 27 questions	- GSS feedback - Domain representativeness
Phase VIII: Finalizing	May 2005	Group discussions	Project group	GSS feedback	Final concepts, conceptual framework, and measures of IT Governance

Table 1 Development and validation process of the IT Governance tool

Table 1. One key form of participation has been in the form of one-day work-shops involving both the project group and the focus group. Prior to each workshop meeting, pre-work-shop 'exercises' were prepared by the project group, and sent to be filled-in by the focus group members. In each workshop, the role of the "exercises", the results of the exercises, and the progress of the project were discussed in detail. Before the first work-shop (Phase II), for example, the importance of each of the 48 questions to IT governance and also the status of each organization were evaluated by members of the focus group and a general importance index for each area of the initial framework was calculated.

	Averages	
Field of IT Governance	**Importance**	**Status**
Strategic alignment	6.16	4.58
Value delivery	5.70	3.03
Risk management	6.25	4.41
Resource management	5.85	4.08
Performance management	5.83	3.59

Table 2 Importance and status of IT governance (34 responses from the focus group, Likert scale 1-7)

During the third phase (Phase III in Table 1), the domain of IT governance was extended to 93 items. A Group Support System (GSS) was used to collect, categorize and prioritize ideas. The outcome of the phase was a questionnaire that was sent to the focus group as a pilot survey (as a pre work-shop exercise) for the next phase.

In the fourth phase, the focus group answered the pilot survey, evaluated the importance of each item for IT governance and evaluated how well their organization performed with respect to each item. This procedure made it possible to select the most important items from each IT governance framework factor to be used in the development of the instrument. As a by-product, the average importance (representativeness) of each item and the present status in the organizations were assessed and the general importance and status of each factor/area in IT governance were calculated as shown in Table 2. As Table 2 indicates, our framework followed COBIT's IT governance focus areas at that time. Strategic alignment between business and IT was considered to be the most important area of IT governance and value delivery of IT was considered the least important.

Using the data collected in the pilot survey an Exploratory Factor Analysis was conducted. The unidimensionality of the key constructs were tested using Principal Component Analysis, and the results were then used to reduce the items in the instrument. Generally, the loadings of the items that were considered to be the most important by the focus group, were between 0.5 to 0.9, indicating that the items moved together reasonable well. However, there were some items in risk and resource management that were considered to be important but were loaded improperly. These items were reconsidered, and the questions were reformulated by the project group.

In Table 3, the loading of 25 items in 'Business Value Delivery of IT' are given as an example. As can be seen in Table 3, most items had excellent or very good loadings (over 0.63). The results of the pilot survey and the Exploratory Factor Analyses were used as input in the next phase where the number of the items was reduced as well as the key concepts and the framework were elaborated further. In the next workshop (Phase VII), GSS technology was used to collect final feedback from the focus group concerning the items of the instrument. The representativeness of each item was evaluated by the focus group, and a large number of comments and suggestions were recorded. The project group then used this feedback in the finalizing phase (Phase VIII).

First Factor Loadings	
Item	**Loading**
B1	0.4586
B2	0.4369
B3	0.4909
B4	0.5669
B5	0.5911
B6	0.7424
B7	0.7468
B8	0.6720
B9	0.7351
B10	0.7742
B11	0.8310
B12	0.7062
B13	0.7491
B14	0.8097
B15	0.8467
B16	0.6351
B17	0.7376
B18	0.7268
B19	0.7655
B20	0.7145
B21	0.6588
B22	0.8154
B23	0.7271
B24	0.6848
B25	0.6377

Table 3 Example of loadings in Exploratory Factor Analysis

In this project, special attention has been paid to the initial validation of the measurement instrument. The principles of content and construct validation, pretest, and pilot survey are used repeatedly and extensively to yield consistency and representativeness of each IT governance factor and every measure item. The development of the tool has continued with the selection of an appropriate database system and an actual auditing of participating organizations. During the actual auditing process, data is collected to the database so that statistical methods can be used to validate the measurement instrument and to develop it further.

5 Concluding Remarks

The contributions of this paper are that it presents a new IT governance framework, a related assessment instrument, and describes their conceptual validation. We describe the framework – the factors of IT governance – with the instrument and the validation process as a whole, whereas the wording of specific instrument items is left to a future research report when statistical data becomes available. We started the development of our senior executive tool with the identification and analysis of existing IT governance frameworks, especially COBIT. In an early phase, our framework had the same IT governance factors as the COBIT framework but was transformed into a system model, and contingency factors were added. During the validation process, the framework evolved to the one shown in section 3.

Our framework and instrument are "integrative" in three respects. They integrate: (1) IT governance structures and processes, (2) business-IT alignment with IT operations and performance measurement, and with business value delivery, and (3) suggest that executives need information over a wide ("integrated") area to assess IT governance.

Our framework is a system model. Systems are steered by structures and structures change through processes. We previously noted that IT governance is an organizational (planning/management) system. This system incorporates organizational governance structures (organization, decision making rights etc.) and processes (activities) and, as a whole, follows the phases of a generic management planning and improvement process. Further, integration of organizational structures and processes is a classical issue in organization theory. In essence IT governance is a coordination process guided by structures used for coordination where at least: (1) business-IT strategies as well as short-term business-IT needs and possibilities are coordinated, (2) the plans, targets, resource allocation, and activities of various inter- and extra-organizational stakeholders are coordinated between organizational functions and processes from business to IT and vice versa, and (3) conflicting interests, such as stability and flexibility of IT infrastructure, support to external IT activities and support to internal IT activities, are coordinated.

The major limitations of our paper are that the statistical validity testing and the empirical proof of the relationships still lay ahead of us. At the moment, we are only able to tentatively propose that our framework contributes to the field – backed by the participating 27 organizations. Further, a more detailed description of the framework and the instrument as well as exploration of the relationship between IT and corporate governance has been left to a future report.

To conclude, our integrative IT governance framework and the related assessment instrument are aimed at serving the following current and future research goals: (1) act as the theoretical basis for IT governance and an IT governance assessment instrument, (2) provide a holistic picture of the current and target status of IT governance as a part of corporate governance. (3) Data collected with the instrument should facilitate comparisons among (anonymous) organizations, and (4) the use of data and benchmarking to support senior executives' ability to understand, control and improve the status of IT governance in their organizations, and to promote communication and learning between executives with different responsibilities.

6 References

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