



Implementing IT Governance

Rafael Saraiva de Almeida

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Examination Committee

Chairperson: Prof. Miguel Nuno Dias Alves Pupo Correia

Supervisor: Prof. Miguel Leitão Bignolas Mira da Silva

Member of the Committee: Prof. Pedro Manuel Moreira Vaz Antunes de Sousa

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To my parents and my sister, who have supported and guided me throughout life.

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Abstract

Information Technology (IT) has been used in large organizations since 1950s or 1960s, for internal and for external purposes. This pervasive use of technology has created a critical dependency on IT that calls for a specific focus on IT Governance (ITG).

ITG has been a concern in the last 20 years and can contribute to higher returns on assets (ROA) at a time when business is increasing their technology investment. Indeed, Gartner states that ITG has been recognized as a Chief Information Officer (CIO) top-10 issue for more than five years and has risen in priority between 2007 and 2009.

However implementing ITG is not an easy task since its definition and role is not clear and determining the right ITG mechanisms remains a complex endeavor. Therefore, in this thesis we propose to perform an exploratory research by formalizing the ITG mechanisms and analyzing several ITG case studies in order to elicit possible ITG mechanisms patterns that aiming to assist organizations and practitioners by providing more guidance on how ITG can be implemented.

Moreover, based on six interviews in Portuguese financial services organizations we provide insights regarding the effectiveness and ease of ITG mechanisms' implementation as well as a minimum baseline of ITG mechanisms that Portuguese Financial Services organizations at least should have.

The research methodology adopted in this thesis was Design Science Research (DSR). To evaluate our proposal, we used the appraisal of scientific community, interviews, DSR guidelines and Österle principles.

Keywords: Design Science Research, IT Governance, IT Governance Factors, IT Governance mechanisms, IT Governance patterns, Minimum Baseline.

Resumo

As Tecnologias de Informação (TI) têm sido utilizadas nas grandes organizações desde a década de 50 ou 60, com propósitos internos e externos. Esta utilização cada vez mais universal das TI obrigam a que um especial foco tenha que ser dado à Governança das TI. Esta tem sido uma preocupação nos últimos 20 anos e pode contribuir largamente para maiores retornos dos activos, sobretudo em tempos que os investimentos tecnológicos têm aumentado.

Contudo implementar a Governança das TI não é uma tarefa fácil, uma vez que a sua própria definição e o seu papel nas organizações não é claro, e a escolha dos mecanismos de Governança das TI apropriados continuar a exigir um grande esforço.

Deste modo, nesta tese pretendemos realizar uma pesquisa exploratória de modo a formalizar os mecanismos de Governança das TI bem como analisar vários Casos de Estudo de modo a explicitar possíveis padrões de Governança das TI com o intuito de fornecer um guia às organizações sobre o modo como a Governança das TI pode ser implementada.

Baseado em 6 entrevistas em 6 organizações Financeiras portuguesas, esta tese fornece percepções quer em relação à facilidade de implementação quer em relação eficácia dos mecanismos de Governança das TI. Mais ainda, é fornecido uma base mínima de mecanismos que estas organizações deveriam ter.

A metodologia de pesquisa utilizada foi o *Design Science Research* (DSR). Para avaliar a nossa proposta foram utilizadas entrevistas, as *guidelines* de Hevner, os quatro princípios de Österle e o reconhecimento da comunidade científica.

Palavras-chave: Base Mínima, Design Science Research, Factores, Governação das TI, Mecanismos, Padrões.

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List of Acronyms

BOK	Body of Knowledge
CEO	Chief of Enterprise Officer
CG	Corporate Governance
CIO	Chief of Information Officer
CMMI	Capability Maturity Model Integration
COBIT	Control Objectives for Information and related Technology
COO	Chief Operating Officer
DSR	Design Science Research
EG	Enterprise Governance
IT	Information Technology
ITG	Information Technology Governance
ITIL	Information Technology Infrastructure Library
ITM	Information Technology Management
IS	Information Systems
LR	Literature Review
ROA	Returns on assets
SLA	Service Level Agreement
SME	Small and Medium Enterprise
USD	United States Dollar

1. Introduction

Information Technology (IT) has become crucial to the support, sustainability and growth of the business (Law and Ngai, 2005; Quershil et al., 2009). The dependency on IT becomes even more imperative in our knowledge-based economy, where organizations are using technology in managing, developing, and communicating intangible assets, such as information and knowledge (Patel 2003)

Definition – IT
<i>IT in its broadest sense encompasses all aspects of computing technology. As an academic discipline, IT is concerned with issues related to advocating for users and meeting their needs within an organizational and societal context through the selection, creation, application, integration and administration of computing technologies.</i>
(Lunt et al., 2008)

IT not only has the potential to support existing business strategies, but also to shape new strategies (Guldentops 2003; Henderson and Venkatraman, 1993). In this mindset, IT becomes not only a success factor for survival and prosperity, but also an opportunity to differentiate and to achieve competitive advantage (Van Grembergen 2003). Leveraging IT successfully to transform the enterprise and to create products and services with added value has become a universal business competency (Guldentops 2003).

IT often entails large capital investments in organizations while companies are faced with multiple shareholders that are demanding the creation of business value through these investments (Van Grembergen and De Haes, 2008). According to Gartner, the worldwide IT spending in 2012 is expected to increase from United State Dollar (USD) 3.7 trillion to USD 3.8 trillion. This annual expenditure growth has underlined the importance of IT as an enabler for organizational success (Kim et al., 2007).

The question of the 'productivity paradox', why ITs have not provided a measurable value to the business world, has puzzled many practitioners and researchers (Duffy 2002; ITGI 2001; Kakabadse and Kakabadse, 2001; Henderson and Venkatraman, 1993).

This situation calls for a specific focus on IT Governance (ITG) (Van Grembergen et al. 2003; De Haes and Van Grembergen, 2008A). This focus is needed to ensure that the investments in IT will generate the required business value and that risks associated with IT are mitigated (Van Grembergen and De

Haes, 2009). There are evidences of the positive effect of ITG implementation in organizations. ITG claims to deliver the following benefits:

- Assure Expected IT Benefits (Kan 2003).
- Decreased Risks (Carroll et al., 2004).
- Efficiency and Control of IT Functions (Van Grembergen 2003).
- Gain returns on IT investment 40% higher than their competitors; given the same business strategy, those with an average performance in ITG may make 20% more profit (Lingyu et al, 2010).
- Higher ROA at a time when businesses are increasing their technology investment (Webb et al., 2006).
- Increased Organizational Success (Kan 2003) and Value (Hwang 2002).
- Return on Investment (Patel 2002).
- Shareholders' Contentment with the Organization's Success (Parker et al., 2002)

Definition – ITG
<i>IT Governance is specifying the decision rights and accountability framework to encourage desirable behavior in the use of IT.</i>
(Weill and Ross 2004)

Therefore good ITG is no longer a “nice to have”, but a “must have” (Pereira and Mira da Silva, 2012). Indeed Gartner states that ITG has been recognized as a CIO top-10 issue for more than five years and has risen in priority between 2007 and 2009 (Gerrard 2009). Therefore Organizations can no longer afford to have ITG by default or bad ITG by design (Simonsson et al., 2008; Symons, 2005).

Several authors argue that organizations should implement ITG over the use ITG mechanisms (Van Grembergen and De Haes, 2009; Weill and Ross, 2004). ITG can be deployed using a mixture of various structures, processes and relational mechanisms (De Haes and Van Grembergen, 2004) that encourage behaviors consistent with the organization's mission, strategy, values, norms, and culture (Weill 2004).

Definition – Mechanisms
<i>Mechanisms are entities and activities organized such that they are productive of regular changes from start or set-up to finish or termination conditions.</i>
(Machamer et al., 2000)

1.1. Problem

However there are some problems regarding ITG, its mechanisms and its environment.

First of all a commonly agreed upon definition of ITG does not exist and it proves that ITG field has much to evolve further (Pereira and Mira da Silva, 2012B).

Further, without formal ITG, individual managers are left to resolve isolated issues as they arise, and those individual actions can often be at odds with each other (Weill and Ross, 2005). Weill and Ross (Weill and Ross, 2005) have performed a study of almost 300 enterprises around the world and suggest that ITG is a mystery to key decision makers at most companies. On average, just one in three senior managers knows how IT is governed at his company.

Furthermore, ITG implementation is influenced by external and internal factors (Xue et al., 2006). But the literature and current Frameworks and Best Practices fail to reveal a clear and concise identification of these factors (Pereira and Mira da Silva, 2012A).

Beyond that, understanding how and why a firm has adopted a specific ITG arrangement is important in order to advance knowledge about the effectiveness of alternative governance arrangements for sustaining IT-based innovation (Sambamurthy and Zmud, 1999). Prior research has examined the influence of a variety of factors: industry (Ahituv et al. 1989; Clark 1992), firm size (Ahituv et al. 1989; Brown and Magill 1994; Clark 1992), corporate strategy (Brown and Magill 1994), and corporate structure (Applegate et al. 1996; Brown and Magill 1994; Tavakolian 1989).

However these studies have focuses on singular impacts of specific factors and not how a set of factors impacts ITG arrangements.

Moreover, few researchers attempt to describe and provide a complete explanation on ITG mechanisms (Almeida et al., 2013). Plus, there is not a consensus about all the existent ITG mechanisms and even some contradictory definitions exist (Almeida et al., 2013). Therefore determining the right ITG mechanisms is a complex endeavor (Van Grembergen et al. 2003).

It should also be recognized that what strategically works for one company does not necessarily work for another (Patel 2003), even if they work in the same industry sector (Van Grembergen et al., 2003). This means that different organizations may need a combination of different structures, processes and relational mechanisms.

Summarizing there is no single "best" ITG arrangement because IT needs to respond to the unique environments within which it exists (Agarwal and Sambamurthy, 2002; Lunardi et al., 2009) and therefore a guide that assists the organizations with similar characteristics to implement ITG lacks in the field. However it is possible to create a guidance about which can be the most relevant ITG mechanisms to implement given a specific organizational context.

1.2. Proposal

Therefore this thesis aims to eliminate inconsistencies among ITG literature and to elicit a set of ITG patterns used by organizations taking into account several factors that affects the organizations. Such patterns enable the solution of “real world” problems because they capture and allow for the reuse of experiences of best practice in a specific professional domain (Schadewidzt and Timothy, 2007).

Furthermore, based on several interviews, a minimum baseline of ITG mechanisms that Portuguese Financial Services organizations implement is provided. As it was previously stated, these patterns and minimum baseline will not ensure a 100% successful implementation of ITG in an organization, but should be seen as guidance about which can be the most relevant ITG mechanisms to implement given a specific organizational context.

Definition – Patterns
<i>Capture and allow the reuse of experiences of best practice in a specific professional domain.</i>
(Schadewidzt and Timothy, 2007)

This study is not purely theoretical, but a practical means of looking at ways of ITG implementation in organizations in order for them to cope with growing competition in the market. It should be noted that the main motivation for this paper was provided by (De Haes and Van Grembergen, 2008) who suggested that further researchers should study the ITG mechanisms implementation in different contexts.

The main contributions of this thesis are not only the four papers that we offer to Scientific Community. As we said before, the present thesis investigated the impact of organizational ITG mechanisms and ITG contingency factors in organizations, and in that way, we offer a minimum baseline that will help Portuguese organizations in the implementation of the different ITG mechanisms and also in comparison with Belgium organizations.

1.3. Structure

This document is divided in seven different chapters, described as follows:

1. Introduction gives a general context about the thesis and describes in detail the thesis problem and motivation.
2. Research Methodology shows the research methodology used in this thesis.

3. Related Work presents a brief overview of the literature on the research area, and describes the needed concepts that underlie the proposal, which was crucial for our proposal's coherence.
4. Proposal identifies the objectives of the solution.
5. Evaluation provides an explanation of the evaluation strategy used to access the artifact, the analysis of the artifact, the evaluation results, and a discussion about the results.
6. Publications presents all the papers accepted in International Conferences as well as a short description of each paper.
7. Conclusion presents a summary of the main conclusions, limitations, and contributions of the thesis, and some proposals for the future work.

2. Research Methodology

In this thesis the research methodology used was Design Science Research (DSR). In this section we will describe this methodology and also our review procedure in detail, with the purpose of making our review procedure as transparent as possible in order to achieve high validity and reliability. In this context validity means the degree of accuracy in identifying and handling sources, which includes selection of scientific databases and search terms. Reliability refers to the replicability of the search process and can be achieved by thoroughly documenting the procedure and the making selection criteria explicit (vom Brocke et al. 2009).

Toward the end of the 1990s DSR began growing in popularity for use in scholarly investigations in Information System (IS). This methodology is a system of principles, practices and procedures required to carry out a study. IS can draw advantage from DSR methodology by often using theories from diverse disciplines, such as social science, engineering, computer science, economics, and philosophy to address problems at the intersection of IT and organizations (Hevner et al., 2004). Several researchers have succeeded in integrating design as a major component of research in order to solve relevant organizational problems (Hevner et al., 2004; Peffers et al., 2008).

DSR methodology is conducted in two complementary phases: build and evaluate. In contrast to behavior research, design-oriented research builds a “to-be” conception and then seeks to build the system according to the defined model taking into account the restrictions and limitations (Österle et al., 2011). Design science addresses research through the building and evaluation of artifacts designed to meet the identified business needs, instead of analyzing existing IS in order to identify causal relations (Österle et al., 2011).

Based on the four design artifacts produced by DSR in IS (constructs, models, methods and instantiations) we will focus on constructs and models. Constructs are necessary to describe certain aspects of a problem domain and allow the development of the research project’s terminology (Schermann et al., 2009). In other words, they provide the language in which problems and solutions are defined and communicated (Schon 1983). Models use constructs to represent a real world situation, the design problem and the solution space (Simon 1996).

The constructs that we propose are the domain definition, the ITG mechanisms elicitation, the ITG mechanisms definition and the ITG contingency factors.

We define the domain definition along Section 3 (Related Work). In turn, the ITG mechanisms elicitation and the ITG mechanisms definition are represented in Section 4.1, and the ITG contingency factors are represented in Section 4.2.

The model of this thesis is the ITG patterns which are designed based on the integration of the constructs. The ITG patterns are defined in Section 4.3.

As advisable in (March and Smith, 1995) the research methodology applied is divided according to the two processes of DSR in IS: build and evaluate. The build process is composed by two stages (Constructs Definitions and Model Construction) whereas the evaluate process is comprised by only one (Evaluation) (Table 1). This kind of research approach was already used in other studies as (Vicente and Mira da Silva, 2011; Pereira and Mira da Silva, 2013C).

In the Evaluation stage we used several techniques in order to evaluate our proposal. We used the appraisal of scientific community (Section 5.1 and Section 6) to communicate the results that we collected throughout this thesis.

Moreover we used the Hevner guidelines (Section 5.2) and Österle principles (Section 5.3) to evaluate our scientific research and DSR guidelines respectively.

Finally we used interviews (Section 5.4) and a Minimum Baseline (also in Section 5.4) to evaluate our ITG financial patterns.

Build		Evaluate
Constructs Definitions	Model Construction	Evaluation
<ul style="list-style-type: none"> - Domain definition (Section 3) - ITG mechanisms elicitation (Section 4.1) - ITG mechanisms definitions (Section 4.1) - ITG contingency factors (Section 4.2) 	<ul style="list-style-type: none"> - Integrate constructs and define ITG patterns (Section 4.3) 	<ul style="list-style-type: none"> - Appraisal of scientific community (Section 5.1, 6) - Hevner Guidelines (Section 5.2) - Österle principles (Section 5.3) - Interviews (Section 5.4) - Minimum Baseline (Section 5.4)

Table 1 Research Methodology – DSR

2.1. Literature Review

In order to leverage the ITG mechanisms and their definition we used an extensive Literature Review (LR). A review of prior, relevant literature is an essential feature of any academic project. An effective review creates a firm foundation for advancing knowledge. An effective review makes theory development easier, closes areas where there is a plethora of research, and uncovers areas where research is needed (Webster and Watson, 2002). A LR is *“the use of ideas in the literature to justify the particular approach to the topic, the selection of methods, and demonstration that this research contributes something new”* (Hart 1998).

Definition – LR

The use of ideas in the literature to justify the particular approach to the topic, the selection of methods, and demonstration that a research contributes something new.

(Hart 1998)

Nevertheless, the LR represents the foundation for research in IS. As such, to review articles is critical to strengthen IS as a field of study (Webster and Watson, 2002). To have a quality IS research we should conduct a LR that will enable researchers to find out what is already known. When proposing a new study or a new theory, researchers should ensure the validity of the study and reliability of the results by making use of quality literature to serve as the foundation of their research.

We analyzed the current literature about LR and identified the most important steps and tips to be followed in order to provide an effective LR. These steps can be shown in Table 2. Throughout this thesis we tried to follow the main steps (Table 2) we identified in order to provide an effective thesis.

At the beginning of a LR it is recommended to start with a conception of the topic and a definition of key terms in order to derive meaningful search terms (vom Brocke et al., 2009). Using those terms, we started looking into journals articles. Moreover, we also looked into some of the most known communities, as IEEE and ACM, as well as publications from relevant publication, where we looked for terms as “IT Governance”, “IT Governance mechanisms”, “IT case study”, “IT Governance factors”, and finally “Structures” “Processes” and “Relational” “mechanisms” in articles from no further than 2013. Plus, the publications had to be peer-reviewed, written in English and available in full text. In this processes we enhanced the queries by adding synonyms or abbreviations. This selection of databases allowed us to search a lot of journals from the IS management and computer science, including the top 25 MIS journals listed by the AIS.

In order to guide our evaluation procedures during the literature search process, we derived a set of explicit inclusion and exclusion criteria in accordance with our thesis goal. Those criteria provide additional transparency, not only on the search procedure but also on follow-up literature evaluation procedures (i.e. title, abstract and full text evaluation). Publications were eligible for inclusion if they provided empirical results related to our thesis goal and we included suitable qualitative and quantitative research studies.

Having the initial set of publications we read through titles and abstracts of those publications and excluded those that did not match our defined inclusion and exclusion criteria. In uncertain cases we kept the publications for subsequent full text analysis.

After the identification of the most relevant articles in those communities’ digital libraries, we then follow the articles referenced in each identified article. We searched backward by analyzing the references of the publications. We searched forward by utilizing respective functions of Thomson Reuters Web of Knowledge and Google Scholar for identifying citing publications.

Nº	STEP	Description	In this Thesis
1	Identifying relevant literature	A high-quality review is complete and focuses on concepts. A complete review covers relevant literature on the topic and is not confined to one research methodology, one set of journals, or geography. The quality of the literature used plays a significant role in advancing the knowledge of the researcher and the overall Body of Knowledge (BoK) (Levy and Ellis, 2006; Webster and Watson, 2002).	Section 1, Section 2, Section 3.
1.1	Validating the quality of the IS literature	In order to select the source material for the review, the following steps must be performed (Creswell 2002; Levy and Ellis, 2006; Webster and Watson, 2002). a) The major contributions are likely to be in leading journals. You should also examine selected conference proceedings, especially those with a reputation for quality. b) Go backward by reviewing the quotations for the articles identified in step 1 to determine prior articles you should consider. c) Go forward to identify articles citing the key articles identified in the previous steps.	Several journal articles, the main digital libraries (IEEE, ACM, etc.)
1.2	Testing for applicability to your study	While searching for quality literature is essential, it is also important to identify articles that are applicable to the proposed study. This issue has two critical facets. The first deals with the inclusion or exclusion of articles from the LR, and the second deals with ethical and unethical use of references (Creswell 2002; Levy and Ellis, 2006)	Only papers with focus on ITG, ITG factors and ITG mechanisms were considered
2	Structuring the review	Concept-Centric against Author-Centric. Thus, concepts determine the organizing framework of a review (Webster and Watson, 2002).	Table 5, 6, 7,8 and 9
2.1	Writing arguments and argumentation theory	Describe the problem and support it with good references (Levy and Ellis 2006).	Section 1.1
2.2	Apply the literature	Application is demonstrated by activities such as demonstrating, illustrating, solving, relating, and classifying. In the context of the LR, application is most directly revealed by the two-step process of (Levy and Ellis 2006): a) Identifying the major concepts germane to the study; b) Placing the citation in the correct category.	All Document
2.3	Theoretical development in your article	Add knowledge and advice for possible future work (Webster and Watson 2002).	Section 7.3
2.4	Creating discussion and conclusions	Discussion and conclusions (Webster and Watson, 2002).	Section 7
3	Tips for LR	Tips for doing a good LR (Levy and Ellis, 2006).	Table 2
3.1	Know the literature	Describes what the work is about (Levy and Ellis 2006).	Section 1
3.2	Comprehend the literature	Demonstrates that you understand the work and if possible provides some examples (Levy and Ellis, 2006).	All Document
3.3	Analyze the literature	Demonstrates the work relevance (Levy and Ellis, 2006).	Section 1, 1.1
3.4	Synthesize the literature	Several references for one phrase instead of a reference for each phrase (Levy and Ellis, 2006).	All document
3.5	Evaluate the literature	Demonstrate if the work is already validated or not (Levy and Ellis, 2006).	All Document
3.6	Tone	A successful LR constructively informs the reader about what has been learned. In contrast to specific and critical reviews of individual papers, it tells the reader what patterns you are seeing in the literature. Do not fall into the trap of being overly critical (Webster and Watson 2002).	All Document
3.7	Tense	Present or past tense? We believe that we should use the present, because it gives to the reader a great sense of immediacy. There is an exception: an author's opinion can change with time, so we should use the past tense when quoting someone (Webster and Watson, 2002).	All Document
4	Evaluating the theory	With each revision, the paper ripens. Expose your paper to the fresh air and sunshine of collegial feedback. With each discussion, new ideas emerge. The ripening process is facilitated with hard work and frequent revisions (Webster and Watson, 2002; Weick 1995).	Section 5

Table 2 LR Guidelines

2.2. Interviews

Interview is a managed verbal exchange (Ritchie and Lewis, 2003; Gillham 2000) and as such its effectiveness heavily depends on the communication skills of the interviewer (Clough and Nutbrown, 2007). These include the ability to clearly structure questions (Cohen et al., 2007); listen attentively (Clough and Nutbrown, 2007); pause, probe or prompt appropriately (Ritchie and Lewis, 2003); and encourage the interviewee to talk freely, “Make it easy for interviewees to respond” (Clough and Nutbrown, 2007).

Definition – Interview
<i>A managed verbal exchange of information which effectiveness heavily depends on the communication skills of the interviewer.</i>
(Clough and Nutbrown, 2007; Gillham 2000; Ritchie and Lewis, 2003)

There are several types of interviews. Some of them are (Bryman, 2012):

- **Unstructured Interviews:** when the researcher has a clear plan, but minimum control over how the interviewees answers.
- **Semi-structured Interviews:** when the researcher uses a guide with questions and topics that must be covered.
- **Structured Interviews:** when the researcher has fixed questions and they are asked in a specific order.

In this thesis we used a Semi-Structure interview.

Definition – Semi-Structured Interview
<i>The order in which the various topics are dealt with and the wording of the questions are left to the interviewer’s discretion. Within each topic, the interviewer is free to conduct the conversation as he thinks fit, to ask the questions he deems appropriate in the words he considers best, to give explanation and ask for clarification if the answer is not clear, to prompt the respondent to elucidate further if necessary, and to establish his own style of conversation.</i>
(Corbetta, 2003)

In this kind of interview the researcher has a list of questions or fairly specific topics to be covered, often referred to as an interview guide, but the interviewee has a great deal of leeway in how to reply. Questions may not follow on exactly in the way outlined on the schedule. Questions that are not included in the guide may be asked as they pick up on things said by interviewers. But, by and large, all of the questions will be asked and a similar wording will be used from interviewee to interviewee

This method relies on the inter-personal skills of the interviewer, the ability to establish relationship and rapport. These qualities are valuable but ethically very sensitive (Newton, 2010). The types of questions to be asked, issues of confidentiality and at times anonymity have to be thoroughly assessed and discussed with all the interviewees in order to ensure the acceptance of all.

In the literature we found that exist some tips that should be followed in order to perform a better interview. In Table 3 we provide these tips.

Tips	Description
Tip 1	Greet your informant at the beginning of the interview in a culturally appropriate way (Hardon et al., 2004).
Tip 2	Explain the purpose of the interview and ask the informant for consent (Laforest, 2009).
Tip 3	Explain how the information will be recorded. Ask for permission to tape-record the session if you plan to do so (Laforest, 2009).
Tip 4	Introduce the people present at the interview. The interviewees should be asked for permission for all of them to stay (Hardon et al., 2004).
Tip 5	Start the interview with a general, open-ended question (Laforest, 2009).
Tip 6	Use a language that is comprehensible and relevant to the people you are interviewing (Bryman, 2012)
Tip 7	Be an "active" listener; look at your informant's face (not at your interview guide), and always behave in a culturally sensitive way (Laforest, 2009).
Tip 8	Ask as few questions as possible; the interviewees should do most of the talking (Laforest, 2009).
Tip 9	Making reference (anonymously, of course) to statements made in other interviews or to findings based on other data sources can a good way to encourage interviewees to express themselves. It is also useful for validating information already gathered (Laforest, 2009).
Tip 10	Follow the flow of the discussion, but make sure that all the topics are covered (Hardon et al., 2004).
Tip 11	Ask clear and direct questions such as How? Where? When? Who? What? Why? How much? How many? (Hardon et al., 2004).
Tip 12	Ask 'probing' questions to clarify points or to encourage more explanation (Hardon et al., 2004).
Tip 13	Avoid giving opinions or judgments about what the informant says, and treat him/her as an equal (Laforest, 2009).
Tip 14	Thank the informant at the end and give him/her time to ask more questions (Hardon et al., 2004).

Table 3 Tips to a good interview

During the interviews we tried to follow these tips. In the Proposal Chapter we will provide further details on how we have done the interviews and the results of these interviews. In Appendix B the readers can find the template used in the interviews.

2.3. Österle principles

Österle principles result from a memorandum written by 10 authors and supported by 111 full professors, with the objective of providing: rules for scientific rigor and improved guidance for researchers; criteria for journal and conference reviewers work; criteria for selection of young

researchers and tenure procedures; criteria for evaluation of researchers and research organizations; and design-oriented IS research in the international research community. In summary, it tries to provide a contribution to the rigor of research. These principles are (Österle et al., 2011):

- **Abstraction:** the artifact must be applicable to a class of problems.
- **Originality:** the artifact must substantially contribute to the advancement of the Bok.
- **Justification:** the artifact must be justified in a comprehensible manner and must allow for its validation.
- **Benefit:** the artifact must yield benefit, either immediately or in the future, for the respective stakeholder groups.

2.4. Hevner Guidelines

Evaluation is one of the most crucial steps in DSR methodology because it is what verifies the contribution of the solution for the identified problem and its utility, quality, and efficacy. This is accomplished through Hevner et al. (Hevner et al., 2004) seven guidelines (Table 4).

Guidelines	Description
Guideline 1: Design as an artifact	DSR must produce a viable artifact in the form of a construct, a model, a method or an instantiation
Guideline 2: Problem relevance	The objective of DSR is to develop technology-based solutions to important and relevant business problems.
Guideline 3: Design evaluation	The utility, quality and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods.
Guideline 4: Research contributions	Effective DSR must provide clear and verifiable contributions in the areas of the design artifact and design methodologies.
Guideline 5: Research rigor	DSR relies upon the application of rigorous methods in both the construction and evaluation of the design artifact
Guideline 6: Design as a search process	The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment.
Guideline 7: Communication of research	DSR must be presented effectively both to technology-oriented as well as management-oriented audiences.

Table 4 Hevner guidelines

3. Related Work

ITG has been hotly debated in the extant literature in the last few years, resulting in numerous research streams (Brown and Grant, 2005). Therefore in this section we are going to explain what ITG is and some concepts related with it.

Governance is a concept that can be used in many contexts and is by now a well-known term in business. It has focused on the role of boards of directors in representing and protecting the interests of shareholders (Fama and Jensen, 1983; Kooper et al., 2011) and addresses the proper management of organizations (Spafford, 2003). There are many different types of governance and we should present a brief description of them in order to understand each one and which governance type will be focused on this thesis:

- Corporate Governance (CG) – is seen as a set of processes, customs, policies, laws, and institutions (Kooper et al., 2011) affecting the way a corporation is directed, administered or controlled (Van Grembergen and De Haes, 2008), is the responsibility delegated by stakeholders and the public, defined by legislators and regulators and shared by boards, in some measure, with managers (Webb et al., 2006).
- Enterprise Governance (EG) – is a set of responsibilities and practices exercised by the board and executive managers, with the goal of providing strategic direction, ensuring that plans and objectives are achieved, assessing that risks are proactively managed, and assuring that the enterprise's resources are used responsibly (Van Grembergen and De Haes, 2008).
- ITG – Literature has demonstrated a lack of a clear shared understanding of the term ITG. None of the definitions reflect all of the elements of the framework, possibly indicating that authors do develop definitions to support their particular focus (Webb et al., 2006). In Section 3.1 we will identify several ITG definitions in many articles and books, with minor differences.

These types of governance are correlated and cannot be dissociated from each other. They should be dealt with as “whole Governance” with dependencies and relations between them and an order to be followed.

It is clear that ITG already developed into a discipline of its own rights (Simonsson and Ekstedt, 2006). Since ITG cannot exist in isolation but must be a subset of EG (Symons, 2005) and is also commonly referred to as a subset of CG (Lunardi et al., 2009; Webb, 2006; Kooper et al., 2011; Simonsson and Johnson, 2006) and meaningful only in this context (Peterson, 2004; Information Technology Governance Institute, 2007; Dahlberg and Kivijarvi, 2006), it is concluded that ITG is the most specific and focused on the identified types of governance. In this thesis the focus will be about ITG.

3.1. IT Governance

IT and its use in business environments, has experienced a fundamental transformation in the past decades. Since the introduction of IT in organizations, academics, and practitioners conducted research and developed theories and best practices in this emerging knowledge domain (Peterson, 2004). A commonly agreed upon definition of ITG does not exist and would be very useful (Simonsson and Johnson, 2006). Despite the different definitions address some common issues, such uncertainty is not advisable and proves that ITG field has much to evolve further (Pereira and Mira da Silva, 2012). Many studies continue to focus on defining ITG (Peterson, 2004; Webb et al., 2006) and, as we can see in Table 5, many definitions have been proposed.

Definition	Researcher
ITG decisions the locus of responsibility for IT functions	Brown and Magill, 1994
ITG is the degree which the authority for making IT decisions is defined and shared among management, and the processes managers in both IT and business organizations apply in setting IT priorities and the allocation of the IT resources	Luftman, 1996
ITG refers to the patterns of authority for key IT activities	Sambamurthy and Zmud, 1999
ITG is the organizational capacity by the board, executive management and ITM to control the formulation and implementation of IT strategy and in this way ensures the fusion of business and IT	Van Grembergen, 2000
ITG is about who is entitled to make major decisions, who has input and who is accountable for implementing those decisions. It is not synonymous with IT Management (ITM). ITG is about decisions rights, whereas ITM is about making and implementing specific decisions	Broadbent, 2003
ITG is the responsibility of the board of directors and executive management. It is an integral part of EG and consists of the leadership and organizational structures and processes that ensure that organization's IT sustains and extends the organization's strategies and objectives	IT Governance Institute, 2004
ITG is specifying the decision rights and accountability standard to encourage desirable behavior in using IT	Weill and Ross, 2004
ITG is the process by which decisions are made around IT investments. How decisions are made, who makes the decisions, who is held accountable and how the results of decisions measured and monitored are all parts of ITG	Craig et al., 2005
The strategic alignment of IT with business, such that maximum business value is achieved through the development and maintenance of effective IT control and accountability, performance management and risk management	Webb et al., 2006
ITG is the preparation for, making of and implementation of IT-related decisions regarding goals, processes, people and technology on a tactical or strategic level	Simonsson and Ekstedt, 2006
ITG is the collection of management, planning and performance reporting and review processes with associated decisions rights, which establish control and performance metrics over key investments, operational and delivery services and new or change authorizations and compliance with regulations, laws, and organizational policies. It formalizes and clarifies oversight, accountability and decisions rights.	Selig, 2006
The system by which the current and future use of IT is directed and controlled.	ISO 38500, 2008

<p>ITG is the process that ensures the effective and efficient use of IT in enabling an organization to achieve its goals. The definition contain certain key concepts:</p> <ul style="list-style-type: none"> • ITG is composed of processes with the inputs, outputs, roles and responsibilities that are inherent in a process definition. (However, the definition does not talk about how these process) • The role of ITG “ensures”, as opposed to “executes”. • The goal of ITG is defined as a business goal, not just IT-related. • Key performance measures, identified as effectiveness and efficiency, together represent business value. 	<p>Gerrard, 2010</p>
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Table 5 Several definitions of ITG (Pereira and Mira da Silva, 2012B)

It must be clear that the purpose of this thesis is not to decide which the most appropriate ITG definition is, or even propose a new one; however, the concern is stated and a historical review of the main ITG definitions in the literature presented.

In this thesis, as we previously stated, we use the definition provided by (Weill and Ross, 2004) because it seems to be the more comprehensive definition and one of the most widely cited in the literature (Pardo and Burke, 2009).

<p>Definition – ITG</p>
<p><i>IT Governance is specifying the decision rights and accountability framework to encourage desirable behavior in the use of IT.</i></p>
<p>(Weill and Ross, 2004)</p>

3.2. IT Management

Even today much of the literature does not differentiate ITM from ITG (Krey et al., 2011) and some authors tend to view the two concepts as synonymous, even though they clearly differ (Sohal Fitzpatrick, 2002).

An important distinction between governance and management was made by Gallagher (Gallagher and Worrel, 2008) who states that while executives and managers administer, develop, implement and monitor business strategies on a day-to-day basis, boards and other governance structures deal with overall organization policy, culture and direction.

Definition – ITM
<i>ITM is the responsibility of executives and managers about administer, develop, implement and monitor business strategies on a day-to-day basis.</i>
(Gallagher and Worrel, 2008)

Weil and Ross (Weil and Ross, 2004) add that a change to an organization’s strategy may well require changes in management but not the governance of an asset. Peterson (Peterson, 2004; Krey et al., 2011) go further and states that in ITM, the provision of IT services and products can be assigned to an external provider (as in outsourcing), while ITG is specific to an organization. Since governance gives direction and control over IT expenditures, it cannot be outsourced and it’s the direct responsibility of the senior executive.

The goal of ITG is not only the responsibility of the board of directors and executive management that specify the decision rights to encourage desirable behavior in using IT (Weil and Ross, 2004; Huang et al., 2010), how organizations structure and manage organization’s IT- related decisions, structures, processes and actions such that desired behaviors and outcomes are realized (Park et al., 2006; Gerrard, 2010; Jacobson, 2009; Huang et al., 2010; Jaafar and Jordan, 2009), but also to support IT’s role as a business enabler (Simonsson et al., 2008).

Other authors state that governance is not about the specific decisions made, but rather about determining who makes each type of decision, who has input into the decision, and how one is held accountable for their roles (Lingyu et al., 2010; Gallagher and Worrel, 2008). ITG is the exercise of authority and accountability in making and executing decisions about technology operations (Guney and Cresswell, 2010).

For example, ITM of an organization might be concerned with maintaining laptops and ensuring enough laptops for everyone in the organization. ITG requires senior management and ITM work together to identify those who need laptops, and resources, human and mechanical, further the goals of the organization. While ITM attends to the delivery of IT services and manages IT equipment; ITG works to ensure ITM meets the long-term goals of the organization.

As explained before, this means that there is a clear difference between ITG and ITM.

In Figure 1 we can see the difference between ITG and ITM:

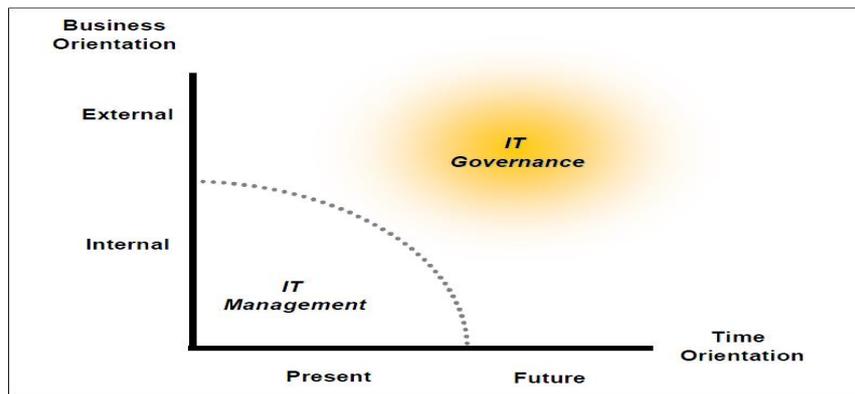


Figure 1 ITG and ITM (Peterson, 2003).

Summarizing, ITM is focused on the effective and efficient internal supply of IT services and products and the management of present IT operations (Van Grembergen and De Haes, 2009) while ITG in turn is much broader, and concentrates on performing and transforming IT to meet present and future demands of the business (internal focus) and the business' customers (external focus) (Peterson 2004).

3.3. ITG Case Studies

Case Studies are a valuable way of looking at the world around us (Harling 2002; Rowley 2002). Past literature reveals the application of the case study method in many areas and disciplines (Zainal 2007) where the researchers gain an "in-depth" understanding of complex issues, like the phenomena in a "real-life" setting (Dobson 1999).

In practice oriented fields of research, such as architecture, planning or even IT, the case study has a special importance (Johansson 2003) and different types have been used in a variety of ways IS research (Kaplan and Duchon, 1988). Indeed, a tremendous progress of interpretive research happened in the last 30 years in the IS community (Fernandez 2004).

Definition – Case Study

An empirical and holistic inquiry that investigates a contemporary phenomena within its real life context especially when the boundaries between phenomenon and context are not clearly evident

(Yin, 2009)

Particularly, in IS field three main advantages are stated by (Benbasat et al. 1987) the researcher can study IS in a natural setting, learn about the state of the art, and generate theories from practice; the method allows the researcher to understand the nature and complexity of the process taking place; and valuable insights can be gained into new topics emerging in the rapidly changing IS field.

However, case studies are often accused of lack of rigor (Zainal 2007) making it difficult to reach a generalizing conclusion (Tellis 1997). Lee (Lee 1989) also pointed generalizability as a main case study problem. Another common pitfall associated with case study is that there is a tendency for researchers to attempt to answer a question that is too broad or a topic with too many goals for one study. In order to avoid this problem, several authors including Yin (Yin 2009) and Stake (Stake 1995) have suggested placing boundaries on a case to keep your study reasonably in scope. Plus, selecting the wrong case studies may result in a lack of theoretical generalizations (Gable 1994).

Given such problems around case studies in IT field we found ourselves with many difficulties to found valuable case studies.

3.4. ITG Contingency Factors

ITG implementation is influenced by external and internal factors (Xue et al., 2006). Nevertheless, literature fails to reveal a clear and concise identification of these factors (Pereira and Mira da Silva, 2012A).

Among the literature we found three approaches provided that state some ITG contingency factors. These approaches were provided by (Pereira and Mira da Silva, 2012B); Sambamurthy and Zmud, 1999; Weill 2004). Below we are going to explain each of these approaches.

First approach is provided by (Pereira and Mira da Silva, 2012B) and the factors that this approach states that influence ITG implementation are: Culture, structure, strategy, size, regional differences, industry, maturity, ethic and trust.

The second approach can be seen in (Sambamurthy and Zmud, 1999). The factors that are used in this publication are: Overall Governance mode, Firm size, Diversification mode, Diversification breadth, Exploitation strategy for scope economies and Line IT knowledge.

The third approach is provided in (Weill 2004). This approach argues that are five factors that influence ITG patterns are: Strategic and performance goals, Organizational structure, Governance experience, Size and diversity and Industry and regional differences.

3.5. ITG Mechanisms

When looking at an organization, it can typically be subdivided into three layers, as shown in Figure 2. It is clear that ITG is situated at each of these layers in the organization: at strategic level where the board is involved, at management level within the C-suite (Chief Executive Officer (CEO), CIO, Chief Operating Officer (COO), etc.) and senior management layer and finally at the operational level with operational IT and business management.

This implies that all these levels, business as well as IT, need to be involved in the EG of IT process and they have to understand their individual roles and responsibilities within the framework (Van Grembergen and De Haes, 2008).

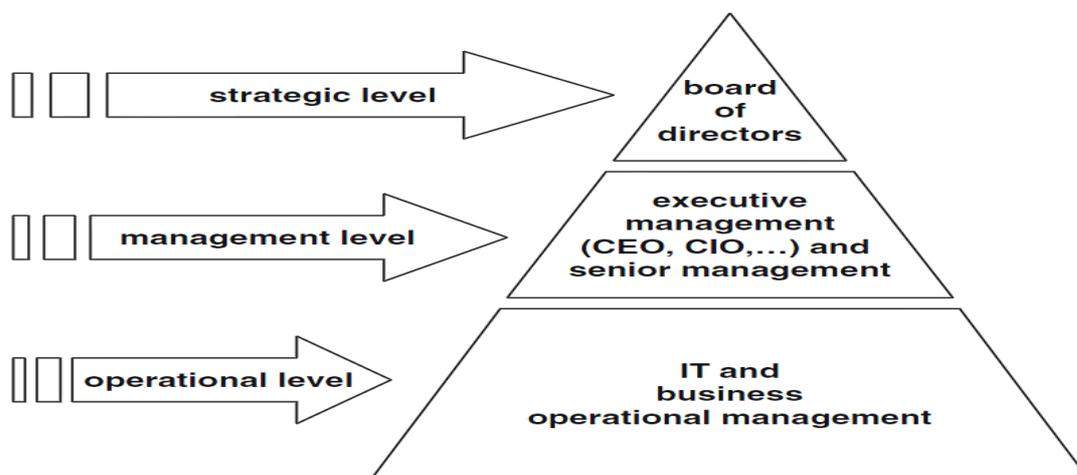


Figure 2 Three layers of ITG responsibility (Van Grembergen et al., 2003)

ITG can be deployed using a mixture of various structures, processes and relational mechanisms (De Haes and Van Grembergen, 2004) as we can see in Figure 3. The challenge is to choose the rights mechanisms to achieve better results. Among the literature several authors argued that organizations should use ITG mechanisms (Van Grembergen and De Haes, 2009; Weill and Ross, 2004), but few researchers attempt to describe and provide a complete explanation on ITG mechanisms.

Moreover, there is not a consensus about all the existent ITG mechanisms. The majority of the authors point a set of ITG mechanisms without justifying why those and not others, were selected. Plus, in some cases they overlap each other. For example, Weill and Ross (Weill and Ross, 2004) call communication mechanisms while Grembergen and De Haes (Van Grembergen and De Haes, 2008) use the term relational mechanisms to the same type of ITG mechanisms.

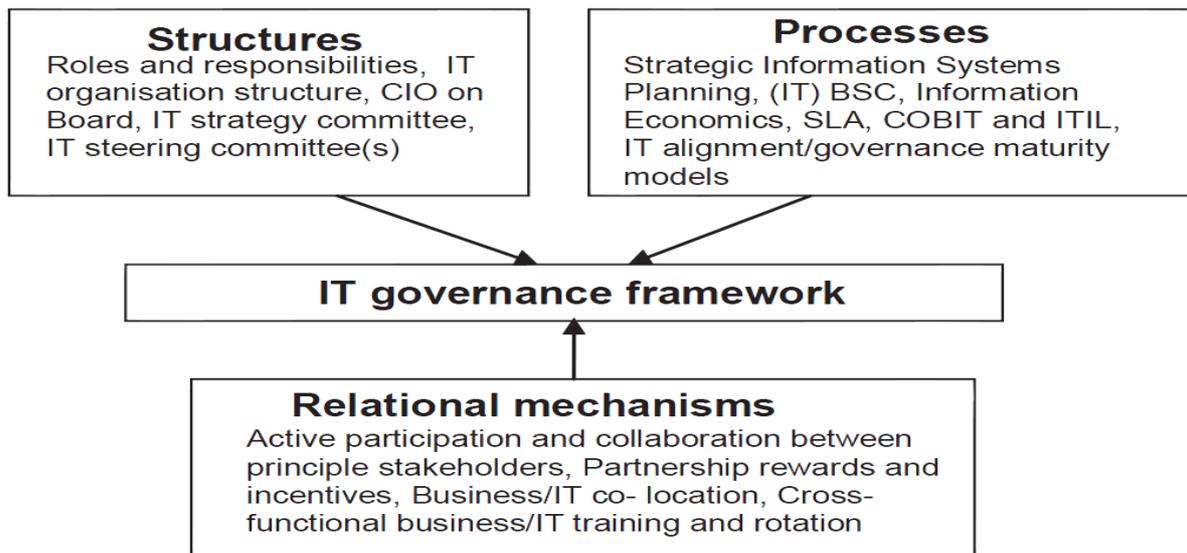


Figure 3 The necessary elements of an ITG framework (Van Grembergen and De Haes, 2008)

Regarding the ITG mechanisms we can state that:

- The Structure mechanisms are the most visible ITG mechanisms. They can be defined as the organizational units and roles, responsible for making IT decisions. Some examples of such mechanisms are committees, executive teams and business/ IT relationship managers (Van Grembergen and De Haes, 2008; Weill and Ross, 2004).
- The Processes mechanisms are formal processes for ensuring that daily behaviors are consistent with IT policies and provide input back to decisions. These include IT investment proposal, architecture exception processes, Strategic Information System Planning, chargebacks, among others (Van Grembergen and De Haes, 2008; Weill and Ross, 2004).
- The Relational mechanisms complete the ITG framework and are paramount for attaining and sustaining business-IT alignment, even when the appropriate structures and processes are in place. For attaining and sustaining business-IT alignment, mechanisms like announcements, advocates, channels and education efforts are used (De Haes and Van Grembergen, 2008A; Parker et al., 2002; Weill and Ross, 2005).

In the Section 4.1 we will present all the relevant ITG mechanisms, describing them and pointing out the main references. Moreover we will show the incongruities and inconsistencies and how to solve this problem in order to increase the consensus about this subject.

3.6. ITG Patterns

This section describes the different approaches among the literature that somehow are related with our proposal. After an extensive LR we found two different valuable approaches but, as we will see forwardly, they do not solve this thesis problem.

The first approach that it is useful is provided by Weill (Weill, 2004). Professor Peter Weill of Massachusetts Institute of Technology and his research team took five years to investigate 300 enterprises more than 20 countries and established a framework for analysis of ITG patterns (known as CISR Pattern).

This research addressed large enterprises and a wide range of industries. In this research, the authors want to understand how the different domains of ITG (in this case, IT principles, IT architecture, IT infrastructure, Business applications needs and IT investment and prioritization) are governed. In other words, this study, try to see the styles of governance (from a more decentralized to a more centralized style) that are used by top performers to decide the major IT decisions that must be made.

In Figure 4 we can see an approach provided by Weill (Weill, 2004).

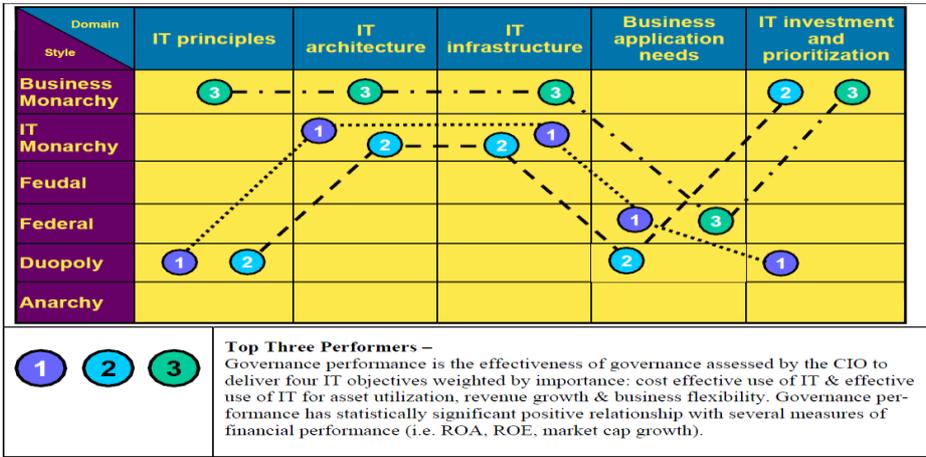


Figure 4 Top Three Overall Governance Performers (Weill, 2004)

The other approach that is similar to our proposal is provided by De Haes and Grembergen in (De Haes and Van Grembergen, 2008). This approach provides a minimum baseline of ITG practices those Belgian financial services organizations at least should have. This study also addresses the ease of implementation and the effectiveness of these mechanisms. However, this research only has focused in Belgian financial services organizations with headcounts ranging from 100 to more than 1000 employees.

In Figure 5 we can see the findings of this research.

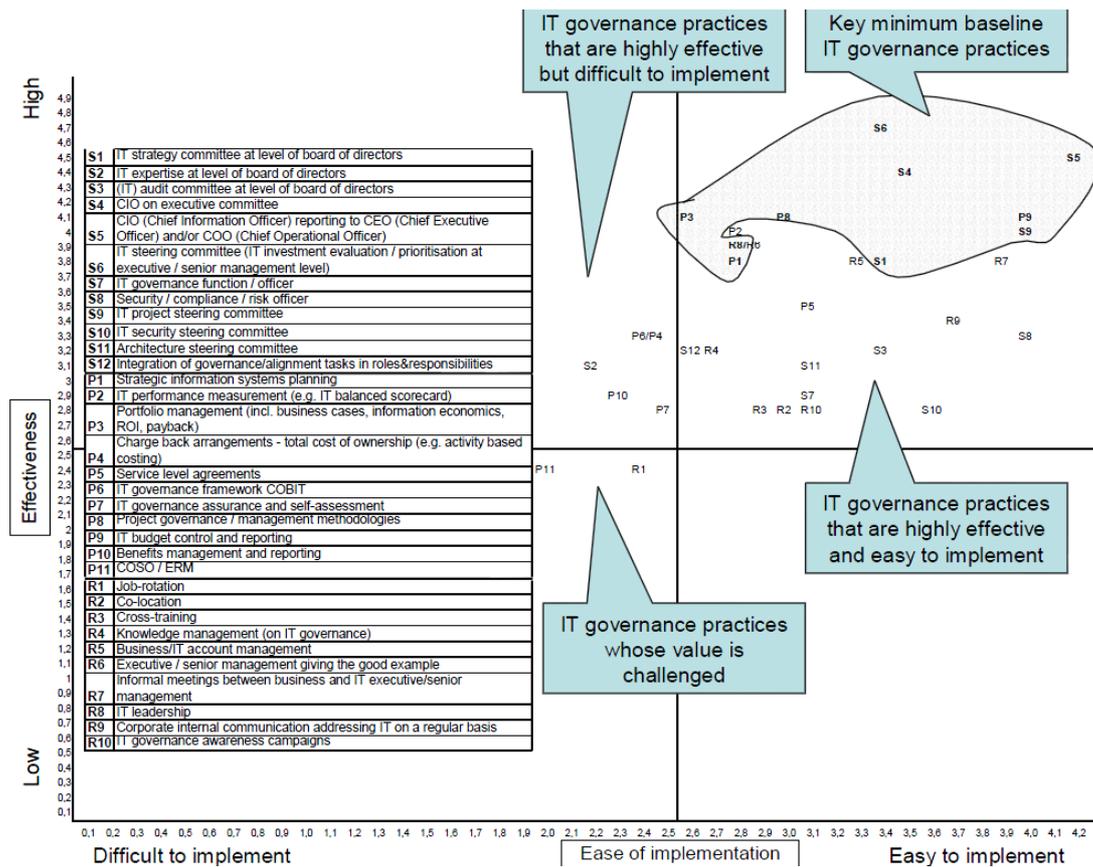


Figure 5 Effectiveness, Ease of Implementation and Minimum Baseline of ITG Practices (De Haes and Van Grembergen, 2008)

3.7. Conclusion

Practitioner IT frameworks appear to be more process oriented. They identify a set of processes/areas that should be followed and based on practitioners' experience the framework propose a set of practices and activities for each process/area. However, none of the practitioner IT frameworks make reference to any of the contingency factors, not even to the contingency factor concept as a whole. Such conclusion reinforces some statements present in the literature that affirm that these frameworks are generic to be adaptable to any organizational context (Lunardi et al., 2009; Information Technology Governance Institute, 2007; Agarwal and Sambamurthy, 2002).

Contingency factors are not a concern in all of the academic IT frameworks. The researchers conclude that contingency factors are a relevant topic to be explored with a lot of work to be done. Selig (Selig, 2006) framework appears to be the most complete academic IT framework even not caring about contingency factors. Dahlberg (Dahlberg and Lahdelma, 2007) framework is also a good academic IT framework, besides addressing few areas it cares about contingency factors as well.

Despite ITG mechanisms relevance the literature still lacking their formalization and most of the authors have been using the mechanisms they want without any formal description. It is usual to find the same mechanism with different description or the same description for different mechanism.

Few authors addressed studies about ITG patterns and those o did it are far from solving the problem we intend to help to solve in this thesis.

Summarizing, ITG is hard to implement and hard to use. There are several misunderstandings in ITG that must be clarified in order to promote a correct implementation and use of ITG.

Therefore, we started this thesis trying to point the different definitions about ITG. Then we realized the role of ITG in organizations and clarified the differences between ITG and ITM. Plus we looked into the ITG case studies in order to take some notes about how they are written and about some gaps they could present.

After that, we searched about the major factors that could influence ITG implementation and we also gathered all the ITG mechanism and respectively definitions present in the literature.

Finally we looked for similar approaches to our proposal and we only found two valuable approaches.

4. Proposal

In this chapter we present the different proposed artifacts that aims to solve the identified problem and achieves the objectives defined in previous chapters. This chapter is divided in three sections, which correspond to the sequential process that composes our proposal.

In Section 4.1, we formalize the ITG mechanisms that are spread in many sources in the literature in order to eliminate some inconsistencies and incongruities. The main goal is to present a set of formalized ITG mechanisms and its definitions. The formalization of ITG mechanisms and its definitions is a very important step once we must have a well-defined set of mechanisms to have a coherent approach in the extraction of these mechanisms from the 50 case studies that we are going to analyze.

In Section 4.2 we need to go deeper and detail the different ITG contingency factors. Therefore we are going to explain each factor. The explanation of the ITG contingency factors is essential to categorize the organizations. It means that, in order to group organizations taking into account their similarities, we need to have a clear definition of the factors that affect the organizations. For example, we cannot just state that an organization has Culture (obviously that all organizations have Culture). We must go deeper and define the organization Culture, in order to detail further this factor, so that in this way we clear group organizations taking into account their similar characteristics (in that case similar Culture).

In Section 4.3 we are going to analyze several ITG case studies (a total of 50 case studies) in order to extract the ITG mechanisms that are used in organizations and ITG contingency factors that affect them. After that we will create some patterns regarding ITG implementation in financial services organizations. These patterns are essential to show the practices used by organizations. To extract these patterns we have used the ITG mechanisms formalized in Section 4.1 and the ITG contingency factors detailed in Section 4.2. It should be noted that these patterns are not a cookbook to be strictly followed but they can be seen as a guidance about which can be the most relevant ITG mechanisms to implement given a specific organizational context.

4.1. ITG Mechanisms

As previously stated in this thesis, enterprises must design and implement three types of ITG mechanisms (Structure, Processes and Relational mechanisms) in order to promote desirable IT behaviors (De Haes and Van Grembergen, 2004). All these types of ITG mechanisms are important and they must be combined in order to create a holistic approach that promotes effective and efficient ITG throughout the organization.

Summarizing, enterprises can pragmatically implement ITG by using a mixture of various structures, processes and relational mechanisms.

However several problems exist regarding ITG mechanisms, and therefore a clarification is needed. Through an extensive LR we have listed all the relevant ITG mechanisms, describing them and pointing out the main references.

In this thesis we presented a total of 46 ITG mechanisms (18 Structure mechanisms, 14 Processes mechanisms and 14 Relational mechanisms).

To do that, some choices were made. All ITG mechanisms that do not have at least 2 references were excluded. This situation is due to the fact that we only intend to provide the more consensual mechanisms. Furthermore, as we encountered some gaps regarding ITG mechanisms, we have to correct these incongruities.

For example:

- We decided to use the term Relational mechanisms used by (Van Grembergen and De Haes, 2008) instead of the term Communication mechanisms that is used by (Weill and Ross, 2004), once it seems the term most used among the literature (Lunardi et al., 2009; Peterson, 2004; Thomas et al., 2012).
- We decided to consider the mechanisms Balanced Scorecard (that is included in the general mechanisms IT Performance Measurement) as a Process mechanism, since only one author (Symons, 2005) consider this mechanisms as a Relational mechanisms.
- We merged the mechanisms benefits management and reporting (Van Grembergen and De Haes, 2009) with the mechanisms formal tracking of business value (Weill and Ross, 2004) since they have similar definitions.
- All the frameworks as Control Objectives for Information and related Technology (COBIT), Information Technology Infrastructure Library (ITIL) and so on were included in a more generic mechanism - ITG Frameworks – since we think that detail all the frameworks is not a correct approach.
- The mechanism Working with nonconformists (Weill and Ross, 2004), Active conflict resolution (Peterson, 2004) and ITG awareness campaigns (Van Grembergen and De Haes, 2009) were merged in one mechanism (ITG awareness campaigns) due to the similarity and complementarity of the definitions.

In Table 6 we detail the Structure mechanisms. We list a total of 18 Structure mechanisms.

Structure	
Architecture steering committee	(Broadbent , 2002; Symons 2005; Van Grembergen and De Haes, 2009; Weill and Ross, 2004)
Business/IT relationship managers	(Broadbent, 2002; Gartner, 2004; Weill and Ross, 2004)
CIO on Board	(Lunardi et al., 2009; Peterson, 2004; Van Grembergen et al., 2003; Weill and Ross, 2004)
CIO on executive committee/CIO reporting to CEO and/or COO	(Symons, 2005; Van Grembergen and De Haes, 2009)
E-business advisory board	(Peterson 2004; Van Grembergen et al., 2003)
E-business task force	(Peterson 2004; Van Grembergen et al., 2003)
Integration of governance /alignment tasks in roles & responsibilities	(Lunardi et al., 2009; Van Grembergen and De Haes, 2009)
IT audit committee at level of board of directors	(Sprenić 2009; Van Grembergen and De Haes, 2009; Weill and Ross, 2004)
IT councils	(Broadbent, 2002; Weill and Ross, 2005)
IT expertise at level of board of directors	(Van Grembergen and De Haes, 2009; Weill and Ross, 2004)
IT investment committee or capital improvement	(Broadbent and Weill, 2003; Symons, 2005; Weill and Ross, 2004A)
IT leadership councils	(Weill, 2004; Weill and Ross, 2004A)
IT organization structure	(De Haes and Van Grembergen 2004; Lunardi et al., 2009; Van Grembergen et al., 2003; Weill and Ross, 2004)
IT project steering committee	(Lunardi et al., 2009; Thomas et al., 2012; Van Grembergen et al., 2003)
IT steering Committee	(Broadbent and Weill; 2003; Huang et al., 2010; Van Grembergen and De Haes, 2008; Weill and Ross, 2004)
IT strategy committee	(Broadbent and Weill; 2003; Van Grembergen et al., 2003; Weill and Ross, 2004)
ITG function/officer	(Symons, 2005; Van Grembergen and De Haes, 2009)
Security/Compliance/Risk Officer	(De Haes and Van Grembergen, 2008; Van Grembergen and De Haes, 2009)

Table 6 Structure Mechanisms

In Table 7 we detail the Processes mechanisms gathered from the literature. We present a total of 14 Processes mechanisms.

Processes	
Architectural exception process	(Weill and Ross, 2004; Weill and Ross, 2005)
Benefits management and reporting	(De Haes and Van Grembergen, 2008; Van Grembergen and De Haes, 2009; Weill and Ross, 2004)
Chargeback	(Broadbent and Weill, 2003; Symons, 2005; Van Grembergen and De Haes, 2009; Weill and Ross, 2004)
Demand management	(Heier et al., 2007; Symons, 2005)
ITG Frameworks	(Lunardi et al., 2009; Van Grembergen et al., 2003; Van Grembergen and De Haes, 2008)
ITG assurance and self-assessment	(De Haes and Van Grembergen, 2009; Van Grembergen and De Haes, 2009)
IT budget control and reporting	(Thomas et al., 2012; Van Grembergen and De Haes, 2009; Weill, 2004)

ITG Maturity Models	(De Haes and Van Grembergen, 2004; Van Grembergen et al., 2003)
IT Performance Measurement (IT Balanced Scorecard)	(Peterson, 2004; Parker et al., 2002; Van Grembergen and De Haes, 2009)
Portfolio management	(Heier et al., 2007; Symons, 2005; Van Grembergen and De Haes, 2009)
Project Governance Management Methodologies	(De Haes and Van Grembergen, 2009; Van Grembergen and De Haes, 2009)
Project Tracking	(Weill and Ross, 2004; Weill and Ross, 2004A)
Service Level Agreement	(Symons, 2005; Van Grembergen et al., 2003; Van Grembergen and De Haes, 2009; Weill and Ross, 2004)
Strategic Information System Planning	(Heier et al., 2007; Van Grembergen et al., 2003; Van Grembergen and De Haes, 2009)

Table 7 Processes Mechanisms

Finally in Table 8 we detail the Relational mechanisms. We present a total of 14 Relational mechanisms gathered from the literature.

Relational	
Business/IT account management	(De Haes and Van Grembergen, 2008A; Van Grembergen et al., 2003)
Business/IT collocation	(Peterson, 2004; Van Grembergen et al., 2003; Van Grembergen and De Haes, 2009)
Corporate internal communication addressing on a regular basis	(Luftman, 2000; Van Grembergen and De Haes, 2009)
Cross-functional business/IT job rotation	(Peterson, 2004; Van Grembergen et al., 2003; Van Grembergen and De Haes, 2009)
Cross-functional business/IT training	(Peterson, 2004; Van Grembergen et al., 2003; Van Grembergen and De Haes, 2009)
Executive/Senior management give the good example	(De Haes and Van Grembergen, 2008; (De Haes and Van Grembergen, 2008A; Van Grembergen and De Haes, 2009)
Informal meeting between business and IT executive/senior management	(Broadbent, 2002; Van Grembergen and De Haes, 2009)
IT leadership	(Broadbent and Weill, 2004; Thomas et al., 2012; Van Grembergen and De Haes, 2009)
ITG awareness campaigns	(Van Grembergen and De Haes, 2009; Weill and Ross, 2004)
Knowledge management (on ITG)	(Van Grembergen and De Haes, 2009; Weill and Ross, 2004)
Office of CIO or ITG	(Gartner, 2004; Weill and Ross, 2004; Weill and Ross, 2005)
Partnership rewards and incentives	(Peterson, 2004; Van Grembergen et al., 2003; Van Grembergen and De Haes, 2008;
Senior management announcements	(Weill and Ross, 2004; Weill and Ross, 2004A)
Shared understanding of business/IT objectives	(Peterson, 2004; Van Grembergen et al., 2003; Van Grembergen and De Haes, 2008)

Table 8 Relational Mechanisms

Knowing what mechanisms exist is very important but it is not enough. It is necessary understand the differences between them. Therefore it is necessary to have a clear definition of each ITG mechanisms. In Table 9, due to space limitations, we only provide the definition for some ITG mechanisms.

Structure Mechanisms	Definition
Integration of governance /alignment tasks in roles & responsibilities	Clear and unambiguous definitions of the roles and the responsibilities of the involved parties are a crucial prerequisite for an effective ITG framework. It is the responsibility of the board and executive management to communicate these roles and responsibilities and to make sure that they are clearly understood throughout the whole organization. The best idea is document all roles and responsibilities (Van Grembergen et al., 2003; Van Grembergen and De Haes, 2009).
CIO on executive committee/CIO reporting to CEO and/or COO	CIO has a direct reporting line to the CEO and/or COO. This ensures that IT is part of the executive team where most strategy discussions begin and end. With that interaction IT can be an enabler of the organization (Symons, 2005; Van Grembergen et al., 2003).
Processes Mechanisms	Definition
Service Level Agreement	A SLA is defined as "a written contract between a service provider of a service and the customer of the service". The functions of SLAs are: Define what levels of service are acceptable by users and are attainable by the service provider; define the mutually acceptable and agreed upon set of indicators of the quality of service. Three basic types of SLAs can be defined: in-house, external and internal SLAs. The differences between those types refer to the parties involved in the definition of the SLA (Van Grembergen et al., 2003) Summarizing the main goal of the SLA is to provide Formal agreements between business and IT about IT development projects or IT operations (Van Grembergen and De Haes, 2009).
Chargeback	Chargeback is an accounting mechanism for allocating central IT costs to business units. The purpose of chargeback is to allocate costs so that business units IT costs reflect use of shared services while the shared services unit matches its costs with the business it supports. When IT understands its costs and charge out accordingly, chargeback processes demonstrates the cost saving resulting from shared services. Enterprises with effective costing mechanism find that chargeback can foster useful discussions between IT and business units about IT charges, leading to better-informed ITG decisions (Broadbent and Weill, 2003; Van Grembergen and De Haes, 2009; Weill and Ross, 2004).
Relational Mechanisms	Definition
Partnership rewards and incentives	One way that enterprises use to guarantee that the firm's strategy is followed by the employees is offering financial rewards and promotions to the employees who help organization achieve performance objectives (Montazemi and Pittaway, 2012).
ITG awareness campaigns	Campaign to explain to business and IT people the need for ITG. Working with managers who stray from desirable behaviors is a necessary part of generating the potential value of governance processes. Therefore is necessary to communicate with those managers in order to educate them for IT issues (Van Grembergen and De Haes, 2009; Weill and Ross, 2003).

Table 9 Definitions of some ITG Mechanisms

Summarizing in our proposal we tried to eliminate some gaps that, as were aforementioned, may difficult the implementation of ITG.

In this section we also defined some of the ITG mechanisms (Table 9) presented in Table 8. These definitions are important since it is important to have a deep knowledge about the meaning of the ITG mechanisms before choosing the most suitable to the organizations.

The complete list of ITG mechanisms and its definitions can be seen in Appendix A.

4.2. ITG Contingency Factors

Designing ITG is contingent upon a variety of sometimes conflicting internal and external factors. This led us to the theory of the contingency factors which we define below.

Definition - ITG Contingency Factors
Factors that, depending on organizations context, may influence the ITG implementation but that are not likely or intended, are a possibility that must be prepared for.
(Pereira and Mira da Silva, 2012B)

After analyzing all the different approaches in the literature regarding the ITG contingency factors, we decided to use the approach provided by (Pereira and Mira da Silva, 2012B) since it encompasses almost all the factors of the two other approaches described in Section 3.4. In Table 10 we list the ITG contingency factors that we are going to analyze in this thesis.

ITG Contingency Factors
• Culture
• Ethic
• Industry
• Maturity
• Regional Differences
• Size
• Strategy
• Structure
• Trust

Table 10 ITG Contingency Factors (Pereira and Mira da Silva, 2012)

However, pointing out the ITG contingency factors is not enough to our purpose. We need to go deeper in the different factors and study the different theories and approaches of each ITG

contingency factor in order to be able to characterize each organization. Therefore in this section we will provide a clearly explanation about the nine ITG contingency factors that we use in this thesis.

4.2.1. Culture

Like most organizational problems, it has both structural and human aspects. The people involved react according to their mental software. Part of this mental software consists of people's ideas about what an organization should be like.

Geert Hofstede (Hofstede et al., 2010) conducted one of the most comprehensive studies of how values in the workplace are influenced by culture. And as we have not found another valuable study about the Culture we will follow the Hofstede' approach in this thesis.

There are different layers of Culture (Hofstede et al., 2010). For example:

- **A national level:** related with to one's country (or countries for people who migrated during their lifetime);
- **A regional and/or ethnic and/or religious and/or linguistic affiliation level:** as most nations are composed of culturally different regions and/ or ethnic and/or religious and/or language groups;
- **Organizational or corporate level:** is about the way employees have been socialized by their work organization.

In this thesis, due to the complexity of analyzing all the layers, we will only analyze the national level, since it is the only one where there is a wide range of studies and therefor is a more mature layer. Geert Hofstede conducted perhaps the most comprehensive study of how values in the workplace are influenced by culture. He analyzed a large data base of employee values scores collected by IBM between 1967 and 1973 covering more than 70 countries.

There are four different dimensions in national culture accordingly to Hofstede (Hofstede et al., 2010):

- **Power distance:** the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally.
- **Individualism:** pertains to societies in which the ties between individuals are loose: everyone is expected to look after himself or herself and his or her immediate family. **Collectivism** as its opposite pertains to societies in which people from birth onwards are integrated into strong, cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty.
- **Masculinity:** the extent to which the dominant values of a society are "masculine" (e.g., assertive and competitive). Masculinity pertains to societies in which social gender roles are clearly distinct (i.e., men are supposed to be assertive, tough, and focused on material

success whereas women are supposed to be more modest, tender, and concerned with the quality of life. **Femininity** pertains to societies in which social gender roles overlap i.e., both men and women are supposed to be modest, tender, and concerned with the quality of life.

- **Uncertainty avoidance:** the extent to which the members of a culture feel threatened by uncertain or unknown situations and try to avoid such situations. This feeling is, among other things, expressed through nervous stress and in a need for predictability: a need for written and unwritten rules.

Hofstede's books include a generous sprinkling of amusing anecdotes and general observations regarding how national culture could influence organizational behavior. Huib Wursten (Wursten, 1997), a management consultant from Netherlands has followed up on this by adding observations drawn from his own international experiences creating some Implicit Models of Organizations that maps with the four dimensions.

In this thesis we will use Wursten approach to analyze the culture of the organizations taking into account the country of origin. The approach split different countries, grouping each country with others with similar characteristics.

This approach is divided into the following topics:

- **The contest model:** Competitive Anglo-Saxon cultures with low power distance, high individualism and masculinity, and fairly low scores on uncertainty avoidance. Examples: Australia, New Zealand, UK and USA.
- **The network model:** Highly individualistic, 'feminine' societies with low power distance like Scandinavia and the Netherlands. Everyone is supposed to be involved in decision-making.
- **The organization as a family:** Found in societies that score high on power distance and collectivism and have powerful in-groups and paternalistic leaders. Examples: China, Hong Kong, India, Indonesia, Malaysia, Philippines and Singapore.
- **The pyramidal organization:** Found in collective societies with large power distance and uncertainty avoidance. Examples: much of Latin America (especially Brazil), Greece, Portugal, Russia and Thailand.
- **The solar system:** Similar to the pyramid structure, but with greater individualism. Examples: Belgium, France, Northern Italy, Spain and French speaking Switzerland.
- **The well-oiled machine:** Found in societies with low power distance and high uncertainty avoidance, carefully balanced procedures and rules, not much hierarchy. Examples: Austria, Germany, Czech Republic, Hungary, German speaking Switzerland.

In this thesis, the different organizations will be mapped accordingly these six topics. For example, a Portuguese organization will be considered as a pyramidal organization in our thesis.

4.2.2. Ethic

High impact scandals in organizations have generated widespread interest in ethical and unethical behavior in organizations.

In large part due to pressures from the legal and regulatory environment, many large organizations have adopted various efforts to implement policies and programs aimed at fostering ethical behavior in organization members (Weaver et al., 1999). These “ethical infrastructures” contain both formal and informal elements: ethics codes and policies, communications, training, monitoring systems, sanctions, and rewards on the formal side, and attention to ethical climates and organizational cultures on the informal side (Tenbrunsel et al., 2003).

To achieve an effective ethic of compliance, a firm needs to establish a code of conduct, adopt and implement (at least in part) a comprehensive compliance framework such as COSO (Committee of Sponsoring Organizations of the Treadway Commission), COBIT (Control Objectives for Information and related Technology), ITIL (Information Technology Infrastructure Library), and/or ISO 17799, provide sufficient ethical training for employees, and provide a reporting hotline.

In this thesis the organizations will be considered as “ethical organizations” if they use some of these “ethical infrastructures” previously stated.

4.2.3. Industry

IT has a wide range of applicability across almost all industries (Tanriverdi 2006) and means different things in distinct industries, which is obvious by the different regulations that have been developed and by the different legislative documents (De Haes and Van Grembergen, 2008A).

Financial Services, together with manufacturing and retailing, is the first industry to use ITs and as such is already more matured in these domains (Chiasson and Davidson, 2005).

The more relevant organizations are related with Financial Services (Banking and Insurance), Universities, Pharmaceutical Laboratories and Telecommunications.

Therefore in this thesis, the different organizations will be sliced in the different industries.

4.2.4. Maturity

IT has matured so much that, in many ways, IT has become a commodity. However, specialized resources are still needed (Cochran 2010). The use of ITG maturity measurements is one of the means to evaluate the success (Dahlberg and Lahdelma, 2007).

Some studies were performed and interesting conclusions were collected: a study compared different organizations and determined that, in general, the high performers have more mature ITG structures

and processes (De Haes and Grembergen, 2008A); another study identified possible requirements for good ITG maturity assessments (Simonsson, Johnson and Ekstedt, 2008); and yet another study concluded that there is a correlation between ITG performance and ITG maturity indicators (Simonsson et al., 2008A).

In order to classify the different organizations as IT matured organizations, it should be necessary to have some information regarding ITG Maturity Models as COBIT or Capability Maturity Model Integration (CMMI) that are used in the organizations.

Therefore, if it is clear for us that any organization uses in a proper manner any of these models, this organization will be considered as an IT matured organization.

4.2.5. Regional Differences

Weisinger and Trauth (Weisinger and Trauth, 2003) pointed out the importance of aspects, such as language, local laws and national information infrastructures. Another study performed by Aagesen, van Veenstra, Janssen and Krogstie (Aagesen et al., 2011) made a cross-country comparative study where they found different ITG implementations, while Fink and Ploder (Flink and Ploder, 2008) performed some regional case studies in different countries.

4.2.6. Size

Some studies have attempted to discover the effect of organization size on ITG (De Haes and Grembergen, 2008A; Brown and Grant, 2005; Cochran, 2010). Sambamurthy and Zmud (1999) state the size of the firm influences the ITG mode through its effect on the mode of CG. There are also evidences that many small organizations lack standardized project management practices (Cochran, 2010).

However this is a sensitive topic because there is no single globally accepted definition of small and medium enterprises (SME). Countries use different definitions for a variety of reasons. For example a SME in European Union can be organizations with < 250 employees (Glossary of Statistical Terms 2007), in United States of America with less than 500 (United State International Trade Commission 2010), Australia with less than 200 (United State International Trade Commission 2010), and so on.

In this thesis the organizations will be mapped accordingly the values stated before. To all countries that have no information regarding the definition of SME, we decided to use the definition used in European Union.

4.2.7. Strategy

The purpose of IT strategy is that enterprises can enhance their level of information system, based on the modern information technology, and provide better services for the management strategy (Van Grembergen et al., 2003).

In the literature we found two different approaches regarding the IT Strategy. The first approach is provided by Grembergen (Van Grembergen et al., 2003) who claims that several IT Strategies exist: IT for efficiency, IT for flexibility and IT for comprehensiveness.

- **IT for efficiency:** is oriented toward internal and inter-organizational efficiencies and long-term decision-making and maps well on the defender's business strategy.
- **IT for flexibility:** focuses on market flexibility and quick strategic decisions which map on the prospector's business strategy.
- **IT for comprehensiveness:** enables comprehensive decisions and quick responses through knowledge of other organizations which complies with the analyzer's business strategy.

These IT strategies are aligned with three different business strategies:

- **Defenders:** aiming to reduce costs, maximizing efficiency and effectiveness of production, and avoiding organizational change.
- **Prospectors:** seen as leading innovators, reacting first on signals of change in their market.
- **Analyzers:** closely watching competitor's activities and carefully evaluating organizational changes.

Other approach is provided by Weil and Ross (Weill and Ross, 2004) that define three different strategies that are pursued by the organizations:

- **Operational Excellence:** where businesses emphasize efficiency and reliability, lead the industry in price and convenience, minimized overhead costs, streamline the supply chain.
- **Customer Intimacy:** Focusing on the cultivation of relationships, lifetime values to the company, customer service, and responsiveness and customization based on deep customer knowledge.
- **Product Leadership:** with continuing product innovation, the embrace of ideas, new solutions to problems and rapid commercialization.

In this research we decided to use Grembergen approach because it is more linked with IT Strategy. Therefore the organizations will be divided into: IT for efficiency, IT for flexibility, IT for comprehensiveness or any combination regarding these types.

4.2.8. Structure

Effective ITG is also determined by the way the IT function is organized and where the IT decision-making authority is located within the organization.

In the literature we found two different approaches. The first one is provided by Grembergen and De Haes (Van Grembergen and De Haes, 2008) and the other one is provided by Weill and Ross (Weill and Ross, 2004).

The first approaches claims that three different types of Structure exist:

- **Centralized Structure:** top-down responsibility for solutions delivery, conceptualizing, developing and implementing IT solutions for all parts of the business is controlled by some central authority. A centralized model is economical from both a skill and an overhead standpoint, but does little to build client relationships, foster business knowledge in IT staff, or further align IT with business needs since customizing the solution to fit the business can be difficult (Windley, 2002).

Summarizing, one central IT organization provides services to all functions or business units.

- **Decentralized Structure:** solutions delivery is aligned with the agency line of business and IT managers *report* to the agency director. When coordination happens, it is achieved in ITM and executive councils. The decentralized approach gives agencies the most control over IT direction and closely aligns IT service delivery with agency needs (Windley, 2002).

Summarizing, Multiple IT organizations provide services to various functions or business units.

- **Federal Structure:** is mostly a hybrid design of centralized infrastructure control and decentralized application control. This model tries to achieve ‘the best of both worlds’): efficiency and standardization for the infrastructure (centralized) and effectiveness and flexibility for the development of applications (decentralized) (Van Grembergen and De Haes, 2008).

Summarizing this Structure describes a hybrid of the centralized and decentralized models. A central IT organization provides some IT services, but there are also IT organizations in some or all of the functions or business units.

The other approach is provided by Weill and Ross (Weill and Ross, 2004) who defined more detailed decision-making allocation models that go beyond the traditional centralized, decentralized, or federal approaches. They have defined six ITG archetypes or styles, describing who within the organizations have decision rights or provide input to IT decisions. The archetypes are: Business monarchy, IT monarchy, Feudal, Federal, Duopoly and Anarchy.

In this thesis we choose the first approach since it is a more pragmatic approach and the different archetypes of the second approach are included in the approach chosen.

Therefore in this thesis the organizations will be divided into the following Structures: Centralized Structure, Decentralized Structure or Federal Structure.

4.2.9. Trust

Although social scientists have afforded considerable attention to the problem of defining trust (e.g. Barber 1983, Luhmann 1988, Mayer et al 1995), a concise and universally accepted definition has remained elusive. As a consequence, the term trust is used in a variety of distinct, and not always compatible, ways within organizational research (Kramer, 1999).

Despite divergence in such particulars, most trust theorists agree that, whatever else its essential features, trust is fundamentally a psychological state (Kramer, 1999).

Thus we found a great variety of definitions of Trust. Therefore we decided to use the definition that seems to be the more complete (in order to address several levels of trust) and diverse one.

Trust is an essential element in constructive human relationships (Puusa and Tolvanen, 2006). It creates togetherness and gives people a feeling of security (Mishra and Morrissey, 1990). Shamir and Lapidot (Shamir and Lapidot, 2003) suggest that trust is both an interpersonal and a collective phenomenon.

Trust as a phenomenon is very abstract. Like organizational identity, trust can be examined at different levels. Trust at the level of organizations refers to a collective commitment and co-operation in order to achieve organizational goals. At the individual level, trust affects to willingness to co-operate and to commit to organizational changes (Puusa and Tolvanen, 2006).

Trust is expressed at three levels within an organization: individual, group and system level (Puusa and Tolvanen, 2006).

- At the individual level, trust is based on interpersonal interaction (Atkinson and Butcher, 2003).
- At the group level, trust is a collective phenomenon. Teams represent collective values and identities. (Shamir and Lapidot, 2003.)
- At the system level, trust is institutional and based on roles, systems or reputation, from which inferences are drawn about the trustworthiness of an individual (Atkinson and Butcher, 2003).

In this thesis we will consider that trust exists if any evidence regarding interpersonal interaction, common values, identity or trustworthiness of the three levels within an organization is identified.

In this Section, we proposed a set of contingency factors supported by the literature that organizations should put into consideration for ITG implementation. Moreover we detailed these contingency factors in order to have a clear perception about the meaning of each contingency factor.

In the next Section we will propose the ITG patterns gathered from the analysis of several case studies.

4.3. ITG Case Studies

Companies with effective ITG have higher profits than other companies. There are several reasons for this situation, however only one is clear: it does not happen by accident.

The most profitable and best governed organizations wring greater value out of IT by clearly defining and verifying business strategies and the role IT plays in obtaining the goals of those business strategies.

The best governed organizations “design organizational practices to fit IT to their business strategies” and “assign accountability for the organizational changes required to benefit from new IT capabilities”.

It means that are some mechanisms that contribute to better results than others. And therefore it should very interesting to analyze possible patterns used by organizations. And this was what we did in this section.

After the identification of the ITG factors and mechanisms, we have selected 50 case studies from the field, in order to extract several ITG patterns regarding the ITG mechanisms and the ITG contingency factors.

The 50 case studies are described in the following publications:

- Case study 1 to case study 6 (Grembergen and De Haes, 2008);
- Case study 7 (Weill and Woodham, 2002);
- Case study 8 (Kumaralalita et al., 2011);
- Case study 9 (Baka and Aziz, 2010);
- Case study 10 (Wilkin and Riddet, 2008);
- Case study 11 to case study 13 (Iskandar et al., 2010);
- Case study 14 (Kan, 2004);
- Case study 15 (Wittenburg et al., 2007);
- Case study 16 (Fraser and Tweeddale, 2003);
- Case study 17 (Albretch and Pirani, 2004);
- Case study 18 (Bhattacharjya and Chang, 2007);
- Case study 19 (Aliyu, 2010);
- Case study 20 to 28 (Broadbent and Weill, 2003);
- Case study 29 and 30 (Weill and Ross, 2004);
- Case study 31 (Hoffmann and Weill, 2007);
- Case study 32 (Jaafar and Jordan, 2011);
- Case study 33 to case study 37 (Giraldo et al., 2010);
- Case study 38 to case study 44 (Herrera and Giraldo, 2012);
- Case study 45 to case study 49 (Nfuka et al., 2009), and
- Case study 50 (Winkler, 2013).

Finding 50 case studies was not an easy task. Not only there are few case studies in the literature, but also many of them missed crucial information (Pereira et al., 2013). Therefore, many case studies had to be dropped during the selection process.

In order to extract these 50 case studies we have looked into some of the most known communities, as IEEE and ACM, as well as publications from relevant publication, where we looked for terms as “IT Governance Case Study”, “IT Governance mechanisms Case Study”, “IT Governance factors Case Study” and “IT Case Study”.

Afterwards we did another search based on the articles referenced in each identified case study. We searched forward by utilizing respective functions of Thomson Reuters Web of Knowledge and Google Scholar for identifying citing publications.

It was not an easy task to find 50 case studies. Besides few ITG case studies among the literature, many of them lack a lot of crucial information. Therefore, several case studies were dropped during the selection process.

All the information gathered from the 50 case studies regarding both the ITG mechanisms and the ITG factors can be seen respectively in Table 11 and Table 12.

In Table 11 we adopt the following simbology: when the mechanism does not exist, the cell is empty; when the mechanism is partially implemented or there is some evidence that it is used, the cell is filled with “◐”; when the mechanism is totally implemented, we use “◑”.

Regarding Table 12, we use “O” to indicate by which factors each organization is characterized. When all the cells regarding a certain ITG factor are empty, it means there was no evidence of it.

We must also clarify that we decided to call “Gulf” to the following group of countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

The elicited ITG patterns can be seen in Table 13. All the patterns were manually elicited by the authors without the help of any specific algorithm or any other method.

The process used was the following: First one author read all the case studies and gathered the information regarding the ITG mechanisms and the ITG contingency factors.

Then a second author read the same case studies and extracts the ITG mechanisms and the ITG contingency factors. When the ITG mechanisms and ITG contingency factors were equal in both extraction we considered that these mechanisms or factors were presented in the case studies. When a mechanisms or factor only appears in the extraction of one reader, the other reader read this case study again and searched for the mechanisms or factor that did not appear in their extraction.

In that way we believe that we have an accurate and coherent approach.

It should be noted that in Table 13 we only consider Financial Services organizations. This situation is due to the fact that Financial Services sector is the first industry to use ITs and as such is already more matured in these domains, making empirical research interesting (Chiasson and Davidson 2005).

Moreover this choice was carefully taken, foreseeing the different ways to validate our proposal. It means that the choice of Financial Services was not spontaneous but carefully thinking.

Furthermore it should be noted that in Table 12 we are not considering the information about ethic and trust since there were several gaps in the analyzed ITG case studies regarding these factors. Such fact is not a surprise, once they are subjective factors that depend on the human behavior. The results from Maturity were no considered too. This situation is due to the fact that almost none case study tells something about the organization maturity level or even if any maturity model is used. Such gap of information forced us to exclude these factors from the patterns' elicitation.

A brief explanation of how the patterns were elicited from each case study is also advisable. First of all, only when a mechanism exists in at least two case studies it was consider as a mechanisms pattern.

An example of how we gathered the information is for example (case study 1): "Service level agreement (SLA) are put in place to guarantee that every piece of the IT puzzle knows exactly its role and responsibility in particular situations", we understand that they are considering the "SLA" mechanism.

Another example is (case study 15): "The main purpose of the portfolio management is to identify those project proposals, which should be accomplished and are finally stated as approved", which clearly shows us that the "Portfolio Management" mechanism was implemented.

ITG Mechanisms Financial Patterns	
1	Large enterprises with "Centralized" Structure use the following mechanisms: 10.
2	Large enterprises with "The Pyramidal Organization" Culture and "IT for flexibility" Strategy use the following mechanisms: 3, 10, 23 and 24.
3	Large enterprises with "The Pyramidal Organization" Culture and "IT for Flexibility and IT for Efficiency" Strategy use the following mechanisms: 10, 16, 23, 24 and 31.
4	Large enterprises with "The Pyramidal organization" Culture and "IT for Efficiency" Strategy use the following mechanisms: 23.
5	Large enterprises with "IT for Flexibility" Strategy use the following mechanisms: 3 and 10.
6	Large enterprises with "IT for Efficiency" Strategy use the following mechanisms: 23.

Table 13 ITG Mechanisms Patterns

To conclude, as previously stated, the authors believe that the elicited patterns will help organizations by providing a guide, about which ITG mechanisms are suitable for them, taking into consideration the respective organizations' context. They are not a cookbook to be strictly followed (Almeida et al., 2013A) but they can be seen as a guide about which can be the most relevant ITG mechanisms to implement given a specific organizational context.

5. Evaluation

This section explains how we will proceed in the evaluation of our research. With this assessment we intend to demonstrate that the proposal supports the solution of the problem statement. The evaluation method of this research will consist in the following steps:

- Appraisal of the community through the submission of scientific publications.
- Fulfillment of the four principles of Österle et al. (2011)
- Fulfillment of Hevner Guidelines.
- Interviews with Practitioners

5.1. Appraisal of scientific community

This step consists in communicate the problem and its importance, the artifact, its utility and novelty, the rigor of its design, and its effectiveness to researchers and other relevant audiences such as practicing professionals.

In order to fulfill this point, we decided to submit several scientific publications. We submitted a total of 8 papers and 4 of these were accepted in international conferences.

We tried to submit our papers only to reputable conferences or Journals. The conferences chosen were:

- International Conference on Exploring Service Science (IESS).
- International Conference on Advanced Information Systems Engineering (CAISE).
- International Conference on Information Resources Management (CONF-IRM).
- International Workshop on Business/IT-Alignment and Interoperability (BUSITAL).
- International Conference on Design Science Research in Information Systems and Technology (DESRIST).
- International Conference on Information Systems (ICIS).
- International Journal of Information System Modeling and Design.
- Hawaii International Conference on System Sciences (HICSS).

In Chapter 6 we will provide further details about our accepted scientific publications.

5.2. Hevner Guidelines

Evaluation is one of the most crucial steps in DSR methodology because it is what verifies the contribution of the solution for the identified problem and its utility, quality, and efficacy. This is accomplished through Hevner et al. (Hevner et al., 2004) seven guidelines (Table 4) because of their completeness for good design research (Peffer et al., 2008).

Regarding Guideline 1, the result of DSR in IS is, by definition, a purposeful IT artifact created to address an important organizational problem (Hevner et al., 2004). Therefore in this thesis we created several artifacts (Constructs and Model) that will help organizations to solve their problems.

Taking in account Guideline 2, we know that accordingly to Hevner (Hevner et al., 2004) the objective of research in IS is to acquire knowledge and understanding that enable the development and implementation of technology-based solutions to heretofore unsolved and important business problems. In this thesis we provide important knowledge to the BOK by creating a proposal that will address unsolved business problems.

Concerning Guideline 3, the utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods. In this thesis we followed some of the most appropriated steps to validate a research.

Regarding Guideline 4, accordingly to Hevner (Hevner et al., 2004) effective DSR must provide clear contributions in the areas of design artifact, design construction knowledge and design evaluation knowledge. We fulfilled this guideline by offering a proposal that will be useful to organizations to implement ITG.

In relation to Guideline 5, we know that DSR requires the application of rigorous methods in both the construction and evaluation of the designed artifact. Research rigor was fulfilled by the use of various methods and data collection summarized in previous sections.

Taking into account Guideline 6, we know that DSR is inherently iterative. Therefore this guideline is hard to fulfill, due to the deadline of this thesis and also because there are no other competing approaches.

Finally regarding Guideline 7, DSR must be present to technology-oriented and management-oriented audiences. We fulfilled this guideline by submitting several papers to technology-oriented and management-oriented audiences.

In Table 14 we provide further details about how we have fulfilled all the seven Hevner guidelines.

Guideline	Description
Guideline 1: Design as an artifact	Design as an artifact was fulfilled by producing two artifacts: A Construct and a Model. In the Construct we define the domain in which this research falls as well as the elicitation of the ITG mechanisms and the ITG contingency factors. The Model we constructed consists of a set of ITG mechanisms patterns regarding nine ITG contingency factors.
Guideline 2: Problem relevance	Problem relevance was achieved by determining the relevant ITG mechanisms to be implemented according some organizational contexts as acknowledged and motivated by De Haes and Grembergen (De Haes and Grembergen 2008).
Guideline 3: Design evaluation	Design evaluation was achieved by doing a strict evaluation of our artifacts. This evaluation was done through the appraisal of the scientific community, by strictly following the guidelines of DSR and Osterle principles at by interviews with practitioners.
Guideline 4: Research contributions	Research contribution was achieved through the results of this research activity. These results help to improve ITG implementation, successful providing ITG mechanisms patterns for specific organizational contexts.
Guideline 5: Research rigor	Research rigor was fulfilled by the use of various methods and data collection summarized in previous sections.
Guideline 6: Design as a search process	Design as a search process is not an easy guideline to fulfill because there are no other competing approaches as we proved in Section 3.6. Likewise, as we stated, our solution is not a cookbook to be followed but a set of ITG mechanisms patterns that organizations must be aware of.
Guideline 7: Communication of research	Communication of research was fulfilled by communicating the results of this study through the submission in reputable international conferences.

Table 14 Hevner guidelines' fulfillment

5.3. Österle principles

Scientific research in general needs to be characterized by abstraction, originality, justification, and publication in order to distinguish itself from the way solutions are developed in the practitioners' community (e.g. in user organizations) or by commercial providers (e.g. software vendors, consulting companies) (Österle et al., 2011).

We fulfilled the four principles of Österle et al. (2011) by:

- **Abstraction:** This paper proposes some ITG mechanism patterns for specific industries and regions.
- **Originality:** The artifact proposed is not present in the BOK of the domain.
- **Justification:** The various methods proposed to evaluate the artifact should justify the artifact.
- **Benefit:** The ITG mechanisms elicitation will help organizations to better implement ITG, achieving in that way a better alignment between the business and the IT.

5.4. Interviews with Practitioners

The objective of the interviews with practitioners is mainly to validate the research, its proposal, and results. This technique is used to collect qualitative information by setting up a situation that allows an interviewee the time and scope to talk about his opinions on a particular subject.

As it was previous stated we used a semi-structure interview because we did not have get more than one chance to interview and this kind of interview provides a clear set of instructions for interviewers and can provide reliable, comparable qualitative data.

The inclusion of open-ended questions and training of interviewers to follow relevant topics that may stray from the interview guide does, however, still provide the opportunity for identifying new ways of seeing and understanding the topic at hand (Cohen and Crabtree, 2006).

In order to validate the ITG Patterns we performed 6 qualitative interviews in 6 Portuguese Financial Services Organizations. The interviewees were IT experts with several years of experience in IT (Table 15).

The interviews were conducted by two people over a period of one month. Each session lasted from 1 to 2 hours and was transcribed into digital data for analysis.

To support and lead the interviews, we designed a questionnaire with both open-response questions and close-response questions because of the nature of the information that we needed to elicit. Furthermore, clarifications regarding the various concepts used by the interviewees were sought during the conversation, so that later these descriptions can be examined and matched to the more standard designations.

	Size	Structure	Regional Differences	Culture	Strategy
1	Large	Centralized	Portugal	The pyramidal organization	IT for Flexibility
2	Large	Centralized	Portugal	The pyramidal organization	IT for Efficiency
3	Large	Centralized	Portugal	The pyramidal organization	IT for Efficiency
4	Large	Centralized	Portugal	The pyramidal organization	IT for Efficiency
5	Large	Centralized	Portugal	The pyramidal organization	IT for Efficiency IT for Flexibility
6	Large	Centralized	Portugal	The pyramidal organization	IT for Efficiency IT for Flexibility

Table 15 Interviewees' Information

In Table 16 we present the data collected from the 6 interviews (columns) performed. Each main column has 3 sub-columns which correspond to a specific question of the questionnaire. The "U" portrays the ITG mechanisms used in the organization. The "E" represents how effective the

mechanism under the interviewees' viewpoint (from 0, not effective at all, until 5, highly effective). Finally, the "D" represents how difficult is the implementation of the mechanisms according the interviewees' viewpoint (from 0, not difficult at all, until 5, extremely difficult).

Yet, the last two columns of Table 16 are the sum of the "E" columns and the sum of the "D" columns.

These numbers will be important because we decided to order the lines regarding the difference between the effectiveness and the difficulty which will reflect somehow the relevance of the mechanisms. The first criterion was sum "E" minus sum "D" where the largest difference wins. When difference was equal the major sum "E" prevails. When equal sum "E" also exists we decided to choose the most used mechanism to prevail. We also identify with red color the mechanisms used by all the organizations.

Regarding the ITG patterns the global evaluation is positive. From six possible patterns five were confirmed by the interviews. Only one pattern wasn't validated.

In order to enrich our interviews and results we decided to ask a fourth and last question on the questionnaire. We asked the interviewees to choose the ten most important mechanisms. These choices are represented by grey cells over the columns in Table 16.

In Table 17 we can see the comparison between De Haes and Grembergen minimum baseline, the chosen mechanisms of the interviewees and the most relevant mechanisms according the sum "E" minus sum "D". Cells in grey represent a match between at least two of them. All the mechanisms in the grey cells are what the minimum baseline mechanisms for Portuguese Financial Services organizations.

Regarding the minimum baseline mechanisms several conclusions can be withdraw. First, there are six common mechanisms between Belgian and Portuguese financial services organizations. Two of the common mechanisms have a great effectiveness/difficulty ratio. Another four mechanisms with a good effectiveness/difficulty ratio were selected by Belgian or Portuguese financial services organizations. Few mechanisms (nine) remain without any match. So far we cannot conclude anything about them with rigor but they must certainly be studied in the future.

The Structure mechanisms are seen as being the easiest mechanisms to implement in both studies. This appears to be a pattern between Belgian and Portuguese financial services organizations that must be further explored by future researchers.

Finally there are some differences regarding the perceived effectiveness between our study and De Haes and Grembergen (De Haes and Grembergen, 2008) study. In our study the processes mechanisms are seen as the most effective mechanisms to implement while in De Haes and Grembergen (De Haes and Grembergen, 2008) study the structure mechanisms have this characteristic. Notwithstanding the difference is not substantial. Such difference may be related with the context behind the organizations interviewed.

	1			2			3			4			5			6			Sum	
Structure Mechanisms	U	E	D	U	E	D	U	E	D	U	E	D	U	E	D	U	E	D	E	D
IT organization structure	●	5	1	●	5	3	●	5	1	●	5	1	●	5	4	●	5	1	30	11
IT councils	●	5	2	●	5	1	●	4	4	●	5	3	●	5	4	●	5	4	29	18
IT strategy committee	●	5	3	●	5	5	●	4	5	●	5	1	●	5	3	●	5	3	29	20
IT project steering committee	●	5	1	●	5	5	●	4	1	●	5	4	●	4	2	●	4	4	27	17
IT steering Committee	●	5	2	●	5	5	●	4	4	●	5	1	●	4	3	●	4	3	27	18
CIO on executive committee/CIO reporting to CEO and/or COO	●	3	1		0	1	●	5	1	●	5	3		2	4	●	5	1	20	11
Business/IT relationship managers	●	4	3	●	5	5	●	4	3	●	5	3	●	5	4	●	5	2	28	20
IT leadership councils	●	5	1	●	3	5	●	3	3	●	5	3	●	4	3	●	5	3	25	18
Integration of governance/alignment tasks in roles & responsibilities		2	1	●	4	3	●	4	1	●	4	3	●	4	3	●	4	4	22	15
Security/Compliance/Risk officer	●	5	4	●	5	4	●	4	5	●	5	3	●	5	3	●	4	3	28	22
IT expertise at level of board of directors	●	3	1		1	5	●	4	2	●	5	1	●	3	4	●	4	3	20	16
IT investment committee or capital improvement	●	5	2		0	5	●	4	1	●	5	3	●	5	5	●	3	3	22	19
IT audit committee at level of board of directors	●	4	3	●	0	1	●	4	3		4	4	●	4	4	●	4	2	20	17
CIO on Board		4	4		0	5	●	5	4	●	5	1		3	4	●	5	2	22	20
E-business advisory board	●	5	2	●	5	4		1	2		3	4	●	4	2		1	3	19	17
Architecture steering committee	●	4	4	●	3	5	●	4	4	●	5	4	●	5	3	●	4	4	25	24
E-business task force		0	3		0	1		1	2	●	3	4	●	5	3	●	4	2	13	15
ITG function/officer		3	4	●	5	5		2	4		4	4	●	4	4		1	1	19	22
Processes Mechanisms	AVERAGE																	23.6	17.7	
Demand management	●	4	4	●	5	3	●	4	3	●	5	3	●	5	3	●	4	2	27	18
Project Tracking	●	4	3	●	5	5	●	5	4	●	5	3	●	5	4	●	4	3	28	22
IT budget control and reporting	●	4	3	●	5	5	●	5	3	●	4	3	●	5	4	●	4	4	27	22
Portfolio management	●	5	4	●	5	5	●	4	5	●	5	2	●	4	3	●	5	5	28	24
Benefits Management and Reporting	●	4	4	●	5	5	●	5	3	●	5	4	●	5	3	●	3	4	27	23
ITG assurance and self-assessment	●	2	2	●	5	5	●	4	3	●	4	3	●	5	3	●	4	4	24	20
Frameworks ITG	●	5	4	●	5	5	●	5	4	●	5	4	●	3	4	●	4	5	27	26
Project governance/management methodologies	●	4	4	●	5	5	●	3	5	●	5	3	●	5	4	●	4	4	26	25
Service Level Agreement	●	4	3	●	3	5	●	5	5	●	4	4	●	5	5	●	5	4	26	26
ITG Maturity Models	●	2	4	●	3	3	●	4	3	●	5	4		4	3	●	3	4	21	21
Strategic Information System Planning		4	5	●	3	5	●	3	5	●	5	2	●	5	4	●	4	4	24	25
IT Performance Measurement (E.g. IT BSC)		3	4		1	4	●	3	5	●	4	3	●	4	4	●	5	4	20	24
Chargeback	●	3	3		1	5	●	5	5	●	4	2		4	4		3	5	20	24
Architectural exception process	●	4	4	●	3	5	●	4	3	●	3	2		1	5	●	4	4	19	23
Relational Mechanisms	AVERAGE																	24.6	23.1	
Informal meeting between business and IT executive/senior management	●	3	2		3	3	●	3	0	●	4	0	●	4	3	●	4	2	21	10
Executive/Senior management give the good example	●	4	3	●	5	5	●	4	2	●	5	3	●	5	3	●	4	4	27	20
Business/IT account management	●	3	4	●	5	5	●	4	3	●	5	2	●	5	4	●	4	2	26	20
IT leadership	●	4	4	●	5	5	●	5	2	●	5	3		2	2	●	4	3	25	19
Senior management announcements	●	4	1	●	4	5		3	3		4	4	●	5	4	●	4	2	24	19
Partnership rewards and incentives		2	4	●	5	5		5	5	●	5	2	●	4	3	●	5	3	26	22
Office of CIO or ITG	●	3	2	●	5	5		2	4		4	4	●	5	3	●	4	2	23	20
Knowledge management (on ITG)		3	4	●	4	4	●	4	3		4	3	●	4	3	●	4	4	23	21
Corporate internal communication addressing on a regular basis	●	3	3	●	3	3	●	4	3	●	5	3	●	2	4		4	2	21	20
Shared understanding of business/IT objectives	●	4	3	●	3	5	●	4	4	●	5	3	●	3	4	●	4	4	23	23
Cross-functional business/IT training	●	4	2	●	2	4	●	5	4		2	3		4	4	●	4	4	21	21
Business/IT collocation		2	2		0	5	●	4	3		4	4		2	4	●	4	4	16	22
ITG awareness campaigns		2	3		0	5	●	5	5		4	3		2	2		3	4	16	22
Cross-functional business/IT job rotation		1	4		2	5		4	5		3	4		2	4	●	4	4	16	26
	AVERAGE																	22.0	20.4	

Table 16 Interviews' results

Minimum baseline (De Haes and Grembergen, 2008)	Interviews	Sum “E” minus Sum “D”
IT strategy committee	IT strategy committee	IT strategy committee
IT project steering committee	IT project steering committee	IT project steering committee
CIO on board	CIO on Board	
Portfolio management	Portfolio management	
IT budget control and reporting	IT budget control and reporting	
IT leadership	IT leadership	
IT steering committee		IT steering Committee
CIO reporting to CEO and/or COO		CIO reporting to CEO and/or COO
	Business/IT relationship managers	Business/IT relationship managers
	IT organization structure	IT organization structure
Project gov./mang. Methodologies	Service Level Agreement	Demand management
Strategic information systems planning	Partnership rewards and incentives	IT councils
	Frameworks ITG	Executive/Senior management give the good example
		Informal meeting between business and IT executive/senior management

Table 17 ITG Mechanisms comparison

6. Publications

In this chapter we present all the papers accepted in International Conferences. Moreover we provide a short description about all these papers. It should be noted that all these papers are directly related with the findings of this thesis as we can see in the topic Section (Thesis) presented in Table 18.

In Table 18 we can see a summary of the papers accepted in International Conferences.

Conference/ Journal	Paper	Ranking	Place	Date	Section (Thesis)
International Conference on Exploring Services Science 1.3 (IESS 2013)	IT Governance Mechanisms: A Literature Review	-----	Porto, Portugal	07-08 February	4.1
International Workshop on Business/IT-Alignment and Interoperability (BUSITAL 2013)	IT Governance Mechanisms Patterns	B (IST)	València, Spain	17 June	4.3
Design Science Research in Information Systems and Technologies (DESRIST 2013)	How to Generalize an Information Technology Case Study	A (ERA)	Helsinki, Finland	11-12 June	4.2
Hawaii International Conference on System Sciences (HICSS 2013)	IT Governance Patterns in the Portuguese Financial Industry	A (ERA)	Waikoloa, Hawaii	6-9 January (2014)	All Document

Table 18 MSc Accepted papers

Regarding the papers that were accepted in the International Conferences, as we stated before, we provide a short explanation about the subject of each paper.

In the paper accepted in IESS 1.3 we performed a LR in order to elicit which are the main ITG mechanisms as well as to describe them and state what they are useful for.

Regarding the paper accepted in BUSITAL 2013 we performed an exploratory research and we analyze several ITG case studies to elicit possible ITG mechanisms patterns used in specific

organizational context. Our main goal was to build some theories (ITG mechanisms patterns) which we believe that guide organizations about the suitable ITG mechanisms to implement.

Taking into account the paper accepted in DESRIST 2013, in this paper we performed an extensive LR about case study methodology, specifically in IT domain, in order to leverage critical information about organizations, which should be present in all IT case studies to enable their generalization and pattern matching.

Finally in the paper accepted in HICSS 2013 we performed an exploratory research and analyze several ITG case studies to elicit possible ITG mechanisms patterns. Then, we performed six interviews in Portuguese financial services organizations and compare the results. Our goal was to build some theories (ITG mechanisms patterns), which will guide financial services organizations about the advisable ITG mechanisms given their specific context. We also elicited conclusions regarding the most relevant ITG mechanisms for Portuguese financial services organizations.

7. Conclusion

As a general conclusion of this exploratory study, this thesis revealed that ITG is indeed very important to the organizations.

Our artifacts are based on extensive LR and so we argue that our proposal was designed with strong theoretical foundation. Yet, in order to provide practitioner viewpoint we also performed interviews with ITG experts. Therefore we argue that the artifacts were built under both scientific and practitioner viewpoint what are advisable in order to achieve a complete proposal.

From the literature we conclude that some main topics have been studied by researchers in this area as for example: the IT/Business strategy alignment (Bartenschlager and Goeken, 2009; Goeken and Alter, 2009; Simonsson et al., 2008a) where some models have been proposed; the impact of ITG in organizations (Bernroider, 2008; Shpilberg et al., 2007; Webb et al., 2006); and how to implement ITG (Goeken and Alter, 2009; Lingyu et al., 2010; Xiao-wen et al., 2009).

Some researchers have considerable relevance among the literature: Luftman designed the strategic alignment model; Peter Weill proposed the essential mechanisms for ITG implementation; De Haes and Van Grembergen have been applying (ITGI, 2007) in several perspectives; Goeken focused on meta models and also on strategic alignment; and Simonson has been working on several domains as ITG definition or a new ITG tool, which intends to overcome some of the problems with (ITGI, 2007).

However, literature lacks topics as ITG mechanisms, ITG contingency factors and general ITG mechanisms patterns for ITG implementation.

Therefore, we pointed out that there are several issues regarding ITG, starting with their own definition as we demonstrated in this thesis. In our point of view it is urgent to understand what kind of ITG mechanisms exist and what their purpose is. Therefore in this thesis we started by looking in the literature all the relevant ITG mechanisms in order to elicit these ITG mechanisms, describing them and pointing out the main references.

However, knowing what mechanisms exist is very important but it is not enough. It is necessary to understand the differences between them. Thus it is necessary to have a clear definition of each ITG mechanisms. In this thesis we provide such definitions and we also explained how we got these definitions. With that we eliminated several incongruities.

Furthermore in this thesis several ITG contingency factors that must be considered by organizations before any ITG implementation are elicited and detailed. Such factors must be addressed by organizations in order to enable the analysis of what can influence ITG implementation and decide what should be done in first place providing each organization's environment. In the literature,

regarding some studies present the contingency factors that should be taken in consideration by the organizations, none study detailed the factors that affect ITG. In that way we propose a clear explanation of each contingency factor considered in our proposal.

In this thesis we also evaluated the ITG mechanisms that are used in several organizations taking into account the ITG mechanisms and Contingent Factors previously elicited. Our main goal was to extract the ITG mechanisms patterns used by Financial Services Organizations.

After that we performed 6 qualitative interviews in Portuguese financial services organizations in order to evaluate our elicited ITG patterns presented in section 4.3. Only pattern 3 wasn't validated. All the other were confirmed in practice.

Finally we asked to the interviewees to state the ITG mechanisms that they think a Financial Services Organizations at least should have. We have then compared the results with the studied provided by Van Grembergen and De Haes (Van Grembergen and De Haes, 2008).

The interviews were very productive and they were also very important to gather other information. From the average numbers we can understand that structure mechanisms seem to be easier to implement and the processes mechanisms more effective when implemented (Pereira et al., 2014).

Following this tendency structure mechanisms appear to be the most common among all the organizations interviewed followed by process mechanisms and then by relational mechanisms.

Each organization had to choose the 10 most important mechanisms. From a universe of 60 possible choices (10 per interview), 28 (46.7%) were structure mechanisms while 24 (40%) were process mechanisms and 8 (13.3%) were relational mechanisms. Moreover, only one relational mechanism is fully used by all the organizations.

7.1. Lessons Learned

Based on both scientific and practitioner viewpoint, this research provided us some important learning in ITG field.

About the ITG mechanisms patterns interesting learning were achieved. As far as we know, Portuguese financial organizations argue that structure mechanisms are the more relevant ones and relational mechanisms the less relevant ones. However, process mechanism appear to be the efficient ones but also the more difficult to implement. On the other side, structure mechanisms appear to have the better efficiency/difficulty relation. This situation is similar to other study provided by De Haes and Van Grembergen (De Haes and Van Grembergen, 2008).

Moreover, it is very interesting to note that there are considerable mechanisms in common between the baseline provided by De Haes and Grembergen (De Haes and Grembergen, 2008) and our

baseline. This means that Belgium and Portuguese financial industries have several similarities. In this case, in ten possible mechanisms from Belgium baseline there's a match of six of them.

We also elicited what we consider to be the quick win mechanisms based on the efficiency/difficulty relation. Both baseline, Belgium and Portuguese only have four quick win mechanisms which means that they can "easily" increase their ITG efficiency (we are not stating that all the quick win mechanisms must be implemented, it is required a previous analysis to understand if the mechanism are relevant and appropriate for the specific organization).

As we said in the previous paragraph, both baselines have four quick win mechanisms each but only two in common. We strongly believe that the implementation of the quick win mechanisms that they don't share would be a plus for both of them.

7.2. Limitations

This research has some limitations as well. So far, we leverage the artifacts based on LR and also validated them through experts' interviews. However to achieve more concrete and coherent results, more interviews are required.

In order to achieve a better validation about the "Regional Differences" contingency factor we must effort in interview experts from other countries or even better experts with experiences in more than one country.

As we already stated literature is not rich in theories appropriated to be mapped to the guidelines but we should keep seeking for such cause.

We elicited the ITG mechanism patterns from several case studies. However, a pattern is a set of procedures that were successfully implemented/used in other situations. Following this line we must argue that in both case studies and interviews we didn't have the success factor in consideration. But, as we already saw (Pereira et al., 2013) IT case studies are not being designed in the most appropriate manner and the success is not present at all in any analyzed case study.

ITG case studies do not abound in the literature. Therefore, we had to resort to more specific IT case studies (i.e. not pure ITG) to reach the 50 case studies

We only elicited the ITG mechanism patterns for Portuguese financial organizations because we wouldn't have time to validate all the other possible patterns negatively impacting the generalizability

However, all the information is in Table 11 and Table 12 and can be extracted to be validated in the future.

7.3. Future Work

We are aware that improvements can be made in the future.

First of all we advise readers to seek more ITG mechanisms and see if they can be mapped with the ITG mechanisms presented in Section 4.1.

We also advise readers to analyze more case studies and leverage information about ITG mechanisms and contingency factors as well as the ITG areas in order to elicit some possible ITG patterns for different organization's environments.

Furthermore, areal-world case studies should be performed, always having into consideration the correct identification of the contingency factors (instantiations). From now on case studies must also be organized by the contingency factors in order to add this kind of knowledge to the literature and to be a useful basis for ITG implementations in other organizations.

In addition, this research is based on a "snapshot in time," and future research could be dedicated to verify how implementations evolve over time. For example, as we saw structure mechanisms seems to have the better efficiency/difficulty relation. It would be interesting study if this situation remains over time or it changes for any reasons.

There are also a lot of patterns that can still be elicited from Table 11 and Table 12. We encourage future researchers to extract the patterns and go to the field to understand if the patterns are valid. We also encourage the search for more IT case studies in order to enrich the information collected so far as well as the possible patterns to extract.

Finally, in this thesis we performed qualitative interviews but we argue that more interviews must be performed not only in the validation of future artifact by future researchers but also to reinforce the validation of the artifacts proposed in this thesis.

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Appendixes

Appendix A: ITG Mechanisms Definitions

Structure Mechanisms	Definition
Architecture steering committee	Committee composed of business and IT people providing architecture guidelines and advises on their applications. The main goal of this committee is identify strategic technologies (Broadbent and Weill, 2003; Van Grembergen and De Haes, 2009; Weill and Ross, 2004).
Business/IT relationship managers	Business/IT relationship managers act as the intermediary between the business and IS, playing a critical daily two-way role by helping IS understand how business operates and giving the business units an entry point to IS. They play an important role in communicating mandates and their implications and supporting the needs of business units managers while help them see benefits rather than inconveniences (Broadbent and Weill, 2003; Weill and Ross, 2004).
CIO on Board	ITG effectiveness is only partially dependent on the CIO and should be viewed as shared responsibility and enterprise wide commitment towards sustaining and maximizing IT business value. The presence of the CIO on Board will ensure that IT will be a regular item on the board's agenda and that it will be addressed in a structured manner. That presence will also enhance the ability of the board to understand the role of IT in business strategy and to map the ITG role of the executive team. The CIO should report on a regular basis to the board (Peterson, 2004; Van Grembergen and De Haes, 2009; Weill and Ross, 2004).
CIO on executive committee/ CIO reporting to CEO and/or COO	CIO has a direct reporting line to the CEO and/or COO. This ensures that IT is part of the executive team where most strategy discussions begin and end. With that interaction IT can be an enabler of the organization (Symons, 2005; Van Grembergen and De Haes, 2009).
E-business advisory board	The growing infusion of e-business technologies in and between organizations, and the e-wakening from the dot.com frenzy, has made both business and IT executives recognize that getting IT right this time will not be about technology, but about governing IT. Internet business can be defined as a new way of business that utilizes the Internet as a medium for transactions. More broadly, e-business is an evolving set of applications, strategies, business processes and technologies linking multiple enterprises or individual consumers to enterprises for the purpose of conducting business using the Internet. An e-business advisory should help the senior managers in optimizing and managing the e-business (Amoroso, 2003; Peterson, 2004).
E-business task force	A task force is a unit or formation established to work on a single defined task or activity. In that case is created a team to deal specifically with E-business. The strength of the task forces are:

	Assembles experts quickly with a clear mission and charter; produces results in a timely manner; structure independent of organizational roles (Gartner, 2004).
Integration of governance /alignment tasks in roles & responsibilities	Clear and unambiguous definitions of the roles and the responsibilities of the involved parties are a crucial prerequisite for an effective ITG framework. It is the responsibility of the board and executive management to communicate these roles and responsibilities and to make sure that they are clearly understood throughout the whole organization. The best idea is document all roles and responsibilities (Van Grembergen et al., 2003; Van Grembergen and De Haes, 2009)
IT audit committee at level of board of directors	Independent committee at level of board of directors overseeing (IT) assurance activities. This committee should identify the key business processes that depend on IT; identify key risks areas and constantly measure the risk level and systematically and carefully examine their controls efficiency (Spremić , 2009; Van Grembergen and De Haes, 2009).
IT councils	IT councils often report in to the executive committee and contain overlapping memberships. Such councils can provide a focused environment to consider several levels of policies and investments. The very large items can then go to the executive committee with informed recommendations. The mix of business unit and IT skills in both individual skill sets and the membership of committee enables the team to align business strategy and IT in making architectures, infrastructures and business application decisions (Broadbent, 2002; Weill and Ross, 2004).
IT expertise at level of board of directors	Members of the board of directors have expertise and experience regarding the value and risk of IT. A lack of board oversight for IT activities is dangerous; it will put the firm at risk in the same way that failing to audit its books would (Nolan and McFarlan, 2005; Van Grembergen and De Haes, 2009).
IT investment committee or capital improvement	Committee responsible for evaluating and approving major capital expenditures. They use the same process and procedures to evaluate IT-related project proposals (Broadbent and Weill, 2003; Weill and Ross, 2004).
IT leadership councils	They are particularly important for large multi-business enterprises where there is a mix of responsibilities for infrastructures services, some enterprise-wide and others business-unit level. Leadership councils may comprise IT functional heads, CIOs of business units or they may be a combination of the two (Brown and Grant, 2005; Weill and Ross, 2004).
IT organization structure	The possibility of effective governance over IT is of course also determined by the way the IT function is organized and where the IT decision-making authority is located in the organization. The adoption of a particular mode is influenced by different determinants, such as history, economies of scale, size, industry, etc. Decision-making structures are the natural approach to generate commitment within the organization (De Haes and Van Grembergen, 2004; Van Grembergen et al., 2003; Weill and Ross, 2004).
IT project steering committee	Steering committee composed of business and IT people focusing on prioritizing and managing IT projects (Van Grembergen and De Haes, 2009).
IT steering Committee	The IT steering committee is situated at executive level. It is responsible for determining business priorities in IT investment (Van Grembergen and De Haes, 2009). It assists the Executive in the delivery of the IT strategy, overseeing the day-to-day management of IT service delivery and IT projects. IT steering committee focuses particularly on implementation, tracking IT investments, setting priorities and allocating scarce resources. Firms using steering committees have been found to exhibit greater business executive attention to IT-related activities, a greater commitment to IT planning

	practices and a forward-looking IT project portfolio (Huang et al., 2010; ITGI, 2003; Van Grembergen et al., 2003).
IT strategy committee	The IT Strategy Committee operates at the board level. The IT Strategy Committee – composed of board and non-board members – should assist the board in governing and overseeing the enterprise's IT-related matters. This committee should ensure that IT is a regular item on the board's agenda and should work in close relationship with the other board committees and with management in order to provide input to, and to review and amend the aligned enterprise and IT strategies (Van Grembergen, et al., 2003; Van Grembergen and De Haes, 2009).
ITG function/officer	Some IT organizations are actually creating the position of IT G officer reporting to the CIO. That means ITG is important and it provides a continual focus on the issue. The function of that structure is to promote, drive and manage ITG processes (Symons, 2005; Van Grembergen and De Haes, 2009).
Security/Compliance /Risk Officer	Function responsible for security, compliance and/or risk, which possibly impacts IT (De Haes and Van Grembergen, 2008; Van Grembergen and De Haes, 2009).
Processes Mechanisms	Definition
Architectural exception process	Technology standards are critical to IT and business efficiency. But occasionally exceptions are not only appropriate, they are necessary. Enterprises use the exception process to meet unique business needs and to gauge when existing standards are becoming obsolete. Without a viable exception process, business units ignore the enterprise wide standards and implement exceptions with no approval. The effectiveness of the architecture exception process depends on the ability of the IT unit to research and define standards and on the enterprise's commitment to technology standards (Weill and Ross, 2004; Weill and Ross, 2005).
Benefits management and reporting	Processes to monitor the planned business benefits during and after implementation of the IT investments / projects (Van Grembergen and De Haes, 2009). Formally tracking the business value of IT enhances organizational learning about the value of IT-enabled initiatives. Tracking includes determining whether expectations of a project's cost reductions or revenue increases actually materialized (Weill and Ross, 2004).
Chargeback	Chargeback is an accounting mechanism for allocating central IT costs to business units. The purpose of chargeback is to allocate costs so that business units IT costs reflect use of shared services while the shared services unit matches its costs with the business it supports. When IT understands its costs and charge out accordingly, chargeback processes demonstrates the cost saving resulting from shared services. Enterprises with effective costing mechanism find that chargeback can foster useful discussions between IT and business units about IT charges, leading to better-informed ITG decisions (Broadbent and Weill, 2003; Van Grembergen and De Haes, 2009; Weill and Ross, 2004).
Demand management	Demands for IT resources come from all directions and in all forms. Some demand is routine, other demand is strategic and complex. Demand management forces all IT demand through a single point, where the demands can be consolidated, prioritized and fulfilled (Heier, et al., 2007; Symons, 2005)
ITG Frameworks	Several standards and best practices, issued by both international standardization organizations and private organizations exist for managing the different aspects of IT. When implementing ITG, it may be important to know how these different standards and best practices relate (Van Grembergen and De Haes, 2009).

ITG assurance and self-assessment	Regular self-assessments or independent assurance activities on the governance and control over IT (Van Grembergen and De Haes, 2009).
IT budget control and reporting	Processes to control and report upon budgets of IT investments and projects (Van Grembergen and De Haes, 2009).
ITG Maturity Models	To implement and improve an IT Governance framework, organizations need to have a self-diagnosing tool to be able to assess IT Governance effectiveness and to identify opportunities for improvement (ITGI, 2001; Peterson, 2003).
IT Performance Measurement (IT Balanced Scorecard)	IT performance measurement in domains of Business Contribution, User Orientation, Operational Excellence and Future Orientation. The Business Contribution perspective captures the business value created from the IT investments. The User Orientation perspective represents the user (internal or external) evaluation of IT. The Operational Excellence perspective represents the IT processes employed to develop and deliver the applications. The Future Orientation perspective represents the human and technology resources needed by IT to deliver its services over time (Van Grembergen and De Haes, 2008; Van Grembergen and De Haes, 2009).
Portfolio management	<p>Prioritization process for IT investments and projects in which business and IT is involved (incl. business cases).</p> <p>Portfolio Management is an answer to the following question: "How can we maximize the business value from IT investments"? Portfolio Management manages IT as a portfolio of assets similar to a financial portfolio an striving to improve the performance of portfolio by balancing risk and return.</p> <p>Portfolio management is a combination of people, processes and corresponding information and technology that senses and responds to change by:</p> <ul style="list-style-type: none"> -Communicating effectively -Eliminating redundancies while maximizing reuse -Scheduling personnel and other resources optimally -Creating and cataloging a detailed, value-based, risk assessment of the inventory of existing assets -Monitoring and measuring project plans (cost, scope, timing, etc) from a development through post-implementation, including disposal <p>IT portfolio management provides the tools, processes, and disciplines needed to translate IT into a common taxonomy that both business and IT executives understand. (Heier et al., 2007; Jeffery and Leliveld, 2004).</p>
Project Governance/ Management Methodologies	Processes and methodologies to govern and manage IT projects (Van Grembergen and De Haes, 2009).
Project Tracking	A critical step in implementing ITG is to develop the discipline to track the progress of individual IT projects. Track the progress of individual IT projects. Dashboards are a common tool to track the projects (Weill and Ross, 2004).
SLA	<p>A SLA is defined as "a written contract between a service provider of a service and the customer of the service". The functions of SLAs are: Define what levels of service are acceptable by users and are attainable by the service provider; define the mutually acceptable and agreed upon set of indicators of the quality of service. Three basic types of SLAs can be defined: in-house, external and internal SLAs. The differences between those types refer to the parties involved in the definition of the SLA.</p> <p>The negotiation of SLAs should be completed by an experienced and multi-disciplinary team that equally represents the user group and the service provider. (Van Grembergen et al., 2003).</p> <p>Through negotiations between the IT service unit and business units,</p>

	an SLA leads to articulation of the services IT offers and the costs of the services. These negotiations clarify the requirements of the business units, thereby informing governance decisions on infrastructure, architectures and business application needs (Weill and Ross, 2004).
Strategic Information System Planning	Strategic Information Systems Planning is the process of aligning an organization's business strategy with effective computer-based information systems to achieve critical business objectives. SISP is a top concern of major executives and considerable resources (time and money) are spent in SISP activities. According to Earl (Earl, 1993), SISP has four components: Aligning IT with business goals, exploiting IT for competitive advantage, directing efficient and effective management of IT resources, and developing technology policies and architectures.
Relational Mechanisms	Definition
Business/IT account management	Bridging the gap between business and IT by means of account managers who act as in-between (De Haes and Van Grembergen, 2008; Van Grembergen and De Haes, 2009).
Business/IT collocation	Physically locating business and IT people close to each other (Van Grembergen and De Haes, 2009).
Corporate internal communication addressing on a regular basis	Internal corporate communication regularly addresses general IT issues (De Haes and Van Grembergen, 2008; Van Grembergen and De Haes, 2009).
Cross-functional business/IT job rotation	IT staff working in the business units and business people working in IT (Van Grembergen and De Haes, 2009).
Cross-functional business/IT training	Training business people about IT and/or training IT people about business (Van Grembergen and De Haes, 2009).
Executive/Senior management give the good example	Senior business and ITM acting as "partners" (De Haes and Van Grembergen, 2008; Van Grembergen and De Haes, 2009).
Informal meeting between business and IT executive/senior management	Informal meetings, with no agenda, where business and IT senior management talk about general activities, directions, etc. (e.g. during informal lunches) (Broadbent, 2002; Van Grembergen and De Haes, 2009).
IT leadership	Ability of CIO or similar role to articulate a vision for IT's role in the company and ensure that this vision is clearly understood by managers throughout the organization. So, we can say that the goal of IT leadership is the coordination across the enterprise (Broadbent, 2002; Van Grembergen and De Haes, 2009).
ITG awareness campaigns	Campaign to explain to business and IT people the need for ITG. Working with managers who stray from desirable behaviors is a necessary part of generating the potential value of governance processes. Therefore is necessary to communicate with those managers in order to educate them for IT issues (Van Grembergen and De Haes, 2009; Weill and Ross, 2004).
Knowledge management (on ITG)	Systems to share and distribute knowledge about ITG framework, responsibilities, tasks, etc. (De Haes and Van Grembergen, 2008; Van Grembergen and De Haes, 2009).
Office of CIO or ITG	ITG needs a recognized advocate, owner and organizational home. ITG needs an owner to ensure that individual mechanisms reinforce rather contradict one another and to communicate governance processes and purposes. The office of CIO or the office of ITG are effective mechanisms for advocating and educating about ITG (Weill and Ross, 2004).

Partnership rewards and incentives	One way that enterprises use to guarantee that the firm's strategy is followed by the employees is offering financial rewards and promotions to the employees who help organization achieve performance objectives (Montazemi and Pittaway, 2012).
Senior management announcements	Senior management announcements clarifying priorities and demonstrating commitment usually get a great deal of attention throughout an enterprise. Commitment about what will and will not be done helps everyone in an enterprise focus their attention on strategic objectives (Weill and Ross, 2004).
Shared understanding of business/IT objectives	Shared understanding of business/IT objectives is the ability of IT and business people, at deep level, to understand and be able to participate in the others' key processes and to respect each other's unique contribution and challenges (Reich and Benbasat, 2000). Taylor-Cummings (Taylor-Cummings, 1998) notes, the "culture gap" between IT and business people has been identified as a major cause of system development failures (Reich and Benbasat, 2000).

Table 19 ITG Mechanisms Definitions

Appendix B: Interviews' Template

This interview is being done in a Master Thesis context.

In order to obtain an understanding on how large financial Portuguese organizations implement IT Governance in a pragmatic way, several interviewees of different organizations were selected.

The purpose of these interviews is to look for different IT Governance Mechanisms in use and how some factors influence IT Governance Implementation.

Our study follows the definition that state that ITG 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 organizational structures and processes that ensure that organization's IT sustains and extends the organization's strategies and objectives.

1. Personnel and Organizational details

First Name:

Last Name:

Job Function:

Experience in IT:

Company:

Industry:

Number of employees:

Number of employees in IT (+ Outsourcers):

2. Contingency Factors

In the following questions check with **X** the right option:

a) What is the **Structure** used in the organization? (**Note:** Only **1 (one)** answer is available).

Centralized

Decentralized

Federal

b) This kind of **Structure** has always been used in the organization?

Yes

No

i. If not, what were **the reasons** behind this change?

c) Is the organization thinking in a **Structure transformation** in a near **future**?

d) Regarding the **IT Strategy**, what kind of **IT Strategy** is used? (**Note: More than 1 (one)** option can be chosen).

IT for **Comprehensiveness**

IT for **Efficiency**

IT for **Flexibility**

e) Taking into account the fact that the organization is a **Multinational** how does the organization address the different **Cultural issues**?

f) Have you followed the **growth** of the organization? What **difficulties** emerged during this transformation for IT?

g) Have you observed an increasing of the IT importance in the last years? Has this situation increased the number of employees in IT?

3. IT Governance Mechanisms

a) What **IT Governance Mechanisms** are used in your organization?

Structure Mechanisms			
Name	Used	Effectiveness	Ease of implementation
Architecture steering committee			
Business/IT relationship managers			

CIO on Board			
CIO on executive committee/CIO reporting to CEO and/or COO			
E-business advisory board			
E-business task force			
Integration of governance /alignment tasks in roles & responsibilities			
IT audit committee at level of board of directors			
IT councils			
IT expertise at level of board of directors			
IT investment committee or capital improvement			
IT leadership councils			
IT organization structure			
IT project steering committee			
IT steering Committee			
IT strategy committee			
ITG function/officer			
Security/Compliance/Risk Officer			
Processes Mechanisms			
Name	Used	Effectiveness	Ease of implementation
Architectural exception process			
Benefits management and reporting			
Chargeback			
Demand management			
ITG Frameworks			
ITG assurance and self-assessment			
IT budget control and reporting			
ITG Maturity Models			
IT Performance Measurement (IT Balanced Scorecard)			
Portfolio management			
Project Governance Management Methodologies			
Project Tracking			
Service Level Agreement			
Strategic Information System Planning			
Relational Mechanisms			
Name	Used	Effectiveness	Ease of Implementation
Business/IT account management			
Business/IT collocation			
Corporate internal communication addressing on a regular basis			
Cross-functional business/IT job rotation			
Cross-functional business/IT training			
Executive/Senior management give the good example			
Informal meeting between business and IT executive/senior management			
IT leadership			
ITG awareness campaigns			
Knowledge management (on ITG)			
Office of CIO or ITG			
Partnership rewards and incentives			
Senior management announcements			

Shared understanding of business/IT objectives			
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- b) If any mechanism was used in the past, but it is not currently, please specify the mechanisms and the reasons for why it is not been used.

Mechanisms	Reason

- c) What is the perceived **effectiveness** of the **IT Governance Mechanisms**?
 Rate with **0 (zero)** if the IT Governance Mechanism is **nothing effective**.
 Rate with **5 (five)** if the IT Governance Mechanism is **very effective**.
- d) What is the perceived **ease of implementation** of the **IT Governance mechanisms**?
 Rate with **0 (zero)** if the IT Governance Mechanism is **very easy** to implement.
 Rate with **5 (five)** if the IT Governance Mechanism is **very difficult** to implement.
- e) What is a **minimum set or minimum baseline** of required **IT Governance Mechanisms**? (**Note:** Please select **10 (ten)** IT Governance Mechanisms)
 Number **1 (one)** is the **most important** mechanism and number **10 (ten)** is the **tenth important** mechanism.

	Mechanisms
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

- f) To whom answers the **CIO: CEO or CFO**? What is the **reason** for this situation?
- g) Does the organization have any certification **in IT Frameworks**?

Frameworks	Level

h) Do the organization employees have any **certificate in good practices**?

Framework	Level	Number of employees

i) Are there any partnership **rewards** and **incentives** to the employees when some goals are achieved?

Yes

Which one(s)?

No