IT Governance Maturity Patterns in Portuguese Healthcare

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Abstract

The pervasive use of technology in organizations to address the increased services complexity has created a critical dependency on information technology (IT) that calls to a specific focus on IT Governance (ITG). However, determining the right ITG mechanisms remains a complex endeavor. This paper uses Design Science Research and proposes an exploratory research by analyzing ITG case studies to elicit possible ITG mechanisms patterns. Six interviews were performed in Portuguese healthcare services organizations to assess the ITG practices. Our goal is to build some theories (ITG mechanisms patterns), which we believe will guide healthcare services organizations about the advisable ITG mechanisms given their specific context. We also intend to elicit conclusions regarding the most relevant ITG mechanisms for Portuguese healthcare services organizations. Additionally, a comparison is made with the financial industry to identify improvement opportunities. We finish our work with limitations, contribution and future work.

Keywords

IT governance; business/IT alignment; patterns; healthcare; case study; design science research

Introduction

Information Technology (IT) has become crucial to the support, sustainability and growth of most businesses (Law and Ngai, 2005; Quershil, 2009; De Haes et al, 2015). 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 is considered a core element in most business models (Bartens et al, 2015) and becomes a relevant success factor for survival, prosperity and an opportunity to differentiate in order to achieve competitive advantage (Grembergen and De Haes, 2009).

Additionally, the pervasive use of technology has created a critical dependency on IT that calls for a specific focus on IT Governance (ITG) (De Haes and Grembergen, 2008; Grembergen et al, 2003). Prior research has demonstrated an important relationship between ITG and business-IT alignment (De Haes et al, 2010).

ITG defines the necessary mechanisms as a means of rationalizing, directing and coordinating an organization's IT-related decision making to ensure the present and future business/IT alignment objectives (Park et al., 2006; Gerrard, 2009; Weill and Ross, 2004).

These ITG mechanisms are expected to support IT-related decisions, actions and assets that are more tightly aligned with an organization's strategic and tactical intentions. However, good ITG is no longer a "nice to have", but a "must have" (Pereira and Mira da Silva, 2012). Proper ITG can contribute to higher returns on assets at a time when businesses are increasing their technology investment (Webb et al, 2006). Gartner states that ITG was recognized as a CIO top-10 issue for more than five years and has risen in priority between 2007 and 2009 (Gerrard, 2009).

A mixture of structures, processes and relational mechanisms exists (Grembergen et al, 2003). It is known that enterprises which have addressed properly ITG have actively implemented a set

of ITG mechanisms that encourage behaviors consistent with the organization's mission, strategy, values, norms, and culture (Weill, 2004).

When designing ITG, it is important to recognize that it is contingent upon a variety of sometimes conflicting internal and external factors. Determining the right mechanisms for each organization is therefore a complex endeavor (Grembergen et al, 2003). It requires commitment from both the enterprise leadership and professionals as ITG implies continuous scrutiny.

Recent studies have identified some ITG problems as the inconsistencies and incongruities about the ITG mechanisms (Almeida et al, 2013) or the lack of consensus about ITG definition (Pereira and Mira da Silva, 2012). However, little research can be found on how organizations can effectively implement ITG (De Haes and Grembergen, 2008a; Lapão et al, 2009).

Our research aims at analyzing several ITG case studies (CSs) and elicits some ITG mechanisms patterns. Such patterns solve "real world" problems because they capture and allow for the reuse of experiences of best practice in a specific professional domain (Schadewizt and Timothy, 2007). The patterns result from one or more ITG practices.

These patterns should not be seen as cookbook recipes to be followed by organizations when implementing ITG. They should be seen as a roadmap for guidance about the most relevant ITG mechanisms to implement given a specific organizational context.

The definition of minimum baselines has been proposed as a way to help organizations in ITG implementation (Bartens et al, 2015).

The main motivation for this paper was De Haes and Grembergen (2008a) paper suggesting that more research is needed to address the ITG mechanisms implementation in different contexts. The paper has the following structure: Introduction (1), Research Methodology (2), Related Work (3), Case Studies Analysis (4), Evaluation (5), Lessons Learned (6), and finally Conclusion (7).

Research Methodology

The Design Science Research (DSR) methodology was used for two main reasons: first, this study focus on ITG which is highly related with information systems (IS) domain and DSR began growing in popularity for use in scholarly investigations in IS (Osterle et al, 2011); second, current ITG solutions has been pointed out as too complex (Pereira and Mira da Silva, 2012) and DSR is suitable to capture the complexity of the topic (Schermann et al, 2009).

From the four types of artifacts produced by DSR (constructs, models, methods and instantiations) we will focus on the first two, constructs and models. Constructs are necessary to describe certain aspects of a problem domain and allowing for the development of the research project's terminology (Schermann et al, 2009) while 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 and the ITG Factors identification. The model we propose is the definition of healthcare ITG patterns taking into account the integration of the constructs.

As advised by March and Smith (1995), the research methodology applied follows the two processes of DSR in IS: build and evaluate. Our approach can be seen in Table 1.

Table 1. Research methodology

BUILD		EVALUATE
Constructs definitions	Model Construction	Evaluation
- Domain definition - ITG Mechanisms - ITG Factors	- Integrate constructs and define ITG patterns	- Interviews - Literature Review - Comparison

To identify the ITG mechanisms and factors an extensive literature review (LR) was performed by analyzing the most relevant research in the field. In order to elicit the ITG in healthcare patterns several published ITG case studies were analized.

The LR started with a conception of the topic and a definition of key terms in order to derive meaningful search terms (Vom Broke et al, 2009). We have started by looking into journals' articles. We have also looked into some of the most known communities, as IEEE and ACM, where we searched for terms as "IT Governance", "IT Governance mechanisms", "IT case study", and finally "IT Governance factors". In these processes we enhanced the queries by adding synonyms or abbreviations.

Related Work

An effective review creates a firm foundation for advancing knowledge. It makes theory development easier, closes areas where there is a plethora of research, and uncovers areas where research is needed (Webster and Watson, 2002). In this section we are going to present the state of the art of the main issues of our research.

First we describe our proposal composed by three artefacts: ITG factors, ITG mechanism and ITG mechanisms patterns. These factors were used to capture the context of the organizations while the mechanisms were used to assess the ITG implementation in the organization. Finally, the patterns were created based on similar approaches founded in the data elicited from the several CSs.

ITG Factors

Determining the appropriate ITG mechanisms is a complex endeavor and one should be aware that what strategically works for one organization does not necessarily work for another (Patel, 2003). This means that some factors may influence the successfulness of ITG implementation. Therefore, it is necessary to look in the literature for such factors.

Three significant studies (Weill, 2004; Pereira and Mira da Silva, 2012a; Sambamurthy and Zmud, 1999) were found. The first approach is provided by Pereira and Mira da Silva (2012a) which identified the following set of factors: Culture, Ethic, Industry, IT Strategy, Maturity, Regional Differences, Size, Structure and Trust.

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

The third approach is provided by Weil (2004) and the factors are as follows: Strategic and performance goals, Organizational structure, Governance experience, Size and diversity and Industry and regional differences.

After analyzing these three approaches, we decided to use the first approach since it encompasses several factors presented in the other two approaches and is the most recent one.

The ITG factors will not be presented here; readers can see it on the original article (Pereira and Mira da silva, 2012a).

ITG Mechanisms

ITG can be deployed using a mixture of various structures, processes and relational mechanisms (De Haes and Grembergen, 2004).

The Structure Mechanisms 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 (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 mechanisms include IT investment proposal, architecture exception processes, Strategic Information System Planning, chargebacks, among others (Grembergen and De Haes, 2008; Weill and Ross, 2004).

Finally, 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 Grembergen, 2008; Ribbers et al, 2002; Weill and Ross, 2005).

The ITG mechanisms research was overviewed. The most detailed ones regarding ITG mechanisms are (Almeida et al, 2013; Grembergen and De Haes, 2008; Weill and Ross, 2004; Peterson, 2003). However, after a detailed analysis the Almeida's study (Almeida et al, 2013) was considered the most complete one. It is grounded on an extensive LR, tries to solve some inconsistencies among the ITG mechanisms and provides a complete list of ITG mechanisms. Plus, it is also the most recent study (2012) encompassing all the other mentioned researches.

We have adopted the list of ITG mechanisms (46) provided by this research. It should be noted that all the mechanisms could be considered as general to any organizations' context.

Unfortunately, again due to space limitations, we cannot provide the definition of all the mechanisms, therefore, we forward the readers to the original article (Almeida et al, 2013).

As suggested by Van Grembergen's definition (Grembergen and De Haes, 2008), ITG is located at multiple layers within the organization: at a strategic level where the board is involved, at a management level within the C-suite layer and finally at the operational level with IT and business management. This implies that all these levels, business as well as IT, need to be involved in the IT governance process and they have to understand their individual roles and responsibilities within the framework.

Based on the definition of the ITG mechanisms (Almeida et al, 2013) and the definition of the different layers (Grembergen and De Haes, 2008) we mapped both (Figure 1). A 3x3 matrix was draw, where the columns are the different layers and the rows are the different type of ITG mechanisms (Figure 1). We then fill the cells with the ITG mechanisms that match both definitions (column and row).

Strategic Level	Management Level	Operational Level	
	IT Organization Structure		**Structure Mechanisms**
CIO on Board			
IT Strategy Committee			
IT Expertise at Level of Board of Directors			
IT Audit Committee at Level of Board of Directors			
E-Business Advisory Board			
	IT Leadership Councils		
	CIO on Executive Committee/ CIO reporting to CEO adn/or COO		
	Integration of Governance/Alignment Tasks in Roles & Responsibilities		
	IT Investment Committee or Capital Improvement		
	IT Steering Committee		
	ITG Function/Officer		
	Architecture Steering Committee		
	Security/Compliance/Risk Officer		
		E-business Task Force	
		IT Councils	
		IT Project Steering Committee	
		Business/IT Relationship Managers	
	ITG Frameworks		**Process Mechanisms**
	ITG Maturity Models		
	Architectural Exception Process		
	IT Performance Measurement		
	Strategic Information System Planning		
	Portfolio Management		
		Chargeback	
		Benefits Management and Reporting	
		IT Budget Control and Reporting	
		Service Level Agreement	
		Project Governance/Management Methodologies	
		Project Tracking	
		ITG Assurance and Self-Assessment	
		Demand Management	
	Partnership Rewards and Incentives		**Relational Mechanisms**
	Corporate Internal Communication Addressing on a Regular Basis		
	Shared Understanding of Business/IT Objectives		
	Office of CIO or ITG		
	Senior Management Announcements		
	IT Leadership		
	Executive/Senior Management Give the Good Example		
	Informal Meetings Between Business and IT Executive/Senior Management		
	ITG Awareness Campaigns		
		Business/IT Account Management	
		Business/IT Collocation	
		Cross-functional Business/IT Job Rotation	
		Cross-functional Business/IT Training	
		Knowledge Management (on ITG)	

Figura 1. ITG Mechanisms Vs Organizational Layers

ITG Patterns

Few papers have focused on any kind of ITG patterns elicitation, only three were found in the literature.

The first approach is provided by Weill and Ross (2004). This research addressed large enterprises and a wide range of industries, where 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.

This study tries to depict the styles of governance (from a more decentralized to a more centralized style) used by top performers to decide what major IT decisions must be made.

Other approach is by De Haes and Grembergen (2008a), which provides a minimum baseline of ITG practices that organizations at least should have. The researchers focused on Belgian financial services organizations with headcounts ranging from 100 to more than 1000 employees. The authors alert to the need for more research on this.

The last research is provided by Pereira (2014). This research addresses the examination of several CSs from where the authors extract a set of ITG patterns and then they perform some interviews in order to evaluate the ITG patterns. The authors alert to the need of more similar researches.

It becomes clear that this is a topic that requires further investigation and we did it in the next sections.

Analysis of the Case Studies

After the identification of the ITG factors and mechanisms, we have selected 50 CSs published in scientific conferences proceedings, journals and books. Besides few ITG CSs among the literature, many of them lack a lot of crucial information. The CSs were selected according to the ITG information richness. Therefore, several CSs were dropped during the selection process.

For space limitation and since our focus will be on the healthcare industry, we only provide the references on this industry CSs: 10 (Wilkin and Riddet, 2008), 38, 39, 40, 41, 42, 43, and 44 (Herrera and Giraldo, 2012).

All the information gathered from the 50 CSs regarding both the ITG mechanisms and the ITG factors can be seen in Table 2 and Table 3.

In Table 2 was adopted the following symbols: if 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 3, we use painted cells 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.

All the patterns were manually elicited by the authors without the help of any specific algorithm or any other method. As a result, the authors had to be very careful about unclear mechanisms references.

Table 2. ITG mechanisms

		ITG Mechanisms	Case Studies																																																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Structure	1	Integration of governance /alignment tasks in roles and responsibilities	●	◄	●	●	●		●				●	●						●		●		●									●	◄	◄				◄	◄					●	●	●	●	●	●		
	2	IT strategy committee	●		●		●						●	●	●	●		●		●																								●							
	3	IT steering Committee	●	●	●	●		●	●	●		●			●		◄	●		●	●	●	●		●	●	●	●	●	●	●	●							◄	◄	◄	●	●							
	4	CIO on Board			●		●								●	●			●		●																							●	●						
	5	IT councils	●	●	●					●											●		●		●	●	◄		●														●		●			●		
	6	IT leadership councils		●			●		●		●				●		●			●				●	●		●				●							●						●						
	7	E-business advisory board												●																																				●
	8	E-business task force	◄			●																																												
	9	IT project steering committee	●	●		●	●		●	●						●			●				●	●	●						◄		◄		●			●	●	●										
	10	IT organization structure	●	●	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	11	IT expertise at level of board of directors	◄		●		●			◄				●			●	◄	●	●	●		●																											
	12	IT audit committee at level of board of directors	◄			◄	◄																																											
	13	CIO on executive committee/CIO reporting to CEO and/or COO	●	●		●		●	●		●				●		●			●	●	●		●	●	●			●	●	●	●	●		●	●			●		●	●	●	●	●					
	14	ITG function/officer			●	●		●													●																													
	15	Security/Compliance/Risk officer						●				●			◄																																			
	16	Architecture steering committee					●					●				●	●		●			●		●		●	●	●	●	●	●		●			●		●	●											
	17	IT investment committee or capital improvement													●								●	●	●	●	●		●	●																				
	18	Business/IT relationship managers	●	●	●		●	●	●				●	●		◄		●		●			●	●	●	●	●	●		●	●	●	●	●					●											
Process	19	IT performance measurement	●		◄	●	●	●	●	●			●			◄		●	●			●			●		●		●				●											●						
	20	Strategic Information System Planning	◄	●	●	●	●	●		◄	●	●		◄		●	●	●	●	●	●	●						◄																●	●	◄	◄	◄	◄	◄
	21	Frameworks ITG	●	●	●	●		◄		●	●	●	●	●	●			●	●									●																●						
	22	Service Level Agreement	●		●	●			●		●								●		●					◄		●		●			●	●												●			●	●
	23	Portfolio management	●	●	●	●	●	●	●	●	●	●	●			●	●	●			●	●	●	●	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●						
	24	Project Governance/Management methodologies																									●	●	◄	●	●	●	●	●	●	●	●	●	●	●	●	●	●							◄
	25	Chargeback	●		◄	●			●							●			●		●		●		●		●			●																			◄	
	26	ITG assurance and self-assessment																																																
	27	IT budget control and reporting	●	●	●	●	●	●	●	●		●		●	●	●	●		●	●	●		●				●																							
	28	Project Tracking	●	●	●	●	●		●	●	●	●	●		●	●	●		●	●	●	●	●	●		●		●		●	●	◄		●	●	◄							●	●	●	●	●	●	●	●
	29	ITG Maturity Models	●	●	●	●	●	●		●	●			●			●																																	
	30	Demand management					●								●	●																																		
	31	Architectural exception process					●								◄				●		◄		●		●			●		◄	◄	◄	●	●																
	32	Benefit management and reporting				●			●		●									●				●		●		●	◄	◄		●	●			●	●													
Relational	33	Partnership rewards and incentives			●	●	●			●					●		●								●	●																			◄					
	34	Business/IT collocation	●		●	●																																					●	●						
	35	Shared understanding of business/IT objectives	●	●	◄	●	◄	◄	●					◄	◄		●	●	●		●			●			●			●	●	◄		●		●		●			●	●		●	●	●	●	●	●	●
	36	Cross-functional business/IT training	●	●	◄		◄												●						◄																		●	●	●	●	●	●	●	
	37	Cross-functional business/IT job rotation	●	◄	◄	◄		●	●																																		●	●	●	●	●	●		
	38	ITG awareness campaigns	●	●	●	●	●	●	◄			●			●	●		●		●	●		●				●	●					●										●		●	●				◄
	39	Corporate internal communication addressing on a regular basis	●	●		●				●							◄																																	
	40	IT leadership			●				●				●		●	●	●	●		●		●	●	●		◄																								
	41	Informal meeting between business/IT executive/senior management	◄				●																					◄													●	●	●	●	●	●		
	42	Executive/Senior management give the good example	●															●					◄																											
	43	Business/IT account management	●	●	●		●								●	●		●		●	●		●	●	●			●	●	●	●	●									●							●		
	44	Knowledge management (on ITG)	●	◄		●		●		●				●		●		●				●	●		●			●																			●				
	45	Senior management announcements																		●	●		●							◄																				
	46	Office of CIO or ITG			●	●		●								●	●													●																				

Table 3. ITG factors

ITG Factors		Case Studies (1–50)
Industry	Airline	
	Automotive	
	Chemical	
	Education	
	Financial/ Banking/ Insurance	
	Government	
	Healthcare / Healthcare Services	
	Infrastructure Services	
	Intergovernmental	
	Pharmaceutical Laboratories	
	Retail	
	Steel Producer	
	Telecommunications	
	Transport	
	Utility	
Size	Large	
	SME	
Structure	Centralized	
	Decentralized	
	Federal	
Culture	The contest model	
	The organization as a family	
	The network model	
	The pyramidal organization	
	The Solar system	
	The well-oiled machine	
Strategy	IT for comprehensiveness	
	IT for efficiency	
	IT for flexibility	

It should be noted that in Table 3 we are not considering the information about ethic, maturity and trust since there were several gaps in the analyzed ITG CSs regarding these factors. ?? Such gap of information forced us to exclude these factors from the patterns' elicitation. Moreover, since we will evaluate the patterns by interviewing CIOs in Portuguese organizations we also excluded the regional differences factor because none Portuguese CS were found among the literature.

The elicited patterns can be seen in Table 4. For space limitations, only the patterns able to be validated by our interviews were leveraged.

A brief explanation of how the patterns were elicited from each CS is also advisable. For example, this sentence (CS1 (Grembergen and De Haes, 2008)): "Service level agreements (SLAs) 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 "Service Level Agreement" mechanism.

Another example is (CS15 (Wittenburg and Matthes, 2007)): "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.

These patterns cannot be seen as cookbook recipes to be followed by healthcare organizations when implementing ITG. On the contrary, they should be seen as guidance about which can be the most relevant ITG mechanisms to implement given a specific organizational context.

Table 4. ITG mechanisms patterns elicited

1	Large enterprises use the following mechanisms: 10, 23
2	Large enterprises with "IT for Efficiency" Strategy use the following mechanisms: 10, 23
3	Large enterprises with "The Pyramidal Organization" Culture and IT for Efficiency" Strategy use the following mechanisms: 10, 23
4	Large enterprises with "The Pyramidal organization" Culture and "IT for Flexibility" Strategy use the following mechanisms: 10, 23

Evaluation

We performed an exhaustive LR since a review of prior, relevant literature is an essential feature of any academic project. An effective review creates a firm foundation for advancing knowledge, makes theory development easier, closes areas where there is a plethora of research, and uncovers areas where research is needed (Webster and Watson, 2002). To review articles is critical to strengthen IS as a field of study. 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.

From the previous CSs analysis, we elicited a set of ITG mechanisms patterns compatible with healthcare organizations, namely Hospitals. In order to elicit the patterns we focused only in CSs from both central and regional hospitals. The elicited patterns can be seen as our theory.

In order to validate our artifacts, besides the complete LR, we also performed six qualitative interviews in six Portuguese healthcare organizations. The interviewees were IT experts from those organizations, with managing responsibilities, with several years of experience on IT (Table 5). We used semi-structured interviews.

In spite of not having a large number of interviews, we decided to use a qualitative approach instead of a quantitative one. As we can see the interviewees have a lot of experience in the IT area that can be exploited. The interviews were conducted by two of the authors over a period of one month. Each session lasted from 1 to 2 hours and was transcribed into digital data for analysis (Table 6).

To support and lead the interviews, a questionnaire was designed with both open-response questions and close-response questions about the ITG factors (Table 5) and the ITG mechanisms (Table 6). Furthermore, clarifications regarding the various concepts used by the respondents were sought during the conversation, so that later these descriptions could be examined and matched to the more standard designations.

Table 5. Interviewees' information

	Experience	Size	Structure	Regional Differences	Culture	Strategy
1	24 years	Large [1000-2000]	Centralized	Portugal	The pyramidal organization	IT for Efficiency IT for Flexibility
2	20 years	Large [1000-2000]	Centralized	Portugal	The pyramidal organization	IT for Efficiency
3	25 years	Large [3000-4000]	Centralized	Portugal	The pyramidal organization	IT for Efficiency
4	15 years	Large [2000-3000]	Centralized	Portugal	The pyramidal organization	IT for Efficiency IT for Flexibility
5	28 years	Large [4000-5000]	Centralized	Portugal	The pyramidal organization	IT for Efficiency IT for Flexibility
6	18 years	Large [1000-2000]	Centralized	Portugal	The pyramidal organization	IT for Efficiency

In Table 6 we present the data collected from the six interviews (columns) performed. Each main column has 3 sub-columns, which correspond to a specific answer to 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, up to 5, highly effective). Finally, the "D" represents how difficult is the implementation of the mechanisms according to the interviewees' viewpoint (from 0, not difficult at all, up to 5, extremely difficult).

A fourth and last question was also present on the questionnaire. We asked the interviewees to choose the ten most important mechanisms. Grey cells represent these choices over the columns.

The last two columns of Table 6 are the sum of the "E" columns and the sum of the "D" columns. These numbers are important because we ordered the lines regarding the difference between the effectiveness and the difficulty to reflect somehow the relevance of the mechanisms. The first criterion was sum "E" minus sum "D" where the largest difference wins. When the difference was equal the major sum "E" prevails. When equal sum "E" also exists we chose the most used mechanism to prevail. We also marked with red the mechanisms used by all the organizations.

We have also evaluated our research by comparing the most relevant mechanisms used by Portuguese healthcare organizations with the ITG patterns proposed by Pereira and Mira da Silva for Portuguese financial services (Pereira et al, 2014).

At Table 4 we present the four patterns that were elicited from Table 2 and Table 3 in order to be compared with the interviews' results.

After the analysis we concluded that patterns 1, 2 and 3 were not confirmed by the interviews. Pattern 4 was impossible to compare since none of the interviewed organizations adopt the "IT for Flexibility" strategy. During the comparison we considered the "◖" as a positive match.

In Table 7 we can see the comparison between Pereira (2014) ITG patterns, 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 the minimum baseline mechanisms proposed for healthcare services.

Table 6. Interviews

Structure Mechanisms	1 U	1 E	1 D	2 U	2 E	2 D	3 U	3 E	3 D	4 U	4 E	4 D	5 U	5 E	5 D	6 U	6 E	6 D	Sum E	Sum D
IT organization structure	●	5	3	●	5	1	●	5	2	●	5	0	●	5	4	●	5	2	30	12
Business/IT relationship managers	●	5	3		5	4	●	5	2	●	5	5	●	5	0		4	4	29	18
Integration of governance/alignment tasks in roles & responsibilities	●	5	4	◐	4	2	◐	5	4	●	4	3	●	5	3	●	5	1	28	17
Security/Compliance/Risk officer	●	5	4		5	5	●	5	3		5	4	●	5	3	●	4	2	29	21
IT project steering committee	◐	5	3		3	4	◐	5	3	●	5	2	●	5	3		4	4	27	19
IT expertise at level of board of directors	●	5	4	●	5	3	●	4	3		5	5	●	5	0	◐	2	5	26	20
IT councils	●	5	3		4	4		4	3	●	5	3		5	4		3	3	26	20
IT steering Committee	●	4	3		5	4		3	4	◐	5	2	●	5	3		3	4	25	20
IT strategy committee		4	5		5	3		5	4	●	5	1	◐	4	4		3	5	26	22
IT audit committee at level of board of directors	◐	4	4	◐	4	4		3	4	●	5	3		2	3	◐	5	4	23	22
IT investment committee or capital improvement		3	4		5	3		2	4	●	4	1		5	4		2	4	21	20
Architecture steering committee		4	4		3	5		3	3		4	3	◐	3	3	●	4	3	21	21
CIO on executive committee/CIO reporting to CEO and/or COO	◐	5	3	◐	5	4		2	2	◐	1	2	◐	2	2	◐	1	4	16	17
E-business task force		4	5		4	4		2	4		4	2		3	5		4	4	21	24
E-business advisory board		4	5		5	4		2	4		3	4		3	5		5	4	22	26
ITG function/officer		3	5		3	4		4	5	●	5	4	◐	4	3		1	4	20	25
CIO on Board		4	5		5	5		5	3		2	5		3	4		1	3	20	25
IT leadership councils									n/a											
Processes Mechanisms									AVERAGE										22,9	20,5
Demand management	●	5	2	●	5	4	●	5	4	●	4	1	●	5	0	●	5	4	29	15
Service Level Agreement	●	5	4		4	5	◐	5	4		5	3	●	5	2	●	5	2	29	20
Architectural exception process	◐	4	4		3	2	●	5	1	●	4	2	●	5	5	●	5	3	26	17
IT budget control and reporting		5	2	◐	4	3	●	5	3	●	4	1	●	4	3		2	3	24	15
Project Tracking		4	4		5	4	●	5	2		4	3	●	5	3	●	5	4	28	20
Strategic Information System Planning	◐	5	4	●	5	4		4	5	●	5	4	●	5	0		4	4	28	21
ITG assurance and self-assessment	●	5	3	●	4	4		4	4	●	4	3	◐	5	2	●	4	3	26	19
Portfolio management	●	5	3	●	5	3		4	5		3	3	◐	5	2	●	4	3	26	19
Frameworks ITG		4	4	◐	4	4	◐	5	5	◐	5	2	◐	5	3	◐	5	3	28	22
Chargeback		5	5		4	5		4	4	◐	4	2	●	5	2		4	5	26	23
Project governance/management methodologies		5	4		4	5		4	4		4	5	●	5	3		4	4	26	25
Benefits Management and Reporting	◐	4	5	◐	5	4		4	4		3	3		5	4		4	4	25	24
IT Performance Measurement (E.g. IT BSC)		4	4		3	4		4	5		5	4	●	3	3		4	4	23	24
ITG Maturity Models		4	5		4	4		3	4		4	3		2	3		5	4	21	24
Relational Mechanisms									AVERAGE										26,1	20,6
Informal meeting between business and IT executive/senior management	●	4	3	●	4	1	●	5	2	●	3	1	●	5	0	●	4	2	25	9
Corporate internal communication addressing on a regular basis	●	5	2	●	4	4	●	5	3	●	4	1	●	5	0	●	5	2	28	12
Executive/Senior management give the good example	●	5	5	●	5	1		5	5	●	4	1	●	5	1	●	5	1	29	14
Business/IT collocation	●	5	3	●	5	2	●	5	3	●	5	4	●	5	3	●	5	2	30	17
Senior management announcements	●	4	4	●	5	2	●	4	2	●	4	1	●	5	3	●	5	1	27	14
IT leadership	●	5	2	●	4	3		5	5	●	4	4	●	5	1	●	5	2	28	17
Cross-functional business/IT training	◐	5	5	◐	5	3	●	5	2	●	4	4	●	5	0	◐	3	3	27	17
Business/IT account management	●	5	4		4	3	●	5	2	●	4	5	●	5	2		4	4	27	20
Office of CIO or ITG		3	4		4	5	●	3	1	●	4	1	●	5	1	◐	4	4	23	16
Partnership rewards and incentives		4	5		5	5		5	5	●	5	1		5	5	●	5	2	29	23
Shared understanding of business/IT objectives	●	5	4	●	5	2	◐	4	4	●	5	4	●	5	3	◐	3	4	27	21
Knowledge management (on ITG)		4	4		5	4		4	4		4	2		3	3	◐	5	3	25	20
ITG awareness campaigns		5	4		3	4		4	5	●	4	2	●	4	4	●	5	5	25	24
Cross-functional business/IT job rotation		4	5		4	5	◐	4	5		3	3		3	3		2	4	20	25
									AVERAGE										26,4	17,8

Table 7. ITG mechanisms comparison

Financial ITG Patterns (Pereira et al, 2014)	Interviews (Healthcare)	Sum "E" minus Sum "D"
Business/IT relationship managers	Business/IT relationship managers	Business/IT relationship managers
IT leadership	IT leadership	IT leadership
IT organization structure	IT organization structure	IT organization structure
IT strategy committee	IT strategy committee	
Service Level Agreement	Service Level Agreement	
IT project steering committee		
CIO on Board		
Portfolio management		
IT budget control and reporting		
Partnership rewards and incentives		
Frameworks ITG		
	Integration of governance/alignment tasks in roles & responsibilities	Integration of governance/alignment tasks in roles & responsibilities
	Security/Compliance/Risk officer	
	Strategic Information System Planning	
		Informal meeting between business and IT executive/senior management
		Corporate internal communication addressing on a regular basis
		Executive/Senior management give the good example
		Demand Management
		Business/IT collocation
		Senior management announcements

Lessons Learned

From the IT CSs analysis (Table 2 and Table 3) we conclude that a lot of information regarding ITG mechanisms is missing, a problem already identified and under study (Pereira et al, 2013). However, a lot of information regarding the mechanisms was elicited. Some mechanisms appear to be more used such as "IT Organizational structure", "Demand Management", or "Business/IT Collocation".

Regarding the factors, several points must be stated:

- Unfortunately giving the few or none IT CSs performed in Portugal we do not have much information about regional differences;
- All the analyzed organizations (Hospitals) are large because large organizations are more available to be targeted of a CS;
- The majority of the CSs are Federal; and
- None CSs use IT for Comprehensiveness as IT strategy;

Interviews were very productive and insightful. A lot of useful information was collected. From the average numbers we can conclude that relational mechanisms seem to be the easiest to implement and also the more effective when implemented. Probably for

this reason relational mechanisms are the most common among all the organizations interviewed.

Each interviewee had to choose the 10 most important mechanisms. From a universe of 60 possible choices (10 per interview), 25 (41.7%) were structure mechanisms while 18 (30%) were relational mechanisms and 17 (28.3%) were process mechanisms.

The CSs analysis shows that there are a set of ITG mechanisms which are comprehensively implemented by organizations. So far four ITG mechanisms patterns were elicited, each according to a specific organizational context characterized by the selected factors. There is the perception that the adoption of the ITG mechanisms follows the need to overcome increased processes complexity, but not in a systematic way.

Table 8. Financial industry versus Healthcare insdustry

	Most Relevant Mechanisms			Efficiency			Difficulty		
	Structure	Process	Relational	Structure	Process	Relational	Structure	Process	Relational
Financial Industry	46.7%	40%	13.3%	23.6	24.6	22.0	17.7	23.1	20.4
Healthcare Industry	41.7%	28.3%	30%	22.9	26.1	26.4	20.5	20.6	17.8

Some information regarding the comparison between financial industry (Pereira et al, 2014) and healthcare industry is presented in Table 8. We can easily conclude that there are several differences between both industries, as for example:

- Relational mechanisms are the less relevant for financial industry and process mechanisms for healthcare industry;
- Relational mechanisms are the less efficient for financial industry while for healthcare industry are structure mechanisms;
- Process mechanisms are the most efficient mechanisms for financial industry while for healthcare industry are the relational mechanisms; and
- Structure mechanisms are the less difficult to implement in financial industry while in healthcare industry are the relational mechanism;

There are also some similarities between both industries:

- Process mechanisms are the most difficult to implement for both industries; and
- Structure mechanisms are the most relevant for both industries.

Conclusion

The aim of this paper was to elicit some ITG mechanisms patterns for healthcare organizations through IT CSs reading and analysis, as well as the identification of the minimum baseline mechanisms for Portuguese healthcare organizations. Moreover, this

research intended to present the differences regarding ITG patterns between the financial and healthcare industries. The conclusion is organized according these two main goals.

Regarding the patterns, the global evaluation is negative. From four possible patterns presented in Table 4, none were confirmed. The authors argue that more Healthcare case studies should be considered in the future, as well as more interviews.

Regarding the minimum baseline mechanisms several conclusions can be withdraw. First, there are five common mechanisms shared between Portuguese financial services organizations and Portuguese healthcare organizations. Three of the common mechanisms have a great effectiveness/difficulty ratio.

Another mechanism with a good effectiveness/difficulty ratio was selected by Portuguese healthcare organizations: "Integration of governance/alignment tasks in roles & responsibilities".

Few mechanisms (4) remain without any match. We can conclude that healthcare industry is nearly to use almost all the ITG mechanisms. On the other side we must say that the usefulness of the remained ITG mechanisms still being unknown. We cannot conclude anything about them with rigor but they must certainly be studied in the future.

The financial industry appears to be more complete regarding ITG mechanisms adoption and implementation. This situation can be due to the fact that the financial industry was the first industry to use IT intensively and as such is already more mature in these domains. This situation allows that good practices in govern IT in this sector are widespread all over the world.

Based on the relevance of ITG for business growth and sustainability (De Haes et al, 2015) as well as on the importance of the ITG mechanisms to achieve a good business-IT alignment (Bartens et al, 2015) and yet on the average level of business-IT alignment of some industries (Figure 2), we can state that Portuguese healthcare industry seems to be under to desirable maturity level of this topic.
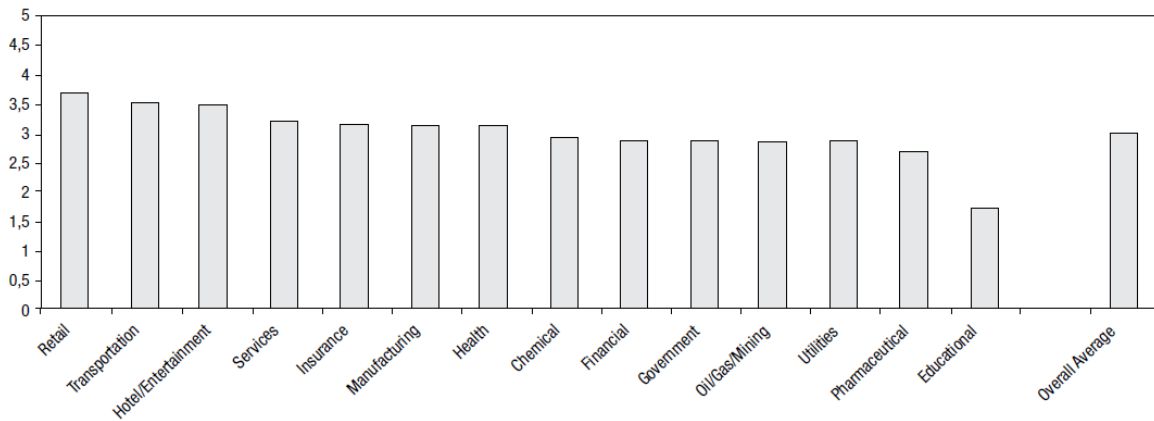

Figura 2. Assessing Business-IT alignment Maturity (Luftman, 2000)

If we pick for example the structure mechanism "CIO on Board" which has been pointed in recent research has an important mechanism for organizational performance and then we look to Table 6, we can exemplify the low maturity of Portuguese healthcare industry. This confirms the results from a previous study done a decade ago (Lapão, 2007). Despite such fact may not be a completely surprise since some recent research has reported that less than

20 percent of corporate boards worldwide has directors with technology expertise (Valentine, 2015). Yet, stills a proof of low ITG maturity.

Once the healthcare industry adopts a patient-centric perspective it will be pushed to make a more comprehensive use of IT, leading to a more mature use of ITG.

We are aware that not much information about the organizations and the interviewees is provided. However, on one side Portugal is a small country and is easy to identify the organization when all the information is provided. On the other side, healthcare organizations are very cautious about their information and therefore we had to exclude some information to fulfill the required confidentiality of the data collected.

Of course our research has some limitations as well. The chosen factors are not static and other factors can be considered in the future as well. Plus, ethic, maturity and trust should be further detailed for a more comprehensive analysis. Finally, despite the difficulty to find good IT CSs in the literature, more CSs may be considered in the future.

Another limitation is the information collected from the IT CSs. Given the problem already identified on the field (Pereira et al, 2013) about the lack of rigor among IT CSs that inhibit the generalization. It must be stated that the information collected is under authors' interpretation.

While this research for validity reasons is focused on Portuguese healthcare industry only, and despite the comparison with Pereira and Mira da Silva paper about the financial industry (Pereira et al, 2014) it can be expected that many conclusions might apply to other sectors and factors. Future research, focusing on other sectors and factors could support this assumption.

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