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IT governance, IT competences and the use of executive information systems at the board level
the case of the Dutch financial industry

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IT governance, IT competences and the use of Executive Information Systems at the board level: the case of the Dutch Financial industry

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Introduction

In the past decennium the role for IT has changed from an enabler and supporting back-office function for the primary process to a driving force behind the strategy of many organisations. The consequences of non functioning IT can have profound implications; the cost of IT are extremely high; failing IT systems or security breaches can lead to the end of an organisation.

It is the task of the executive management to pursue opportunities IT presents, and to control the risk and cost of IT. The board of directors needs to supervise this proces, approve investments, and support the executive management with advice.

This research aimed to investigate the relation between the IT competences of the board of directors, the use of an Executive Information system, and the IT governance related practices that are used. This investigation was set within the financial sector (FS), because here the extend of impact of IT is only surpassed by the IT industry itself.

Literature background

In literature the responsibility for IT governance is placed directly at the board level (Grembergen & Haes, 2009). The need for the top management, both executives as non-executives, to have a good understanding of IT is shown to be of importance to the success of an organisation (Nolan & McFarlan, 2005; Ross & Weill, 2002; Weill & Ross, 2004). In addition the relation between IT governance exerted by the board and the results of an organisation have also been investigated (Turel & Bart, 2014). However the link between IT governance and IT competence has not been throughly examined. There have been studies that have looking into this subject, but non have shown a direct link between IT competence and IT governance (Jennifer Jewer & Kenneth N. McKay, 2012; Turel & Bart, 2014). In addition the usage of an executive information system has not been investigated, and thus the way that information plays a role in the practices of the board in the field of IT governance is not understood.

Methodology

To gain a better understanding of the relation between IT governance and IT competence a conceptual framework was developed. In this framework competence is split in IT knowledge and IT experience (Geneviève Bassellier, Benbasat, & Reich, 2003), and IT governance is deep and broad concepts (Turel & Bart, 2014). To validate this framework a survey was developed both from literature and own analysis. In addition, during the survey the directors were asked to elaborate their answers, in order to collect richer data.

After the analysis of these results best practices were developed. These recommendations were validated through an applicability check. This check was done by interviewing executives that have the responsibility for IT in their organisation.
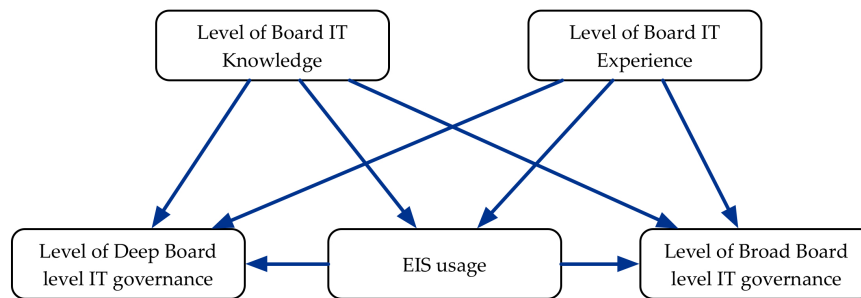
Results

From the potential 249 directors, 38 completed surveys were collected. In addition 42 interviews were completed. Unfortunately the data was not of a sufficient quality or quantity to validate the conceptual framework, but it did lead to an update of the initial framework as shown in the figure below. The main change is the replacement of deep IT governance practices with information usage and effort. This change was implemented based on the results of a factor analysis. The change can be seen in the figure below.
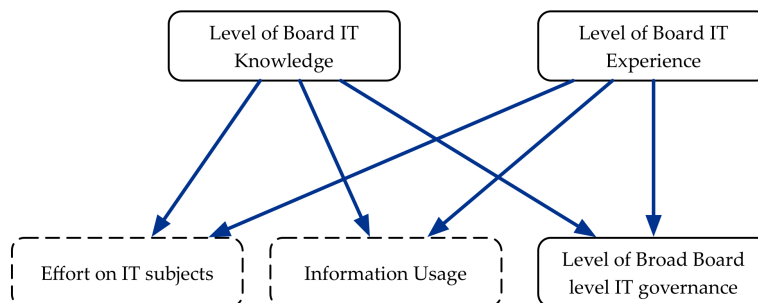
From other statistics it was shown that the contact between directors and management and executives shows a gap. This also goes for the reporting on cost and projects that are received by the directors. The average knowledge that was reported through the self assessment was somewhat above average, yet all the respondents indicate that the general IT competence in the FS is low. The use of an EIS seems to be absent, and no director indicated that they are interested in using such a system. However structured information that is easy and fast to interpret, and if needed to view additional details shows that a different form of dashboards or BI system is considered useful.

From the interviews it was shown that in general the attention for IT needs to be higher, the IT competence profile of boards needs to improve, and directors need to more pro-actively communicate with the management/CIO. Thee suggestions were checked with the applicability check, and in the interviews these suggestions were supported.

Managerial implications

From the interviews and collected data three recommendations were derived. First the overall IT competence profile needs to be improved at the board level. This can be achieved by improving the overall IT knowledge of the board with permanent education, and appointing directors in the board that have vast experience in the interface between IT and business. This combination makes sure that IT becomes better represented in the board room. Secondly directors need to engage in more deep IT governance practices, especially talking to managers/CIO's is highly recommended in addition the overall attention for IT needs to be higher in general.

In their tasks directors recognise the need to well structured information that, if needed can be looked into in some more details. However an EIS is clearly to a bridge to far for a board.

Conclusions

Through a survey and interviews a total of 42 directors from various of the 50 largest FS organisations in the Netherlands have been interviewed. The interviews together with 38 completed surveys led to a better understanding of how directors engage in IT governance practices, and how this is connected to their IT competence. This has led to the development of a number of suggestions that can improve position IT has in the board room. In addition the information requirements of a board do need a well structured and complete overview of project and cost information.

This section will start by giving some background information that this research is positioned against. In addition, since this research has been conducted in cooperation with KPMG a short introduction of the company will also be given.

1.1 Background

In the Netherlands the role of the board of directors has gained more responsibilities (Streppel, 2013)(through the 'corporate governance code'), and combined with the increasing impact of IT investments on company results, the knowledge and skills that impact the tasks of these supervisory boards is also becoming more important. The current research therefore aims to investigate the relation between the board of directors, its combined knowledge and skills in IT related issues, and the ability to critically and pro-actively supervise and advise the board of executives, and how an executive information system can play a role in this responsibility. This research is part of a research program within KPMG, and thus the starting point of this thesis will be the research problem and direction as described by KPMG.

The problem as stated by KPMG; "*Not that long ago the role of IT was restricted to primary processes and supporting back offices in organisations. The role has shifted in the last few years, and so has the expenditure on IT systems. Large banks and financial institutions spend nearly 30% of their budget on IT projects, and the malfunction of these systems can lead to more expenditures to keep the systems working and up-to-date. The past years the role of the supervisory board (Board of directors) has changed, because of regulations and laws, members of the board of directors are expected to be more active, critical, proactive and adequate in their role of advising and supervising the executive board. Traditionally a Board of directors consists of experienced senior executives that have broad experience in the sector, financial and risk management. To be able to execute theirs roles to the best of their abilities members of the board also need skills and knowledge in HRM, legal, M&A and also IT. This knowledge does not need to be as deep as a dedicated IT manager, but it requires to be on a level that allows the board members to ask critical questions, and be able to judge the executive boards' decisions within the IT scope. Current public knowledge seems to lack information on the required skills and knowledge needed in these Board of directors.*" (La Haye 2013). Since the above described problem statement from KPMG is very operational and is not based on research but on personal expert experience an academic approach is needed in order to gain a good balance between rigour and relevance.

1.2 Goal and expected outcome

This work pursued an improved understanding on how IT competence and IT governance are related and how the use of Executive information systems can enhance the information that is required by the board. Since the research was positioned within a company, both practical and theoretical outcomes were of importance. The goal for the research therefor was to develop a set of recommendations, that are practically applicable. In order to obtain the recommendations a conceptual framework was developed. The framework used concepts from literature and linked them together with propositions that were attempted to be be validated with the chosen methodology. This will be elaborated on in the methodology section (Section 4). Expected outcomes were a set of recommendations on the following subjects all in relation to IT issues/subjects:

◉ The level of IT competence that is required to be present at the board of directors in order to properly supervise and advise the top management of an organisation.

◉ The practices a board needs to engage in again in relation to the supervision and advise role of the board

◉ The information a board requires again in relation to the supervision and advise role.

◉ The use of an EIS in relation to the supervision and advise role.

In general it could be stated that the research tried to analyse the current situation compare it with the desired situation, and in order to bridge this gap; explore which are the recommendations.

1.3 Research objectives

Above the goal of the research is shown, however to clearly work towards a goal the objectives of the research needed to be clarified more. The first objective was to investigate if there is a relation ship between the competence of a board of directors on the subject of IT, and the way this influences how IT topics are dealt with in the board. Since this is a very broad objective the performed literature review will have to help in conceptualising this objective into a more abstract research design, that can at the same time address the practical problem as described in the above section.

The second objective was on the actual practices that are performed by the board to fulfil their tasks. These tasks can be topics that are discussed, but also time devoted etc. Especially a potential link between practices and the IT competence of directors has a lot of interesting practical, as well as scientific implications.

The third objective of this research was to see how certain IT systems can support a board in their IT related tasks, and, if already present how does such a system influence the practices exerted by the board on the IT related topics. This objective was strongly related to the possible presence of a support system for boards, and ought to be interesting from a practical point of view to investigate.

In addition to the practical nature of such a information system, there might also be a relationship present between the IT competence and the usage of such a system. This was the third objective; is the use of a possible information system specifically tailored for the board influenced by the IT competence of the board?

These objectives will be further explored and conceptualised after the literature review section of this document.

1.4 Company profile

The KPMG network was formed in 1987 when Klynveld, Peat, Marwick, and Goerdeler merged with their respective member firms. The oldest part of the firm (Peat) originates from 1870. Nowadays KPMG focusses on 3 main areas; Audit, Tax and Advisory. The three main focal areas are all intertwined and complement each other in certain ways. The current research will be part of the advisory area, which is on its turn divided in three business areas of consulting; Management consulting, Transactions & restructuring and Risk consulting. The last area is again divided, and one of the sections is IT advisory. In this light KPMG has developed itself as one of the top IT advisory practices in the Netherlands, and within this section of the company the research for my master thesis will be conducted.

Because of its position as an accounting firm, KPMGs' connection with top management is an important part of doing business and improving its offerings. While there are some more practical reasons for this research to take shape, the recent focus on corporate responsibility and the regulatory pressure are the most important drivers for this research. In addition recent changes in regulations on how an accounting firm can combine advisory and auditing work within an organisation that is marked as a 'public interest organisation' has made KPMG to focus more on the financial sector (Accountant.nl, 2012).

In the following section the literature will be explored. The text here is derived from the literature review that was part of the master thesis research, and is presented here in a more condensed form.

2.1 Method

The used literature in this research has been searched for through a systematic literature search as was taught in the course 'Design Science Methodology' at the TU/e . This method recognised various stages, first a research question is proposed. In order to gain a better understanding of the general knowledge area some general sources are consulted e.g. Grembergen & de Haes (2009), Motiwalla & Thompson (2009), Weill & Ross (2004). Then a systematic review is used to find appropriate literature based on prior knowledge, general information and the research question. The question that is attempted to be answered with the literature review is the following:

"In current literature, what is know about the knowledge and experience of a board of directors, and the influence this has on the way a company governs its IT and how do EIS play a possible role in this?"

With this question keywords are developed that will give us an exhaustive view of topics that are of current interest within the above sketched scope. These keywords are then used in various selected databases. These databases were selected from the selection on the TU/e library website by field of study. In these databases articles were searched and selected based on their academic classification, so articles, books or conference proceedings/papers were included. Various combinations of the keywords were used. By means of sequential scanning an initial selection based on the titles, publication, availability and other metadata was made. For a better understanding of the used method, and a list of the found literature   please use the Literature Review that accompanies this thesis research (Jacobs, 2014).

2.2 Corporate governance

In this section the notion of corporate governance is explored. This section will lead to the IT governance concept that is discussed in the next section. The reason to explore corporate governance is that IT governance is a direct result from corporate governance .

Corporate governance is a concept that is developed to protect and meet the needs of people or entities that have invested money in an organisation. It is basically an assurance structure for investors that their money will not be used for personal gains by the organisations' managers but is used to enhance the organisations' performance and in the

end profitability (Shleifer & Vishny, 1997). Corporate governance is the process of defining responsibilities and assuring the separation of power within an organisation. In developed countries almost all publicly traded companies have an advanced form of corporate governance and report on it in their end of year reports. However this governance structure is different across various countries.

In the Netherlands a two tier structure is used, as opposed to the one-tier structure that is used in for instance the UK. The one-tier structure indicates that the executives and non-executives (the board of directors) are sitting together in one board, and in the case of the USA executives might even sit in the board of directors and the executive board simultaneously, though recently this has started to change (Tricker, 2009) to more separated functions. In figure 1 (one-tier vs two-tier) this is schematically shown. In the Netherlands the two boards are completely separate from each other. Usually the board of directors is filled with external ex-top-managers. The Dutch National Bank (DNB) has some relatively strict rules on what the profile of a director should look like and even what a boards' composition should look like
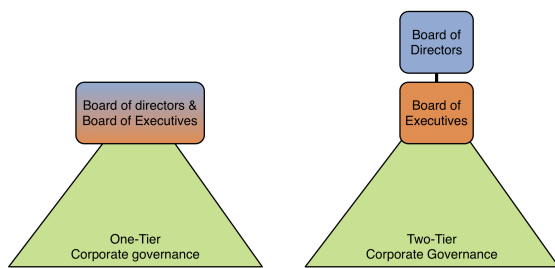
Figure 1 - One- vs Two-tier boards

(DNB, 2013). Up until now boards usually consisted of directors that had extensive competence in financial institutions, however recently some organisations started looking for more IT savvy directors (for instance health insurance company Menzis). Also in the Dutch law a section is devoted to the tasks and responsibilities of a board of directors. It states that the tasks consist of the supervision on the policies and processes of an organisation, and to support the executives with advice ("Burgerlijk Wetboek Boek 2,"). These tasks are devoted to have supervision on the organisation and thus protect the interests of investors. Also the expectations of the society have changed, and people expect the directors to be more closely involved to the company. In additions recent incidents have shown that directors are also expected to be more in control and are held accountable for problems in the organisations (e.g. Vestia Affair; Accountant.nl, 2013)(Streppel, 2013)

Summarising; corporate governance consists of structures that define responsibilities and how the power within an organisation is divided. In the Netherlands a two-tier board structure is employed in which the board of directors and the executive board is formally separated. But the way that the tasks are executed by the directors is changing, towards a more involved role.

In this section the research area will be described and important notions or concepts are briefly explored.

2.3.1 The board of directors

The board of directors is in this research is considered the same body as the supervisory board, or in Dutch the 'raad van commissarissen'. Although there are some important differences between the Dutch form of the board of directors and for instance the board of directors in the USA. The first finds itself in the way corporate governance is done in the US and the Netherlands. In the Netherlands the two tier board is the dominant form of corporate governance while in the USA a one tier board is more common. This difference also means that the interaction between the board and the executives is slightly different then in a one tier board. Interaction in a one tier board model is more frequent and more intensive. However the main goal of a board of directors is to monitor/supervise and advise the executive management on the strategy, risks and opportunities of the organisation. In addition they also remunerate the executives and represent the shareholders. In this light two aspects can be discerned that are of importance to this research; the advise and supervise task.

2.3.2 The Dutch Financial Industry and ICT

Modern organisations all have some sort of IT presence, and this presence is becoming a larger, and more important factor. In some areas like financial institutions IT is becoming one of the larger expenditures, and the impact of IT on the companies financial results is of ever bigger importance. In fact, financial institutions spend on average 6.3% of their yearly revenues on IT, and is the industry that spends the most on IT other then the IT industry itself (Guevara, Stegman, & Hall, 2014). The Dutch financial industry is considered to be relatively large, being the seventh in the world (HFC, 2011). In this research the financial industry is considered to be insurance companies (health insurance included), banks, pension funds and investment agencies. After the financial crisis of 2008 a lot has changed in the financial service providers landscape in the Netherlands. For instance ANB AMRO was nationalised, and ING received monetary support from the government and was placed under far going supervision. One of the results of the support these companies received was that ING and SNS-Reaal had to sell their insurance branch. The split ups caused many companies to also split up their IT systems which was made extra difficult due to the huge amount of legacy systems. In addition to this, there have been numerous occasions when one of the larger financials got negative public attention. For instance;

regular internet banking service downtime, allowances that were not paid in time by Achmea etc. (eg. Buist, 2013). This indicates that IT is, or should be a main topic on the agenda of the top management team.

2.4 IT from a resource based view

In this section the basis will be developed towards why IT needs to be governed and the role it plays in an organisation. This section is an introduction that leads to the concept of IT governance and IT competence. The reason to use the concept of the resource based view is that is has been extensively used in MIS research in the past (Devece, 2013).

2.4.1 The resource based view

The resource based view starts with the notion that a company possess resources of which a subset can create competitive advantage and another subset can generate long term superior performance (Barney, 1991; Wade & Hulland, 2004). These resources are considered valuable, irreplaceable and hard to imitate. In general the notion of resources was considered from a broad perspective. However it has also been argued that the distinction between capabilities and resources can be made (Bharadwaj, 2000). Resources on its turn can be categorised as tangible, intangible resources and personnel resources, where intangible assets are brand equity and image, tangible are physical assets and personnel resources are for instance technical knowhow, culture, loyalty, etc.

Through combining resources companies create organisational capabilities and through this process organisations are able to create competitive advantage. The capabilities of an organisation is the ability to combine and deploy resources (Bharadwaj, 2000).

2.4.2 IT and the resource based view

By using the resource based view as a theoretical lens, researchers have identified IT related resources that can lead to competitive advantage. Bharadwaj (2000) mentions three key IT based resources: the physical IT infrastructure, the human IT resources and the intangible IT-enabled resources. The human IT resources are of special interest to this study since it also incorporates the abilities of a board in the area of IT. Human IT resources relates to the training, experience and insights of an employee. This resource can be categorised further into technical skills and managerial skills. The main distinction between the human resource and the other two is the fact that the human resource aspect takes in general much more time to evolve. One explicit example is managerial skill, which can take years to develop due to trust and relationships. This knowledge is referred to as tacit knowledge and will resurface in the section on IT competence.

2.4.3 Business value of IT

The resource based view advocates that IT can, in itself provide organisations the ability to create competitive advantage, which in its turn leads to business value. In an extensive review Masli et al. (2011) show that there is more to the creation of business value through IT then the three categories mentioned above. However when zooming into the notion of IT capabilities of the management it was shown that this too can be linked to the creation of business value. In fact Armstrong & Sambamurthy (1999) show that there is a clear link between the IT knowledge of the CIO and IT management and the way that IT is assimilated through the organisation. In general the largest body of research indicates that IT is an antecedent of the creation of business value (Masli et al., 2011).

2.5 IT governance

Just as corporate governance attempts to optimise the organisations' operations to better meet shareholder needs, external regulations and environmental considerations, IT governance attempts the same specifically for IT but focusses on both internal and external stakeholders. Many scholars have attempted to develop frameworks to see how IT can deliver value to a company. These attempts usually involved short term financial outcomes and were not very concise in their outcomes. Yet from the previous section it is clear that IT is able to deliver competitive advantage to companies in the long run (Masli et al., 2011; Melville, Kraemer, & Gurbaxani, 2004).

In this research the definition of 'Enterprise Governance of IT' by van Grembergen & de Haes (2009) will be used. The definition for EGIT is: "Enterprise governance of IT is an integral part of corporate governance and addresses the definition and implementation of processes, structures and relational mechanisms in the organisation that enable both business and IT people to execute their responsibilities in support of business/IT alignment and the creation of business value from IT-enabled business investments." (Grembergen & Haes, 2009). The idea behind the usage of a mixture of structures, processes and relational mechanisms is mentioned in various literature sources (e.g. Haes & Grembergen, 2005; Weill & Ross, 2004). Van Grembergen & de Haes (2009) used this concept to base a research framework upon, and validated the framework by empirical research in the Belgium financial industry, other researchers have adopted this framework to base their research on. (Héroux & Fortin, 2014; Lunardi, Macada, & Becker, 2014; Pereira, Almeida, & Silva, 2014).

Research on ITG/EGIT has mostly adopted a contingency approach when referring to ITG. This means that there is no 'one best model for IT governance' (Weill & Ross, 2004) and

that the structures, processes and relational mechanisms regarding IT should be adapted to the needs of each firm (Nolan & McFarlan, 2005). Through this approach scholars have tried to study various antecedents to IT governance (Brown & Grant, 2005).

However little research has been done on the actual IT governance practices that are deployed by a board of directors. Following the publication by CICA (2004) Bart & Turel (2010) have performed an empirical study to see which of the 20 proposed questions are actually used by a board of directors. This research linked the action of 'asking specific questions' to the level of IT governance practices that a board engages in. The work by Bart & Turel's research seems to be the first empirical investigation in board level IT governance, and underpins the contingency view proposed by other researchers. Coertze and von Solms (Coertze & von Solms, 2013) have also attempted to measure the level of IT governance practices boards engage in. Their study however shows how difficult the target group is, and a low response combined with the self reporting nature of their study does not give satisfactory results. Jewer and McKay have (2012) have done an extensive empirical investigation into the board of directors and IT governance. In their work they link various antecedents to board level IT governance to board characteristics and company characteristics. In their model they prove that there is a significant correlation between the board IT governance practices and the IT contribution to firm performance. In this research Jewer & McKay (2012) measured IT governance by actually measuring the governance practices displayed by boards. However in a study by De Haes & Van Grembergen (2009) the expected effect of board level involvement is not supported. The authors show that the mechanisms (according to the authors) to achieve this board involvement ("IT expertise at level of board of directors" and "IT strategy committee") are rated relatively low in terms of perceived effectiveness. The authors analyse this results themselves as "This result can possibly be explained by the fact that making the board of directors more IT literate is not easy to achieve, which is confirmed by the second to last score in term of ease of implementation of "IT expertise at the level of the board of directors." The results of this research raise questions on how financial services organisations realise this board involvement in practice." (De Haes & Van Grembergen, 2009).

Most recently Turel & Bart (2014) claimed to have performed the first empirical investigation to link board level IT governance to organisational performance. In this work the researchers again used the 20 questions from CICA to measure the level of IT governance by the Board. They found strong evidence that board level ITG is positively correlated to organisational performance. Though it must be noted that the way the two

works from Jewer & McKay (2012) and Turel & Bart (2014) measure IT governance is fundamentally different. The measures by Jewer & McKay (2012) are much more in line with the Structures, processes and relational mechanisms that is a widely accepted construct in IT governance literature, while the measure by Turel & Bart (2014) is a much broader concept, and is not established as well.

2.6 IT competence

In the work by Jewer and McKay (2012) one of the measured antecedents to IT governance practices was IT competence. This construct is of importance to this work as well since it represents and important part of the question that is asked in the KPMG research.

But what exactly entails IT competence as a concept? The work by Jewer & McKay (2012) measures this concept and thus gives an interesting idea on how to approach it. The view in this work is very integrated, and is a combination of a variety of constructs that according to the authors can be combined to IT competence. The three constructs that are used by the authors is internal IT knowledge, external IT knowledge and Experience & Training.

The first notion of internal knowledge of IT measured the knowledge of organisational information, for instance the IT strategy, budgets, performance and risks. The second construct external IT knowledge is referring to information that is not related to the organisation. Subjects like knowledge on certain IT technologies, and sources of IT knowledge and information that are not related to the organisation itself are put in this construct. The last construct is experience and training, this relates to the amount of education in IT, directors have, and how much experience they have in IT (e.g. managing projects) In the Jewer & McKay (2012) research the way of measuring was self reporting evidence. What is important to note is that in the Jewer & McKay (2012) research takes both IT governance practices as certain types of knowledge, education & experience, and combines these into one construct.

In other research that directed its attention directly towards the IT competence of the board of directors a different approach was chosen. In their work Bassellier, Benbasat & Reich (2003) used three concepts to build their framework of IT competence. Since this is the most elaborate framework that was available in literature, it will be explored in the following sections in more detail. The framework uses knowledge, experience and the intention to champion IT as the three major corner stones.

2.6.1 IT competence of managers

According to scholars the possession of knowledge itself is not the only road to competence in a certain area, it also requires the use or exploitation of such knowledge. Organisational studies have made a distinction here, and refer to Tacit and Explicit knowledge (Ikujiro Nonaka & von Krogh, 2009). Tacit knowledge is transferable knowledge through language or other forms of communication, while explicit knowledge is something that cannot be attained this way. This distinction indicates that the 'transferable knowledge' through the use of various means of communication is separated from the knowledge that needs to be experienced. For example; one can perfectly describe every mechanic and technique that is required to walk, yet doing so requires personal experience that is not transmittable (I. Nonaka, 1994).

Some have argued that tacit knowledge is a form of knowing (Orlikowski, 2002) while others have argued that it is distinct (Cook & Brown, 1999), the idea that there is a role for 'action' is however present in both perspectives. This leads to the concept that managers whom are competent in IT, possess both knowledge as experience within the area of IT. This distinction is further discussed in the next section. Although explicit and tacit knowledge are both referred to as knowledge, a distinction is made here between experience and knowledge to make the difference more obvious. Moreover the modelling and measurement of the concept of tacit knowledge vs explicit knowledge is hard to achieve. The idea that tacit knowledge cannot be easily transmitted makes it clear that measurement of this concept is hard. In the next two sections the notion of experience and knowledge will be explored further.

2.6.2 IT Experience

Experience is a situated action, and in the subject of this research is the activity taking place within the organisational context of a business managers work (Geneviève Bassellier et al., 2003).

Reich & Benbasat (2000) argue that gaining experience in IT is a 'core competence' for IT managers, and is an important antecedent to the success of IT projects and innovation with IT. The experience can be seen in a deep and wide context, where the depth is linked to the intensity of the experience and the breadth is linked to the diversity of the experience. Nonaka (1994) argues that the variety and the "deep personal commitment" of an experience influences the quality of the experience. It can therefor be argued that the more different experiences someone has in a certain area increases the overall experience of that person. In addition when the experience is deeper, as in more intense, the quality of the

overall experience will also be higher. Thus; overall experience can be improved by a variety of deep experiences. In the case of IT experience this translates to the various stages of an IT project a manager has experience in, and the responsibility he/she had in these stages (Geneviève Bassellier et al., 2003).

2.6.3 IT knowledge

Although knowledge can be explicit and tacit, knowledge is referred to as specialised knowledge possessed by a manager, how they understand concepts and how well informed they are about the organisation, this is inline with the view of Bassellier et al. (2003). As with the IT experience the concept of knowledge should in our view also be looked at from a broad and deep perspective. In Bassellier et al. (2003) the authors mention that the IT manager probably does not need to know about specific technologies, but has to be aware of the way that business and IT meet. This concept is also called business and IT alignment, and will be elaborated upon in a later stage. The idea that an IT manager does not need to know the specific technical details about interoperability between IS applications but needs to understand structures and processes is followed.

The breadth of IT knowledge refers to the knowledge that managers should have regarding their internal and external business environment. In Bassellier et al. (2003) 5 main components of the IT knowledge construct are defined; Technology, Applications, system development, management of IT and access to IT knowledge. Technology refers to the awareness of current technologies and their limitations and future technologies and the opportunities. The applications concept is comparable to technology, but is also about how the company is using IT applications to achieve its business goal. Systems development is referring to the understanding of IT project management and development methods, where the understanding of risks and benefits is an important point. Management of IT is referring to the general management practices like vision and goal setting, allocating resources and progress monitoring. And the last area of IT knowledge is access to IT knowledge, referring to knowing where to access additional information on IT (colleague, vendors , etc.) (Geneviève Bassellier et al., 2003).

2.7 Executive Information Systems (EIS)

This section is aimed to explore a specific form of enterprise information systems called Executive information systems (EIS), its applicability for the board of directors, and its possible link to IT competence and the level of board level ITG. It might be interesting to see how such a system can aid members in the board of directors in gauging their decisions regarding IT. This section will start with a short overview of Executive

information systems theory and research. After this section special attention will be given to the concept of Business Intelligence which is then followed by specific board usage of EIS and the link with IT governance and IT competence.

2.7.1 Executive information systems overview

Executive information systems have changed over the years and can be seen as a part of the larger Decisions Support Systems (DSS) literature. The field of DSS can be fragmented in many specific types of research fields (Arnott & Pervan, 2005). Part of these area's is the personal DSS (pDSS) which support the decision making process of persons or small groups. This is where the EIS fits in since it is directed to support specific people or small groups in their decision making process.

Literature suggests that an EIS is a data oriented information system in which data from various enterprise information systems is aggregated and presented by means of for instance a dashboard. Specific for EIS, the ability to drill down into data and track the source of types of information is an important characteristic. This multidimensional analysis of data along specific measures of interest, which is often referred to as a data cube, allows decision makers to combine information that is usually stored as separate items. This method of combining and analysing data from various databases is also referred to as on-line analytical processing (OLAP) (Arnott & Pervan, 2005).

On-line analytical processing (OLAP) is a technique for analysing data according to multiple dimensions and multiple granularities. The data is presented as a cube. A cube can be seen as a set of cells. This cell represents the association of a measure with one item in each dimension. For example, if the dimensions are iPhones, Apple stores and weeks, the measures of a particular cell can be the sales of an iPhone product in a particular store in a certain week. This multi dimensionally and the data availability is the main difference between the more standard/clerically OLTP (online transaction processing). Whereas the OLTP databases are usually aimed at entering orders or transactions, the OLAP server is more aimed at analysis and combining a huge amount of historical data (Chaudhuri & Dayal, 1997).

One of the technological barriers to EIS was the constant availability of high quality data on the organisations operation. This problem was mitigated though the use of data warehouses, which can roughly be categorised as enterprise level and department level warehouses (Inmon & Hackathorn, 1994; R Kimball, Reeves, Ross, & Thornwaite, 1998). The main reason to use the concept of data warehousing is the fact that it allows the data to be dimensionally modelled as described earlier (Ralph Kimball & Ross, 2011). By storing data in a smart way, performing a query takes much less time and effort to

complete. This aggregation of data, is basically the way a database is designed, and can be optimised to run the multi-dimensional analysis that is needed for an EIS. There are various models that are based on the aggregation of data, from the more operational and fragmented data level to a more strategic level like the snowflake model, the star model and multi-way aggregate fact tables. These models differ in the way the databases are normalised, the snowflake model is a more normalised form of the star model and the multi-way aggregate fact tables are a form of integrated star models. What these models have in common is that they combine many tables from databases, and produce 'facts tables' that give information that can be used for strategic decision making, such as the iPhone example above (Ponniah, 2001).

These multi dimensional models can be used for an EIS but in general these models are used in all kinds of analysis processes. This process of analysing data to be used in the organisation can be considered as business intelligence. The concept of business intelligence (BI) is sometimes seen as the logical 'next step' for systems like the EIS (Arnott, 2008) though a clear and wide accepted definition for BI seems to be lacking. In this research the notion of EIS and BI will be regarded as one term, and comes down to the ability of the IS to drill down and aggregate information from various sources of information in a multidimensional way. It could be argued that EIS are a form of BI, since both use large amounts of data to produce easily interpretable results for top management or decision makers. However there are some distinct characteristics for an EIS that separates it from other information systems.

The difference between a traditional information system and an EIS is described by Kelly (1994), EIS:

◉ are specifically tailored to executive's information needs
◉ are able to access data about specific issues and problems as well as
◉ aggregate reports
◉ provide extensive on-line analysis tools including trend analysis,
◉ exception reporting & "drill-down" capability
◉ access a broad range of internal and external data
◉ are particularly easy to use (typically mouse or touchscreen driven)
◉ are used directly by executives without assistance
◉ present information in a graphical form

These differences are stemming from the multi dimensionality of the data used. This multi dimensionality of the data, as explained above, also is the foundation of business intelligence.

2.7.2 Executive information Systems and the Board

In the above section the technical overview of the EIS is given. What the current literature review however tries to uncover is what literature can be found on the usage of and EIS and how this is possibly influencing the IT governance practices of the board. This section therefor will cover the usage and inherently the success factors of EIS.

In literature some research can be found that has specifically researched the relation between the usage of an EIS (and in some cases IS in a more general sense) and the antecedents to this usage. (e.g. Pijpers, Bemelmans, Heemstra, & van Montfort, 2001; Rainer & Watson, 1995; Singh, Watson, & Watson, 2002; Young & Watson, 1995).

Unfortunately there is no relatively recent research directed specifically at descriptive usage of an EIS by the board of directors. This could indicate that there is no such system that is specifically aimed at directors, or that they are not commonly used in the two tier system of the Netherlands.

However some have argued that due to the changing environment and the changing role that IT plays in some organisations, data analytics should be used more by the board as well (Chastain, 2014)

2.7.3 Available Executive Information Systems

When searching the web for available EIS specifically for the board a relatively large number of software vendors that are currently selling some sort of BI tool can be found, and in general the software could be adopted to be used by the board (Yurgosky, 2012). However when searching for a specific tool for boards there are some portal tools that can be used to share documents on (e.g. Board Books) or have interactive documents that can be used by the board on their laptops or iPads. This however is clearly not an EIS, and does not allow board members to drill-down into certain data, or to have real time information.

When looking at how boards operate within the two-tier board structure this could be explained by the fact that there is a more controlling and supervising task for the board. However the lack of literature in general on this topic might indicate that such a system is not widely used or sought after.

This section will briefly revisit the constructs in the previous sections and combine them in order to gain an overview of the research area. To show how the various concepts cascade into one another figure 2can be used. What is clear is that although the higher echelons of research (IT governance, competence, EIS usage) is well presented the superficialities for the board are very limited, and in case of EIS usage absent.

IT governance at the board level is a concept that has seen some limited research (e.g. Bart & Turel, 2010; Jennifer Jewer & Kenneth N. McKay, 2012; Kuruzovich, Bassellier, & Sambamurthy, 2012; Turel & Bart, 2014) a lot of the antecedents to how a board participates in the governance of IT is unclear. Although research has shown that board level IT governance potentially can indeed improve IT alignment and even business value created from IT, the exact mechanism for this remains unclear. Also the definition of board level IT governance remains a relatively broad concept, in this analysis it is shown that next to the broad understanding a 'deep' category of the level of IT governance can also be considered.

One of the potential concepts that has an influence on the level of IT governance by the board is the IT competence of the board members. Since IT is a complex area that has a potentially large impact on organisations this might be an important antecedent to IT governance practices by the board. Which is explicitly pointed out by Turel & Bart (2014). In various sources skills is mentioned as an important factor is the success of IT alignment and IT governance (e.g. De Haes & Van Grembergen, 2009; ISACA, 2012; Sabherwal & Chan, 2001). Explicit research to the IT competence of directors is scarce, in fact in the systematic literature search only two examples were found (Coertze & von Solms, 2013; Jennifer Jewer & Kenneth N. McKay, 2012).
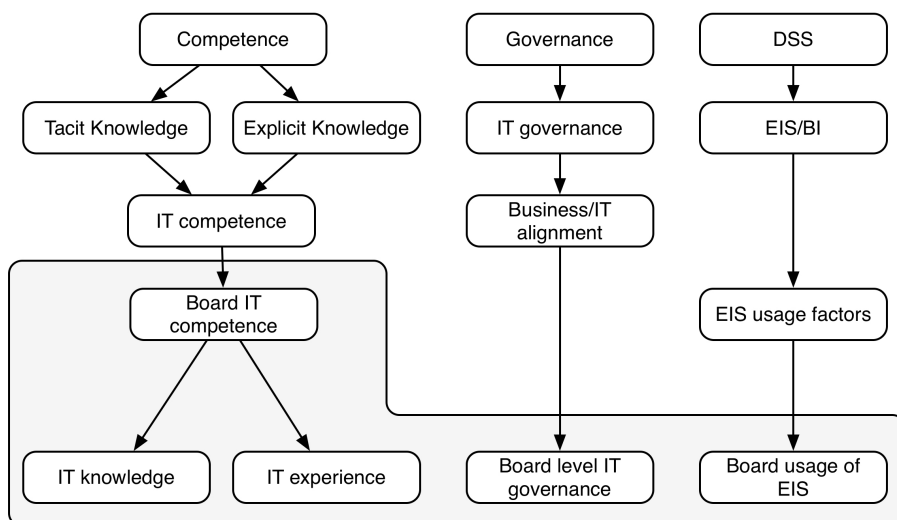
Figure 2

In this section the research design will be detailed. Here the broad and practical research direction will be conceptualised and further abstracted. First the problem statement will be shown. This will delimit the area on which this research has focused. The problem statement was constructed using the information from the the problem statement from KPMG and the literature study that was conducted, in combination with the previously stated research objectives. The next part of this section are the propositions, here the final fine-tuning of the research will be shown, since these are the hypothesis that are to be tested with the research. This is followed by the eventual conceptual framework. The last section is an initial exploration that is conducted to get a good understanding of the research environment.

3.1 Problem statement

From the literature and the practical problem that was presented by the company a problem statement was defined. The research was directed to investigate the relationship between IT governance and IT competence and the usage of an executive information system. In literature there is information on IT governance practices, IT competence and the working of an EIS, but the connection between the concepts was lacking empirical research at the time of writing. This notion combined with the practical question that KPMG had, which boils down to; *"what is the current IT competence level of the board of directors and what should it be?"* leads to the following problem statement: *"Currently the connection between the IT governance practices, the IT competence and the usage of an EIS at the level of the board of directors is poorly explored, as is the interaction between these concepts"*

Since the objectives and the problem are now identified, a more abstract research framework was developed. This will be done is the following section.

3.2 Propositions

This section will use the description of the research area, the research questions and literature to construct propositions that eventually led to the formation of a conceptual framework.

The core for the definition of the first proposition was the tasks a board member has, supervise and advise on various subjects, but in this study specifically IT. According to the EGIT definition supervising the structures, processes and relational mechanisms that are in place (or are planned to be implemented) require a board member to understand these concepts. In addition critical questions should be asked by a board member to also formally stay in control of the risk. He/she needs to be able to process information on risks, both internal as external. The same goes for the advising part; opportunities or trends need

to be understood. Nolan & McFarlan (2005) and Weill and Ross (2004) have argued that this task is critical in the successful IT business alignment, and this also flows from the ITG/EGIT definitions discussed in the literature section. It is evident that the processing of a lot of specific, detailed and specialistic information requires certain levels of knowledge and experience which according to Bassellier et al. (2001) are the two main components of IT competence.

In addition some literature has suggested that the higher the level of IT governance practices a board performs the more aligned the business and IT becomes (Kuruzovich et al., 2012). This suggests a direct link between the tasks of a board, the value that is created from IT and the level of IT governance that is present at the board level (Turel & Bart, 2014).

One important aspect is the 'advise and supervise' notion. To test this, a measure for this concept was needed in the eventual research design. The best option is to measure this directly. But this is very dependant on what is practically achievable, and it seems that a direct measurement of this was not possible. However previous research has suggested that increased IT governance at the level of the board increases IT alignment and business value from IT (Kuruzovich et al., 2012; Turel & Bart, 2014). Therefor it is expected that the higher the overall IT governance practices at the level of the board is, the better they supervise and control the implementation of SP&RM.

Bart & Turel (2010) consider these practices to be questions that are asked by the board on the SP&RM. However in their study in which they operationalised these questions and used them to measure the level of IT governance of the board the authors remarked that the questions alone measures only the level of IT governance in a broad perspective (Turel & Bart, 2014). There is also a deep perspective that indicates how deep the IT related matters are touched upon by the board. This deep perspective consists of the time and effort that a board puts into IT matters. In practical terms; one can ask a lot of questions but what is done with the answers is also a very important consideration. Therefor in this study the term 'the level of IT governance' consisted of both a deep and a broad perspective, which together combines to the overall level of IT governance practices at the board level. From the above information the following were proposed:

P1a: The board requires a certain base level of IT Experience to achieve high levels of broad IT governance practices.

P1b: The board requires a certain base level of IT Knowledge to achieve high levels of broad IT governance practices.

P2a: The board requires a certain base level of IT Experience to achieve high levels of deep IT governance practices.

P2b: The board requires a certain base level of IT Knowledge to achieve high levels of deep IT governance practices.

The next subject focused specifically on the level of IT governance a board exerts. Again this level of IT governance is considered both in a deep (effort) and broad (# of subjects) sense. Here the use of EIS was also introduced since it is a way to gather information, both internal as external (Walters, Jiang, & Klein, 2003) and to drill down and aggregate information from various sources in a multidimensional way (Arnott & Pervan, 2005). Since deep IT governance is seen the effort a board puts into the IT subjects, it can be argued that the possibility to drill down into information and track down anomalies or changes that are indicators for, for instance possible risks or opportunities, empowers a board member to put more effort into the IT subject at hand, thus indicating a higher level of deep IT governance. Therefor the following proposition was defined:

P3a: The usage of an EIS will support higher levels of deep IT governance exerted by the board.

The above arguments are also applicable to the broad perspective of IT governance. This can be stated since structured information that is available through an EIS can prompt a board to ask questions based on both internal information (e.g. IT strategy) and external information (e.g. technology trends or market information). The ability to have multi dimensional information available enables a board to raise more questions that are also more focussed. Therefor the following proposition was constructed:

P3b: The usage of an EIS will support higher levels of broad IT governance exerted by the board.

The above propositions basically linked the concepts that were the main pillars of this study together and testing these propositions allowed the answering of the research questions from the previous section. Moreover testing the propositions shown here led to the goal of the research; defining recommendations on the above discussed subjects.

One last subject that was of interest in this study but did not directly link to the main task of the board, is how the IT competence of a director is linked to the use of an EIS. There are various antecedents to the usage of an EIS (eg. Bajwa, Rai, & Brennan, 1998; Khalil & Elkordy, 2005; Young & Watson, 1995), and it can be argued that the IT competence is one of them. Although the actual overall usage can be influenced by the IT competence of the user (Pijpers et al., 2001) it could be argued that the way a board members uses (or would

use) the EIS is influenced by his/her IT competence. Therefor the final proposition to be tested was:

P3c: *The level of IT knowledge of the board will influence the usage of an EIS.*

P3d: *The level of IT experience of the board will influence the usage of an EIS.*

In the next section the conceptual framework will be shown in totality. In general it can be said that the IT competence influences IT governance in a broad sense. But these concepts were split in deep, broad, knowledge and experience to gain a more complete understanding of these basic concepts.

3.3 Conceptual framework

In figure 3 the conceptual framework with all the propositions are shown. This figure shows all the relationships between
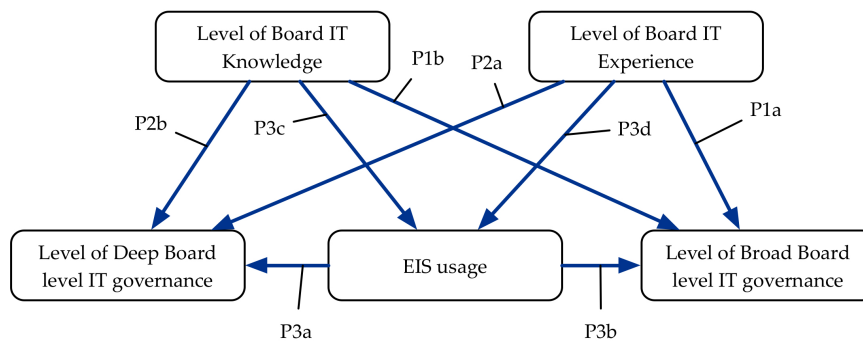
Figure 3 - Conceptual framework

This figure shows both the knowledge and experience constructs that combined are the measure for IT competence, but was treated as separate constructs in the research model. The same goes for the distinction between the deep and broad IT governance constructs, which can be considered the underlying constructs for IT governance.

By identifying the links between the constructs, as depicted by the propositions in this model, the objectives of the current research can be explored, since the link between competence and IT governance practices was analysed. In addition the influence of the usage of an EIS was investigated as well. combining these correlations with the interview results, practical suggestions were to be derived.

3.4 Initial Exploration

In this section an initial exploration on the experience of the board of directors in the dutch financial industry will be shown. This exploration started with the selection of the 50 largest financial organisations and listing their directors. This list of directors was used to perform an online inquiry to uncover specific IT related education and functions.

3.4.1 set-up

The exploration set forth to answer three questions on the director's IT experience; What specific IT education can be found, what specific IT functions can be found, and what C-level functions did a director hold? In order to answer these questions the following data was researched; on LinkedIn the C-level function, specific IT education, IT functions, and any mentions of IT competences are looked up. If this data is unsatisfactory the search will be extended to a broader web search, from this web search all data on IT or technical education will be recorded. This set-up was handed off to the KPMG support facilities; KGS in India, where the actual search was performed.

3.4.2 Results

The explorative research resulted in 239 directors that that were individually researched. from this group 214 profiles could be collected, of 25 no data could be found. The complete profiling can be seen in Appendix 1. The main findings are the fact that 29 directors (13%) have some sort of IT related function, education or competence mentioned. Of these 29, 59% mentioned specific IT competences, 28% mentions an IT function and 14% IT education. When looking at the C-level function that directors have held, the COO and CIO, which can be considered the most IT heavy functions at that managerial level, make up only 11% of the total (2% CIO, 9% COO)

The results indicated that there is potentially a lack of IT competences in the board of directors in the dutch financial industry. Whether this is problematic is to be seen, but intuitively this could indicate that it is hard to perform IT governance related practices when there is a lack of IT competences.

However as has been explored in the literature section there are two concepts that form the basis for IT competence, this is not only the experience, but also the knowledge. So this exploration formed a basis that makes the research direction more credible as a more practical support, in addition to the theoretical support explored in the literature section.

3.5 Wrap-up

The previous sections have described the path from the practical research objectives to the problem that will be addressed in this research, to a conceptual framework that when validated can be used to (partially) address the problems and thus fulfil the objectives for this research. In the design of this research the starting point is practical problem that has been put forward by KMPG. After this the problem has been translated to a more abstract set of propositions. These propositions then led to the formation of the conceptual framework

In this chapter the research method is explored. First the various methods that are available will be briefly touched. After this the most appropriate method is explored and operationalised for the current research.

4.1 Research methods

In order to explore the research question and test the propositions there are various methods to choose from, though they all have their advantages and disadvantages. This section will briefly explore them. In table 1 some of the most applicable and most used research methods are shown (Blumberg, Cooper, & Schindler, 2011).

As is shown in table 1 the mentioned research methods can all be applied when just looking at the target group and the separate concepts. Though there were some practical limitations; in choosing the method for this research the departure needed to be the research goal, and the research design. In order to choose the correct method three questions were answered. 1) What are we trying to answer with this research? This study attempted to test the propositions to see whether there is a relation between the previously discussed concepts, and what underlying practices support these. In addition some recommendations on how to get from the current situation to a desired situation was expected. 2) What do we need to measure to answer the research questions? In order to answer the research question the previously mentioned relations between the concepts will be tested. From this framework the research questions can be answered. Secondly the study tries to uncover the desired situation is for the previously mentioned concepts. 3) What do we want to do with the results of the study? The results are meant to test the interaction between the structure in terms of IT competence and the processes that a board uses to govern IT and compare them to a desired situation. In addition some best practices that can improve the current situation will be defined.

The three questions above show that the main objects that were to be measured were; IT competence, Information Usage, and EGIT practices. These objects were measured in their state at the time of writing, and also what they should be according to the board members. These two situations were to be compared and from this best practices or recommendation can be derived. Also by measuring these three objects the three previously mentioned propositions can be tested.

Table 1 Methods (adapted from: Blumberg et al., 2011)

Method	Description	Pro	Con
Archival research	Using existing data for analysis	- Cheap - Relatively time saving - Potential data quality	- Data quality - data availability - Data purpose - Sample Quality
Survey Research	Approaching target group with structured questionnaires designed to meet research goals	- Designed for specific research - Uniform Information - Anonymous - Easy data entry	- Non-respons - Difficulties with definitions - Difficult to contact focus group
Interviews	Structured to unstructured interviewing to explore explain or describe	- Personalised - In depth - Flexible - More elaboration	- Time consuming - Dependant on interviewer skills - Findings harder to report
Case study	investigates contemporary phenomenon within it's real-life context	- Real life setting - In depth theory building	- Low generalisability
Focus groups	Panel interview	- Interaction between respondents - Explores different views - cost and time effective	- Dependant on moderator skills - Polarisation - Small sample - Reporting is hard
Observation	Observing focus group	- Independent of individual articulation - original data - Natural environment - All information availble	- Small sample - time consuming - Past events are unknown

To measure these objects the survey method was used. In order to measure practices, opinions and competencies while still remaining within the scope of the master thesis a combination of potentially more appropriate methods was not possible. In addition the statistically testing of the hypothesis requires quantitative results which could be obtained by other methods.

In addition to the survey data that was collected, a second data gathering method was employed. Since the board of directors is a difficult group to target for this type of data collection, and the chances that a sufficiently large data set cannot be collected was real, the survey would also be used as a guide for an interview, that was conducted. During the data collection the directors were also asked to elaborate on the questions that were asked, this way a potentially too small data-set which is unable to validate the model can still yield valuable information.

After the survey and interviews have been conducted the framework with the propositions is validated. The results led to a set of preliminary implications for practice. In order to fully understand and corroborate the results of the survey an applicability check will be conducted (Rosemann & Vessey, 2008). This method attempts to check the (not surprisingly) applicability, the importance and the accessibility of the research. In this study interviews will be used to perform the applicability check. The reason for this method is that it allows the interviewee to express his/her opinions on the matter at hand, but also to elaborate on subjects that he/she deems more important. By performing an applicability check the research also gained an improved research relevance. The type of interview that was conducted is a semi-structured interview in which the main findings from the survey are discussed and room was left for the respondent to elaborate on the questions, yet still allowing the interviewer to guide the interview towards the desired subjects.

The applicability check was conducted after the initial interviews and after the survey data was collected and analysed. Here it was planned to have interviews with the person who had IT in his portfolio within the executive board (usually the CFO or COO). The reason to do this is the connection between the executives and the directors. The directors and the executives are the two groups that have most frequent communication, and views from this perspective can shed an interesting light on the results of the first phase.

4.2 Method design

In the above section the various methods that can be applied in research have been explored, and the optimal one has been chosen. This section aimed to operationalise the method. First the survey will be discussed, here the mapping of the questions that were used will be given. After this, the interview for both the applicability check and the initial data collection will be discussed.

4.2.1 Survey

In this section the design of the survey is explored. The survey itself is shown in appendix 2. As seen in appendix 2 the survey is divided into 3 blocks, each of which represents one major factor from the conceptual model. This section will explore each of these blocks.

4.2.1.1 Deep IT governance

For the questions on deep IT governance the notion by Turel & Bart (Turel & Bart, 2014) was followed; there are two ways of looking at IT governance, a broad and a deep way. The deep perspective represents the idea that when many subjects are being discussed (which would indicate a high broad board level IT governance) there is also the depth, which indicated the extend to which these subjects are discussed. Measures for this depth

are the time being dedicated to IT, the amount of meetings that covered IT subjects, the IT topics that are discussed outside formal meetings and the information that is used.

4.2.1.2 Broad IT governance

The second block was aimed to measure broad IT governance. This concept was developed in the work by Turel & Bart (2010) and Bart & Turel (2014), in these studies they used 20 questions that were developed by CICA (2004), and indicate a set of questions that a board should ask on the subject of IT. There are however other studies that give more information on the type of IT subjects that a board should ideally address. By using the Turel & Bart (2014) study, McKinsey's publication on 'do or die questions boards should ask' (Wilmott, 2013) and the Jewer and McKay study (Jennifer Jewer & Kenneth N. McKay, 2012), a common ground on the various subjects was found. These subjects were then validated though expert opinion at KPMG and led to a set of 11 subjects. Although this is less then the 20 used in the board and turel research, the current study needs to measure other constructs as well, thus from a practical perspective this set is more condensed.

4.2.1.3 EIS usage

For the usage of EIS on the level of the board fewer questions were devoted. Since there was no previous research on the subject of board usage of an EIS it was hard to find a starting point for questions on this subject. However, since there was a lack of knowledge on the usage of such system the opportunity to make some initial measurements on this subject was presented. Therefor it was decided that in order to understand the EIS usage, first it needs to be determined if an EIS is used at al, and if so how it is used, and if not, would there be a need for such a system?

4.2.1.4 IT Competence

The last set of questions is on IT competence. Since this construct is divided in knowledge and experience, but both these concepts are closely related this block was treated as one. Bassellier's (Geneviève Bassellier et al., 2003) study based the constructs for IT competence on the notion that competence is based on tacit and explicit knowledge. In a management perspective this means knowledge and experience in the field of IT. This is exactly what Bassellier (2003) did, and divided knowledge and experience into sub fields. For knowledge these are: Knowledge on technologies, Applications, System development and management of IT. For experience these are, Experience in IT projects and experience in general management of IT.

In the research by Jewer & McKay the questions that measure the 'IT expertise' section was based on the research by Bassellier, but was adapted to meet the target group of the board of directors. The researchers however abandoned the separation between the experience and knowledge, and consider three other concepts; internal and external knowledge, and

Experience & Training. Internal knowledge is information on the company, like budgets, policies, and strategy. External knowledge is the knowledge the directors possesses, like knowledge on technologies and applications, but also where or to whom to go for information. Experience and training is evident.

The distinction that Jewer & McKay (2012) make was based on the exploratory factor analysis they did. Bassellier (2003) used confirmatory factor analysis to validate the framework the authors used. This means that both studies were empirically validated, yet one is aimed at managers and is based on a well grounded theory, while the other is aimed at directors but is based on the interpretation of the authors with no direct earlier research. For the current study it was attempted to create a survey to measure IT competence of directors based on both these studies and 'cherry pick' the well grounded items and sub-concepts, and support them with expert judgement.

Some background information that needs to be kept in mind is the fact that directors are not the executives, and do not actively manage the company, they are supposed to judge information that is received, and if needed ask critical questions and in addition give advice if they see the necessity or are asked for it. In addition there is a distinction between a one-tier board and a two-tier board, which makes this notion of separation of power and thus duties, even stronger.

In this light the current research departed from the basis of the tacit and explicit knowledge. The Bassellier (2003) research used a lot of items on the knowledge on technologies, applications and system development. This is however, for a director too abundant, since the knowledge they should be able to apply is on a more strategic level. Therefor the knowledge concept was based on a self assessment, with one item on applications, and one of technologies. For both items the examples that are supposed to explain the item are also updated to be more inline with current technologies (like cloud and data analytics, mobile) and applications (SAP, Oracle, and other ERP/CRM systems) The third main knowledge item that was used in both studies is the knowledge on system development lifecycle, this includes the development lifecycle, prototyping, outsourcing and project management practices. However in talking to experts within KPMG it was found that this item led to confusion, and it was decided that the system development lifecycle should be asking about the overseeing of IT project in general and not just system development, since this can be considered a vary narrow concept in todays world. Therefor separate items were developed for the management of IT projects, and the knowledge on how to lower IT cost, which includes outsourcing and considering the IT landscape as a holistic landscape.

In the Basssellier (2003) research the sub-concept of knowledge on management of IT was closely related to the internal knowledge concept of Jewer &McKay; it includesd things like knowledge on budgets, policies strategies, resources and the IT landscape of the organisation. These items are largely used one-on-one and result in a self assessment of knowledge on the following items; The impact of IT on the strategy of the organisation, Security, System availability, data quality, quality of the IT organisation (in terms of staffing). These items were based on the notion that directors are required to have information on the organisations' IT performance, and asses this information. In talking to experts the most important topics were identified that are were affecting the financial industry. To validate that indeed these topics are the most important an open question was included that asked to give the three main challenges on IT according to the respondent.

For the experience factor it was decided that there would be two questions on the specific IT experience of a board member. First there is the question whether he/she has fulfilled an explicit IT function like IT manager, CIO, IT executive. This would indicate that there was a high amount of experience in this field. The second question is, if the respondent has had a role as end-responsible for IT, like CFO, COO or CEO. This would indicate that there is experience, however this could be less deep as for someone who has had an explicit IT role.

4.2.2 Interviews

The interviews that were conducted are of two sorts, one was aimed to be performed during the data collection, and the other is aimed as an applicability check. The first interview was done during the survey. This means that for each block in the survey, as described above, the possibility was left to discuss the subject matter. So when the questions on deep IT governance had been answered some additional discussion on these points is initiated. In practical terms this meant that for every appointment that was made with a director one hour was planned for the actual data collection. During this hour the closed survey questions were discussed and also left enough time for the director to elaborate on his/her answers. This way extra quantitative data was gathered during the interviews as well. Other advantages were that answers that might seem strange, or might be considered outliers during analysis could be double checked during the data collection. The subjects that formed the main blocks of the survey also formed the main structure of the interviews.

The second round of interviews was conducted after the initial data collection was completed. This means that the conceptual framework will be validated, and though the

results of the interviews with the directors some practically applicable best practices or guidelines will be developed that are to be checked with the second group of interviewees. This way the applicability of the practices derived from the initial results is validated to an extend.

4.2.3 Practical

To obtain the largest sample possible various approaches were used to contact directors with the request to participate in this study. First a short list of the 50 largest financial institutions in the Netherlands was generated based on their revenues. After this the directors of these companies were listed, and the KPMG database for their contact details was searched, in the end 239 names were listed. Simultaneously the partners at KPMG were asked to list the directors they know, and emails in which they were referred were sent to their contacts. In addition the 50 companies that were listed have been contact by telephone, and the secretary of the board was asked to relay our request to participate in this research. This request included a explanation of the research and a letter from the KPMG chairman in which he recommends participation. For each respondent a personal appointment is made at a location of choice in order to make the process as easy and smooth as possible. The interviews themselves were conducted by myself and Marten La Haye or Rob Fijneman. Both the interviewers noted the answers, and each created his own report of the interview. Afterwards the two versions were combined, thus creating a high validity, and lowering the possibility of transcription errors.

In this section the data that is gathered during the interviews will be analysed. First the data from the survey will be scrutinised, after that the interview data will also be further explored. Since one of the results of this research was the development of the conceptual framework this data was integrated into the conceptual framework that was presented in the section 3. After this the practical implications that are derived from the data and the framework will be developed. Following this the applicability check will be done using the data from the interviews with the executives.

5.1 Statistics

This section will describe the quantitative data that has been gathered during the research. First some general statistics are shown, after which the concepts from the conceptual model are used to explore the data in more detail. The first analysis will entail the items that were designed to form the concepts in the model. After this a factor analysis will be used to further confirm the constructs that are measured with the survey.

5.1.1 Descriptive statistics

From the 239 possible respondents a total of 42 responses were gathered. Due to the nature of 4 of the responses, a total of 38 completed interviews were gathered. In table 2 some initial statistics are shown. The 4 omitted responses were incomplete due to the nature of the company, or the interview that didn't cover all the questions due to time limitations. Looking at the sectors of the boards in which the respondents are active it is shown that banks make up more then half of the sample, with health insurance and insurance companies coming 3rd and 4th.

Next the number of meetings each year and the the IT cost, here it is clear that a larger part of the interviewed directors is not aware of the IT cost of the organisation, while on the other hand the group who do know, report a percentage of almost 17% of the total cost of

Table 2-1 - Sectors			Table 2-2 - Gender		
Sector of the BoD			**Gender**		
	Frequency	Percent		Frequency	Percent
Insurance	6	15,8	Female	13	34,2
Health Insurance	7	18,4	Male	25	65,8
Banking	20	52,6	Total	38	100,0
Pensionfund	1	2,6			
Investment Company	4	10,5			
Total	38	100,0			

the organisations. These results are shown in figure 4. In addition it is shown that on average the boards meet 11 times per year, but there is a large discrepancy in this figure.

In the next section the blocks from the questionnaire will be analysed using factor analysis, to see whether the planned constructs flow from the collected data.
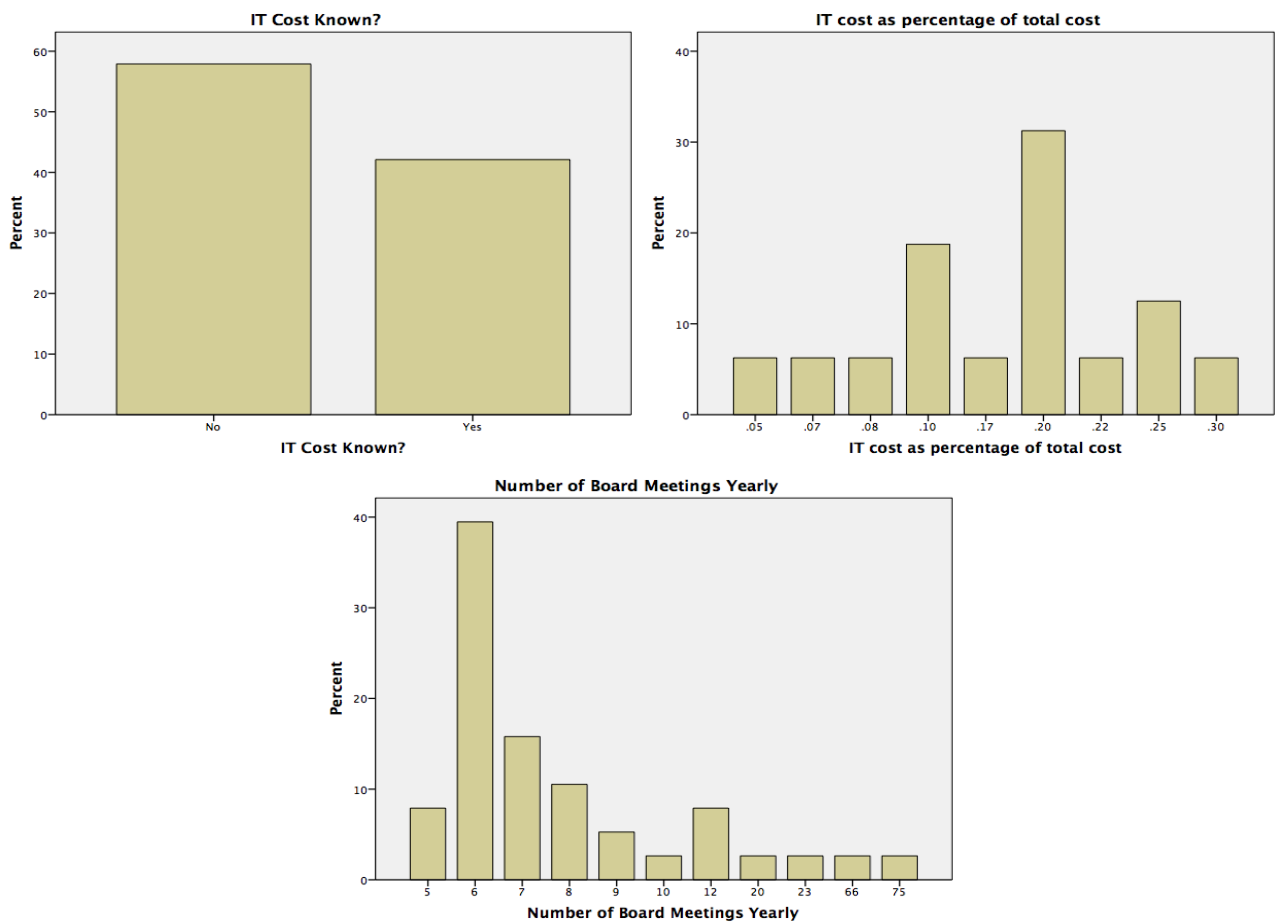

Figure 4 - Responses on "IT cost known", "IT cost as % of total cost" and "Number of yearly board meeting"

5.1.2 Conceptual Framework Exploration

First the concepts from the theoretical model are explored; the concepts being broad and deep IT governance, IT experience and knowledge and EIS usage. To do this the items / questions from the survey that should combine to the concepts are analysed to see whether taking them together is a reliable option. This is done using the Cronbach's Alpha, which calculates the reliability that the items are consistently measuring the same construct. The results show that the CA for each block is: deep ITG, .712; Broad ITG, .662; IT knowledge.926; IT experience, .069. The first three constructs show a high reliability, but the last construct, IT experience does not. This however is probably related to the fact that there are only two items; since the Cronbachs's alpha is calculated by splitting the data in every single way and calculating the correlation coefficients. With only two items this is not resulting in a reliable measure. Later a factor analysis will be performed to see whether extraction yields the same results.

5.1.2.1 Structural Equation Modelling

The next step is taking the constructs that are calculated by adding the items that load onto them. This creates four new items that will be entered into SEM modelling software. The software used is Onyx. The reason for choosing this software is simple, there are more then 16 variables (in the next section), so LISRELs student edition cannot be used. Onyx is free, and runs natively on MacOSX. For the analysis the relations between the created constructs are free. In figure 5 the model is shown.

Table 3 - GoF indices

	cutoff	GoF Value
RMSEA	0.05-0.08	0,26
SRMR	0.1	0,27
χ**:df**	~1:3	3,5
CFI	approach 1	0,188
TLI	>.90	0,142
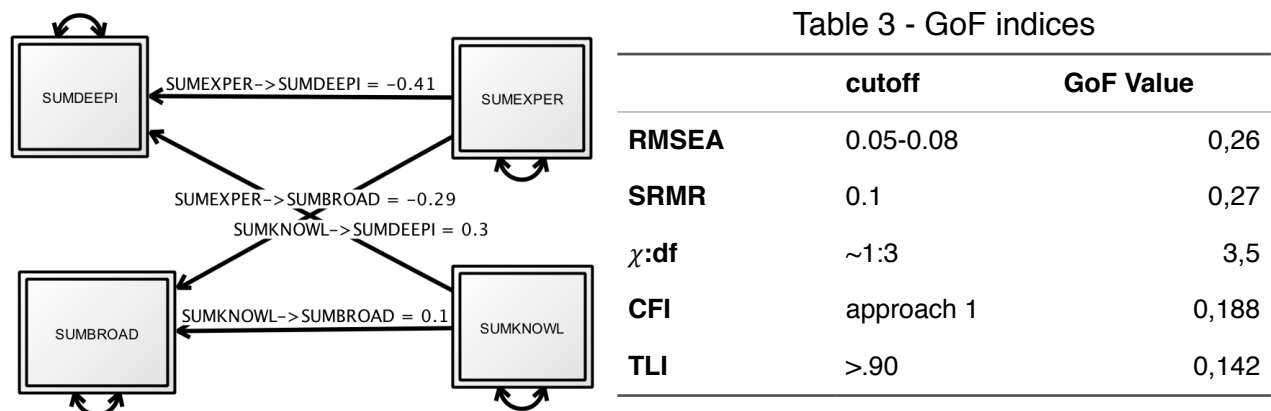
Figure 5 - SEM model

The model's GOF indices are shown in table 3. The double edged boxes mean that the standardised values are used for the estimation. As shown in table 3 the fit indices for the model estimated by the SEM software do not meet the criteria, which can be attributed to the amount of observations in the items from which they are derived. Since the model fit is not good other analyses are explored in the following sections.

Since the SEM didn't yield a good fit in the previous section a further exploration of the data is performed in this section. First using SPSS the correlations between the four constructs as depicted in the conceptual model are analysed.

The first analysis is the bivariate correlation between the four constructs developed in section 3.4 (Deep & Broad IT governance, and IT knowledge & Experience). The result of this analysis can be seen in table 4. The results show correlations between Deep and Broad ITG and between IT experience and IT knowledge. Other interesting findings are the negative correlation between IT experience and the two IT governance measures. Although this correlation is not significant, both measures are very close to 1. When looking at the Kendall's Tau, which is a non parametric test. The reason to choose Kendall's Tau is the small data set and the ability of this measure to give a better estimation of the correlation in the population (Field, 2013). In the non parametric test the correlation still exists, and the significance improves slightly, and with the relatively small sample this can be considered a result, albeit not being a very strong supported one.

When the R^2 for for instance IT experience and IT knowledge is calculated (the correlation being .573), the R^2 will be 0,328, meaning that 32,8 % of the variability of experience is shared with knowledge. This also goes for the shared variability between deep and broad ITG (42,6%), deep ITG and IT experience (4,5%) and broad ITG and experience (4,9%).

Table 4 Bivariate Correlations

		SumDeepITG	SumBroadITG	SumKnowledge	SumExperience
SumDeepITG	Pearson Correlation	1			
	Sig. (1-tailed)				
SumBroadITG	Pearson Correlation	.573[**]	1		
	Sig. (1-tailed)	,000			
SumKnowledge	Pearson Correlation	,035	-,089	1	
	Sig. (1-tailed)	,417	,298		
SumExperience	Pearson Correlation	-,212	-,222	.653[**]	1
	Sig. (1-tailed)	,100	,090	,000	

The second analysis is MANOVA, again using SPSS. Since in the previous analysis one variate was compared to one other, and the research set out to test the effect of both knowledge and experience on deep and broad IT governance a multivariate test is needed.

The first analysis is the effect of IT experience and IT knowledge on broad ITG. The results can be seen in appendix 3. Since Box's test of equality of covariances was not significant (.561>0.05) the assumption holds, and MANOVA was possible. Looking at the multivariate test it can be seen that although an effect was reported, this is not significant, even for Roy's root which has a higher power (resulting in a better significance then the others) the significance criterion is not met (p<0.05).

The univariate tests showed the same problem as the multivariate test; the significance of the test is too low indicating that between items effect was also not significant.

The same test was performed with the IT knowledge and experience and the Deep ITG. This time Box's test and Levene's test could not be calculated. This can indicate that there might be problems with the assumption of equality of covariance matrices, or the multivariate normality. These problems can again arise due to the fact that the univariate variables are not normally distributed, and this could be contributed to the small sample size and the combinations of the various measurement units. The bootstrapping technique also does not improve this problem, which normally can be used for small samples that violate the normality assumption.

To see whether the assumption of normality of the univariate variables held, is tested with the Kolmogorov-Smirnov test. The results can be seen in appendix 4. It is clear that for IT experience the assumption of normality was not met (KS sig. less then 0.05). And an assessment of the Q-Q box plots shows the same problem. The other three constructs do meet this assumption. Since the distribution of one of the variables was not normal, this could indicate that the assumption of multivariate normality was not met.

5.1.2.4 Findings so far

Summarising the above shown analysis reveal that although the Cronbachs Alpha on the various theoretically predicted constructs were high enough to take the designed items for these constructs together, these factors could not significantly confirm the framework. Although there is a significant bivariate correlation between the knowledge and experience, and between deep and broad IT governance, the hypothesised relation between these cannot be confirmed. MANOVA analysis yielded the same results and showed the same problem. The reason for the tests to be non-significant could potentially be attributed to the small sample size.

5.1.3 Factors Explored

Following the previous section a factor analysis for each of the three four blocks that were designed in the survey was performed. The planned factors were ran through a factor analysis to further asses the appropriateness of combining items as was done in the

previous section. As an initial exploration the questions that theoretically related to one of the main constructs (IT competence, Deep and Broad IT governance) were all be added to one factor analysis. Since the goal was to reduce the dimensions, principal component analysis was used.

5.1.3.1 Deep IT governance

The first main block in the survey was the Deep IT governance. Here the questions were on various dynamics that are of influence on the board IT governance practices, like time spend and number of meetings with formal IT agenda subjects. The results of the Factor analysis can be seen in appendix 5. Ideally the items would load on one factor, but they did not. The assumptions for factor analysis were met and the component matrix also was not an identity matrix, with the KMO statistic being well above .50 and Bartlett's tests null hypothesis being rejected (sig. =.000(<0.005)).

When looking at the extracted factors, there were 3 factors extracted when using Varimax rotation. If the items are analysed there is theoretical support that can explain these factors. First are the three questions on what IT means for the organisation; the impact on strategy, continuity and competitive advantage. This can be factored into one item as; 'The impact of IT on the organisation'. The second factor consists of the information quantity and quality, and the presence of an IT cost and project report. This can be considered the information that is used by the board. The third factor is formed from the percentage of IT meetings, the time spent on IT during meetings, the contact board members have outside the meetings with executives and the CIO/IT manager. This factor can be considered the effort that is put into the IT subject by the directors. For these three factors the Cronbachs Alpha can be seen in appendix 69. All of these were well above .50 which indicates adequate reliability when combining these items.

5.1.3.2 Broad IT governance

When using the items from the block on broad IT governance for the factors analysis the non rotated component matrix results in two factors, as was expected. The results can be seen in appendix 7. KMO is just above cutoff, and Bartlett's test of show good results (KMO = .586 and sig. =.003 (<.005)). Two things are interesting when analysing the component matrix. One being the first factor, where various discussion subjects are loading on. The subject of the performance of IT suppliers is not included, as is the discussion on data quality. This might explained by the fact that this is a very technical subject, and that according to various directors the IT suppliers are not a subject for the board, as they are to operational. The second interesting observation are the loadings on the discussion of the IT benchmark, and the discussion on IT system quality, which somewhat resembles the discussion on Cost vs Quality. Still the first factor supports the

construct in the conceptual framework that forms the broad form of IT governance. Again the Cronbach's Alpha was well above the cut-off point (.786 see appendix 8) and thus the set of items can be considered to have a high internal consistency.

5.1.3.3 IT Knowledge and IT Experience

The last block in the survey is on knowledge and experience. Again a factor analysis was performed, of which the results can be seen in Appendix 9. The KMO sampling adequacy was good with .805, and the null hypothesis of Bartlett's test was rejected (sig.=.000). This time the extracted factors almost perfectly resembled the conceptual constructs of knowledge and experience, with two factors. One was loading on all the questions on knowledge, but also included the IT function question that was expected to predict experience. The second factor is loading on only the question on the IT responsibility. To further explore this Cronbach's alpha will be used (see appendix 10). First testing the internal validity of only the knowledge questions, then combining this with the IT function question, adding the IT responsibility question, and finally taking the IT responsibility and IT function question separately. When the knowledge is taken separate, and combined with the IT function question the value stays the same with .926. When adding also IT responsibility, the CA decreases slightly to .922. When taking IT function and IT responsibility together the CA becomes very low with .069. This strengthens the idea that only the responsibility loads for the Experience construct, where the knowledge is predicted by both the items on knowledge and the item on IT function.

When looking at the function of a board member as a controlling and advising role on the overall strategy and high level decision making, the experience that one has had in the past in an IT related role (CFO, COO CEO) is of more importance then a, generally less recent, role of for example IT manager, or consultant.

5.1.4 Framework revisited

Now that the factor analysis were concluded, the framework that was theoretically developed in the literature section might require an update. Since the deep IT governance can be considered the effort a board put into discussing the IT related subjects, the information they use for these discussions becomes of apparent importance.

5.1.4.1 SEM

In order to represent this change an adaptation to the framework would potentially be required. In order to test this notion the items that loaded on the various factors determined in the above section are inputted into Onyx and a SEM analysis was ran. The resulting structural model is shown in appendix 11. The results of the GOF tests are shown in Table 4.

Table 5 - GoF Statistics

	Cut-off	Value
RSMEA	0,05 - 0,01	0,146
SRMR	0,1	0,18
χ**:Df**	~ 1:3	1,8
CFI	Approach 1	0,49
TLI	> .90	0,284

Again the model cannot be estimated reliably. In addition the model is reported by the software to be over-specified meaning the amount of observed variables is higher then the observations, further reducing the reliability of the model.

5.1.4.2 Correlations

When performing the bivariate correlations analysis on the factors the same sort of correlations are reported. Correlations between knowledge and experience, and correlations between information usage, effort, and broad IT governance can be observed. This is comparable to the findings in the section where the items were simply surmised with no factor extraction. The results for the correlation analysis is shown in table 5.

Table 6 Bivariate Correlations

		Knowledge	Deep ITG (effort)	Deep ITG((Information)	Broad ITG	Did director have IT responsibilty
Knowledge	Pearson Correlation	1				
	Sig. (1-tailed)					
Deep ITG (effort)	Pearson Correlation	,198	1			
	Sig. (1-tailed)	,116				
Deep ITG (Information)	Pearson Correlation	-,094	.416**	1		
	Sig. (1-tailed)	,288	,005			
Broad ITG	Pearson Correlation	-,113	.583**	.518**	1	
	Sig. (1-tailed)	,249	,000	,000		
Did director have IT responsibilty	Pearson Correlation	.299*	,044	-,156	-,126	1
	Sig. (1-tailed)	,034	,396	,175	,225	

When using simpler statistics some interesting findings can be derived. Looking at the results from the questions on Deep IT governance from the survey and calculating the frequencies, some details catch the eye. In appendix 12 the frequency results for some of the items that form Deep IT governance can be seen. The things that stood out are the 31,6% of the directors that reported that IT is discussed always in each meeting ,whereas almost 82% does not come further then 25% of the meeting time being spent on it. On the other hand half of the directors reported that only up to 1/3 of the meeting IT is a topic on the agenda. Clearly there is a distinction between boards that have an intense IT discussion, and ones that do not. To further explore this the two percentages are multiplied this yields a 'percentage of the time of the percentage that IT is discussed per meeting'. The box plot for this is shown in appendix 13. Now the average shows that the actual time that is spent on IT subjects is relatively low, with some exceptions up to .50.

When looking at the reports that are used in the board meetings the histograms are shown in appendix 14. Quality and quantity was reported average to good, yet there was some room for improvement. When looking at the presence of a cost and project report a difference can be observed. Where 60% did not get a cost report, almost 70% did receive a project progress report, however almost 30% did not receive a report on neither cost or project progress. The ones that did receive a report show that approximately one-third receives either one, and one-third receives both (see appendix 15). The other interesting finding was that board members seemed to have contact outside the board meetings with IT managers/CIO (47,4%) and with the executives (65,8%) or both (44,7%) (see appendix 16).

In the broad IT governance questions no immediate points of interest are visible, 8 out of the 11 topic's were discussed in general (see appendix 17). The same goes for the knowledge related items, on average the score was just above 3 (see appendix 18). However when looking at the experience questions an interesting link can be made with the initial exploration that was done in section 3.5. Here it was found that only 19% of the sample has had IT experience of some sort ,while in the sample that was administered the survey 63.2% reports to have has some sort of previous IT experience.

5.2 Interviews

In addition to the survey, of which the data is explored in the previous section, interview data was also collected. During the appointments we had with the directors all the questions for the survey were discussed in some more detail. This way each block yielded some extra information. In total 42 interviews have been performed. Since the interviews

that did not yield a complete survey, did yield usable interview results this number is higher then the amount of completed survey's. The data from the interviews is summarised in appendix 19. Various parts of the interview were on company specific points and cannot be added to the interview section, nor do they add useful information for the current research.

The first step was the indexing of the interviews. This information was coded, and the major themes were extracted. In table 6 these themes can be seen. These themes were extracted from the interviews as the most important challenges for the finical industry, and how the directors thought that IT will have an impact on their role, or how the role of directors in general needed to adapt to the changing environments. There are some important points that need to be taken into account when looking at these figures. First the impact of IT on the strategy, continuity and the competitive advantage is covered in the first block of questions, so these are not recorded here. Only when a directors specifically mentioned continuity as a separate challenge is it recorded in table 5. Note that this does not represent the context in which this topic was mentioned.

Table 7 - Interview Subjects

Subject	mentions
Permanent Education	15
Legacy IT Systems	15
Client interface	13
General IT Systems	12
IT & Innovation	10
Regulations & reporting	6
Increased Director responsibility	6
Data Quality	5
Security	6
Cost	5
Outsourcing	4
Continuity	3
Total	100
Per interview	2,4

The most noted subject was the permanent education. This is clearly related to the experience and knowledge questions. There were a few questions in the questionnaire that

got unanimous answers, and one of them was the question; "What do yo think of the IT competence of the board in general?"; everyone said low. This combined with the permanent education can improve the level of the IT competence on the board. Interesting is that although all directors said the level of IT competence was too low, the average score that directors gave themselves was just above three. This seems to be somewhat of a contradiction.

The other subject that was mentioned relatively many times was legacy IT systems, this is somewhat more of a technical subject, but it also shows what IT related subjects matter most to directors at this moment in the financial industry. This also goes for the other subjects, up until the reporting and regulations, and increased responsibility, that is mentioned a couple of times (15%). This underlines the notion at the very beginning of this research, that the regulators and society are expecting more from directors. Other major subjects mentioned are also of a technical nature and are not immediately related to the current research.

One returning remark was that in the board meetings the attention for IT is too low, and should be given more attention, especially since the importance of IT is changing so rapidly. From a classical viewpoint the directors of banks or insurance companies are in general bankers, financial experts and lawyers, and technically educated directors are hard to come by (see the initial exploration in section 3.5). This leads to an obvious vicious circle, in which low IT competence leads to lower attention for IT and in its turn does not support IT savvy directors to enter the board room. In a broader sense Valentine & Steward (2013) also noted the clear responsibility a board has in the rapid changing world of disruptive technology. In a more narrow sense Kuruzovich et al. (2012) indicated this same responsibility for the board but then directed towards IT. Earlier Nolan & McFarlan (2005) noted the same thing.

The main point that came forward from the interviews is the increase in responsibilities, combined with the notion that the IT competence is too low in general at the level of the board. In addition it is noted multiple times that the attention for IT is too low at the board especially when taking the importance of IT into account.

From the interviews a number of recommendations came forward. First the need of more IT savvy directors; this raises the question whether the director needs to be one individual or if the whole board needs a basic level of IT competence. In general the answer was that the overall profile of the board needs to meet the needs of the organisation. The danger of one IT directors is that the other directors might think that he/she can do the IT area all by

himself, and they can completely ignore these issues. In addition a basic understanding of IT is needed to understand the need for such an IT director.

The other recurring recommendation was that IT needs to be a more strategic point, and not viewed upon as just a commodity. Therefor some directors mentioned the need to have a strategic session on IT that can serve as a refresh of the knowledge and state of art in the area of IT.

One recommendation that is mentioned in literature is the formation of an IT committee on the board level. This committee would prepare the IT related information so that there can be a well grounded IT discussion (Grembergen & Haes, 2009). When asked almost all directors didn't like this idea. Some mentioned it would be possible when very large IT implementations or programs where running, or when big problems occurred, but another committee was not seen as a solution.

The Executive information system is another part of the interview. Since the answer to the question whether the board uses an EIS was unanimously 'no' it could not be taken into account for the statistical analysis. However some interesting information is shared during the interviews on this subject. Most directors did not need an EIS an when asked why mostly the answer was; a dashboard systems that summarises information is enough, it does not need to be live or have a drill down feature. So a good overview of data like cost, project progress or risks is great to have. Most directors indicated that a dashboard with traffic lights, trends and the option to have more detailed information when needed. Although this somewhat resembles the characteristics of an EIS, it has some clear distinctions. Some directors even went as far to say that this is the realm of the executives.

The last important remark that came along a couple of times is also in line with findings in the factor analysis. Some directors mentioned that is is of great importance to be pro-active in the organisation. This means that a director should go a talk to people in the organisation outside the board of executives, and thus getting a better feeling for the problems and risks that an organisation potentially faces. This is in line with the factor analysis that puts effort like time spent on IT, in one factor along side contact with CIO IT managers and executives outside board meetings.

5.3 Best Practices and Recommendations

From the above information recommendations/best practices to better implement IT into the board room can be developed.

Since there is a correlation between deep and broad IT governance, and the factor analysis has given support for the notion that deep ITG consists of information availability and

quality, combined with the effort exerted by the board, the first recommendation is related to the Deep ITG. Boards should make sure they receive high quality and enough information on cost, projects and risks of IT. On the other hand they need to make sure to put enough effort into the IT subject by talking to IT managers, the CIO and executives, also outside board meetings.

The second recommendation is directed to the knowledge and experience of the board on the subject of IT. Although the relations in the conceptual framework could not be validated statistically the interviews have shown that there is a clear need for more IT competence on the board level. The correlations between IT experience and both forms of IT governance was not formally significant, but it came very close giving some support for this notion. Although the link IT between competence and IT governance is not statistically proven, the interviews have indicated that there is a certain importance to it. So the second recommendation is to enhance the overall IT competence profile of the board of directors in the Dutch financial industry. This should be done by increasing the overall IT competence with permanent education, which should fill a knowledge problem. While on the other hand a director with more IT experience can fill the IT experience problem. The education that is mentioned will require a certain structure that is fit for directors and their role. It should not be a story that delves deep into the technical aspects of for instance encryption. It should contain a practical and applicable theory for the high level oversight that directors have.

The third recommendation is that directors should be proactive in searching for the information they need for their tasks on IT. This is inline with the questions that were asked on the contact directors should have outside the board meetings with executives and managers. In the interviews this was also mentioned multiple times as a good way to better supervise.

5.4 Applicability Check

To validated whether the profile of the board of directors needs to also account for more IT competence, whether training could accomplish this, and if the board needs to engage more in the effort part of the deep IT governance is checked in this section. This is done by interviewing some executives from large financial organisations that are responsible for IT. Due to the broader nature of the research in which the master thesis has been performed, not all the aspects of the recommendations mentioned above have been covered in every interview.

In total 7 interviews were conducted, and a summary of the responses can be found in appendix 20. The first recommendation is on the IT competence profile of the board of

directors. This is in line with the competence testing that is done by the Dutch national bank, although this test does not account for IT competence. From the interviews the IT competence profile is mentioned 7 times. The way this is seen by the executives, is that the overall profile is more important than either having one member on the board with deep knowledge and experience or having multiple members that have a more basic understanding of IT. The important thing here is that the whole area of IT competence is covered. Some argue that this should be part of the regulations, others say that this responsibility lies with the directors themselves. Clearly though the call for more IT competence in a broad sense is almost unanimous.

When asked on how to achieve this, not all interviewees mention PE as a solution. Although it is mentioned 2 times, others argued that you need both experience and knowledge and that the knowledge alone cannot cover the IT competence that is needed. However if the basic understanding of IT is not present at the board then the urge to change this can also be problematic. Therefor it seems that the total IT competence profile of a board needs to be taken into account, and just adding one expert or raising the overall knowledge might not be enough.

Lastly is the effort part of the deep IT governance, this is related to time spent and the amount of meetings that have an explicit IT topic on the agenda. This was not really mentioned, as most executives found that their board of directors was doing a fine job. Maybe this point came to close to giving critique to the directors, or on the executives' distributed information quality.

This section will summarise the findings and integrating them into the conceptual framework that was developed in section 3. Also the recommendations, managerial implications, limitations and future research will be discussed. As the final chapter of this thesis a conclusion will be drawn. The conceptual framework that was developed will also be discussed. In addition a personal reflection on the process of the research will be given. In this section first the framework with the propositions will be addressed. Then the implications for the research objectives are reviewed, after which the more practical significance is discussed.

6.1 Problem revisited

To review whether the research has succeeded in its goal the problem as stated in section 3 is revisited. Here it was stated that not a lot was known about the relation between IT governance practices, IT competence and EIS usage at the level of the board of directors. Following the research objectives a set of propositions, that were captured in a conceptual framework. This process can be seen as abstracting a practical (more high level) problem into a measurable model. This idea will be used in the next section to explore the results, from the abstract model up to the practical problem.

6.2 Discussion

First a validation of the conceptual model in figure 3 from section 3 is attempted with various statistical techniques such as structural equation modelling, MANOVA, factor analysis and correlation analysis. These analysis dit not yield a conclusive result. In addition no correlation between EIS usage and any of the other constructs could be made since no board actually uses such a system. Because of this the relationships in the conceptual framework could not be validated, and thus are not supported. The reason for this might be found in the fact that the sample size is not large enough, combined with the large amount of items that was used in the survey. Although in itself this could not explain why MANOVA and correlation analysis didn't yield significant results. This can lead to a lack of multivariate normality which can affect the reliability of the statistical tests that were performed.

From the interviews however there was more to be derived on the propositions that were put forward. First almost all directors mention that IT needs more attention, both in subjects that are discussed (like strategic usage, innovation, legacy, security and client interfaces) as in the depth of the discussion. However a part of the directors felt that board and even themselves were inhibited to do so due to their IT competence. A lack of basic knowledge on a broad array of IT subjects, but also an experience gap seemed to be

missing. so although a statistical basis is missing from this research, the interview results suggest that there might be a basis for hypothesis P1a and b, however formally it is not supported.

Since the results from both the survey as the interviews suggest that an EIS is not ideal for the board of directors and formally no link can be made between this and IT competence or IT governance P2a, b and P3 are not supported. However the use of information that give good insight into for example cost, projects and risks of IT is important to directors. However this is also captured in the deep IT governance, which will be discussed below.

From a more technical point of view directors indicated that dashboards with trends, and 'traffic light' reports, and the ability to delve into certain details, is enough. This does not necessarily needs to be software, but paper is according to some also fine.

The conceptual framework that this study set out to validate was adapted to agree with the collected data. The factor analysis on the deep IT governance questions has shown that this concept needs to be reconsidered. All the other concepts returned factors much as was expected, except for deep IT governance. Here an interesting split could be made between the information that was used by directors in their tasks, and the effort they put into the topic of IT. Reflecting on this afterwards makes this split up seem very logical, moreover since the concept of deep IT governance is mostly developed in the current research and has seen little previous use as a empirically measured concept. This led to redefine the conceptual model to the one shown in figure 6.
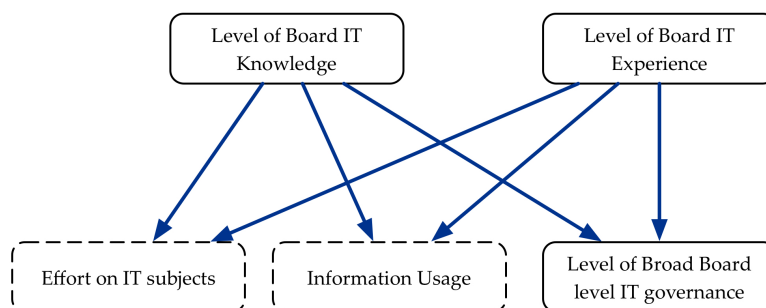

Figure 6 - Updated Conceptual Model

Whether the two concepts of effort and information usage should completely replace the deep IT governance concept is unclear, however it is clear that this concept is somewhat more complicated then depicted at first.

Summarising, solely form the interviews there seemed to be support for the ideas behind the conceptual framework, in that competence and the attention that IT receives is linked to a certain extent. Statistical evidence was not found however, and the survey thus does

not support the qualitative data from the interviews. In the following section some of the recommendations that could help improve the current situation are given and discussed.

When looking back at the research objectives that were discussed in section 1; how does the collected information reflect on this objective? For the first objective; from the interviews a careful conclusion can be drawn that the directors think that the current competence level is too low, and for the future this needs to be improved. This competence is not deeply technical in nature, but can be on a more strategic level. However the complexity of IT does require a certain amount of experience in this subject. One of the interviewees said that: "*The danger is in overestimating your own competence. When you truly understand the complexity of IT one would probably estimate his/her own competence lower then someone who doesn't really understands the vast complexity.*" When looking at the responses that were given by the directors on the self-estimated IT knowledge on average each item yielded a score of a little above 3, indicating an above average knowledge. This is counterintuitive when looking at the unanimous response on whether the IT competence was high enough on average in the financial sector. There are three possible explanations; one the directors overestimated their own knowledge, two the sample that was drawn is biased, or three; experience plays a bigger role then knowledge in the functioning of the board. The first explanation is very possible, since self-estimating ones knowledge is prone to bias (as is indicated in all research that uses this self-reporting survey (e.g. Geneviève Bassellier et al., 2003)). But when looking at the percentage of interviewed directors that have had some sort of IT experience in the past, the second explanations might be valid as well. In addition when comparing the initial exploration in section 3.5 to our sample this assumption is strengthened. The third explanations cannot really be tested, but since previous research found that experience and knowledge go hand in hand this is also plausible. So although a direct statistically supported link between IT governance and IT competence cannot be found, the interviews do give an interesting insight into this matter.

The second research objective is on practices that are performed by directors. And these differ quite a bit. Most directors have some sort of IT topics that are discussed with management reports on cost and project progress, in fact approximately in fact 71.1% of the interviewed directors have had some sort of cost or project report or both. So if the reporting is adequate then what should be done otherwise? Since IT is becoming more and more a strategic tool; IT is slowly becoming the only medium through which financial companies have contact with their customers. Directors therefor mentioned in the the interviews that a strategy session only on IT would be a good idea to plan yearly. This would include innovations and disruptive technologies that might pose a treat or present

opportunities. The topics that are discussed (8 out of 11) do also show some room for improvement, especially at the lower end of the curve where less then half of the topics is discussed (see appendix 19).

One other practice that was tested with the survey was the contact directors had outside the board meetings with managers and executives. It turns out that during the interviews this was also mentioned a couple of times as a good way of improving the way that IT is discussed in the board, since this contact can yield interesting insights that otherwise might stay hidden.

These findings eventually led to three recommendations that were also checked with the executives that were interviewed, in order to check the applicability. The first recommendation on the IT competence profile of the board is supported by both the interviews with the directors as the applicability check with the executive. The second recommendation, on PE is supported by the interviews, but the applicability check did not yield as convincing results. For the better deep IT governance the same can be said, although the applicability check seems to not support this, but this might be due to the target group that was interviewed as discussed above.

The third objective was to uncover more about the use of an executive information system and the possible use of such a system by the board of directors. Unfortunately it seems that such is system is not used, and there is also no real interest in the full extend of an EIS at the board level. The main reason is that such a systems to too much aimed at managing, which is something directors are not meant to do.

The following section will contain some more practical implications, and will summarise what the actual suggestions that have been derived from the results mean in practice.

6.3 Managerial Implications

Implicitly the results of this study suggest the need for more IT competence in the board of directors. Therefor directors should actively search for IT directors such as ex-COO's or CIO's with a clear business background. In addition the current directors need to improve their understanding of IT through permanent education. Although it seems from the interviews that this might be harder then expected since a good curriculum is missing. By combining the IT expert in the board with better understanding of IT by the rest of the board members, the overall IT governance related practices will probably improve.

This is immediately a very practical recommendation for KPMG, since they have the expertise, and the network to create a permanent education IT curriculum for directors. Possibly this would entail a number of small scale meetings on various strategically

relevant topics, in which practical information on market changes and risks are discussed. In addition it would be possible to develop an e-learning based education program. This would give directors the opportunity to improve their IT knowledge at home, without openly admitting their lack of IT knowledge.

The second recommendation is on the practices directors should engage in. The lines between managers CIO's and executives need to be open to directors. Directors should pro-actively search for contact with these functions and this contact should be as transparently as possible to keep the trust relation between executives and board members in a good condition. By doing so the directors can make sure that the information they receive is of good quality and that all the aspects that should be covered are in their field of view.

These two recommendations together can potentially make sure that the subject of IT will receive the much needed attention it requires, and that directors are better capable to assess the information that flows from the company into the board room.

6.4 Limitations & Future Research

This research know various limitations that will be discussed here. Also some future research direction are discussed.

6.4.1 Limitations

First the statical relevance was missing, potentially because of the small sample size the various statistical analysis that were attempted did not yield satisfactory results. At the start of the research it was planned to be able to send an invitation to at least 250 directors, in the hope to be able to collect data from ~100 directors. This number was not achieved since the approachability of this group is less then expected, even with KPMG as a company behind the research.

The second limitation was the possibility that only IT savvy directors responded to the invitation to participate, since they understand the problems companies face, and the complexity of IT. This cannot be checked but the results compared to the initial exploration do indicate a possible bias.

Thirdly, due to the fact that the master thesis research was part of a broader KPMG research the research design had to be slightly adopted to meet both requirements. Meaning that less time in the interviews could be devoted to the main research questions that are proposed in this research.

For the survey itself the factor analysis gives a reason to believe that the constructs that were meant to be measured by each block of items were indeed measured. But the self reporting nature of the knowledge block can potentially cause a bias in the results.

6.4.2 Future research

Because the current research is built on a relative new stream of research there is a lot of opportunity for future research.

The most obvious is to attempt to take this research design in a broader population, and include other industries or counties. This will also increase the possibility to have better statistically grounded results and possibly the ability to actually confirm the conceptual framework presented in this research. In addition since there is a rather unique corporate structure in the Netherlands, the impact of the two- vs one-tier board might reveal some interesting insights.

Second, it might prove interesting to have a better understanding of how deep IT governance practices have an influence on company results, this could even be expanded outside the IT area; how do effort and information at the board level influence the results of a company?

6.5 Conclusion & Reflection

The current research has set out with two goals in mind; first to validate a conceptual framework that was developed with literature; second, to give practical recommendations to board of directors on the subject of IT governance, IT competence and Executive information systems. As far as the literature review has been able to confirm this is the first research that has taken these concepts together and attempted to validate the relations between them.

Due to the nature of the target group the validation of the framework was not possible, since the sample size was to small. However by combining some findings from the measurement data and the interview data, recommendations could be developed, and tested by means of an applicability check. These two recommendations could potentially improve how boards of directors in the dutch financial industry handle IT related topics, and the supervision of IT.

When looking back at the process that has been followed to conduct this research, there are some points that could have been performed better. First the potential problems that could seriously delay or endanger the research should have been identified better in the start of the process. This could have identified that there was a problem with contacting the directors that were needed to complete the survey. At first there was an expectation

that all the contact information that was needed was present. This expectation was based on various meetings within KPMG. This assumption has led to some serious extra work, since all the contact details for the directors had to be collected through hours of calling, and hundreds of emails. Earlier identification of the lack of this critical information would have improved the throughput time.

Also the relationship with the TU/e and specifically the mentor should have been managed differently. Communication should have been, in hindsight, more structured. In addition more structured agreements and review moments should have been in place. This would have led to a better process, and maybe some delays and conflicts could have been avoided.

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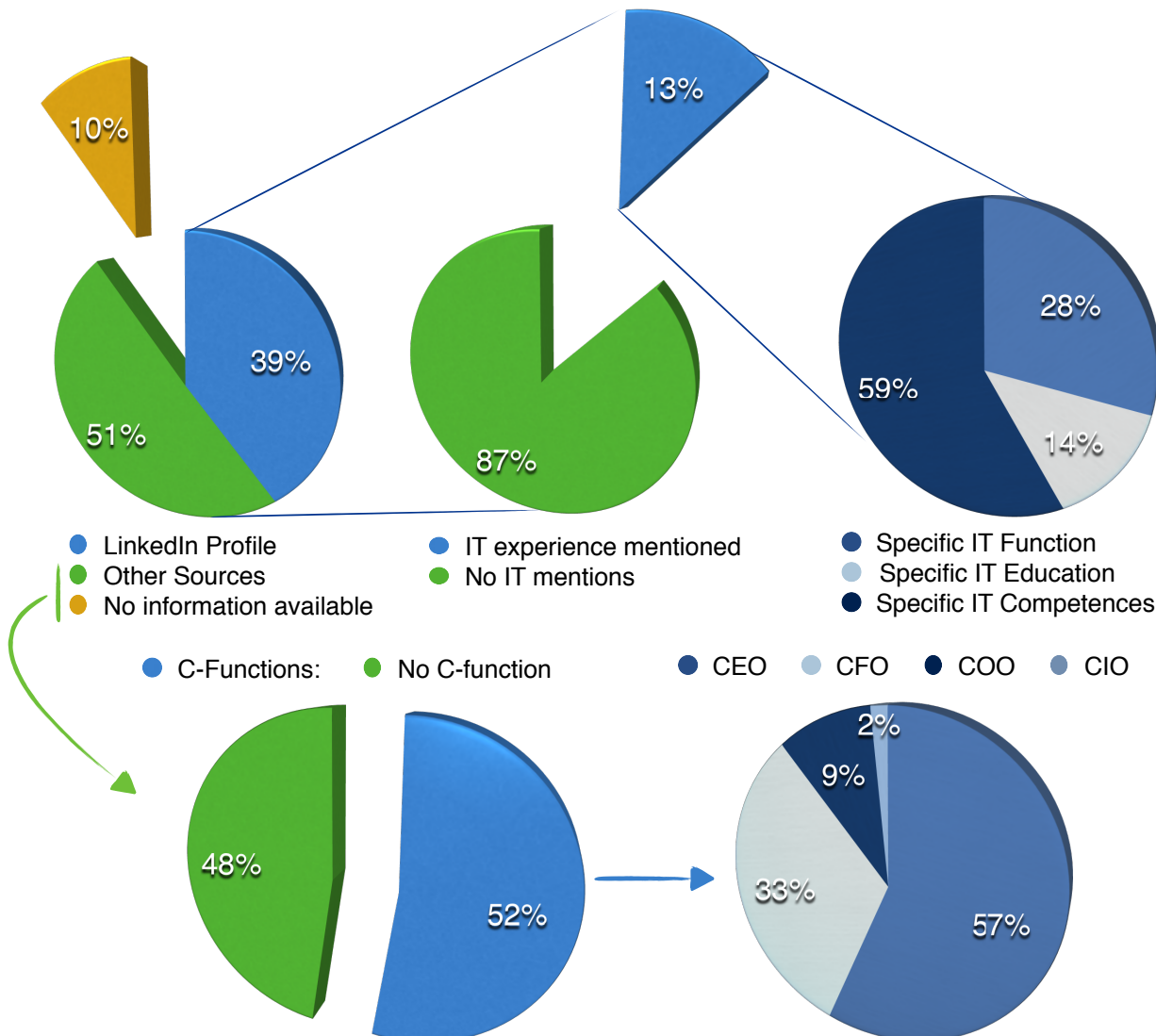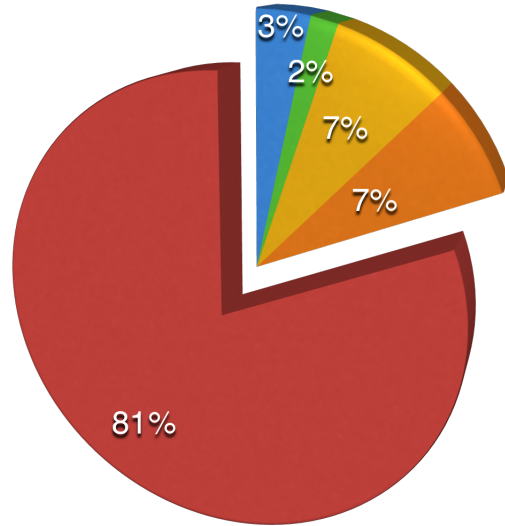
Total Profiles Scanned:	239
Profiles Found	214
LinkedIn Profile	93
Other Sources	121
No information available	25
Specific IT Function	8
Specific IT Education	4
Specific IT Competences	17
Technical Education	16
No IT mentions	194
IT experience mentioned	29
C-Functions:	112
No C-function	102
CEO	73
CFO	42
COO	12
CIO	2

Legend (top chart): Specific IT Function · Specific IT Education · Specific IT Competences · Technical Education · No IT mentions

Values: 3%, 2%, 7%, 7%, 81%

Legend: LinkedIn Profile · Other Sources · No information available · IT experience mentioned · No IT mentions · Specific IT Function · Specific IT Education · Specific IT Competences

Values: 10%, 39%, 51%, 13%, 87%, 28%, 14%, 59%

Legend: C-Functions: · No C-function · CEO · CFO · COO · CIO

Values: 48%, 52%, 2%, 9%, 33%, 57%

Name	
Age:	years
Gender:	male/female
# boards within FS:	
Sector:	Bank/Health-/insurance/ investments/pensionfund

Part 0: General Questions and IT impact:

How large do you rate the impact of IT on the organizations' strategy and innovation capacity?	1 – 2 – 3 – 4 – 5
How in important is the availability of the IT systems for the organization?	1 – 2 – 3 – 4 – 5
How do you rate the importance of IT to realize competitive advantage?	1 – 2 – 3 – 4 – 5
Do you know the total cost of the organisations' IT department?	Yes/no
If so what is its percentage compared to the total cost of the organization	%
How many times does the board meet during one year?	x /year

remarks part 0:

5 point likert scale: no impact/importance - little impact/importance - medium impact/importance - high impact/importance - very high impact/importance

Part 1: Deep board level IT governance

On how many board meetings was IT a formal agenda item?	x/year
Can you make an estimation of the average time that is spend during the meetings on IT subjects in a percentage of the total time?	%
How would you rate the amount of information you receive for the preparation of the meetings?	1 – 2 – 3 – 4 – 5
How would you rate the quality of the information you receive for the preparation of the meetings?	1 – 2 – 3 – 4 – 5
Did you, in the past year, outside of the board meetings talk to the IT responsible IT executive about IT subjects?	yes/no
Same question as above, but with the CIO?	yes/no
How many times in the past year, did you contract an external expert on IT subjects?	x/year
Do you receive a periodic management letter that updates you on the cost of IT	yes/no
Do you receive a periodic management letter that updates you on the progress of large IT projects and programs?	yes/no
Does the board use an EIS to gather the information they need?	yes/no
Is there a separate IT committee that prepares the information for the board meetings?	yes/no

Remarks part 1:

5 point likert scale: very bad - bad - not good & not bad - good - very good

Part 2 – Broad board level IT governance

	Is discussed?	Remarks
Impact of IT on the organizations' strategy	Yes/No	
IT project plan for the coming year	Yes/No	
Security of IT systems	Yes/No	
Availability of IT systems	Yes/No	
Data quality and integrity	Yes/No	
Quality of the IT landscape	Yes/No	
Progress of large IT projects and programs	Yes/No	
Quality of the IT organization	Yes/No	
Performance of external IT suppliers	Yes/No	
IT cost compared to competitors (benchmarking)	Yes/No	
Possibilities to lower IT cost (through cloud, outsourcing etc.)	Yes/No	
Which are the three biggest IT related challenges of the coming years?	- - -	

Part 3 – IT competence

Experience:

		Period
Did you, in your working life have any direct IT management role?	Yes/No	
Did you, in your working life, have any direct responsibility for IT?	Yes/No	

Knowledge:

Impact of IT on the strategy of the organization	1 – 2 – 3 – 4 – 5
IT-Security	1 – 2 – 3 – 4 – 5
Availability of IT systems	1 – 2 – 3 – 4 – 5
Data quality and integrity	1 – 2 – 3 – 4 – 5
Quality of the IT landscape	1 – 2 – 3 – 4 – 5
Management of large IT projects and programs	1 – 2 – 3 – 4 – 5
Quality of the IT organization	1 – 2 – 3 – 4 – 5
Possibilities to lower IT cost (through outsourcing, cloud, etc.)	1 – 2 – 3 – 4 – 5
IT applications such as SAP, Oracle, etc.	1 – 2 – 3 – 4 – 5
IT technologies such as Cloud, Mobile, Data Analytics, etc.	1 – 2 – 3 – 4 – 5
What do you think of the average IT competence of directors in the Dutch financial industry?	1 – 2 – 3

5 point likert scale: no knowledge - little knowledge - average knowledge - well above average knowledge - expert knowledge

3 point likert scale: Low - Average - high

Would the use of an EIS help the board members in IT related discussions and agenda topcis?

Other remarks:

Box's Test of Equality of Covariance Matrices[a]

Box's M	18,780
F	,903
df1	15
df2	654,631
Sig.	,561

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,952	265.564[b]	2,000	27,000	,000
	Wilks' Lambda	,048	265.564[b]	2,000	27,000	,000
	Hotelling's Trace	19,671	265.564[b]	2,000	27,000	,000
	Roy's Largest Root	19,671	265.564[b]	2,000	27,000	,000
SumBroadITG	Pillai's Trace	,452	,907	18,000	56,000	,573
	Wilks' Lambda	,594	.893[b]	18,000	54,000	,589
	Hotelling's Trace	,607	,877	18,000	52,000	,607
	Roy's Largest Root	,427	1.329[c]	9,000	28,000	,267

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SumDeepITG	,095	38	.200[*]	,978	38	,637
SumBroadITG	,173	38	,006	,944	38	,057
SumKnowledge	,073	38	.200[*]	,994	38	,999
SumExperience	,249	38	,000	,795	38	,000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.651
Bartlett's Test of Sphericity	Approx. Chi-Square	182.537
	df	91
	Sig.	.000

Rotated Component Matrix

	Component			
	1	2	3	4
Impact of IT on Contunuity	.847			
Impact of IT on Strategy	.838			
Impact of IT on Competitive Advantage	.800			
IT Cost Known?				
Presence of IT cost report		.770		
Information Quantity		.756		
Information Quality		.706		
Presence of IT project report		.630		
Presence of IT Committee at the Board level				
Contact with CIO/IT Man. outside BoD Meetings			.826	
Contact with Execs outside BoD Meetings			.808	
Time spent on IT in meetings (%)			.551	
Percentage of meetings on IT		.545		
BoD usage of External Advice/ Experts				.890

Reliability Statistics Factor 1

Cronbach's Alpha	N of Items
,822	3

Reliability Statistics Factor 2

Cronbach's Alpha	N of Items
,714	4

Reliability Statistics Factor 3

Cronbach's Alpha	N of Items
,695	4

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.586
Bartlett's Test of Sphericity	Approx. Chi-Square	88.522
	df	55
	Sig.	.003

Component Matrix[a]

	Component			
	1	2	3	4
Meeting discussion IT project plan	.653			
Meeting discussion IT availabilty	.650			
Meeting discussion on IT cost reduction	.636			
Meeting discussion Project progress	.633			
Meeting discussion on IT organisation Quality	.578			
Meeting discussion IT security	.522		.657	
Meeting discussion on IT cost benchmarks		-.735		
Meeting discussion IT Sys Quality		.734		
Meeting discussion on performance of IT suppliers				.503
Meeting discussion IT impact on strat				
Meeting discussion Data Quality				

Reliability Statistics

Cronbach's Alpha	N of Items
,716	7

APPENDIX 9 FACTOR ANALYSIS IT COMPETENCE

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.805
Bartlett's Test of Sphericity	Approx. Chi-Square	285.376
	df	66
	Sig.	.000

Component Matrix[a]

	Component	
	1	2
Self assesment on knowledge of IT system quality	.891	
Self assesment on knowledge of data quality	.873	
Self assesment on knowledge of IT Applications	.829	
Self assesment on knowledge of IT Availability	.818	
Self assesment on knowledge of IT technologies	.801	
Self assesment on knowledge of Project management	.790	
Self assesment on knowledge of cost reduction of IT	.780	
Self assesment on knowledge of quality of the IT organsation	.726	
Did director have IT management Function	.684	
Self assesment on knowledge of IT Strat	.602	
Self assesment on knowledge of security	.569	
Did director have IT responsibilty		.777

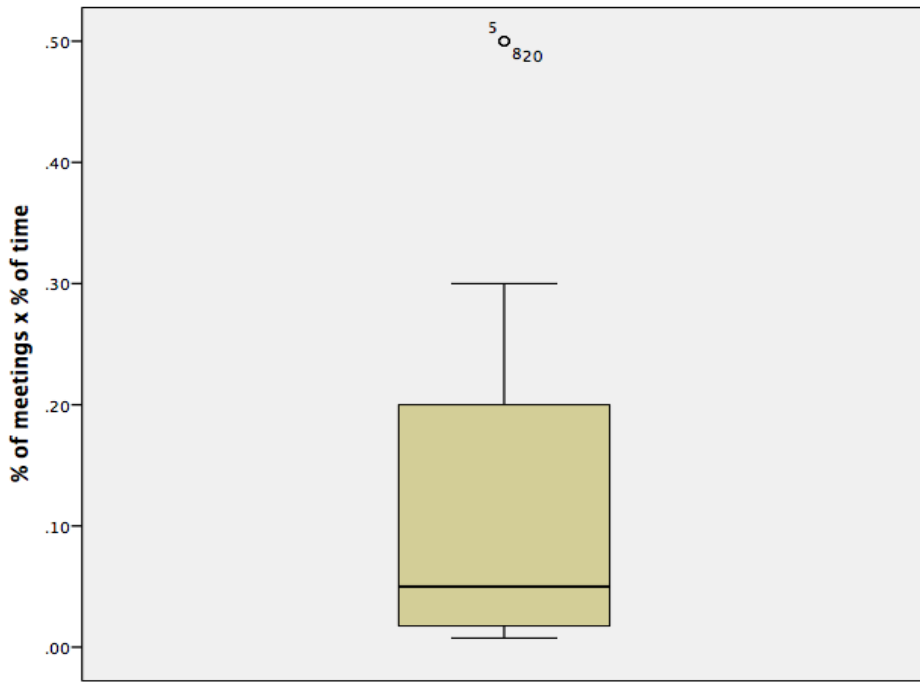**Reliability Statistics**

Cronbach's Alpha	N of Items
,926	10

APPENDIX 11 SEM MODEL FACTORS (SEM SOFTWARE CFA)
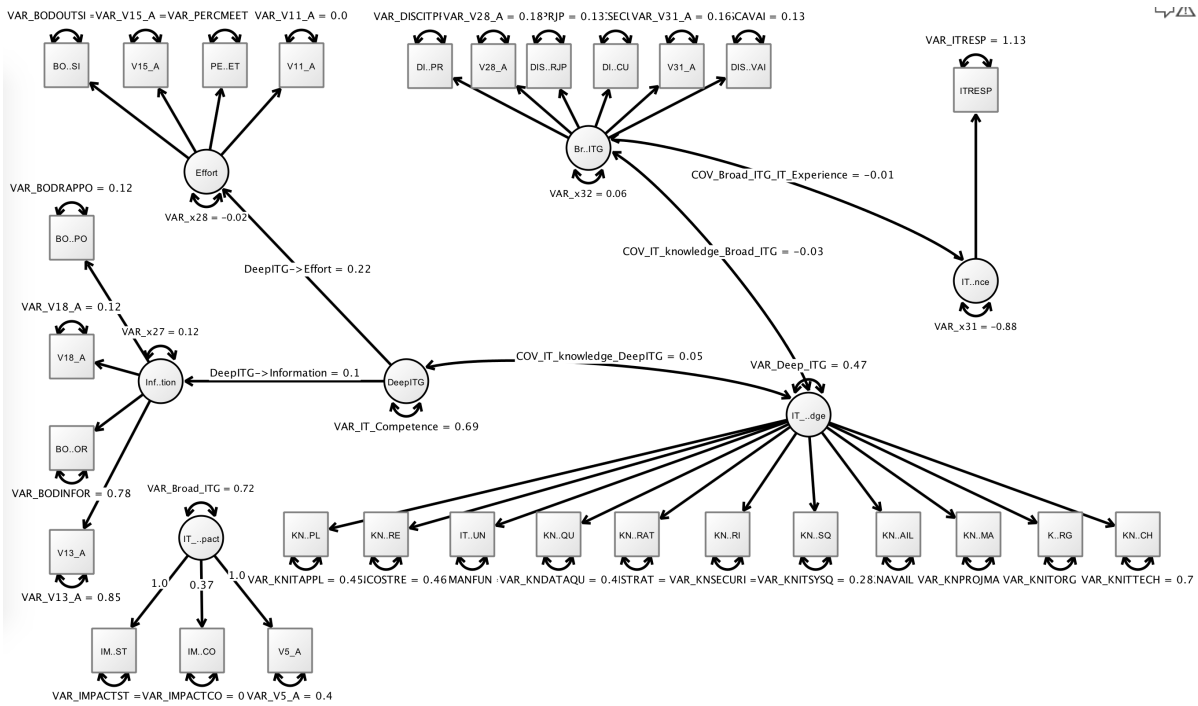
APPENDIX 12 DEEP ITG FREQUENCIES
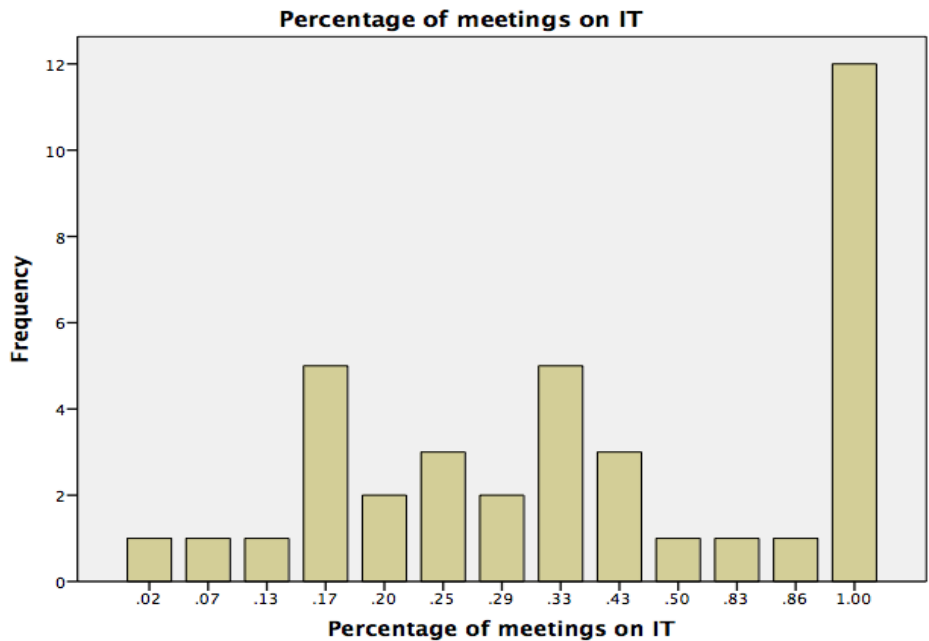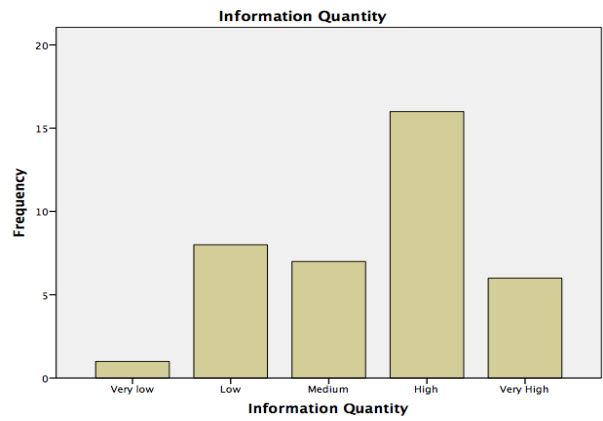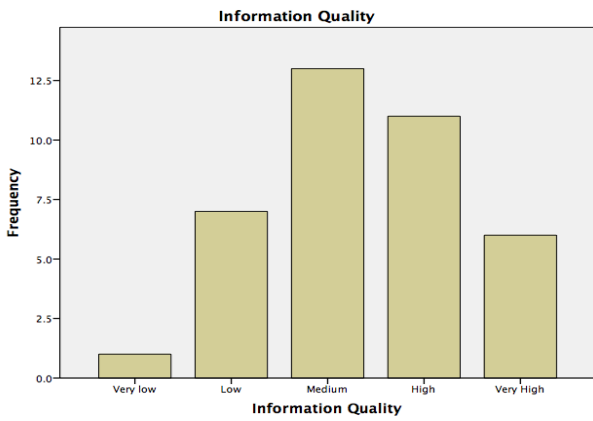
Frequency of board reporting
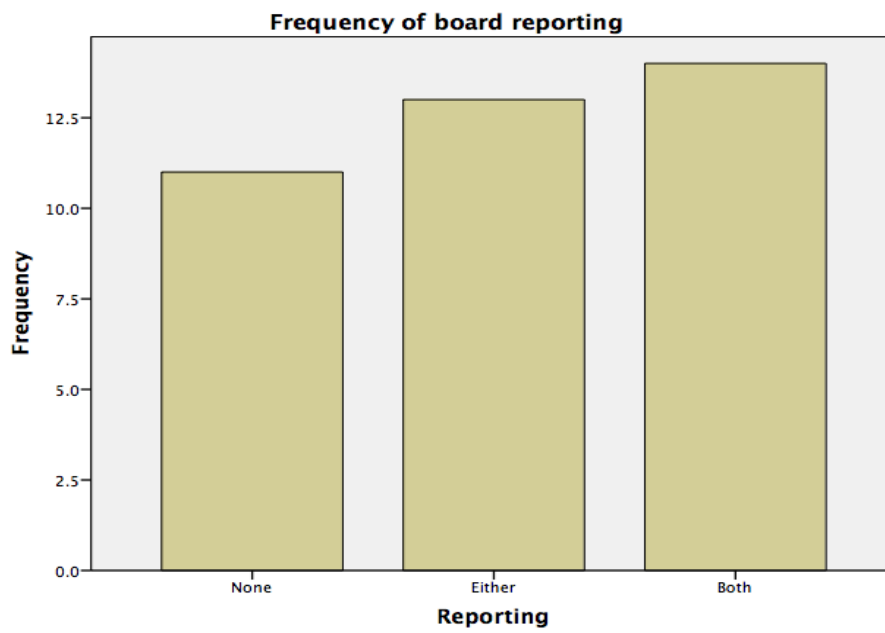
CumulOutsideCont
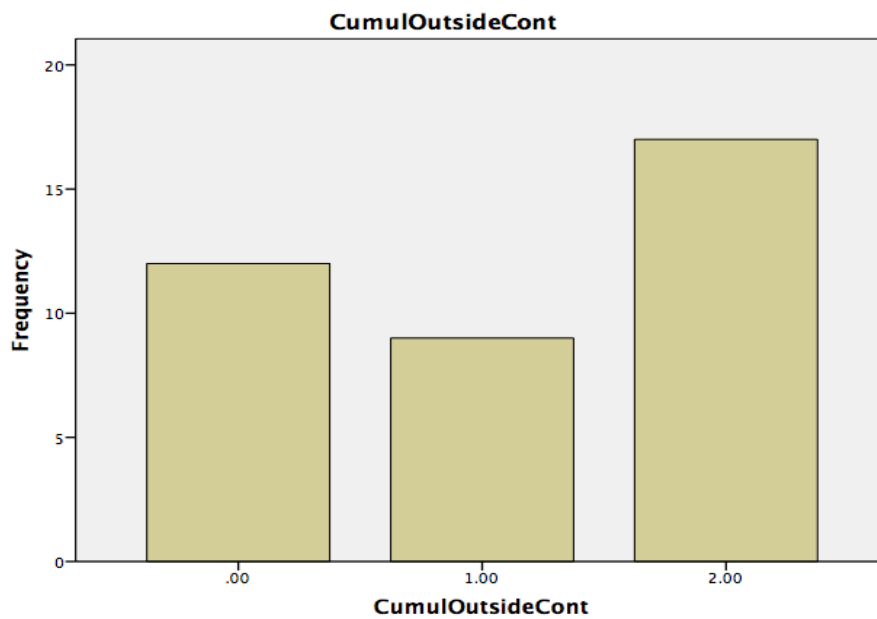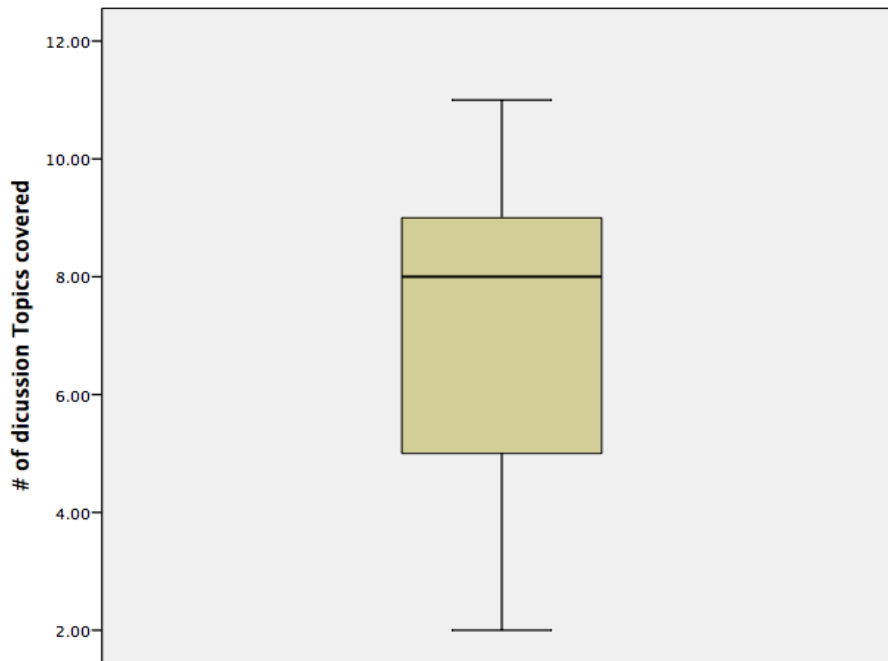
APPENDIX 18 AVERAGE KNOWLEDGE SELF REPORTING

		Statistics										
		Self assesment on knowledge of IT Strat	Self assesment on knowledge of security	Self assesment on knowledge of IT Availabilit y	Self assesme nt on knowled ge of data quality	Self assesme nt on knowled ge of IT system quality	Self assesme nt on knowled ge of Project manage ment	Self assesme nt on knowled ge of quality of the IT organsat ion	Self assesme nt on knowled ge of cost reductio n of IT	Self assesme nt on knowled ge of IT Applicat ions	Self assesme nt on knowled ge of IT technolo gies	Average
N	Valid	38	38	38	38	38	38	38	38	38	38	38
	Missing	0	0	0	0	0	0	0	0	0	0	0
Mean		3,74	3,32	3,39	3,50	3,24	3,74	3,63	3,32	2,66	2,95	3
Median		4,00	3,00	3,50	4,00	3,00	4,00	4,00	3,00	3,00	3,00	3
Mode		3ª	3	4	4	3	4	4	3	3	4	3
Std. Deviation		,860	,775	,916	1,109	1,025	,950	,913	1,016	1,072	1,229	1
Percen tiles	25	3,00	3,00	3,00	3,00	2,75	3,00	3,00	3,00	2,00	2,00	3
	50	4,00	3,00	3,50	4,00	3,00	4,00	4,00	3,00	3,00	3,00	3
	75	4,00	4,00	4,00	4,00	4,00	4,25	4,00	4,00	3,00	4,00	4

Block 1 - Deep IT Governance

-

Block 2 - Broad IT governance

The most important challenges for the coming year is facilitating growth, making information available for reporting, and conforming to regulations

Block 3 - IT competence

In general the IT competence in FS is too low, all members do not nessecarily need a basic understanding of IT, but one expert is a must

Block 4 - EIS

-

Block 1 - Deep IT Governance

The time commitment by directors has increased in the last years

Block 2 - Broad IT governance

-

Block 3 - IT competence

It would be good if al members in a board have a basic understanding of IT, although IT should not become a regulatory requirement

Block 4 - EIS

-

Block 1 - Deep IT Governance

IT has become the primary process for companies like banks or insurance agencies, companies like these are information processing plants. IT is of importance to be, as a directors, involved in the organisation, so talking to managers or the CIO is of importance

Block 2 - Broad IT governance

The most important challenges are large IT projects, innovation with IT and security

Block 3 - IT competence

The IT competence is too low in NL FS. All members need some sort of IT competence, but not too deep. One director with lots of experience and knowledge is enough to cover the IT area

Block 4 - EIS

An EIS is not necessary since the reporting from the executives needs to be trusted and understood.

Block 1 - Deep IT Governance

IT is more then an enabler and needs to be unsed in a more fundamental way, thus becoming a strategic asset, although in FS one does not need to be at the very forefront of innovations, one needs to keep up.

Block 2 - Broad IT governance

Most important topics: cost reduction and data analytics

Block 3 - IT competence

In general the IT competence is too low, and it is of importance to admit this as a director. All members do not need basic knowledge, but the overal profile needs to cover IT

Block 4 - EIS

-

Block 1 - Deep IT Governance

IT is underestimated by executives and especially directors, and the attention for this subject needs to be increased substantially. The directors need to keep up with the developments in IT

Block 2 - Broad IT governance

Decisions surrounding large IT projects is the biggest challenge for the board

Block 3 - IT competence

IT competence is too low in general, All members do not need basic knowledge, one expert is a must in that case though

Block 4 - EIS

Dashboard would be nice, but no EIS. Live access and drill down functions is not necessary.

Block 1 - Deep IT Governance

The time commitment for directors has increased substantially. It has become so embedded in the primary processes that it is not a separate entity anymore. IT and business alignment does need to go further; integration is needed.

Block 2 - Broad IT governance

The most important topic are cost reduction, legacy and process design and automation

Block 3 - IT competence

Way too low! A basic level is certainly needed, and one expert as well.

Block 4 - EIS

Live is not necessary, dashboard is enough

Block 1 - Deep IT Governance

Large IT projects are sometimes performed for the incorrect reasoning, it needs to focus on IT/ business alignment.

Block 2 - Broad IT governance

Consumer insight and data analytics are the most important IT topics at the moment

Block 3 - IT competence

Competence on IT is low, but it is not a topic for the board to go into deep.

Block 4 - EIS

-

Block 1 - Deep IT Governance

IT is critical and the attention is too low, especially when looking at the speed of the changing markets which are becoming all IT driven. The information that is received is of great importance; you can only manage what you measure. A board IT committee might require serious thought. Directors need hands on experience, only memo's dont cut it.

Block 2 - Broad IT governance

Topic of importance are legacy and customer interface. But also innovation needs to be part of the directs scope more.

Block 3 - IT competence

IT competence is absent in FS. All members need a basic level of IT comptence, IT makes 20% of the companies cost! One expert like a COO who has lived the problems is necessary as well!

Block 4 - EIS

No dashboards are sufficient

Block 1 - Deep IT Governance

cost of IT is not a separate figure, since it is too much one with business

Block 2 - Broad IT governance

Reducing legacy, security and IT for future developments/innovation are the most important topics on IT now.

Block 3 - IT competence

IT competence is too low, and could be improved with PE. an overall basic level on IT is important, since IT is just as important as finance for a company, in addition one expert with experience is also a must

Block 4 - EIS

Not nessecary, overview is enough

Block 1 - Deep IT Governance

-

Block 2 - Broad IT governance

Legacy and digitalisation of processes is important now

Block 3 - IT competence

Too low, forget it, thin. IT is not necessary to demand an overall IT level, but the overall profile of the board is of more importance. One expert is a must though, someone with a technical background and executive experience.

Block 4 - EIS

Only overview/dashboard is enough.

Block 1 - Deep IT Governance

FS = IT Most of the times the outside (customer interface) looks fine but the back office is a mess with lots of old legacy systems. Although on the long run IT does not form competitive advantage by itself, you do need to keep up. For the directors to function the reporting needs to improve vastly. Due to the regulatory pressure the time that is consumed by a board position has increased.

Block 2 - Broad IT governance

Legacy and data quality are the most important topics

Block 3 - IT competence

IT competence is low, but a basic level of knowledge is a minimum in nowadays world. An IT expert on the board should be mandatory! PE would be needed from an external party, and has to be practical, from experience. In addition the subject need to be taken out of the 'shame area' because directors sometimes do not admit their lack of competence on IT.

Block 4 - EIS

Oversight of information is enough

Block 1 - Deep IT Governance

The time that is needed for a board position has greatly increased. Boards are in general not equipped to deal with IT topics, it is uncharted terrain. Although this is changing, with more and more COO that are entering the board room. FS companies are information processing factories, nothing more. The impact of IT and Innovation needs to be more in the sights of the director. In addition the directors need to be proactive and talk inside the organisation with managers and CIO's.

Block 2 - Broad IT governance

Most important topics are the legacy in the core systems, data quality and structure and the client interfaces

Block 3 - IT competence

In general the IT competence is too low, and there is not enough attention for this subject. Basic IT knowledge is needed, in addition one IT expert that also has sector knowledge is needed. Although one needs to be careful that the directors do not become the executives. To improve the knowledge more PE is needed, which are not too technical, but give an overview of the landscape

Block 4 - EIS

Not needed, overview is good to have

Block 1 - Deep IT Governance

It is bevomijg the replacement for human contact, thus is an important strategic question. In addition compliance and regulations are becoming more and more a burden for directors. Contact with the organisation is very important; speak with managers. And talking to CIO's especially for less IT competent directors is of great importance.

Block 2 - Broad IT governance

Most important topics; Agile IT, Innovation, investments

Block 3 - IT competence

IT competence is insurfficiencent. Basic level is needed, and even two experts for a good discussion. For PE there is almost nothing offered right now, that would need to change to increase the competence of the boards

Block 4 - EIS

-

Block 1 - Deep IT Governance

Because of the regulations the FS companies are of a semi-public type. These kind of security nets hold back security and creative destruction, but only for so long. In talking to the executives a frame of reference was missing

Block 2 - Broad IT governance

Commerce is more and more IT driven so the combination between IT, business and innovation is needed.

Block 3 - IT competence

Comptence is too low, but the combination of IT and executive experience is difficult to come by. The basic level of IT competence needs to be higher, and an expert with experience is also needed.

Block 4 - EIS

Overview is sufficient

Block 1 - Deep IT Governance

More attention for IT in general is needed, and needs to be higher on the agenda in the management letter

Block 2 - Broad IT governance

The most important topics are Risk management, and regulations/reporting

Block 3 - IT competence

Comptence is too low

Block 4 - EIS

Not needed

Block 1 - Deep IT Governance

There needs to be a better link between IT and the Board of directors

Block 2 - Broad IT governance

important topics are outsourcing, quality and performance of IT, and project progress reporting

Block 3 - IT competence

The competence is too low, and both basic knowlege for all members is needed as is one expert with experience. External education is needed to accomplish this

Block 4 - EIS

Not needed

Block 1 - Deep IT Governance

The way that IT cost are calculated is unclear, this needs to become better. In general the reporting on IT needs to become better overall. IT is major problem for the board.

Block 2 - Broad IT governance

Major topics are legacy, cost transparency, and client interface, outsourcing, benchmarking

Block 3 - IT competence

The competence is too low, and is given too little attention. In boards the over all IT knowledge needs to be higher, and one experts is needed, on larger boards even more.

Block 4 - EIS

Not needed as live system with drill down, but overview is enough

Block 1 - Deep IT Governance

IT needs to become a more strategic point; more oversight of current and future developments are needed

Block 2 - Broad IT governance

Most important topics; uptime, security and cost of IT

Block 3 - IT competence

Competence is too low, and the general IT competence of the board needs to be higher, and one expert with more experience will be needed to fully cover the topic

Block 4 - EIS

-

Block 1 - Deep IT Governance

Block 2 - Broad IT governance

Topic that are of importance are uptime, availability and security

Block 3 - IT competence

In gerenal the competence is too low, and need to be higher. The directors have some knowledge of IT, but this needs to be much higher, and IT experience is also needed in the board

Block 4 - EIS

Block 1 - Deep IT Governance

It needs to be clear what is expected of the board on the subject of IT. The BoD needs to be able to challenge the executives to see if they know what there is going on in the company.

Block 2 - Broad IT governance

Block 3 - IT competence

In general the IT competence of directors is not really good ("minder" in dutch). Depending on the definition of a basic level it would be good that boards have a basic level of IT understanding. But more technical educated directors are needed since they have a 'natural' IT affinity.

Block 4 - EIS

Dashboard is fine, with well defined KPI's

Block 1 - Deep IT Governance

The time that is used for a board function has increase tremendously, and the role of director has been more professionalized. IT is in general a subject that has received too little attention, especially the impact of IT on the products. IT is integral in the nerve-system of an organisation. It needs to be a fixed agenda topic ("shame if it isn't")

Block 2 - Broad IT governance

Legacy, data structure/quality and automation is very important

Block 3 - IT competence

The competence is too low in general, and this needs to be increased, else discussions are not possible, in addition a experienced director is needed. To achieve this PE is needed, but this is a fragmented market, and is very superficial, and is aimed too much on compliance.

Block 4 - EIS

Not needed

Block 1 - Deep IT Governance

IT is of strategic importance mostly in the consumer market. It is of importance that directors have 1 on 1 contact in the organisation to increase knowledge and insights. This is also true for visiting suppliers, that are more capable to understand the developments in IT. Directors need to be more proactive, and this is also expected of them by society.

Block 2 - Broad IT governance

Topic that are of importance are mobile, quality of systems, big data and data quality.

Block 3 - IT competence

IT competence is insufficient. PE is present but either too technical or too broad. Basic knowledge is not needed for all directors, but an IT directors is needed. Although he should not be a technical person, but someone who can connect business and IT.

Block 4 - EIS

Block 1 - Deep IT Governance

The board of directors is more and more involved, and moving to a one-tier board structure, also due to the society. The time devoted to IT is too little, and needs to increase

Block 2 - Broad IT governance

Topics for the future are legacy systems, innovation with IT and agile IT development.

Block 3 - IT competence

The competence should be improved. Demanding a basic level is not needed, but all aspects need to be covered, an expert would be possible but also not necessarily.

Block 4 - EIS

No, then there is a danger that not all directors look at the information.

Block 1 - Deep IT Governance

IT is a utility, it just needs to work well. The BoD need to take the responsibility themselves to ensure the IT coverage.

Block 2 - Broad IT governance

Topics of importance: Improve legacy, Internet distribution model.

Block 3 - IT competence

The IT competence is insufficient ,and although basic knowledge is not needed for all members one expert is needed. One time each year a PE session on IT would be good

Block 4 - EIS

Is not needed as online tool. Good management information is fine

Block 1 - Deep IT Governance

The attention IT receives is decent, but the reporting needs to be better overall. If banks in NL would depreciate all their old IT systems they would go bankrupt in one day.

Block 2 - Broad IT governance

Legacy systems and the underlying data quality of is major concern

Block 3 - IT competence

In FS the IT competence is too low, general level needs to be higher, and more experience is also needed. Directors would need to challenge the executives more on IT, but there is not enough knowledge to do so.

Block 4 - EIS

Not needed, dahsboard that presents information in a structured manner is.

Block 1 - Deep IT Governance

It needs more attention then it receives now.

Block 2 - Broad IT governance

Topics: Security, more understanding of strategic impact of IT, cooperation between countries (for specific company)

Block 3 - IT competence

Could be improved in general. For the board the overal profile of the board is more important, but basic knowledge supported by an expert is needed. The expert would be able to connect business and IT, whilst also having executive experience. To accomplish this PE would be needed, but not technical. The modules need to talk the language of a director.

Block 4 - EIS

No, 'trafficlight system is enough'

Block 1 - Deep IT Governance

The information quality that is received needs to be improved.

Block 2 - Broad IT governance

Topic of importance are mobilem and international system integration

---

Block 3 - IT competence

The current level of IT knowledge is insufficient in FS. It is not needed that all directors have IT knowledge but at least two are needed that understand the impact of IT on the organisation and the risks involved. In addition the dutch national bank would need to have IT in the competence test.

Block 4 - EIS

It is important to have a good balanced scorecard and to steer on that information

---

Block 1 - Deep IT Governance

In the board there is lots of contact with the management, this is good, but does not need to be like that in every organisation. It is a very strategic asset, but the BoD doest act accordingly in many cases.

Block 2 - Broad IT governance

Major topics are: flexibility of the IT system, security and disentanglement of IT systems.

Block 3 - IT competence

In general the IT competence is too low. And a basic level of IT knowledge for the board would be good, but the entire board competences need to be kept in mind (this is more important). The BoD would need to check in the self-evaluation if IT is an issue or not. The BoD does not need to be ashamed to explore IT to enhance the competence, since doing as if they know it is much worse.

Block 4 - EIS

trafficlight system' is enough

Block 1 - Deep IT Governance

IT needs to be on each board agenda, and at least once a year a more strategic IT session is need which is very comprehensive.

Block 2 - Broad IT governance

Major topics are: quality of the organisation, strategic use of IT, and the quality of the IT systems

Block 3 - IT competence

Insufficient competences, this should be changed with PE for directors, so that the overal level of IT knowledge is raised. Somehow this need to be done without the directors having to feel ashamed for their lack of knowledge. In addition experts are needed as well that bring experience into the board room.

Block 4 - EIS

-

Block 1 - Deep IT Governance

IT is fully outsourced,

Block 2 - Broad IT governance

Block 3 - IT competence

Competence of directors in FS is insufficient, both the basic level of the directors as more experts are needed in the board.

Block 4 - EIS

Block 1 - Deep IT Governance

In general IT is discussed every time, and 20% of the time is spent on IT, this is enough.

Block 2 - Broad IT governance

Client interface, system integration and external supplier management are the main topics for the BoD

Block 3 - IT competence

IT competence is virtually non-existent with BoD's. To enhance this PE is needed in a broad sense and an expert on IT needs to sit in the board; he/she needs business and IT profile.

Block 4 - EIS

A balanced scorecard systems should suffice, the executives should steer accordingly.

Block 1 - Deep IT Governance

Informal contact with managers, suppliers or other parts of the organisation is a good idea to have.

Block 2 - Broad IT governance

Block 3 - IT competence

The competence is too low, this is caused by disinterest and age. Some basic knowledge is needed for all members but this does not need to be very technical. One expert should be enough, that can cover the IT subject. the basic knowledge can be achieved through PE, this will also improve the attention for IT

Block 4 - EIS

Dashboard with 'traffic light' system is fine, it would just be nice to be able to look past the traffic lights, since sometimes they don't tell the complete story. Trends need to be visible.

Block 1 - Deep IT Governance

In this company IT is talked about every Audit and Risk committee meeting, and there is a strategy session on which the subject is also discussed. On these meetings 25% of the time is spent on IT, this is sufficient.

Block 2 - Broad IT governance

The most important topics are legacy, regulatory pressure and security.

Block 3 - IT competence

If you understand the complexity of IT, you will estimate your own knowledge and experience lower. In general the competence is too low, and needs to be higher. There is also not enough attention for PE in this field. All members of the board need to know to a certain extent about IT, since it is a subject that is as important as finance. At least one member needs to have deeper experience in the field of IT.

Block 4 - EIS

Not needed, traffic light system with trends is enough.

Block 1 - Deep IT Governance

In general the attention that is directed towards IT needs to be more. Although it is not needed to have it as a fixed agenda point. But it is good to have a strategic session that is devoted to IT entirely.

Block 2 - Broad IT governance

Block 3 - IT competence

In general the IT competence is too low, PE should change this, although it is needed to make a difference in the level of competence, since there is a large discrepancy. In the self-evaluation the board of directors needs to explicitly look a the competences of the board in its entirety.

Block 4 - EIS

-

Block 1 - Deep IT Governance

strategy and IT are intertwined, it is required to survive. In general and for this company specifically the attention for IT is too low. In addition IT needs to be a fixed agenda topic, and at least once a year a more strategic IT session is needed.

Block 2 - Broad IT governance

The hot IT topics are; speed of IT developments, innovation with products and services, and communication with the client.

Block 3 - IT competence

IT competence is too low.

Block 4 - EIS

-

Block 1 - Deep IT Governance

There is a distinct lack of attention for IT and innovation on the board. It is not needed to be ahead of the curve, but innovation is needed. The biggest risk are too low investments, and the lack of attention for IT at the top level of FS. For this company every meeting has an IT topic, and 10% of the time is used for it, which is enough.

Block 2 - Broad IT governance

The hot topics are continuity, big data and online client interface.

Block 3 - IT competence

"IT competence at the board level is sad, and worrisome, many of the directors don't want to admit their lack of knowledge". Still it is not needed to have all board members with IT knowledge, the overall profile is more important. Although one expert is needed, in addition an Innovation expert would be needed as well.

Block 4 - EIS

Block 1 - Deep IT Governance

Regulatory and social pressure lead to a more professional directors role.

Block 2 - Broad IT governance

Block 3 - IT competence

Competence is too low in general. BoD members overestimate their own knowledge and that is dangerous. There is a large need for PE, in which the link between architecture and strategy needs to play a larger role. In general the overall knowledge level needs to be higher, and more experienced IT directors are needed.

Block 4 - EIS

Not needed, but better high level insights in the progress of large IT projects would be great.

Block 1 - Deep IT Governance

At this company 25 percent of the time is spent on IT, this is enough. But IT needs to be a standard agenda topic, combined with a strategic IT session yearly.

Block 2 - Broad IT governance

Block 3 - IT competence

Competence is too low, although a basic level is not needed, at least two IT experts are needed. ex-COO's IT consultants that can connect IT and business would be perfect.

Block 4 - EIS

Real-time EIS is not needed.

Block 1 - Deep IT Governance

20% of the time is spent on IT topics, this is sufficient.

Block 2 - Broad IT governance

Strategic IT usage needs attention as a subject.

Block 3 - IT competence

Competence is too low, and directors need to say of they dont know. In addition the 'IT side' needs to make sure that the communication is not too technical.

Block 4 - EIS

-

Block 1 - Deep IT Governance

20-25% is spent on IT during meetings, this is sufficient.

Block 2 - Broad IT governance

There are two processes, internal and external, the strategic perspective has its main focus on the external aspect. Main topics are cost reduction, legacy, and client interface.

Block 3 - IT competence

The competence is probably too low, the basic knowledge on IT is needed for a board, with in addition an IT director (for example IT consultant from big 4)

Block 4 - EIS

Not needed, traffic light system would be sufficient.

Block 1 - Deep IT Governance

The importance for IT is enormous in this organisation, 18% of the total cost is IT.

Block 2 - Broad IT governance

Data analytics, stakeholder analysis, and security are major topics.

Block 3 - IT competence

In general is the IT competence on the board level not very high

Best Practices

- Cost reporting, and the question if there is enough invested in IT is important to ask for a director
- The overall competence profile for the board is very important on the topic of IT
- Once a year an IT strategy session would be a good idea, but IT does not require to be a fixed agenda topic

Block 1 - Deep IT Governance

The strategic importance of IT is massive. Banks are IT companies. In this company there is informal contact between the directors executives. The formal role of directors is changing to a challenger/advising role. A yearly IT strategy session is a good idea, but the directors should not become executives.

Block 2 - Broad IT governance

Block 3 - IT competence

In general the competence on IT is too low a the board level in FS, although a basic level of knowledge is not needed, the overal profile is more important. One expert with deeper experience is a good idea. To make use of external knowledge should not be a problem, when directors feel they cannot make the correct estimations.

Best Practices

- IT expert with experience would be good idea to add to the board.

Block 1 - Deep IT Governance

In general IT can be considered as a strategic asset. The board needs to actively ask questions on IT topics and challenge the executives.

Block 2 - Broad IT governance

Continuity, agility and cost reduction are important topics. The board also needs to take project progress into account.

Block 3 - IT competence

In general there are no real IT directors, though this would be good. For directors IT experience is more important then IT knowledge.

Best Practices

- Overal profile of the board needs to entail IT
- PE for directors on IT subjects is needed, and should be part of the competence check from the Dutch National Bank.

Block 1 - Deep IT Governance

For this company also IT can be considered a strategic asset. But on the other hand this will change in the future where IT will just be an enabler that just needs to work. In addition the cost need to be lowered to stay competitive. The information that is given to the directors is very comprehensive, but if needed directors can receive more information. Because of the impact of IT it is always a topic in the board meetings.

Block 2 - Broad IT governance

Block 3 - IT competence

Not all directors need to have knowledge/experience in IT, but 2 with deeper experience is needed. This IT director needs to have a high level overview of IT. A CIO would not be a good IT directors since they tend to be too technical.

Best Practices

- More IT experience is needed in the board
- Because of the impact of IT the subject needs thorough attention

Block 1 - Deep IT Governance

For boards IT should be a fixed subject on the agenda during meetings, although this can be the audit/risk committee of the board. The entire board can then talk about the main findings/topics. One yearly IT strategy session is also a good idea. The directors needs to challenge the executives, and not just passively monitor.

Block 2 - Broad IT governance

Block 3 - IT competence

All members on the board need to have a basic level of knowledge, this needs to enable them to ask questions and challenge the executives on a strategic level. In addition one person with more thorough knowledge is also needed to challenge the executives more in a deeper/content way.

Best Practices

- Active challenging role for directors
- IT needs to be fixed topic
- The board needs both a basic level of IT competences as an expert that can challenge more content wise.

Block 1 - Deep IT Governance

Because of the regulatory pressure directors cannot focus enough on the matter of the subject; what does IT mean for the company. Although this is the case, attention for IT is needed.

Block 2 - Broad IT governance

Block 3 - IT competence

In the boards more directors with an IT background are needed, although the overall competence profile of the board is most important

Best Practices

- IT competence needs to be present in the board, with two more experienced persons. Though the overal profile is the most important factor.

Block 1 - Deep IT Governance

The members of the board need to be more present in the organisation, and need to be more proactive.

Block 2 - Broad IT governance

Block 3 - IT competence

The board needs a good level of IT competences, and need to understand the risks and measures that IT needs and encompasses. At least one person in the board needs to have deep understanding of IT, and needs to be able the bridge the gap between business at IT. This can be achieved with more PE.

Best Practices

- The board needs more IT competence
- One members is needed with more experience in IT
- There needs to be more attention for PE on IT