

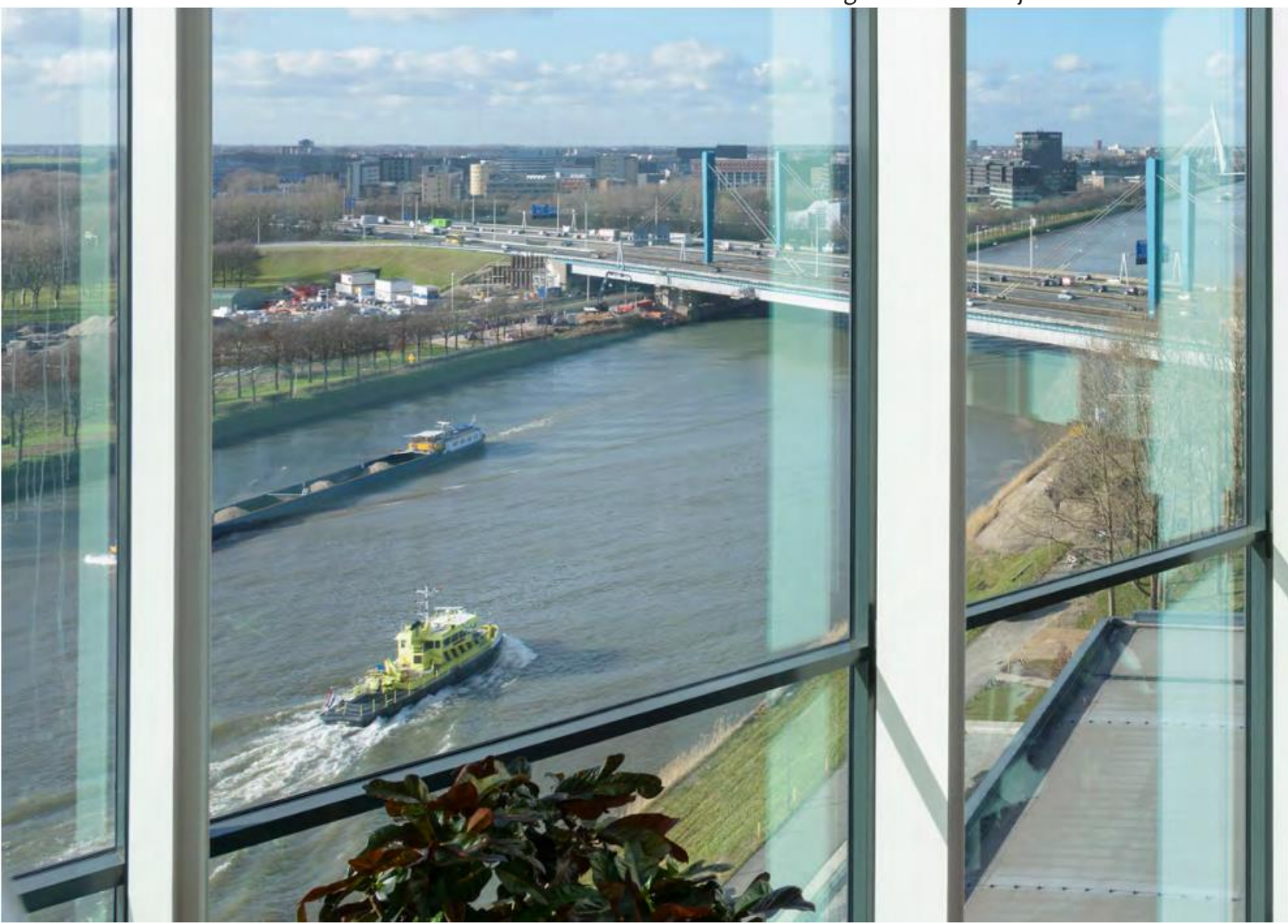


Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat

Bridging the Gap

Developing an Assessment Model to Measure Strategic Business IT-Alignment within a large Dutch Executional Government Organization

Water. Wegen. Werken. Rijkswaterstaat.



Master Thesis submitted in partial fulfillment of the requirements for the degree of
Master of Science in Business Informatics.

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We build too many walls and not enough bridges

Isaac Newton

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Jos Hessels

Utrecht, January 29, 2018.

Abstract

Purpose

The purpose of this study is twofold: to develop an assessment model that combines IT and business aspects to enhance strategic business-IT alignment (BITA), specifically for Dutch executional government organizations (DEGOs), and to apply and validate this model by consulting experts at Rijkswaterstaat (RWS) and performing a case study there. These two goals were defined after identifying three gaps in current literature and a problem investigation at RWS. In the literature, the current models were developed 15 to 25 years ago, while new emerging technologies have changed the role of IT in the business strategy. In addition, these models are often too descriptive in nature and fail when used in practice. The third gap concerns the lack of application to specific organizational contexts, especially in the public sector. RWS is a public organization, and more specifically an executional one. Aligning the business and IT strategy remains a challenge for them, while IT becomes a crucial role and public organizations can profit the most of IT to achieve the organization's strategies and improve their services to society.

Methods

The general method used for the design of the research is the design cycle by Wieringa (2014). It consists of three phases in which various research methods are used to answer the research questions. The first phase regards the problem investigation consisting of a literature review to address the gap that currently exists in the literature. In addition, company documents are reviewed and unstructured interviews are performed to achieve information for defining the problem statement. The second phase concerns the treatment design in which the assessment model is developed based on an extensive literature study and expert opinion. In the last phase, treatment validation, a case study is performed at RWS to validate the model. Interviews with 15 managers from both the IT and business at RWS are performed to evaluate the behavior of the model in practice.

Results

The treatment design resulted in the Business-IT Strategic Alignment Model (BISAM) consisting of 22 aspects across four categories: business related aspects, aspects related to the connection between IT and business, IT related aspects and environment-related aspects. The measurement approach used is a maturity model in which each of the 22 aspects contains five levels with specific criteria on each level. The goal of the interviews was to select the most appropriate level that fits the organization the best. All the 22 aspects were formulated to a question, allowing the participants to freely express their opinions and thoughts. Based on their answers and with their consent, one level was chosen for each of the 22 aspects. The average scores show how mature the organization is in their alignment between the business and IT strategy. In addition, six interviews were conducted with experts on alignment at RWS to evaluate the completeness and validity of the model.

Conclusion

Overall, the model performed well and only some minor changes were done to the formulation of some aspects and criteria. However, situational factors like red tape could have an impact on the behavior of the BISAM. Due to political exploitation, it is possible that the highest maturity level could never be achieved. Also, the large amount of stakeholders with often conflicting interest is a situational factor that should be taken into account.

The results of an assessment with the BISAM indicate the current maturity level in alignment, but also indicates opportunities for improvement. The next maturity level provides prescriptive opportunities for advancing to a higher maturity. As alignment should be seen as a dynamic process, a six-step continues process is suggested for improving strategic BITA, where the BISAM serves as a vehicle for performing the first half of the process. Eventually, alignment should be sustained by institutionalizing the culture of alignment and perform periodical assessments with the BISAM to address the changes over time in the harmonious relationship between the business and IT.

Future research should involve continuing studies to further refine and validate the BISAM to verify its appropriateness in other public sector organizations as well, specifically executional government organizations.

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Abbreviations

Abbreviation	Meaning
BISAM	Business-IT Strategic Alignment Model
BITA	Business-IT Alignment
EA	Enterprise Architecture
RWS	Rijkswaterstaat
SAMM	Strategic Alignment Maturity Model

Definitions

Concept	Definition
Antecedent	A thing that existed before or logically precedes another.
Artifact	An object, in this context, for example methods, techniques, notations, and algorithms used in software and information systems.
Aspect	A part of something, in this case, strategic business-IT alignment.
Business-IT Alignment	The degree to which IT application, infrastructure and organization enable and shape the business strategy and processes, as well as the process to develop this (Silvius A. J., 2013).
COBIT	A good-practice framework created by the international professional association (ISACA) for IT management and IT governance.
Executorial government organization	A government agency who independently delivers products and/or services to organizations within the government, against payment.
Inhibitor	A thing which inhibits (slows down) someone or something.
ISO	The International Organization for Standardization, which develops and publish international standards.
Red tape	An idiom that refers to excessive regulation or rigid conformity to formal rules that is considered redundant or bureaucratic and hinders or prevents action or decision-making. It is usually applied to governments, corporations, and other large organizations.
TOGAF	The Open Group Architecture Framework is a framework for the development and management of Enterprise Architecture.

Thesis Outline

This thesis is structured as follows:

- **Chapter 1 – Problem Investigation**
The first chapter comprehends a clear view of what phenomena must be improved and why. It contains the problem statement, the research goal and its research questions, the scientific and social relevance, the design of the research and the literature review. The latter confirms that a gap exists in research regarding this subject and gives an answer to the first research question: what is business-IT alignment?
- **Chapter 2 – Treatment Design**
This chapter is about developing the artifact (assessment model) to treat the problem defined in the previous chapter. The chapter is divided into two sections in which the second and third research question are answered. Thus, a literature study is done to understand how BITA is measured and expert opinions are used to identify alignment aspects that are specifically applicable to the public sector. Next, the actual assessment model is developed during research question three based on the information gathered in research question two.
- **Chapter 3 – Treatment Validation**
Chapter three contains the last phase of the design cycle, in which the developed artifact is validated in order to examine whether the design treats the problem. This is done through a case study within a large DEGO: Rijkswaterstaat. In addition, research question four is discussed in which the results of the assessment are evaluated, and a literature study is done to explore how the developed model could improve strategic alignment.
- **Chapter 4 – Reporting**
In the fourth and last chapter of this thesis, the conclusion and discussion are reported. It contains a brief overview of the answers on the research questions, interpretations of the results, research limitations and suggestions for future work.

Figure 1 (on the next page) shows an overview of the above in which the relationship between the research questions and chapters is illustrated.

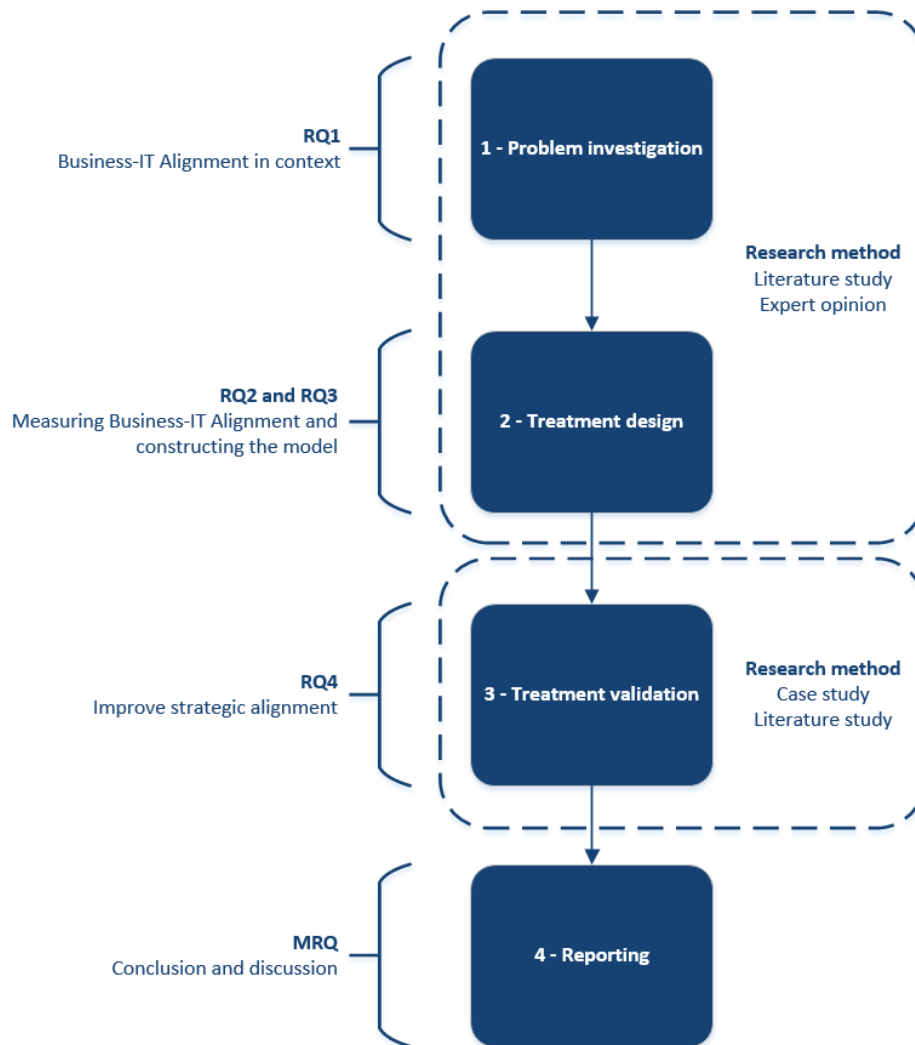


FIGURE 1: THESIS OUTLINE

1 Problem Investigation

The first chapter of this thesis explores the problem this study tries to solve. To do so, this chapter is divided into three subchapters: introduction, research design and literature review. In the introduction the problem statement is described, the research questions to solve the problem and the relevance of this study. The research design contains the methods used in this study in order to answer the research questions. Lastly, the literature review confirms whether a gap exists and simultaneously answers the first research question.

1.1 Introduction

1.1.1 Problem Statement

In order to describe the problem statement, this section is divided into three parts: the current situation, the challenge this situation created and the proposed solution to tackle this challenge.

Situation

It cannot be unseen in the news: many IT projects seem to be failing within the government. It remains a challenge for the government to adequately select and execute IT projects. Often these projects turn out to be more expensive than estimated, exceed their deadlines and eventually have a poor result. A measure the government took was introducing 'Bureau ICT Toetsing' (BIT), which evaluates large projects in which IT has an important role. The goal of BIT is to give advice to minimize the risks and increase the success rate of the projects. Despite this measure, some IT projects are still failing.

RWS is a government organization, and more specifically the executional organization of the Ministry of Infrastructure and Water Management. They are responsible for executing the Ministry's strategy and policy and have the following mission for the Netherlands:

- Protection against floods;
- Develop a sustainable environment;
- Ensure sufficient and clean water;
- Make safe and efficient travel from A to B possible;
- And provide trustworthy information.

In addition, IT has become more and more a crucial role in executional government organizations. In the case of RWS, they manage bridges which depend heavily on proper IT to ensure they will open when cargo or pleasure boats want to pass. The same goes for the floodgates, they depend on information about the water level delivered by sensors which are strategically placed on multiple locations. In addition, RWS will soon be facing the challenge to renovate a large number of their 'works of art' (infrastructure). Bridges and floodgates that were built 60 years ago will be improved to ensure they will also work for the next 60 years. Besides this renovation, RWS wants to standardize the IT components of these artworks.

In order to meet the above, optimizing the information services is essential. This is where BITA houses, both the IT and the business should work in harmony where the IT plays the supporting role to help achieve the goals of the business. The business at RWS are the primary processes in which their mission is executed. More specifically, with the 'business' is meant the people that operate the bridges and floodgates, but also the people that operate the cameras on the highway, open or close lanes depending on traffic and provide information on the matrix boards. It is essential that IT supports these people and provides the correct information to ensure they can do the right thing (recall the last mission statement). Which raises the question: Is RWS doing the right thing? Does the IT deliver the correct information? Are the business and IT aligned on a strategic level? To answer these questions, insight into their BITA is desired.

Challenge

In order to acquire this insight, an assessment is needed on their current strategic alignment. Which brings the challenge of this study: addressing the problem of assessing strategic BITA within a large DEGO like RWS. As it is essential to have insight into the extent to which IT supports the business strategy. With this insight, improvements could be made to achieve proper strategic alignment and excel in their mission to the Netherlands.

However, to this day, there is no appropriate method nor model to assess the alignment between strategic business and IT plans in executional government organizations. Meaning, underlying to the challenge mentioned before, an assessment model needs to be developed. Various business and IT goals and other relevant alignment aspects will be taken into consideration. These aspects will be categorized and weighed such that BITA can be quantified. In the end, the model to be derived from this study will be able to label the extent to which IT aligns with the business with numerical values or percentages. Besides the quantification in the model, the assessment done with the model will also provide qualitative data. For example, for which aspects improvement is needed in order to increase the alignment. Furthermore, this model can be used again over time, which is especially useful when functions, activities and strategies change. The differences in the outcome can be compared to measure whether improvements have been made. Lastly, the model will be specifically developed for DEGOs, which also distinguishes this study in the current state of literature in BITA.

There are BITA models that provide an assessment, however, as supported by the literature review in [chapter 1.3](#), these models are outdated due to emerging technologies, have a lack of organizational context and are often too theoretical and descriptive in nature. The challenge of this study is to adjust the current models in order to tackle these three gaps in the literature. Besides the contribution to scientific literature and society, the study will be beneficial for RWS as a case study will be done to assess their current state in strategic BITA. This case study serves as an instrument to validate the assessment model and simultaneously provides insight for RWS.

Summarized, this study addresses how to assess and improve strategic business-IT alignment in a large Dutch executional government organization by developing an assessment model such that it can assess the alignment in order to acquire insight in the extent to which the IT supports the business strategy and how the alignment between these can be improved.

Solution

The solution will be an assessment model that serves as a fundament to measure strategic BITA for the next couple of years at RWS. Results of a particular assessment are useful for updating the strategy plans, containing actions to improve strategic BITA. Because a case study is conducted at RWS, the results will be used as input for their upcoming strategy plan: 'i-Strategie RWS 2.0 (2019-2022)'. Additionally, the goal of this study is to serve other DEGOs as well, such as the Employee Insurance Agency (UWV), Dutch Vehicle and Driver Licensing Authority (RDW), The Royal Netherlands Meteorological Institute (KNMI) and the Dutch Tax Administration (Belastingdienst). While the case study is done at RWS, the assessment model could also be used by these organizations to acquire insight into their strategic BITA.

As mentioned before, measuring the alignment after each update creates insight into whether improvements were made in the extent to which the IT supports the business strategy. In addition, BITA can be measured on different levels in the organization, such as operational, process- or project level. However, the scope is limited to the policy and plans. More specifically, the aim is to focus on strategic alignment in this research whereas the strategies are considered, but also the plans that put the strategy into action. Because this study is done at RWS the scope is also set to the public sector.

1.1.2 Research Goal and Questions

The research goal of this study is twofold:

- 1) To develop an assessment model that combines IT and business aspects to enhance strategic business-IT alignment, specifically for Dutch executional government organizations.
- 2) To apply and validate this model specifically for Dutch executional government organizations by consulting experts at Rijkswaterstaat and performing a case study there.

In order to reach these goals, research questions are formed in order to direct the inquiry in this study. It consists of the main question, which is the fundamental question this study is exploring, and multiple sub-questions that support the main question. According to Wieringa (2014), these questions are called design research problems, or technical research questions. As the following questions express to improve some kind of artifact (the assessment model) in some kind of context (a large DEGO).

Main Question

The main research question of this study is:

What is an appropriate model that satisfies the need for an assessment of the strategic business-IT alignment, such that a large Dutch executional government organization acquires insight into the extent to which IT supports the business strategy and how the alignment between these can be improved?

Sub Questions

The sub-questions that support the main research question above are:

- 1) **What is business-IT alignment?**
 - a) How is business-IT alignment defined?
 - b) What current approaches exist for assessing business-IT Alignment?
 - c) What is currently known about business-IT alignment in the public sector?
- 2) **How to measure business-IT alignment?**
 - a) Which aspects determine the level of strategic alignment between the business and IT?
 - b) Which aspects are specifically applicable to public sector organizations?
 - c) How can each of these aspects be measured?
- 3) **How could these aspects be combined in an assessment model to measure strategic business-IT alignment?**
 - a) What is the purpose and need of the model?
 - b) Which aspects does the model need to consist of?
 - c) How is the model constructed?
- 4) **How could this model improve strategic alignment?**
 - a) How is the model used in practice at a large Dutch executional government organization?
 - b) What are the situational factors of the public sector that influence the model?
 - c) How could the model provide insight to which extent the IT supports the business strategy?

In order to answer the questions above, a rigor research method is needed per sub-question. This requires a research design and a conceptual/research framework, which are both discussed in chapter [1.2 Research Design](#).

1.1.3 Relevance

Scientific Relevance

A lot of research has been done towards BITA since it has emerged as one of the first research domains in Information Systems (IS) literature. Still, it remains one of the main challenges of IT executives. In addition, the literature review in [chapter 1.3](#) confirms that there are still some gaps which could lead to interesting scientific insights. Summarized, these gaps are:

- 1) The current business-IT alignment models are too descriptive in nature and fail when used in practice;
- 2) The fundamental models were developed 15 to 25 years ago, while new emerging technologies have changed the role of IT in the business strategy;
- 3) Their application to specific organizational contexts is still lacking, especially in the public sector.

The aim of this research is to fill these gaps in order to contribute to the scientific literature and serve as a foundation for further research. Which, eventually, supports IT executives to overcome the challenge of aligning the business and IT in their organization.

Lastly, this research will create an assessment model to evaluate BITA. Which is partly based on existing models in the scientific literature. This model, that is specifically adapted to the public sector, considers new technologies and focuses on practicality, is going to give insight to practitioners and researchers in the field of IS.

Social Relevance

IT plays a crucial role in organizations for the support, sustainability and growth of the business. An adequate alignment between the IT and business enhances the success of an organization in many ways. Especially in the public sector this remains a challenge as IT projects tend to exceed their budget, deadlines and eventually have a poor result. Additionally, IT is becoming more and more a crucial role and new technologies are emerging that change the role of IT in the business.

Thus, especially in the public sector, it is essential that both IT and the business work in harmony as they serve the society. Meaning that they have an exemplary role in their country but also have to make sure that everything works as it should be. This means that, for example, the floodgates should close when the water level rises. The operators of these floodgates depend heavily on proper IT as the sensors on the sea detect the rise in water level and tailor-made software opens and closes the floodgate. This all to make sure the citizens of the Netherlands maintain dry feet.

Another example is that RWS's mission is to make safe and efficient travel from A to B possible. For this, trustworthy information is needed for the drivers on the road. Which is done through, among others, the well-known matrix signs and cameras across the highways. These also depend heavily on proper IT and the same goes for the operators who use tailor-made software to control these components.

These operators and other primary processes comprehend the business, and thus insight is needed in their BITA to ensure that IT is delivering the correct information and tools to the business who eventually deliver value to the customers and so the society. The aim of this research is to create this insight by developing an assessment model which can evaluate the level of alignment. This model serves as a base for other DEGOs as well, such that with the acquired insight improvements could be made to excel in the mission to serve society.

1.2 Research Design

As the study embraces a design problem, the design cycle of Wieringa (2014) is used as the research method. Because, eventually, the goal is to design an artifact (assessment model) to improve the problem context (insight in the extent to which the IT supports the business strategy). The design cycle is a rational problem-solving process which consists of three tasks as seen in Figure 2.

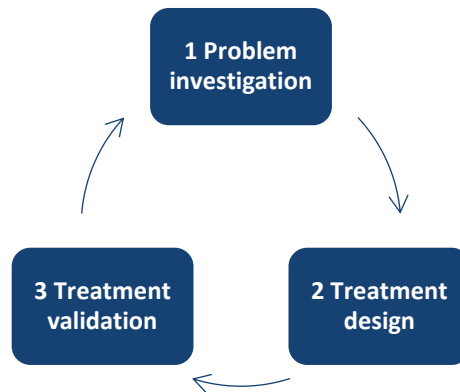


FIGURE 2: DESIGN CYCLE (ADAPTED FROM WIERINGA, 2014)

This design cycle is part of a larger cycle: the engineering cycle. Which consists of two additional tasks in which the validated treatment is transferred to the real world by implementing and evaluating. Regarding problem investigation, it is important to have a clear view of what phenomena must be improved and why. In the second task, treatment design, an (or multiple) artifact(s) are designed that could treat the described problem. The treatment validation task is used to validate whether these designs treat the problem. When validated, the task treatment implementation starts, where the problem is treated with one of the designed artifacts. In the last and fifth task, the treatment is evaluated. Was the treatment successful? If required, this task may start a new iteration through the engineering cycle. However, in this research, the design cycle is used and thus only the three tasks shown above are executed.

Based on the various research methods presented by Wieringa (2014), this study could be identified as a solution-oriented (technical) research. An artifact will be designed and validated by performing a case study. In the tasks of the design cycle, different research methods are needed to perform this study. For the first task, problem investigation, surveys will be done in order to acquire relevant information that contributes to identifying the problem and designing an appropriate artifact. More specifically, these surveys will be mostly taken by interviews with relevant stakeholders. In this study, the relevant stakeholders are Matthijs Sepers and Dwight Wiebers, who are both a strategic advisor in the domain information service assurance of RWS and supervisor of this project. In addition, relevant company reports are surveyed to investigate the problem context and a literature study is done to explore BITA and confirm the gap in the scientific literature

For the second task, the treatment design, an extensive scientific literature study will be performed. Different scientific contributions on BITA will be used to develop the concerned artifact: the assessment model. To achieve developing such a model, relevant business-, IT goals and alignment aspects will be categorized and weighed in this literature study. Additionally, experts are consulted at RWS in order to make the model specific to the public sector.

In order to validate the treatment design, a case study is done for the third and last task. The artifact will be used by performing an assessment at RWS. The results of this assessment serve as advice but also tell whether the design would treat the problem. If the treatment was successful and the goals of the stakeholders are met, the research could be considered as completed. Meaning, the treatment design should have fulfilled the design problem of this study:

Improve and assess strategic business-IT alignment in a large Dutch executional government organization by developing an assessment model that is able to assess the alignment in order to acquire insight into the extent to which the IT supports the business strategy.

If this is not the case, the researcher may start a new iteration through the design cycle by reconsidering the problem investigation.

1.2.1 Literature Study

This section describes the protocol used to search, select and study relevant literature for this study. A traditional literature review is done, which means it consists of mostly a list of related work. However, a semi-structured approach is used to ensure the used literature is of high quality and adds value to the research and thus assessment model. For this, some elements described by Kitchenham (2014) are used. In short, a search strategy is defined, some boundaries are set in selecting relevant literature and keywords are determined, which together describe the literature research protocol of this research.

Search strategy

A manual search for relevant literature is done with help of Google Scholar. Which, together with the Utrecht University Library, should provide a sufficient amount of literature about BITA. When the relevant literature is found, the snowballing method is used to find additional related literature (Wohlin, 2014). This translates to pursuing references of references in systematic literature. For example, when an interesting scientific publication is found about achieving and sustaining BITA, a search is done through the references. When this particular publication refers to other interesting publications, these will be included in the literature review as well. This process called snowballing continues until a sufficient amount of literature is acquired.

In addition to Google Scholar, other search engines are used as well to prevent missing out on relevant literature. These search engines are:

- **DBLP:** An online reference for open bibliographic information on computer science journals and proceedings.
- **ResearchGate:** A social network for scientists and researchers to share papers. But also to ask and answer questions, and find collaborators.
- **ACM Digital Library:** A comprehensive database of articles and bibliographic literature covering computing and information technology.
- **IEEE Xplore Digital Library:** IEEE journals, transactions, letters, magazines and conference proceedings in engineering and technology.
- **Springer Link:** Scientific documents from journals, books, series, protocols and reference works.
- **Wiley Online Library:** A gateway to scientific, technical, medical and economic publications.

For the literature review, a time period of two months is reserved in order to do an extensive review and make sure that there is enough input for developing the assessment model.

Selection criteria

The inclusion- and exclusion criteria used for primary studies can be found in Table 1 below.

Included	Excluded
Studies published since 2005	Studies published earlier than 2005
Studies that are published in English	Studies with less than 3 pages
Studies that either uses quantitative- or qualitative methods of analysis	Studies with a publication language other than English
Studies that directly relate to Business-IT Alignment	Non-peer reviewed studies (grey literature)
Studies that include strategy, goals and maturity aspects of Business-IT Alignment	Studies that do not answer the research questions
Studies that propose measurement models	
Studies that includes a case study (in the public sector)	
Fundamental studies of Luftman, Maes and Henderson (1990-2000)	

TABLE 1: SELECTION CRITERIA LITERATURE SEARCH

These criteria are used for searching literature to set a boundary for literature used in the research. Although BITA is one of the first research domains in IS literature, still a boundary is set regarding the date of publication. The reason for this is due to the changing role of IT in the business as a result of emerging technologies. This boundary makes sure that only relevant aspects are taken into consideration. However, there are some fundamental studies that propose and discuss BITA models which will be of great use. These studies of Luftman, Maes and Henderson are well-known and many elaborations have been done on their proposed models. Therefore they serve as a great start in developing an assessment model to measure strategic BITA within DEGOs.

Keywords

In order to acquire the relevant literature based on the selection criteria and sources above, various keywords are used in the search engines mentioned previously. Table 2 contains the main concepts and their related keywords, which are used as search queries.

Concept	Keywords
Business-IT Alignment	Maturity, strategy, framework, (measurement) model, goals, (best) practices, dimensions, constructs, requirements, assessment, approach, public sector, government
Strategic Alignment	IT Governance, COBIT 5, IT strategy, business strategy, implementations, ISO 38500, maturity, planning, management
Enterprise Architecture	Business IS/IT Alignment
Business/IT Portfolio	Programs, projects, innovations, services, management

TABLE 2: CONCEPTS AND KEYWORDS FOR LITERATURE SEARCH

Results

The above protocol yielded in a total of 115 studies. These studies were assessed on their purpose, overall research quality, relevance, research design and scientific/theoretical contribution. This assessment reduced the number of studies to 93 which was reviewed thoroughly and further used in the research to develop an assessment model that satisfies the assessment of BITA in a DEGO. A state-of-art literature review is performed to create an understanding of the existing knowledge and serve as input for the design of the assessment model. The review of these studies can be found in [chapter 1.3](#) of this thesis.

1.2.2 Case Study

For the design of the case study, the protocol proposed by Yin (2003) is used. The template from Brereton, Kitchenham, Budgen, & Li (2008) is mostly based on the research done by Yin and thus used to shape the case study. The template consists of 10 items of which five are described in the treatment validation chapter: [3.1 Applying the Assessment Model – A Case Study](#). The other items regard criteria for case selection, case study roles, schedule, study limitations and reporting, of which the first three were already defined in preparatory to this study: the research proposal. Regarding the latter two, the study limitations are presented in the discussion section and reporting is done in an external document due to the policy of RWS, which considers the results of the case study confidential.

1.2.3 Research Framework

In addition to the design cycle, the research framework of Hevner, March, Park, & Ram (2004) is used. This framework is shown in Figure 3 below, whereas the design cycle is housed in the ‘Research’ concept. Basically, this framework is used to understand, execute and evaluate research in the IS domain, which combines behavioral science and design science paradigms.

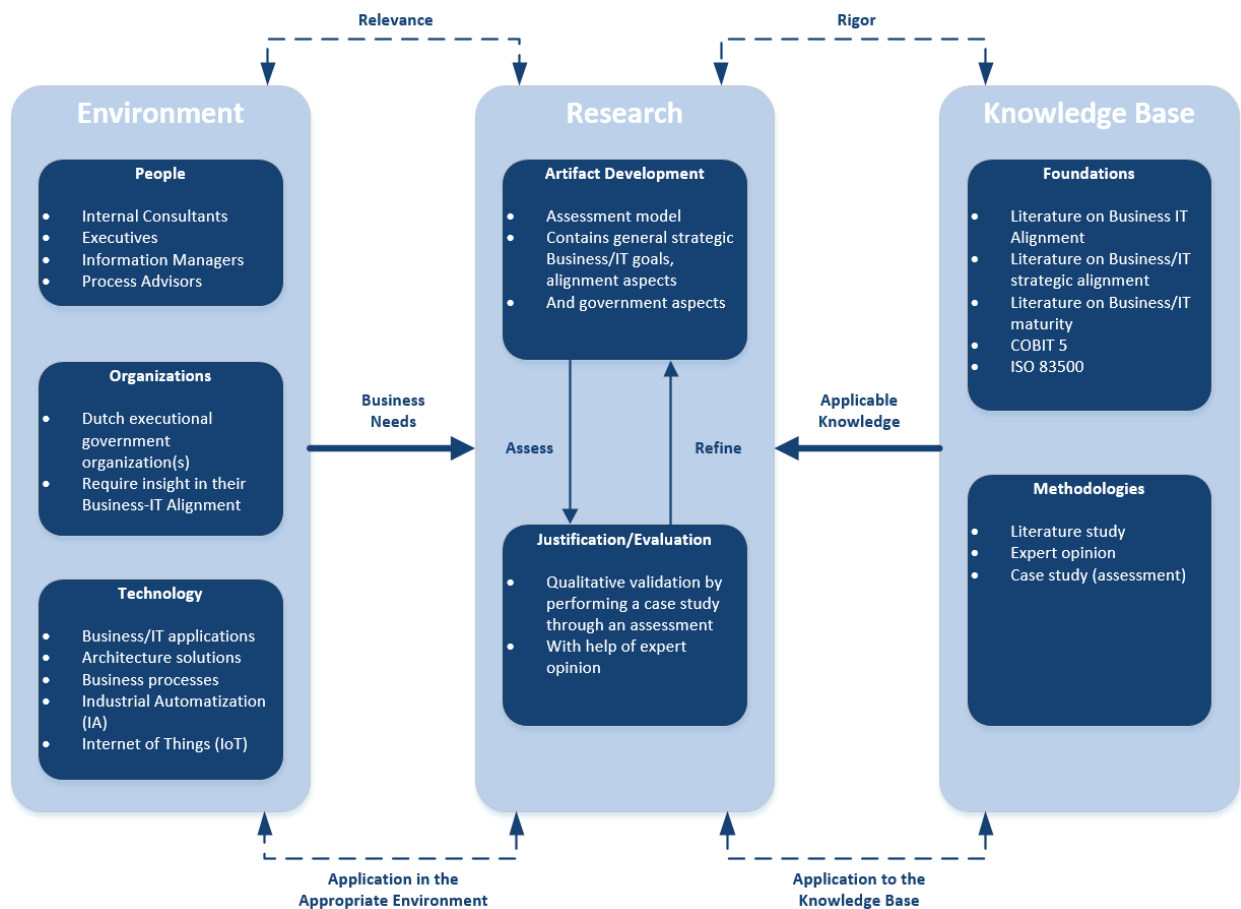


FIGURE 3: RESEARCH FRAMEWORK (ADAPTED FROM HEVNER MARCH, PARK, & RAM, 2004)

1.2.4 Conceptual Framework

For the outline of this research, a conceptual framework is developed as shown in Figure 4 on the next page. Basically, it shows how to find answers to the research questions and the research methods which are mapped on the design cycle discussed earlier. Additionally, it visualizes the research in general with the according deliverables, phases, research questions and -methods. Meaning, this framework comprehends all the research elements needed to adequately perform a proper research. It creates a useful overview of the outline of this research.

The next chapter, the literature review, covers the problem investigation phase. Together with the research plan, it forms the research proposal which initiated this research report. The problem investigation phase describes what phenomena must be improved and why. In the literature review, an answer on the first research question is given to confirm that a gap exists in the literature. In addition, it shows a list of related work to establish a current body of knowledge which serves as a foundation for the other research questions. In this report, this phase concludes the introduction, research design and literature review.

In the second and most important phase, a treatment is designed that could solve the problem described in the previous phase. First, a literature study is done to identify general alignment aspects that have an influence on BITA. After that, alignment aspects that are specifically applicable to the public sector are identified. When a list of these aspects is created, a method for measuring is identified through a literature study. Which concludes the second research question and serves as input for constructing the model, the third research question.

The construction consists of describing the need and purpose of the model, identifying which aspects should be part of the model, and the construction itself. Expert opinion is used in this phase to prioritize the aspects. The output of this phase is an assessment model which is validated in the last and third phase of the design cycle.

The validation is done through a case study, of which the results serve as input for the deliverables for RWS: an assessment report, advice presentation and manual. In addition, the results are evaluated which could lead to improvements in the initial assessment model. The third phase is concluded by a literature study to improving strategic alignment, which answers the last and fourth research question.

The reporting phase consists of merging and finalizing the deliverables created throughout the phases. The deliverables are divided into deliverables for RWS and Utrecht University, whereas this deliverable covers the research report.

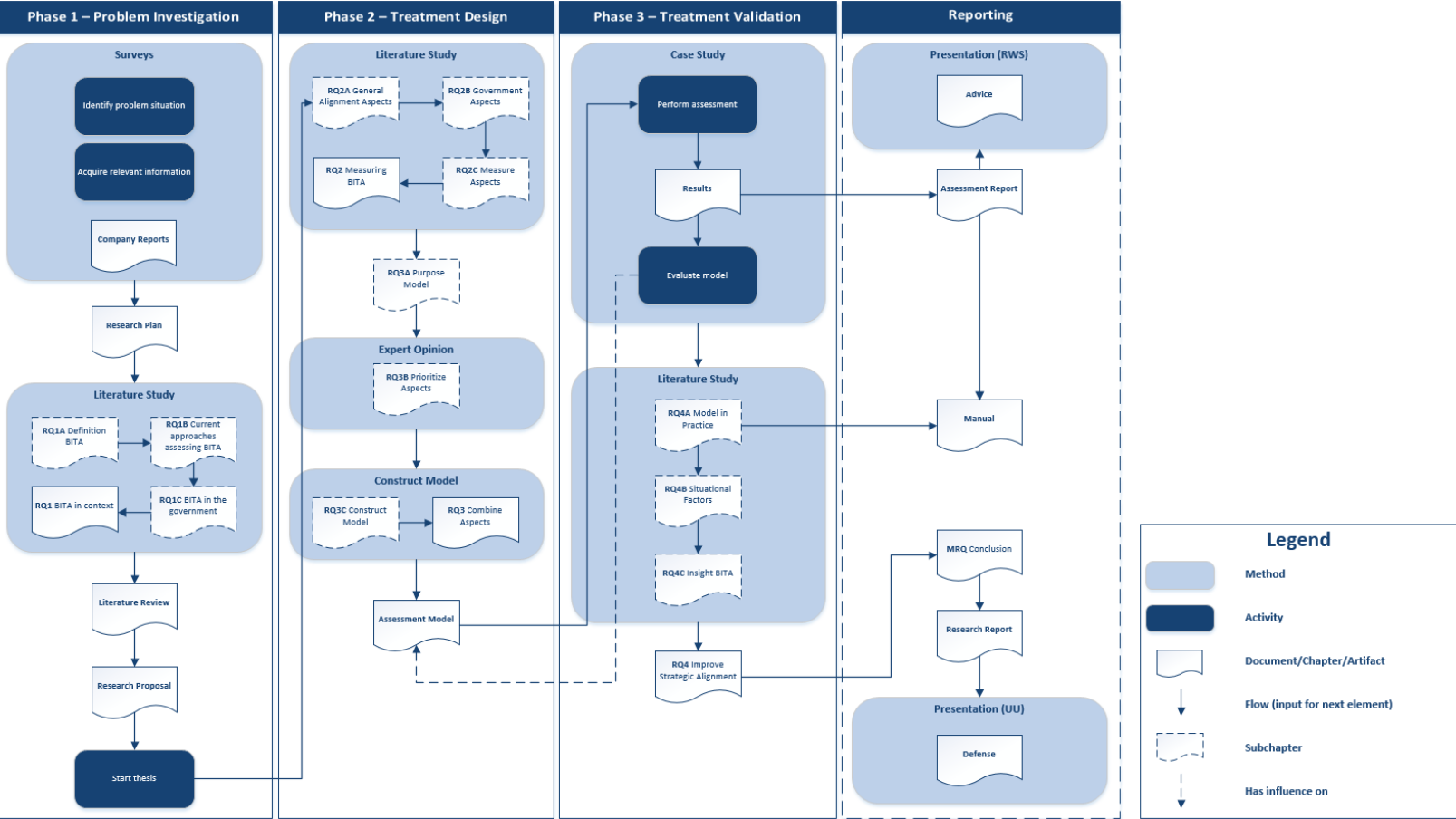


FIGURE 4: CONCEPTUAL FRAMEWORK

1.3 Literature Review – Business-IT Alignment in Context

1.3.1 Definition

IT plays a crucial role in organizations for the support, sustainability and growth of the business (Haes & Grembergen, 2008). An adequate alignment between IT and business enhances the success of an organization in many ways. Specifically, it enables organizations to:

- Maximize the impact of investments in IT (Byrd, Lewis, & Bryan, 2006) (Kashanchi & Toland, 2006);
- Achieve harmony between IT and business (Tan & Gallupe, 2006);
- And increase their competitive advantage, profit margins and growth (Byrd et al. 2006).

The concept ‘business-IT alignment’ comprehends the dynamic process for achieving this. BITA is defined in multiple ways throughout the studies that have been conducted over the last two decades. In fact, BITA is one of the first research domains in IS literature (McLean & Soden, 1977). Still, there is no consensus on a widely-accepted definition of BITA (Kyobe, 2008). A selection of definitions found in the literature is shown in Table 3.

Definition	Reference
<i>“The problem of matching IT services with the requirements of the business.”</i>	(Campbell B. , 2005)
<i>“Linkages between business and IT at the strategic or planning level, which is the degree to which the IT mission, objectives, and plans support, and are supported by, the business mission, objectives, and plan.”</i>	(Chan & Reich, 2007)
<i>“Business and IT Alignment is the degree to which IT application, infrastructure and organization enable and shape the business strategy and processes, as well as the process to develop this.”</i>	(Silvius A. J., 2013)
<i>“The process where business and IT work together to achieve a common business goal.”</i>	(Wieringa, Gordijn, & Eck, 2005)
<i>“The process that helps business organizations understand their goal according to the influence of technology on organizational strategy through the development of a reasonable IT strategy.”</i>	(Xiang, Xiaobo, & H., 2008)

TABLE 3: BUSINESS-IT ALIGNMENT DEFINITIONS

Despite no consensus on a precise definition, the definition by Silvius (2013) covers the essential components of BITA in the literature. Due to this, the definition by Silvius (2013) is used as fundamental in this study for further references to BITA.

In the last few years, a new phenomenon has emerged which requires a rethought of BITA: digitalization or digital transformation (Horlach, Drews, & Schirmer, 2016) or digital business strategies (Kahre, Hoffmann, & Ahlemann, 2017). It is a challenge for organizations today where IT responsibilities are shifting to the business units or even to a whole new unit that needs to be established: a digital IT unit. Especially in today’s technologic advanced and innovative organizations, IT is becoming or already is their business. This way, the business is more flexible in adapting IT but also in adapting to opportunities in the market and the needs of the customer. The arising of this concept requires BITA to be reconsidered and extended to adapt to the age of digitalization. However, there are still an enormous amount of ‘traditional’ organizations that struggle with the digital transformation. The reason for this is mostly due to the complex IT infrastructures and inflexible organizational structures (Horlach, Drews, & Schirmer, 2016), two well-known challenges in especially the public sector. The business and IT units are seen as separate silos and require attention to strategic BITA, a prerequisite before focusing on the paradigmatic shift in strategic management (Kahre, Hoffmann, & Ahlemann, 2017).

Additionally, although BITA already exists for a couple of decades, many IT executives still see this concept as one of their key issues (Luftman J. , 2005), (Luftman, Kempaiah, & Nash, 2006), (Luftman & Kempaiah, 2008), (Luftman, Kempaiah, & Rigoni, 2009), (Luftman & Ben-Zvi, 2010a), (Luftman & Ben-Zvi, 2010b), (Luftman & Ben-Zvi, 2011), (Luftman & Derksen, 2012) and (Kappelman, McLean, Johnson, & Gerhart, 2014). While various studies have shown that organizations who successfully adopt BITA, outperform organizations who lack in the alignment of the business and IT (Chan & Reich, 2007). For this reason, and the aforementioned concern of digitalization, this research focuses on strategic BITA. The related and new concept 'digitalization' is out of scope as, especially in the public sector, it does not have the required attention yet in practice and literature. First, future research is required to examine the impact of this new phenomenon on BITA.

“Organizations that successfully align their business strategy with their IT strategy will outperform those that do not.” (Chan & Reich, 2007, p. 298)

Despite the benefits of 'proper' alignment, it seems that BITA is a persistent challenge for organizations as technologies, markets and economies are constantly changing, and thus making alignment a continuous activity (Kappelman et al., 2014). IT executives acknowledge the need for alignment and the improvement in organizational performance has been proven (Luftman & Derksen, 2012), thus, how to achieve BITA? More importantly, what is alignment? How can this be analyzed to acquire insight and make improvements? For this, several studies propose models or frameworks to conceptualize BITA. A well-known model is the Strategic Alignment Model (SAM) of Henderson & Venkatraman (1992), but also the '9-squares' model of Maes, Rijsenbrij, Truijens, & Goedvolk (2000) is referred numerously in BITA literature. Additionally, many elaborations have been done on these models. Mekawy, Rusu, & Ahmed (2009) evaluated multiple of these models and provided an evaluation based on 23 criteria points. The Strategic Alignment Maturity Model (SAMM) of Luftman (2000) was concluded as the most comprehensive and established model for BITA. This model is based on the SAM of Maes et al. (2000) and many times referred as one of the most valuable tools in the research to BITA in terms of validity (Belfo & Sousa, 2013).

Although many models exist, one of the major points of criticism in the literature is that these models are too theoretical and descriptive in nature, and thus fail to be used in practice (Chan & Reich, 2007) (Silvius A. J., 2013). The SAMM by Luftman (2000) shows more prescriptive insights and provide guidelines on how to achieve alignment. However, even though some of these models exist which are suitable to be applied in practice, their application to specific organizational contexts is still lacking (Silvius A. J., 2013). Especially in the public sector, as research into BITA is more mature in the private sector (Walser, et al., 2016). The reason for this is most likely due to the positive relationship between business performance and BITA (Andrews & Beynon, 2011). In addition, public organizations do not strive for a competitive advantage. However, they do have the responsibility to society to deliver services, cost-effectively as possible, to their stakeholders. Doing so by improving their internal operation as much as possible (Cole & Partson, 2006).

Another motivation for this study is the evolving role of IT. Many important studies on BITA were conducted 15 to 25 years ago. Nowadays, new technologies have emerged and are emerging which faces new challenges, but also opens up new markets and innovates the business (Silvius A. J., 2006). This evolving role of IT influences the approach of achieving alignment in an organization. Additionally, alignment should not only be focused on how the IT is aligned with the business but also the other way around: how the business aligns with the IT (Luftman & Kempaiah, 2007).

“The role of IT in today’s organizations is considerably different, and therefore, their¹ values in providing insights to the strategic IT-business alignment process in today’s business environment are limited.”

(Yayla & Hu, 2009, p. 160)

Thus, BITA can be conceptualized through various models. Still, what is alignment? How is this determined? In some literature, alignment is understood as the leverage of maturity in the IT and business (Maur, Walbeek, & Batenburg, 2009). Whereas in other studies, alignment is described as the communication and mutual understanding between the IT and business (Maur et al., 2009). Alignment is also considered as the mutual shaping of the IT- and business strategy, hence the SAM of Henderson & Venkatraman (1992). The SAMM of Luftman (2000) combines the strategic and maturity interpretation of alignment. In this study, we focus on the latter: the mutual shaping of the IT- and business strategy.

BITA is often related to IT governance. In the study of Haes & Grembergen (2008) they explored this relationship and came to the conclusion that organizations that are mature in their IT governance practices are also more mature in their alignment in comparison to organizations with less maturity in their IT governance practices. Well known IT governance frameworks to apply these practices are for example ISO 38500 and COBIT 5, whereas the latter is used in the case company: RWS.

Enterprise Architecture (EA) is another phenomenon that is often related to BITA. Although it is just a small part of the concept BITA, EA is considered an important approach to fully leverage the potential of IT and increase alignment in organizations (Dang & Pekkola, 2017). A study by Espinosa, Boh, & DeLone (2011) mentions that EA supports alignment by managing strategy, priorities in business and processes with concrete requirements that are related to the technical aspects of the IT infrastructure. Despite this promise, in practice, many EA programs are still failing increasing the gap between the business and IT (Robertson, Peko, & Sundaram, 2018). While organizations can profit from better BITA when EA is correctly implemented as shown by Aleaddini, Asgari, Gharibi, & Rad (2017). In this study, the researchers performed a large and global survey in which organizations that successfully implemented EA were assessed on their BITA maturity before and after implementing EA. The results show that EA indeed contributes to better BITA. Well known EA frameworks are for example the Zachman Framework and TOGAF, whereas the latter is used at RWS.

That governance and architecture is important in BITA, is shown in the example of assessing BITA in the next section.

1.3.2 Assessing Business-IT Alignment

Measuring alignment requires weighing different concepts and mechanisms in order to quantify and assess the BITA in an organization. The SAMM of Luftman (2000) is taken as an example here, as this model was concluded as the most comprehensive and established model for BITA. The model consists of six competencies, these competencies refer to “(..) *organization’s capacity to deploy resources using processes, practices and structures to effect a desired end.*” (Cumps, Viaene, Dedene, & Vandenbulcke, 2006). Within these six competencies, various criteria points are defined in order to assess BITA maturity. The model can be found in Figure 5 on the next page. Follow-up research by Luftman (2003a) provides additional criteria points within these competencies.

¹ With ‘their’ is meant the important studies on Business-IT Alignment that were conducted in the mid-1990s.

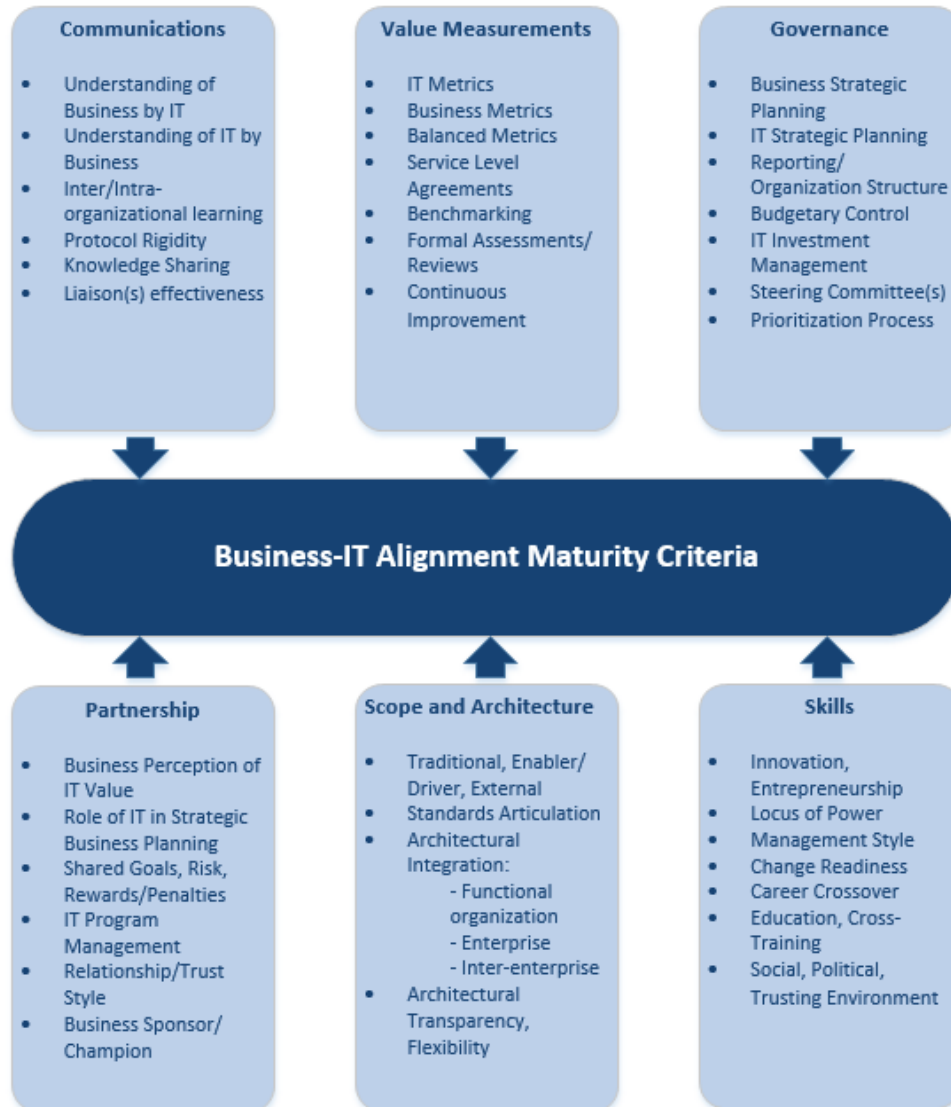


FIGURE 5: SAMM (ADAPTED FROM LUFTMAN, 2000)

As could be seen, the competencies represent a set of skills and technologies, rather than a single specific skill or technology. Luftman (2000) identified them as maturity categories, however, over time elaborations are done on the SAMM. Nowadays, studies such as Cumps et al., (2006) refer to them as competences. But also dimensions, criteria, domains, factors, antecedents, enablers and inhibitors are facets that are commonly used in BITA literature (Belfo & Sousa, 2012).

Cumps et al. (2006) and Belfo & Sousa (2012) defined the competencies as followed:

- **Communications** imply the ability to use universal language between the business and IT.
- **Value measurements** imply the ability to track and measure the performance of IT against the strategic goals.
- **Governance** implies the ability to acquire transparency and responsibility for the results of IT.
- **Partnership** implies the ability to link and accommodate management processes and business- and IT planning.
- **Scope and Architecture** imply the ability to systematically measure the impact of new ICT on the existing business processes.
- **Skills** imply the ability to decrease the resistance to change in new IT.

It is a maturity model and thus consists of various alignment criteria that can be scored on a scale of one to five, which is based on the well-known Capability Maturity Model (CMM) developed by Carnegie Mellon's Software Engineering Institute. The five levels of strategic alignment maturity are: (1) Initial/ad-hoc process (2) Committed process (3) Established focused process (4) Improved/managed process (5) Optimized process. Figure 6 visualizes these levels with the according description.

As mentioned before, each of the six competencies has a set of alignment criterion (as shown in Figure 6). Each criteria point gets a maturity level assigned based on the assessment. For example, in the competence 'Communications' there is a criteria point 'Understanding of business by IT'. Each point on the maturity scale (five in total) has a description that corresponds to how mature a specific organization is in this particular criteria point. For 'Understanding of business by IT' this implies:

- | | |
|---|-----------------------------------|
| 1) IT management is not aware | (1. Initial/ad-hoc process); |
| 2) Limited IT awareness | (2. Committed process); |
| 3) Senior and mid-management | (3. Established focused process); |
| 4) Pushed down through the organization | (4. Improved/managed process); |
| 5) Pervasive | (5. Optimized process). |

All the competences with their according criteria points can be found in [Appendix A – The Six Alignment Maturity Criteria](#).

To conduct the actual assessment Luftman (2000, 2003a) mentions that it should be done with a team consisting of business- and IT executives: an assessment team. When a team is assembled, information should be gathered to perform the assessment. This can be done in multiple ways, such as in a group setting, via surveys, interviews or a combination of those. When enough information is gathered the team members determine, on a Likert scale of one to five, the extent to which the criteria point best matches the organization.

The score is not the most important part of the assessment, but rather understanding the significance of the score for the entire organization and which steps have to be taken in order to improve it. In addition, an average is calculated for each of the six competencies. With this, an overall maturity level of alignment can be assigned to the organization. However, it is valuable to discuss the weight of particular criteria among the team. This could change the overall alignment score of the organization as certain criteria may not be as relevant or important.

This SAMM of Luftman (2000) serves as a benchmarking aid to compare with other organizations and provides an instrument to evaluate the current state and the desired state, to achieve and maintain BITA.

The SAMM of Luftman (2000) was taken as an example here. Although, as mentioned before, many other models exist to measure alignment, not including the many elaborations done on these popular models. Additionally, the SAMM of Luftman (2000) covers strategic maturity while many other approaches exist to measure different levels of BITA. Due to the reason that these models lack organizational context, mostly fail to be used in practice and are outdated due to the evolving role of IT, this research is set up to indicate the importance of new research that develops and validates models based on the previous models.

Fitted to a specific organizational context, such as the public sector, offers more practical handles for managers and include the new emerging technologies that continuously change the role of IT in the business.

"It is important to stress that most authors agree on the fact that business/ICT alignment is a dynamic process rather than a static state." (Cumps et al., 2006, p. 1)

Mekawy et al. (2009) evaluated some well-known strategic alignment models, including the model of Luftman. Their conclusions can be found in Table 4 below.

Model	Evaluation
Strategic Alignment Model – SAM (1993) By Henderson and Venkatraman	It is a comprehensively designed model because it differentiates domains and sub domains of all parts of both business and IT. However, it does not go to the operational level. Although the model can be applied to measure the alignment, but it does not highlight the risks in the company.
Integrated Architecture Framework - IAF (2000) By Maes, Rijsenbrij, Truijens and Goedvolk	As it is an extension of SAM, it deals with the drawback of SAM. The improved model can go deeper to the operational level for the analysis. Business and risk aspects also can be measured. However, these added components increase the complexity of using and applying the model.
Luftman’s Alignment Model - LIAM (2000) By Luftman	One of the well-established and comprehensive models as it follows bottom up approach starting from the factors that affect the alignment towards business and IT domains at the top level. One of the few drawbacks is the complexity of applying and using the model, and the need for expert having understanding of both business and IT.
Reich & Benbasat Model - RBM (2000) By Reich and Benbasat	Although it has added social factor as a new added aspect to the alignment which has not been considered by other models. However, it lacks the deep analysis of business domain within an organization.
Sabherwal and Chan Alignment Model - SCAM (2000) By Sabherwal and Chain	The model is not complete as it focuses on general aspects of business and IT domains without going deeply for e.g. IT and business architecture, as well as it works only at strategic and tactical level, without considering business and IT processes.
Hu Huang Alignment Model - HHAM (2006) By Hu and Huang	It is an extension of RBM. It has added balanced score card as a very useful tool for enhancing business measurability and how it can be integrated with IT through all business processes. Therefore, it also added analysis at operational level. However, the model lacks organizational and architectural aspects as well as modularity. The model remains also complex with the balance score card implementation.

TABLE 4: EVALUATION STRATEGIC ALIGNMENT MODELS (ADAPTED FROM MEKAWY, RUSU, & AHMED, 2009)

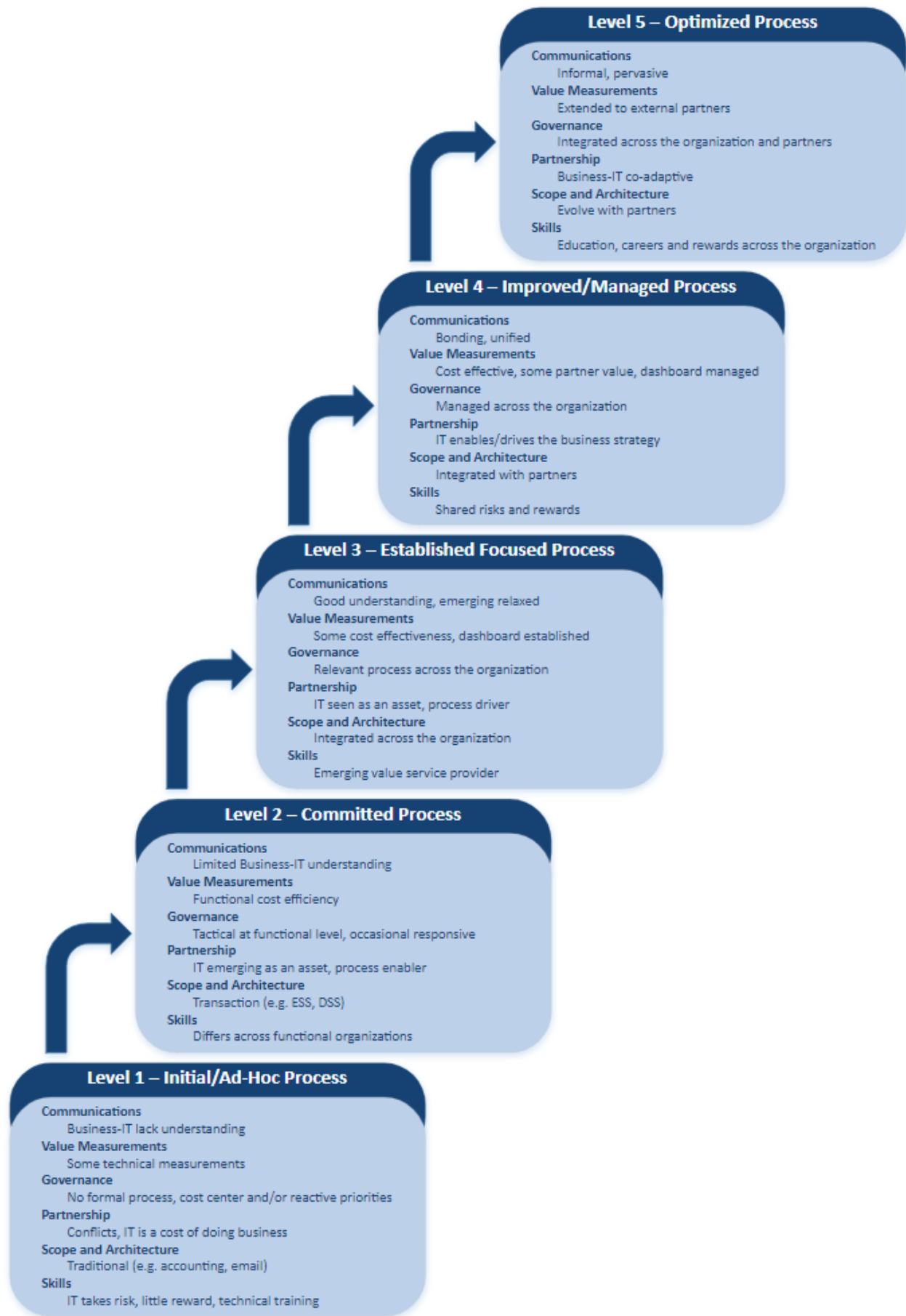


FIGURE 6: MATURITY LEVELS (ADAPTED FROM LUFTMAN, 2000)

1.3.3 Improving Business-IT Alignment

With the scores of the assessment, insight is created for the organization. In addition, it points out the areas for improvement. Based on this, actions can be taken in order to improve the strategic alignment of the organization. In other words: what needs to be changed such that IT adequately supports the business strategy? After these changes, it is not considered done as alignment should be seen as a dynamic process rather than a static state. Thus, each strategic change in the business should be evaluated by re-assessing the appropriateness of BITA (Mekawy et al., 2009). An assessment should be done frequently or after a strategic change in order to measure improvements but also identify the new challenges that could emerge.

Luftman & Kempaiah (2007) performed an alignment assessment in 197 organizations, where they concluded that there is no ‘silver bullet’ in achieving strategic alignment. Appropriate BITA requires close attention of all the competencies as described in Figure 5, no single competence can be left out. However, as discussed earlier, the weight of the criteria within the competencies could differ per organization.

What is missing in alignment models, such as the SAMM of Luftman, are concrete actions in order to advance to a higher maturity level. As well as fitted to a specific organizational context (Silvius, Waal, & Smit, 2009), which is one of the gaps this study tries to cover.

“Practical interventions require not just an understanding of what influences alignment, but also of how alignment is influenced. Bridging the gap between BIA in theory and in practice would therefore require more research on the adoption of theoretical insights to organizational contingencies.”

(Silvius et al., 2009, p. 6)

The influence of alignment is divided into enablers and inhibitors, as discussed in the literature (Luftman, Papp, & Brier, 1999). Whereas, in the sense of achieving alignment, the goal is to minimize the inhibitors and maximize the enablers (Mekawy et al., 2009). Table 5 shows the enablers and inhibitors for BITA according to Luftman (2000). The maturity model of Luftman discussed earlier, with the six BITA maturity criteria, is based on these aspects.

Enablers	Inhibitors
Senior executive support for IT	Senior executives do not support IT
IT involved in the strategy development	IT and business lack close relationships
IT understands the business	IT does not understand the business
Business-IT partnerships	IT fails to meet commitments
Well-prioritized IT projects	IT does not prioritize well
IT demonstrates leadership	IT management lacks leadership

TABLE 5: ENABLERS AND INHIBITORS FOR ALIGNMENT (ADAPTED FROM LUFTMAN, 2000)

Besides enablers and inhibitors, the terms antecedents and drivers are often used in the literature of strategic alignment as well. In addition, mostly the same antecedents and drivers are mentioned in different studies. Meaning, there is some consent and it shows that these aspects indeed improve the strategic alignment when correctly implemented in the organization. Yayla & Hu (2009) identified five antecedents for strategic alignment:

- 1) Centralization;
- 2) Formalization;
- 3) Shared domain knowledge;
- 4) Successful IT history;
- 5) And relationship management.

In addition, they recognized two drivers for strategic alignment:

- 1) The level of connection between IT and business planning;
- 2) And the level of communication between the IT- and business managers.

Whereas, for example, according to Chan, Sabherwal & Thatcher (2006) and Huang & Hu (2007) the important antecedents for strategic alignment are:

- Shared domain knowledge between the IT- and business managers;
- Previous success of IT;
- Connection between the business and IT planning;
- And communication between the IT- and business executives.

Yayla & Hu (2009) mentions five practical handles for improving strategic alignment based on the five antecedents. Regarding the communication, the managers of the business should reconsider their process of strategizing, have planning integration as one of their main goals, and should explore the opportunities to increase the communication with the IT managers. Moreover, executives should improve the level of formalization in their organization as this has a positive effect on the strategic alignment. Especially in the strategy plans it should be clear what the responsibilities are of the IT and the business concerning implementing procedures and policies in the decision-making processes. Third, the IT executives should act proactively regarding improving the transparency and visibility of their success and make sure that they deliver as promised. In addition, related to the shared domain knowledge, the IT- and business executives should pursue opportunities to improve their knowledge in each other's domain through internal- and external training. Lastly, both should invest effort and time into maintaining a good formal, both also informal relationship amongst each other.

Cumps et al. (2006) conducted 640 surveys in European organizations located in Belgium, France, Germany, United Kingdom, the Netherlands, Italy and Spain. One of their conclusions mentioned that organizations who use IT as a business enabler and include the impact of the investments in IT, over the different facets of the business, in their business cases, are better aligned. Improving and measuring the IT management processes for investments in IT brings the business and IT closer together. However, the authors mention that alignment is different for each organization. Therefore, this process of achieving alignment should be cultured as an incomparable and unique organization competence for the support, sustainability and growth of the business.

A more recent study, Sidhu & Gupta (2015), confirmed that clear and open communication between the IT and business is still an important factor in achieving alignment of the business and IT. Besides the communication factor, which was listed as second of the top five important factors, the other crucial factors include (1) Top management instructions (3) Clearly defined roles and responsibilities (4) A proactive IT department, and (5) A healthy relationship between the user and IT.

1.3.4 Business-IT Alignment in the Public Sector

One of the goals of this study is to make the assessment model specific to DEGOs. This is done through, among other things, expert opinion and performing a case study at RWS. Nevertheless, in this literature review, a start is made by listing some situational factors of the public sector that could influence the way BITA is measured.

A characteristic that distinct RWS is that they operate in different markets. For example, they are responsible for (among others) traffic- and water management, which differ in their business needs. Because, after all, guiding traffic safely from A to B is totally different than guiding the maritime transport. Same goes for the bridges and tunnels, they are both operated differently. Meaning, the IT department of RWS, Central Information Services, serves different business units with different business dynamics. Which is a practical issue for CIOs as mentioned by Silvius et al. (2009).

An organization that operates in different markets/divisions are classified as a 'multi-business company' (MBC). The businesses in such an organization differ in, among others, market typology, business cycles, characteristics, market growth and thus business needs.

“The relationship between IT and business strategy becomes even more complex in organizations that have activities in distinctly different markets.”
(Silvius et al., 2009, p. 4)

In addition, Silvius (2007a) points out that in an MBC the alignment between the business and IT within a division/business unit may interfere with the alignment on the central level. The same researcher performed a pilot-study into BITA in 12 Dutch firms (Silvius, 2007), of which four public firms. Compared to the other industries, such as financial and professional services, the public sector scored the lowest. The SAMM of Luftman (2000), which was discussed earlier, is used as an instrument. The public sector scored on all six competencies between maturity level two and three respectively. Whereas the other industries mostly scored between maturity level three and four. The participants from the public sector mentioned that the reason for this low score is due to the unclear and immeasurable goals and political exploitation. Resulting in conflicts when trying to align IT with their business strategy.

Luftman & Kempaiah (2007) also conducted a study and applied the SAMM in 197 companies from all over the world. One of the observations they mentioned is that industries vary in their alignment maturity. Overall, most industries were assessed on level three. Whereas the educational, pharmaceutical utilities, financial and government industries scored relatively low, below level three. However, the industries that scored the highest (retail, transportation and hotel/entertainment), had a relatively low sample size in this study. Which makes it more difficult to generalize. Another interesting finding from this study is that business executives (CEOs, CFOs, VPs and other executives) score higher in alignment than IT executives (CIOs, CTOs and other executives). Moreover, organizations with federated IT structures often have a higher maturity in alignment than centralized or decentralized structures.

“Companies with CIOs reporting directly to the CEO, president, or chairman have significantly higher alignment maturity than those where the CIO reports to a business unit executive, the COO, or the CFO.”
(Luftman & Kempaiah, 2007, p. 165)

As described earlier, public organizations do not aim for maximizing profits and a better competitive position. Due to this reason, the IT and business are organized differently in certain ways. These are not the only characteristics that distinguish a public organization from a private organization. The large size of stakeholders and the variety of services provided to their citizens also plays an important role (Winkler, 2013). In addition, these stakeholders often have competing or opposing interests. Together with a complex institutional structure and political powers, this forms a persistent challenge for alignment in the public sector (Rusu & Viscusi, 2017).

BITA is often related to IT governance. Table 6 shows an overview of the differences between the private- and public sector regarding certain governance attributes.

Attribute	Private sector	Public sector
Goals	Shareholder value	Public value / multifaceted
Stakeholders	Few	Many / potentially conflicting goals
Environment	Less regulated	Legal and formal constraints
Incentives	High / market	Low / 'soft budgets' / scrutiny
Risks	Lower aversion	High aversion
Competition	High competition	Low / intergovernmental cooperation
IT innovation	Competitive advantage	Treated as necessity
IT competencies	Varying	Generally lower
IT sourcing	Flexible contracting	Complex tendering processes
IT resources	Proprietary IT	Shared IT resources

TABLE 6: PRIVATE AND PUBLIC SECTOR DIFFERENCES (ADAPTED FROM WINKLER, 2013)

This table will be used for future references in this thesis for developing the assessment model.

“Furthermore, information technology has become an important resource to improve the variety and quality of services provided by public organizations which makes IT alignment studies relevant and timely appropriate.”
(Rusu & Viscusi, 2017, p. 29)

2 Treatment Design

In this chapter, the proposed solution (an assessment model) is developed to treat the problem stated in the previous chapter. To do so, this chapter is divided into two subchapters. Whereas the second research question is answered in the first subchapter: measuring BITA, and the third research questions in the second subchapter of treatment design: constructing the Model.

2.1 Measuring Business-IT Alignment

Measuring BITA is already introduced in the [first chapter](#) of this thesis. However, in this chapter specific aspects are listed that determine the level of strategic alignment between the business and IT. In addition, specific aspects that are applicable to the public sector are identified. Lastly, this chapter addresses how these aspects can be measured. The results of this chapter serve as a basis for the next chapter in which a selection is done of the relevant aspects in order to construct the assessment model.

2.1.1 Strategic Alignment Aspects

An extensive literature study is done in order to identify aspects that determine the level of strategic alignment between the business and IT. These aspects can either be positive or negative which are often referred to as enablers and inhibitors, of which some of them are already mentioned in [1.3.3 Improving Business-IT Alignment](#). Whereas enablers “(..) *can be used to facilitate the inter-relationship between business and IT.*” and inhibitors “(..) *should likewise be identified to permit firms to address those areas that may hinder the adoption of alignment.*” (Papp, Luftman, & Brier, 1996). Additionally, antecedents and drivers are often used as well in literature to cover positive alignment aspects. It is important to also address the aspects that influence strategic BITA in a negative way, as focusing on the problems that might occur may mitigate the barriers and allow organizations to achieve alignment. Eventually, the goal is to maximize the enablers and minimize the inhibitors (Mekawy et al., 2009).

The identified aspects in literature are shown in Table 7. This table lists the aspects itself but also mentions whether it influences strategic BITA in a positive or negative way (P/N), how they are classified and/or grouped by the source (classification), the source itself and additional comments where extra explanation is required.

“Achieving and sustaining alignment demands focusing on maximizing the enablers and minimizing the inhibitors that cultivate the integration of IT and business.”

(Luftman, 2015, p. 9)

Aspect	P/N	Classification	Source	Comments
<ul style="list-style-type: none"> • Senior executive support for IT • IT involved in the strategy development • IT understands the business • Business-IT partnerships • Well-prioritized IT projects • IT demonstrates leadership 	P	Enablers	(Luftman J. , 2000)	The source also mentions inhibitors. However, they are exactly the opposite of the enablers and thus not listed here.
<ul style="list-style-type: none"> • Centralization • Formalization • Shared domain knowledge • Successful IT history • Relationship management 	P	Antecedents	(Yayla & Hu, 2009)	None.
<ul style="list-style-type: none"> • The level of connection between IT and business planning • Level of communication between the IT- and business manager 	P	Drivers		
<ul style="list-style-type: none"> • Shared domain knowledge • Planning sophistication • Prior IS success • Organizational size • Environmental uncertainty 	P	Antecedents	(Chan et al., 2006)	None.
<ul style="list-style-type: none"> • Integrating IT planning with business planning • Maintaining effective communication channels • Developing strong relationships between IT and business • Institutionalizing the culture of alignment 	P	Key elements	(Huang & Hu, 2007)	None.
<ul style="list-style-type: none"> • Top management not committed to the strategic use of IT • Low level of shared domain knowledge • Lack of organizational integration • Lack of frequent communication between users and IT department • Lack of personal social network • Lack of interpersonal communication skills • Past IT implementation failures • Unsuccessful IT history • Complex IT structure and organization • Lack of management insight into IT operations • Missing focus on customer understanding and customer support • Dominance of business executives in decision making 	N	Factors hindering Business-IT Alignment	(Gbangou & Rusu, 2016)	The study focuses on the banking sector, but these factors are identified outside the financial sector.

Aspect	P/N	Classification	Source	Comments
<ol style="list-style-type: none"> 1. Top management instructions 2. Clear and open communication between IT and business 3. Clearly defined roles and responsibilities 4. Proactive IT department 5. Healthy relationship between the user and IT 	P	Factors for achieving alignment	(Sidhu & Gupta, 2015)	Numbered as they are sorted in level of importance.
<ul style="list-style-type: none"> • Relationship/partnership between CIO and TMT • CIO-TMT communication, participation and planning • Shared CIO-TMT domain knowledge • Shared CIO-TMT understanding • CIO characteristics, attributes and abilities • Track record of IS department/CIO 	P	Antecedents	(Preston & Karahanna, 2009)	TMT stands for Top Management Team.
<ul style="list-style-type: none"> • IT-related opportunities are identified to support the strategic direction of the organization • The goals/objectives of IT are adapted to the changing goals/objective of the organization • The IT plan contains detailed action plans/strategies that support the organization's business objectives and strategies • Major IT investments are prioritized by their expected impact on business performance 	P	Fit between IT and business strategies	(Yayla & Hu, 2012)	None.
<ul style="list-style-type: none"> • Communications between IT and business • Connection between IT and business planning • Shared domain knowledge • Successful IT history • Relationship management 	P	Factors	(Hu & Huang, 2006)	Authors modified the Reich-Benbasat model based on a case study.
<ul style="list-style-type: none"> • IT managers' participation in business planning • Business managers' participation in strategic IT planning 	P	Constructs for strategic alignment between business and IT	(Kearns & Sabherwal, 2006)	These two constructs have an influence on the construct business-IT strategic alignment which also includes some measures.

Aspect	P/N	Classification	Source	Comments
<ul style="list-style-type: none"> Centralization of decision making Formalization of the IT unit Shared domain knowledge of business and IT executives The success of IT unit Relationship management between business and IT executives 	P	Antecedents	(Yayla, 2008)	None.
<ul style="list-style-type: none"> Understanding the strategic priorities of top management Aligning IS strategies with the strategic plan of the organization Adapting the goals/objectives of IS to changing goals/objectives of the organization Maintaining a mutual understanding with top management on the role of IS in supporting strategy Identifying IT-related opportunities to support the strategic direction of the firm Educating top management on the importance of IT Adapting technology to strategic change Assessing the strategic importance of emerging technologies 	P	Success measures for alignment	(Newkirk & Lederer, 2006)	None.
<ul style="list-style-type: none"> Formal evaluation process Incorporation of IS investments in strategic business plan Return on investment analysis Board of director's approval of IT investments Business objectives and strategies in request for proposal selection criteria 	P	Alignment processes	(Bush, Lederer, Li, Palmisano, & Rao, 2009)	Processes and characteristics for choosing new IT systems to support the objectives and strategies (study done in the healthcare industry).
<ul style="list-style-type: none"> Top management involvement IT value awareness Organizational culture of learning 	P	Alignment enabling characteristics		
<ul style="list-style-type: none"> Resistance to change Lack of management support Lack of IT understanding Lack of resources Complexity of organization 	N	Alignment hindering characteristics		

Aspect	P/N	Classification	Source	Comments
<ul style="list-style-type: none"> IT steering committee IT project steering committee Portfolio management IT budget control and reporting CIO reporting to the CEO/COO Project governance/management methodologies IT leadership 	P	IT governance practices	(Haes & Grembergen, 2008)	This study provides a baseline of seven IT governance practices that should be considered as a holistic set of practices, contributing as a whole to better BITA.
<ul style="list-style-type: none"> Business and ICT planning processes are tightly integrated Performance management impacts budget allocation Alignment processes at a centralized and decentralized level are in line ICT investments are prioritized against business strategy There is a clear business ownership for ICT projects The business has a good understanding of the impact of ICT 	P	Alignment practices	(Cumps, et al., 2009)	Remarkable is that the researchers use AntMiner+ to generate BITA rules based on the aspects.

TABLE 7: GENERAL STRATEGIC ALIGNMENT ASPECTS

It should be noted that it was not possible to cite each article. This is due to the hundreds of articles about strategic BITA that are available today. I acknowledge that I have not identified every study, and thus making this one of the limitations of this study. Although, with the almost 100 articles found with the literature research protocol, I am convinced that there is a sufficient amount of input for this study to adequately develop an assessment model to measure strategic BITA.

“To achieve IS strategic alignment, organizations must first comprehend the factors that contribute to its development.” (Preston & Karahanna, 2009, p. 159)

2.1.2 Public Sector Aspects

Next, the same is done for strategic alignment aspects in the public sector. These aspects also have a positive or negative influence on strategic BITA but are identified from studies that specifically focus on the public sector. This additional step is done as the goal is to make the assessment model fit for the public sector, which is one of the gaps in literature this study tries to cover.

Table 8 contains an extensive list of aspects that are proven to influence strategic BITA in a government setting. It has been shown that the degree of BITA in the public sector is different from other branches (Luftman & Kempaiah, 2007). In addition, the environment of the public sector organizations influences the applicability and its IT characteristics of the current BITA models (Winkler, 2013) & (Elpez & Fink, 2006). Due to these reasons, a separate list with alignment aspects is constructed.

Aspect	P/N	Classification	Source	Comments
<ul style="list-style-type: none"> Political and institutional context Autonomy of the management Power and politics Bureaucratic decision process Fixed IT budgets (Financial) inflexibility Political IT priorities Tailor made systems/software Lack of IT competence and skills Complex purchase processes Complex governance 	N	Environmental aspects	(Meines, 2016)	The study relates each aspect to the six categories of the SAMM of Luftman (2000).
<ul style="list-style-type: none"> Unclear and immeasurable goals Political exploitation 	N	None	(Silvius A. J., 2007)	The motivation of participants in the case study done by the researchers. The efforts to align the business with the IT are hindered due to these two aspects.
<ul style="list-style-type: none"> Audit and review External and legislation mandated annual reporting Enterprise architecture (business and IS/IT domains) Non-executive and executive groups Corporate advisory councils Senior management forum Strategic planning 	P	Intellectual mechanisms	(Gregor & Hart, 2007)	The researchers did a case study at an Australian governmental agency: the Australian Bureau of Statistics (ABS).
<ul style="list-style-type: none"> High levels of management support Collective and collaborative business planning style Open business planning communications 	P	Social mechanisms		

Aspect	P/N	Classification	Source	Comments
<ul style="list-style-type: none"> IT leadership to understand the business goals and IT contribution and bring it to the management attention Involve and get support of senior management Encourage and support IT/Business communication and partnership Engage key stakeholders Define and align IT strategies to corporate strategies and cascade them down in an organization Consolidate IT structures to ensure responsiveness and accountability 	P	Critical Success Factors for effective IT governance related to strategic alignment	(Nfuka & Rusu, 2010)	Identified in five public sector organizations from Tanzania.
<ul style="list-style-type: none"> Sharing decision-making within IT portfolio management Alignment between IT strategy and corporate plan Linking a high level of technical integration with customer services Linking between IT projects with a value and alignment measurement tool 	P	Enablers	(Al-Hatmi & Hales, 2010)	The study investigates the impact of strategic alignment perspectives on government IT projects in the Australian local government.
<ul style="list-style-type: none"> Miscommunication in IT activities The lack of a well-defined IT plan The lack of value realization 	N	Inhibitors		
<ul style="list-style-type: none"> The presence, reachability and depth of shared business and IT metrics The way that IT investments are managed by budgets The way there is being prioritized The degree to which IT is used to realize business goals The readiness for change in the organization 	NA ²	Business characteristics	(Meines, 2016)	These characteristics are derived from the SAMM of Luftman (2000) and are proven by the study to have a direct relationship with the influence of a government environment.

TABLE 8: STRATEGIC ALIGNMENT ASPECTS IN THE PUBLIC SECTOR

In contradiction to the general strategic alignment aspects, little research is done to alignment in the context of public organizations (Meijer & Thaens, 2010), (Muhammad, 2009) & (Winkler, 2013). A useful source to acquire relevant literature was the book by Rusu & Viscusi (2017), which includes a systematic literature review of IT alignment in public organizations by Lazar Rusu and Gideon Mekonnen Jonathan. This study contains a useful overview of all the aspects of the redefined SAMM of Luftman (2015) that are researched by studies investigating these specific aspects in the public sector.

“In fact, public organizations can benefit the most by using IT to achieve organization's strategies and improve their services.” (Rusu & Viscusi, 2017, p. 7)

² Not applicable as these aspects imply the degree of alignment and thus are neither positive or negative.

2.1.3 Measure the Aspects

The last section covers the question of how the aspects listed in the previous section could be measured. The literature review in the first chapter of this thesis already discussed that different models exist which are able to measure BITA. There is no universal way of measuring, each model has its own approach. However, Haes & Grembergen (2015) distinguish four different approaches to measure BITA:

- The matching and moderation approach;
- The profile deviation approach;
- The scoring approach;
- And the maturity model approach.

With the matching approach, the goal is to look at the differences in the rating between two pairs of related constructs. For example, when there is a significant difference between the constructs, the alignment is low. However, when the difference is low between the constructs, the alignment is high. A visual example is shown in Figure 7.

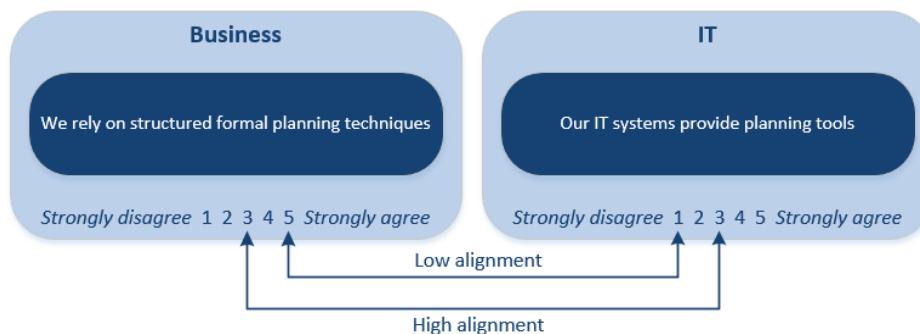


FIGURE 7: MATCHING APPROACH (ADAPTED FROM HAES & GREMBERGEN, 2015)

The moderation approach is the opposite of the matching approach. Instead of parallelism, alignment is viewed as an interaction. In this approach, the harmony between the business and IT is assessed in product terms. Meaning, in the example of Figure 7 when the business scores a three and the IT scores a three the alignment is nine. A high score represents a better interaction between the business and IT. It should be noted that both approaches are useful, but can result in different conclusions about the degree of alignment in an organization.

Measuring BITA with the profile deviation approach consists of two steps: (1) an ideal alignment scenario is defined from theory (2) any deviations from this ideal scenario are calculated. Thus, instead of first calculating the current state and then improve this state to achieve the ideal state, this approach does it the other way around.

The scoring approach is the approach that is used by most of the sources of the aspects listed previously. In general, a Likert scale is used to measure the degree of alignment. Statements related to the aspect are presented in an interview and/or questionnaire form, in which the concerned person assigns a score to the statement. These Likert scales are often either five-points or nine-points and range from strongly disagree to strongly agree (such as in Figure 7), but also from entirely unfulfilled to entirely fulfilled. The averages of the assessment provide the alignment score.

Closely related to the scoring approach is the maturity model approach. Closely related, because the respondents in the assessment are also presented with a Likert scale but now the scale relates to the maturity levels. The SAMM of Luftman (2000) uses this approach, the [Literature Review – Business-IT Alignment in Context](#) in the first chapter of this thesis contains an extensive example of how this approach works in practice. This approach provides an easy-to-understand method to assess the current alignment state and the desired alignment state. With this knowledge, specific actions can be defined to improve the organization's maturity in strategic alignment. This approach is also popular in the literature and used by some sources of the aspects listed in the previous section.

Table 9 shows the benefits and limitations of each approach, providing a good overview of which approach could be used best in which context.

Approach	Benefit	Limitation
Matching	An intuitive and simple approach for measuring alignment (Haes & Grembergen, 2015).	The question is whether the scores really need to be at the same level to indicate high degrees of alignment (Haes & Grembergen, 2015).
Moderation	Focus on the interactive relationship (moderation) between business and IT, rather than the difference (Haes & Grembergen, 2015).	Due to the focus on the interactive relationship, the scores/ conclusions could be relatively low in comparison to other approaches. For example, when the business scores high but the IT low, the alignment will still be relatively low due to using product terms for calculating the score.
Profile deviation	An aid for determining which IT strategy best fits which business strategy (Haes & Grembergen, 2015).	Rather complex compared to the other approaches. Depends on available theoretical literature for defining ideal IT and business strategies. Descriptive in nature.
Scoring	Easy to use and efficient for calculating an overall alignment score.	Somewhat subjective as the scale could be interpreted differently among individuals (Hubbard, 2009).
Maturity model	An easy-to-understand approach to evaluate the 'as-is' and 'to-be' situation. The gap between these situations defines which specific actions can be taken to improve the alignment maturity. (Haes & Grembergen, 2015).	A well-known drawback of a maturity model is that each level is seen as a target. Organizations make their goal to reach the next level up, which is dangerous as you could lose focus on the real goal: improving the alignment (Atwal, 2008).

TABLE 9: BENEFITS AND LIMITATIONS OF MEASUREMENT APPROACHES

Table 10 shows an overview of which sources use which measurement approach and an example of measurement. These are the sources which were listed earlier regarding aspects that influence strategic BITA. Note that not every source provides a measurement for the aspects but are simply mentioned. These sources are excluded in the table. Decisions and considerations on which aspects will be included in the assessment model and which measurement approach will be used is part of the next chapter: the construction phase.

Source	Measurement Approach	Example
Luftman (2000)	Maturity model	<p>Competence: Governance Aspect: IT Strategic Planning</p> <p>Level 1 – Initial/Ad Hoc Process Ad-hoc Level 2 – Committed Process Basic planning at the functional level Level 3 – Established Focused Process Focused planning, some inter-organizational Level 4 – Improved/Managed Process Managed across the enterprise Level 5 – Optimized process Integrated across and outside the enterprise</p>
(Yayla & Hu, 2009)	Scoring approach	<p>Aspect: Shared Domain Knowledge Measurement item: IT executives have a good understanding of the organizations' business environment. Scale: 1 – Strongly disagree to 7 – Strongly agree</p>
(Chan et al., 2006)	Profile deviation	<p><i>"Alignment was calculated by measuring the deviation of an organization's actual IS strategy from the IS strategy that is theoretically ideal for its business strategy."</i></p>
(Preston & Karahanna, 2009)	Scoring approach	<p>Aspect: CIO characteristics, attributes and abilities Measurement item: CIO's level of business-related knowledge. Scale: 1 – Not well informed to 5 – Extremely well informed</p>
(Yayla & Hu, 2012)	Scoring approach	<p>Aspect: The goals/objectives of IT are adapted to changing goals/objectives of the organization. Scale: 1 – Strongly disagree to 7 – Strongly agree</p>
(Yayla, 2008)	Scoring approach	<p>Aspect: The successes of IT unit Measurement item: The IT unit has met its commitments in the past. Scale: 1 – Strongly disagree to 7 – Strongly agree</p>
(Newkirk & Lederer, 2006)	Scoring approach	<p>Aspect: Educating top management on the importance of IT Scale: 1 – Entirely unfulfilled to 5 – Entirely fulfilled</p>
(Cumps, et al., 2009)	Scoring approach	<p>Aspect: There is a clear business ownership for ICT projects Scale: 1 – Strongly agree to 5 – Strongly disagree</p>
(Kearns & Sauerwal, 2006)	Scoring approach	<p>Aspect: IT managers' participation in business planning Measurement item: IT managers regularly attend business meetings Scale: 1 – Strongly disagree to 7 – Strongly agree</p>
(Haes & Grembergen, 2008)	Maturity model	<p>Aspect: IT budget control and reporting Scale: 0 – Non-existent to 5 – Optimized</p>

TABLE 10: MEASUREMENT APPROACHES OF THE IDENTIFIED SOURCES

2.2 Constructing the Model

In this second subchapter of the treatment design, the assessment model is developed. The development is related to the third research question and consists of describing the purpose of the model, determining the relevant aspects for the assessment model based on the previous section and the construction of the model itself.

2.2.1 Purpose of the Model

The need and purpose of the model are briefly introduced in the introduction of this thesis. See chapter [1.1.3 Relevance](#) which lists the gaps in scientific literature and practice and how this model will contribute by covering these gaps.

A model, because when studying a convoluted problem it is important to conceptualize this. This could be done by developing appropriate models, as they provide a prescriptive and inclusive approach for investigating the alignment problem (Majstorović, 2016). In addition, there is a famous saying that you cannot control what you cannot measure, and you cannot measure what you cannot define. As this model tends to measure strategic BITA, the goal is to improve alignment by using the results from the measurement.

Existing models are generic and could be applied by every organization that would like to achieve insight in their alignment. While Chan and Reich (2007) argue that research to alignment in specific industries potentially creates more cultivated findings. Resulting in a deep understanding of how IT enables value creation in the business. This is one of the reasons why the scope is limited to the public sector.

“The research to derive the business-IT alignment maturity assessment has just begun and the tools and processes are still being refined.”

(Luftman, 2015, p. 41)

2.2.2 Determine Aspects

To this day, no approach exists to reduce and determine relevant aspects in qualitative research. It is a specific concern in this study but must be carried out to achieve a more manageable set of aspects. The current list is too large for performing a case study and would require too many resources. With the input and consent of the project- and daily supervisors of this research, a tailored approach is defined to achieve a reduced set of aspects. Thus, it should be noted that this is not a proven approach and certain bias may occur. It is one of the limitations of this study and requires future research to justify this approach. For now, the abstract approach is used in order to continue this study with a more manageable artifact.

Similar to the model of Luftman (2000), the aspects listed in the previous chapter shape the building blocks for the strategic BITA assessment model. In this section, a selection of aspects is made which will be part of the assessment model developed in the next section. To do so, three steps are taken to determine the aspects:

- 1) First, aspects with similar intent are merged and titled as an aspect that covers all the merged aspects.
- 2) Multiple analyses are done on this reduced list, such as the number of sources the aspect consists of (see step one), whether the aspect has already criteria for measurement in its source (see the previous chapter) and the expert opinion of two experts at RWS.
- 3) Based on the criteria for each of the three analyses done in step two, a final selection is made which serves as the base for the development of the assessment model in the next section.

The above is done to not only reduce the number of aspects but also to determine which aspects have more support from the literature and which aspects are applicable to the public sector.

Step 1 – Merging aspects with similar intent

Appendix B shows the first step of the selection. Aspects with no similarity are either kept the same label or written slightly differently to match the emphasis of the other aspects to increase consistency and make them suitable for the environment of the public sector.

This merging process (from 135 to 39 aspects) leaves us with a reduced list that is easier to work with, as shown in Table 11 below.

Aspects that influence strategic BITA	
Adaptation of IT to the organization's goals	IT competencies and skill
Advisory board for non-binding strategic advice	IT steering committee
Assessing the strategic importance of emerging technologies	Leadership of IT
Audit and review	Organizational culture of learning
Board of director's approval of IT investments	Portfolio management of the business and IT
Business ownership for IT projects and initiatives	Previous success of IT
CIO reports to CEO	Prioritization of IT projects and investments
Clear and measurable IT and business metrics	Project management methodologies
Clearly defined roles and responsibilities	Readiness for change in the organization
Communication between CIO and top management	Relationship between IT and business
Communication between IT and business	Resource management
Enterprise architecture	Senior executive support for IT
External and legislation mandated annual reporting	Shared domain knowledge
Focus on understanding and supporting the end user	Size of the organization
Formalization of IT and business	Skills and personality of the CIO
Influence of stakeholder environment	Sophistication of IT and business planning
Insight of management into IT	Standardized systems/software
Institutionalizing the culture of alignment	The degree of centralization of decision making
Integration of IT and business planning	Value awareness of IT
IT budget allocation	

TABLE 11: REDUCED LIST OF ASPECTS

Step 2 – Analysis of the merged aspects

In order to determine which aspects should be part of the assessment model, experts from RWS are consulted. Subsequently, asked is which aspect are more relevant and important to RWS. Which, besides the already identified alignment aspects in the public sector, makes the model more specific and representative. It also helps to increase the practicality of the model, as this is one of the gaps this study is trying to cover.

In addition, industry publications such as the InformationWeek and CIO Magazine mention that the way of defining and measuring alignment should be improved (Preston R. , 2014). They advise researchers to focus on measurable goals such as customer satisfaction and business value instead of indicators that often lack practicality, such as internal performance.

First, the aspects are analyzed through expert opinion. Table 6 from chapter [1.3.4 Business-IT Alignment in the Public Sector](#) is used as a guide for the experts indicating the differences between the public- and the private sector. Only aspects with a neutral and positive expert opinion are used in the next analysis where the number of sources the aspect consists of and whether these sources contain measurement criteria, are considered. The goal is to end up with a reduced list, which will be used for the case study. The experts analyzed the aspects with two different perspectives: whether the aspect is important for strategic BITA and whether the aspect is specific for the public sector. Results of the expert opinion are shown in Table 12 on the next page.

Aspect	Expert opinion (importance)	Expert opinion (government)
Adaptation of IT to the organization's goals	+	-
Advisory board for non-binding strategic advice	+	+
Assessing the strategic importance of emerging technologies	+-	-
Audit and review	-	+
Board of director's approval of IT investments	+	-
Business ownership for IT projects and initiatives	+	-
CIO reports to CEO	+	-
Clear and measurable IT and business metrics	+	-
Clearly defined roles and responsibilities	+	-
Communication between CIO and top management	-	-
Communication between IT and business	+	-
Enterprise architecture	+	-
External and legislation mandated annual reporting	-	+
Focus on understanding and supporting the end user	+	-
Formalization of IT and business	-	-
Influence of stakeholder environment	+	+
Insight of management into IT	+-	+-
Institutionalizing the culture of alignment	+	-
Integration of IT and business planning	+	-
IT budget allocation	+	+
IT competencies and skill	+	-
IT steering committee	+	-
Leadership of IT	+	-
Organizational culture of learning	-	-
Portfolio management of the business and IT	+	-
Previous success of IT	+-	-
Prioritization of IT projects and investments	+	-
Project management methodologies	+-	+-
Readiness for change in the organization	+	+
Relationship between IT and business	+	-
Resource management	-	-
Senior executive support for IT	+	-
Shared domain knowledge	+	+-
Size of the organization	-	-
Skills and personality of the CIO	-	-
Sophistication of IT and business planning	+	-
Standardized systems/software	-	-
The degree of centralization of decision making	+	+-
Value awareness of IT	+	-

Aspects with two pluses are color-coded green, where aspects with two minuses are color-coded red.

TABLE 12: EXPERT OPINION ON THE MERGED ASPECTS

Aspects with both a positive expert opinion on the importance and government relevance, are automatically selected for the final assessment model. Since the experts have a significant amount of knowledge about information services, are active for a considerable amount of time in the government and also have been active in the private sector, their opinion is treated as valid. In addition, the experts fulfill the role senior consultant at the case company where this study is conducted. Meaning, with the goal to make the model specific to DEGOs, their opinion is valuable and thus considered as a valid analysis method to determine which aspects will be part of the final assessment model.

The opposite is done for aspects with a negative expert opinion on both perspectives, these aspects are omitted from the model and will also not be part of the analysis hereafter. The remaining aspects are given the benefit of doubt and further analyzed on source count and whether measurement criteria are available in the literature. Especially the latter is an important factor for the final selection of aspects. Indicating with color coding, four aspects are going straight to the final selection and seven aspects are excluded for further analysis. Remaining are 28 aspects, as shown in Table 13 below.

The four aspects are also shown (in the top of the table, dark-green and bold) to indicate the source count and the availability of the measurement criteria for these aspects as well. However, these aspects are not criticized on these indicators as they are already part of the final selection.

Aspect	Source count	Measurement criteria from source
Advisory board for non-binding strategic advice	1	N
Influence of stakeholder environment	4	Y
IT budget allocation	5	Y
Readiness for change in the organization	2	N
Adaptation of IT to the organization's goals	9	Y
Assessing the strategic importance of emerging technologies	1	Y
Audit and review	1	N
Board of director's approval of IT investments	1	N
Business ownership for IT projects and initiatives	1	N
CIO reports to CEO	1	N
Clear and measurable IT and business metrics	4	N
Clearly defined roles and responsibilities	8	N
Communication between IT and business	10	Y
Enterprise architecture	1	N
External and legislation mandated annual reporting	1	N
Focus on understanding and supporting the end user	2	N
Insight of management into IT	1	N
Institutionalizing the culture of alignment	1	N
Integration of IT and business planning	9	Y
IT competencies and skill	1	N
IT steering committee	2	N
Leadership of IT	4	N
Portfolio management of the business and IT	3	N
Previous success of IT	7	Y
Prioritization of IT projects and investments	5	Y
Project management methodologies	1	N
Relationship between IT and business	7	Y
Senior executive support for IT	7	Y
Shared domain knowledge	10	Y
Sophistication of IT and business planning	4	Y
The degree of centralization of decision making	7	Y
Value awareness of IT	4	Y

Aspects that consists of more than four sources or contain measurement criteria are color-coded green, aspects with two/three sources or no measurement criteria are color coded yellow and aspects with one source and no measurement criteria are color-coded red.

TABLE 13: SOURCE COUNT AND MEASUREMENT CRITERIA ANALYSIS

In order to reduce the list and thus making it more manageable for the case study and the final model, decided is to include aspects that are mentioned at least two times in literature and/or has measurement criteria (Y). Again, with color coding, this shows us that 10 aspects will be omitted. Resulting in a final list of 22 (18 from the analysis above and four from the expert opinion) aspects for measuring strategic BITA in DEGOs.

Step 3 – Final selection

The final list of aspects that will be part of the assessment model are (in alphabetical order):

- 1) Adaptation of IT to the organization's goals
- 2) Advisory board for non-binding strategic advice
- 3) Assessing the strategic importance of emerging technologies
- 4) Clear and measurable IT and business metrics
- 5) Clearly defined roles and responsibilities
- 6) Communication between IT and business
- 7) Focus on understanding and supporting the end user
- 8) Influence of stakeholder environment
- 9) Integration of IT and business planning
- 10) IT budget allocation
- 11) IT steering committee
- 12) Leadership of IT
- 13) Portfolio management of the business and IT
- 14) Previous success of IT
- 15) Prioritization of IT projects and investments
- 16) Readiness for change in the organization
- 17) Relationship between IT and business
- 18) Senior executive support for IT
- 19) Shared domain knowledge
- 20) Sophistication of IT and business planning
- 21) The degree of centralization of decision making
- 22) Value awareness of IT

“(..) successful alignment should focus on a larger collection of activities that IT managers and business managers need to carry out jointly as to coordinate goals and operations within IT and across other organizational functions (e.g., finance, marketing, HR).”

(Luftman, Lyytinen, & Zvi, 2017, p. 11)

These aspects can be divided into categories to conceptualize strategic BITA. Which makes it more convenient and manageable for further references (such as in the case study). This categorization is done through qualitative coding which translates to creating categories from the interpretation of the data (Bryman & Burgess, 1994). Additionally, a code is added to each aspect to make future references even more convenient (see Table 14).

Business-related (BUR)	
Advisory board for non-binding strategic advice	BUR1
Clearly defined roles and responsibilities	BUR2
Focus on understanding and supporting the end user	BUR3
The degree of centralization of decision making	BUR4
Connection between business and IT (CON)	
Clear and measurable IT and business metrics	CON1
Communication between IT and business	CON2
Integration of IT and business planning	CON3
Portfolio management of the business and IT	CON4
Relationship between IT and business	CON5
Shared domain knowledge	CON6
Sophistication of IT and business planning	CON7
IT related (ITR)	
Adaptation of IT to the organization's goals	ITR1
Assessing the strategic importance of emerging technologies	ITR2
IT budget allocation	ITR3
IT steering committee	ITR4
Leadership of IT	ITR5
Previous success of IT	ITR6
Prioritization of IT projects and investments	ITR7
Senior executive support for IT	ITR8
Value awareness of IT	ITR9
Environmental related (ENV)	
Influence of stakeholder environment	ENV1
Readiness for change in the organization	ENV2

TABLE 14: CATEGORIES AND CODES

The above is visualized in Figure 8 (next page) and given the name: **BISAM (Business-IT Strategic Alignment Model)**.

Business-IT Strategic Alignment Model

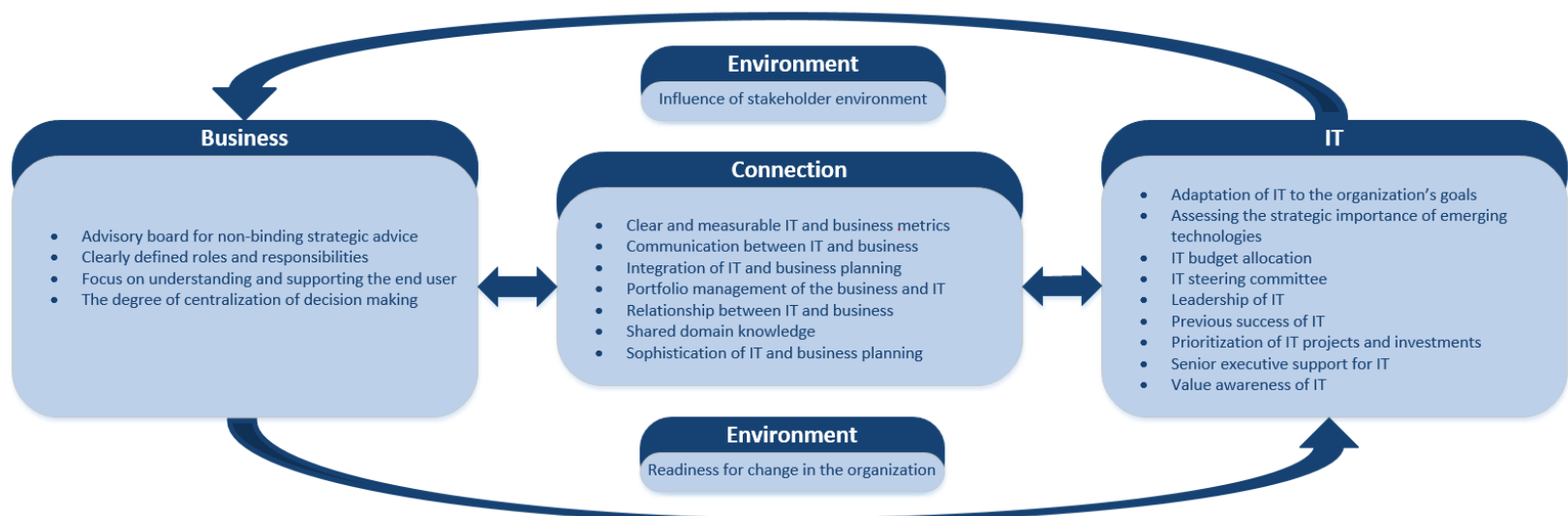


FIGURE 8: BISAM (BUSINESS-IT STRATEGIC ALIGNMENT MODEL)

2.2.3 Assessment Model

In this section, the BISAM is finalized through adding measurement criteria which makes it fit for performing the case study. For each of the aspects from the final selection on the previous section, its sources are used to determine the measurement criteria. For aspects which made it into the final selection, but do not have measurement criteria in their sources, other literature is used to address measurement criteria. When such criteria cannot be found in literature, experts- and my professional judgment are used to develop measurement criteria. Due to its benefits (see [2.1.3 Measure the Aspects](#)), the maturity model approach is used as the base for the measurement criteria.

When a particular aspect has multiple measurement criteria in its sources, the best of all is used by merging the criteria or choosing the criteria that suit the best to the rest of the model and the public sector. An overview of aspects with multiple measurement criteria could be found in Appendix C.

Sources with a seven-point Likert scale are converted to a five-point Likert scale. This to adhere to the maturity model as they consist of five maturity levels. In addition, using a five-point Likert scale tend to increase the response rate, quality and reliability as shown by many researchers (Babakus & Mangold, 1992), (Jenkins & Taber, 1977), (Lissitz & Green, 1975), (McKelvie, 1978) & (Remmers & Ewart, 1941). It is decided to restrict the measurement criteria to a five-point Likert scale as it is a global approach for collecting data, interviewees are restricted to respond in a degree of agreement rather than having an argument. Moreover, the results will be easier to analyze due to its quantizability.

Lastly, the goal is to have distinct and objective criteria per point on the Likert scale instead of a subjective measurement where the opinion of the interviewee is measured on a Likert scale that ranges from strongly disagree to strongly agree. This could potentially create scattered results as each interviewee could have a different view on the shown statements. Whereas when distinct criteria are used per point on the scale, interviewees are most likely to select the same score as it is either done in the organization or not. Thus, preventing scattered results, create consensus, increase validity and make it more generalizable to the organization.

When an aspect has such subjective measurement criteria, the questionnaire instrument of Luftman et al. (2017) is used to transfer it to more objective measurement criteria. When such criteria cannot be found or related to an aspect, the same is done as mentioned before: developing criteria based on experts- and own professional judgment. Another advantage of this approach is making it more suitable to relate the results to a maturity model, which then shows not only the current alignment maturity but also the steps to increase the alignment by advancing to a higher maturity level.

The aspects with their concerned measurement criteria and the approach to determine these criteria could be found in Table 15 below.

Aspect	Measurement criteria	Approach
(ITR1) Adaptation of IT to the organization's goals	The demonstrated contribution of IT and its ability to adapt to accomplish the organization's strategic goals is: 1- Very weak. 2- Somewhat weak. 3- Neither weak nor strong. 4- Somewhat strong. 5- Very strong.	Adapted from its own source (Meines, 2016) with support of Luftman et al. (2017). See Appendix C.

<p>(BUR1) Advisory board for non-binding strategic advice</p>	<p>Regarding the presence of an advisory board for non-binding strategic advice:</p> <ol style="list-style-type: none"> 1- We have no advisory board for non-binding strategic advice. 2- We have an informal advisory board which occasionally delivers strategic advice. 3- We have a formal advisory board which occasionally delivers strategic advice, but we seldom take action based on the findings. 4- We have a formal advisory board which routinely delivers strategic advice and usually actions are taken based on the findings. 5- We have a formal advisory board which routinely delivers strategic advice and have a regulated process in place to take action and measure the changes. 	<p>No criteria in literature available, thus developed specially for this study.</p> <p>Input from Luftman et al. (2017).</p>
<p>(ITR2) Assessing the strategic importance of emerging technologies</p>	<p>Regarding the assessment and review of the importance of emerging technologies:</p> <ol style="list-style-type: none"> 1- We do not formally assess and/or review emerging technologies. 2- We assess and/or review only after when technologies already have emerged in the private sector. 3- Assessment and/or reviews of emerging technologies are becoming routine occurrences. 4- We routinely assess and/or review emerging technologies and have a formal process in place to make changes based on the results. 5- We routinely assess and/or review emerging technologies and have a formal process in place to make changes based on the results and measure the changes. Our external partners are included in this process. 	<p>Own source (Newkirk & Lederer, 2006) uses subjective criteria. Input from the questionnaire instrument of Luftman et al. (2017) is used instead.</p> <p>See Appendix C.</p>
<p>(CON1) Clear and measurable IT and business metrics</p>	<p>Regarding the integration of IT and business metrics to measure the contribution of IT to the business:</p> <ol style="list-style-type: none"> 1- We do not measure the value of our IT and business investments or do so on an ad-hoc basis. 2- The value measurements for IT and business are not linked. We have limited or no formal feedback processes in place to review and take action based on the results of our measures. 3- The value measurements for IT and business are starting to be linked and formalized. We are also starting to have formal feedback processes in place to review and take actions based on the results of our measures. 	<p>Adapted from its own source (Meines, 2016) with support of Luftman et al. (2017).</p>

	<p>4- We formally link the value measurements of IT and business. We have formal feedback processes in place to review and take actions based on the results of our measures and to assess contributions across functional organizations.</p> <p>5- We use a multi-dimensional approach with appropriate weight given to IT and business measures. We have formal feedback processes in place to review and take action based on the results of our measures. These measures are extended to our external partners (such as vendors, outsourcers and customers).</p>	
<p>(BUR2) Clearly defined roles and responsibilities</p>	<p>Regarding the roles and responsibilities in your organization:</p> <p>1- We do not have clearly defined roles and responsibilities.</p> <p>2- We have some informal defined roles and responsibilities.</p> <p>3- We have formally defined roles and responsibilities.</p> <p>4- We have formally defined roles and responsibilities with demonstrated effectiveness.</p> <p>5- We have formal and clearly defined roles and responsibilities with demonstrated effectiveness and are reviewed regularly.</p>	<p>No criteria in literature available, thus developed specially for this study.</p> <p>Input from Luftman et al. (2017).</p>
<p>(CON2) Communication between IT and business</p>	<p>The communication between IT and business (such as ease of access, familiarity of stakeholders) tends to be:</p> <p>1- One-way, from the business. Rather formal and inflexible.</p> <p>2- One-way, from the business. Moderately informal and moderately flexible.</p> <p>3- Two-way, formal and inflexible.</p> <p>4- Two-way, moderately informal and moderately flexible.</p> <p>5- Two-way, informal and flexible.</p>	<p>Own source (Yayla, 2008) uses subjective criteria. Input from the questionnaire instrument of Luftman et al. (2017) is used instead.</p> <p>See Appendix C.</p>
<p>(BUR3) Focus on understanding and supporting the end user</p>	<p>Regarding the focus on understanding the end user for supporting them:</p> <p>1- Senior and mid-level <u>IT/business</u> managers do not understand the end user.</p> <p>2- Senior and mid-level <u>IT/business</u> managers have a limited understanding of the end user.</p> <p>3- Senior and mid-level <u>IT/business</u> managers have a good understanding of the end user.</p> <p>4- Understanding the end user by all <u>IT/business</u> members is encouraged and promoted by senior managers.</p> <p>5- Understanding of the end user is required (e.g. tied to performance appraisals) through the <u>IT/business</u> department.</p>	<p>No criteria in literature available, thus developed specially for this study.</p> <p>Input from Luftman et al. (2017).</p> <p>Based on interviewees position (business or IT), the criteria is phrased differently.</p>

<p>(ENV1) Influence of stakeholder environment</p>	<p>Regarding the influence of stakeholder environment (such as the degree of change and instability in the organization, the usefulness of data, potential impact of developments, changing demand for various courses and programs, innovations by similar organizations and government actions and interference), in our organization the impact on business and IT is:</p> <ol style="list-style-type: none"> 1- Not readily transparent (very disruptive). 2- Transparent at the functional level only. 3- Transparent at the functional level and emerging across all remote, branch and mobile locations. 4- Transparent across the entire organization. 5- Transparent across the organization and to our business partners/alliances. 	<p>Adapted from Luftman et al. (2017) with input from Chan et al. (2006).</p> <p>See Appendix C.</p>
<p>(CON3) Integration of IT and business planning</p>	<p>Regarding the integration of strategic IT and business planning:</p> <ol style="list-style-type: none"> 1- We do no formal strategic <u>business/IT</u> planning or, if it is, done, it is done on an as-needed basis. 2- We do formal strategic <u>business/IT</u> planning at the functional unit level with slight <u>IT/business</u> participation. 3- We do formal strategic <u>business/IT</u> planning at the functional unit levels with some <u>IT/business</u> participation. There is some inter-organizational planning. 4- We do formal strategic <u>business/IT</u> planning at the functional unit and across the enterprise with <u>IT/business</u> participation. 5- We do formal strategic <u>business/IT</u> planning at the functional unit, across the enterprise and with our <u>business partners/alliances (with IT participation)</u>. 	<p>Own source (Cumps, et al., 2009) uses subjective criteria. Input from the questionnaire instrument of Luftman et al. (2017) is used instead.</p> <p>Two items are merged (see Appendix C).</p> <p>Based on interviewees position (business or IT), the criteria is phrased differently.</p>
<p>(ITR3) IT budget allocation</p>	<p>The IT budgets are allocated as a:</p> <ol style="list-style-type: none"> 1- Cost center (costs only) with inconsistent spending. 2- Cost center (costs only) by functional organization. 3- Cost center (costs only) of which some projects treated as investments. 4- Investment center (value, costs and assets). 5- Value center (value and costs) where IT generates value. 	<p>Adapted from its own source (Meines, 2016) with support of Luftman et al. (2017).</p> <p>See Appendix C.</p>
<p>(ITR4) IT steering committee</p>	<p>Regarding the presence and effectiveness of the IT steering committee:</p> <ol style="list-style-type: none"> 1- We do not have (a) formal/regular steering committee(s). 2- We have (a) committee(s) which meet informally on an as-needed basis. 3- We have formal committees, which meet regularly and have emerging effectiveness. 	<p>Adapted from other literature: Luftman et al. (2017).</p>

	<ul style="list-style-type: none"> 4- We have formal, regular committee meetings with demonstrated effectiveness. 5- We have formal, regular committee meetings with demonstrated effectiveness that include strategic business partners sharing decision-making responsibilities. 	
<p>(ITR5) Leadership of IT</p>	<p>Regarding the leadership of IT and its proactive behavior, in our organization:</p> <ul style="list-style-type: none"> 1- IT shows no leadership or acts on an ad-hoc basis. 2- IT enables the business processes. 3- IT drives the business processes. 4- IT enables or drives the business strategy. 5- IT co-adapts with the business to enable/drive strategic objectives. 	<p>No criteria in literature available, thus developed specially for this study.</p> <p>Input from Luftman et al. (2017).</p>
<p>(CON4) Portfolio management of the business and IT</p>	<p>Regarding portfolio management of the business and IT, the components are:</p> <ul style="list-style-type: none"> 1- Not well integrated 2- Integrated at the functional unit with emerging integration across functional units 3- Integrated across functional units 4- Integrated across functional units and our strategic business partners/alliances 5- Evolving with our business partners 	<p>No criteria in literature available, thus developed specially for this study.</p> <p>Input from Luftman et al. (2017).</p>
<p>(ITR6) Previous success of IT</p>	<p>The previous success IT has shown (such as meeting commitments, reliability, credibility, the number of successful implementations/projects and delivered products) is:</p> <ul style="list-style-type: none"> 1- Very weak. 2- Somewhat weak. 3- Neither weak nor strong. 4- Somewhat strong. 5- Very strong. 	<p>Adapted from Luftman et al. (2017) with input from Chan et al. (2006).</p> <p>See Appendix C.</p>
<p>(ITR7) Prioritization of IT projects and investments</p>	<p>Regarding the prioritization of IT projects and investments. The prioritization process in your organization is usually:</p> <ul style="list-style-type: none"> 1- In reaction to a business or IT need. 2- Determined by the IT function. 3- Determined by the business function. 4- Mutually determined between senior and mid-level IT and business management 5- Mutually determined between senior and mid-level IT and business management and with consideration of the priorities of any business partners/alliances. 	<p>Adapted from its own source (Meines, 2016) with support of Luftman et al. (2017).</p> <p>See Appendix C.</p>
<p>(ENV2) Readiness for change in the organization</p>	<p>Regarding the readiness for change in your organization:</p> <ul style="list-style-type: none"> 1- We tend to resist change. 2- We recognize the need for change and change readiness programs are emerging. 	<p>Adapted from its own source (Meines, 2016) with support of Luftman et al. (2017).</p>

	<ul style="list-style-type: none"> 3- Change readiness programs providing training and necessary skills to implement changes are in place at the functional unit level. 4- Change readiness programs are in place at the corporate level. 5- Change readiness programs are in place at the corporate level and we are proactive and anticipate change. 	
<p>(CON5) Relationship between IT and business</p>	<p>Regarding the relationship between IT and business, to what extent are there formal processes in place that focus on enhancing the relationships that exist between IT and business (such as cross-functional teams, training and risk/reward sharing):</p> <ul style="list-style-type: none"> 1- We don't manage our relationships. 2- We manage our relationships on an ad-hoc basis. 3- We have defined programs to manage our relationships, but IT or the business does not always comply with them. Conflict is seen as creative rather than disruptive. 4- We have defined programs to manage our relationships and both IT and the business comply with them. 5- We have defined programs to manage our relationships, both IT and the business comply with them, and we are continuously improving them. 	<p>Multiple sources (see Appendix C) use subjective criteria. Input from the questionnaire instrument of Luftman et al. (2017) is used instead.</p>
<p>(ITR8) Senior executive support for IT</p>	<p>Regarding support for IT from senior level, in our organization we:</p> <ul style="list-style-type: none"> 1- Do not usually have senior-level IT or business support. 2- Often have senior-level IT support only. 3- Often have senior level IT and business support at the functional unit level. 4- Often have senior level IT and business support at the corporate level. 5- Often have senior-level IT and the CEO as support. 	<p>Own source (Newkirk & Lederer, 2006) uses subjective criteria. Input from the questionnaire instrument of Luftman et al. (2017) is used instead.</p> <p>See Appendix C.</p>
<p>(CON6) Shared domain knowledge</p>	<p>Regarding sharing knowledge (intellectual understanding and appreciation of the problems/opportunities, tasks, roles, objectives, priorities, goals, direction, etc.) between IT and the business:</p> <ul style="list-style-type: none"> 1- Knowledge sharing is on an ad-hoc basis. 2- Knowledge sharing is somewhat structured and/or structure is beginning to be created. 3- There is structured sharing around key functional unit processes. 4- There is formal sharing at the functional unit level and at the corporate level. 5- There is formal sharing at the functional unit level, at the corporate level, and with business partners/alliances. 	<p>Multiple sources (see Appendix C) use subjective criteria. Input from the questionnaire instrument of Luftman et al. (2017) is used instead.</p>

<p>(CON7) Sophistication of IT and business planning</p>	<p>Regarding the sophistication of <u>IT/business</u> planning. The level of detail our <u>IT/business</u> plans should consist of is:</p> <ol style="list-style-type: none"> 1- Non-existent and not-enforced. 2- Defined and enforced at the functional unit level but not across different functional units. 3- Defined and enforced at the functional unit level with emerging coordination across functional units. 4- Defined and enforced across functional units. 5- Defined and enforced across functional units, and with joint coordination among strategic business partners/alliances. 	<p>Own source (Yayla & Hu, 2012) uses subjective criteria. Input from the questionnaire instrument of Luftman et al. (2017) is used instead.</p> <p>See Appendix C.</p> <p>Based on interviewees position (business or IT), the statement is phrased differently.</p>
<p>(BUR4) The degree of centralization of decision making</p>	<p>Regarding the degree of centralization of decision making, in our organization important IT decisions are made by:</p> <ol style="list-style-type: none"> 1- Top business management or IT management at the corporate level only. 2- Top business or IT management at corporate level with emerging functional unit level influence. 3- Top business management at corporate and functional unit levels, with emerging shared influence from IT management. 4- Top management (business and IT) across the organization and emerging influence from our business partners/alliances. 5- Top management across the organization with equal influence from our business partners/alliances. 	<p>Own source (Yayla, 2008) uses subjective criteria. Input from the questionnaire instrument of Luftman et al. (2017) is used instead.</p> <p>See Appendix C.</p>
<p>(ITR9) Value awareness of IT</p>	<p>Regarding the value awareness of IT by the business, in our organization the business perceives IT as:</p> <ol style="list-style-type: none"> 1- A cost of doing business. 2- Emerging as an asset. 3- A fundamental enabler of future business activity. 4- A fundamental driver of future business activity. 5- A partner with the business that co-adapts/improves in bringing value to the firm. 	<p>Multiple sources (see Appendix C) use subjective criteria. Input from the questionnaire instrument of Luftman et al. (2017) is used instead.</p>

TABLE 15: MEASUREMENT CRITERIA FOR EACH ASPECT

3 Treatment Validation

3.1 Applying the Assessment Model – A Case Study

With the BISAM now fit for an assessment, a case study is conducted at RWS. In order to perform this case study, a protocol is constructed using the template from Brereton, Kitchenham, Budgen, & Li (2008). This protocol is mostly based on the research done by Yin (2003) who states that using a protocol improves the reliability of the case study. Only relevant items from the template were used, leaving us with five sections to discuss in this chapter. The other items regard criteria for case selection, case study roles, study limitations, reporting and schedule, of which the first two were already defined in preparatory to this study and the latter three are embedded in other sections of this thesis.

3.1.1 Background

The fourth and last research questions require empirical research. For this reason, a case study is conducted to assess whether the assessment model can be used for measuring strategic BITA in executional government organizations and if the individual aspects indeed influence alignment.

“A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.”

(Yin, 2003, p. 13)

If we apply the definition of Yin (2003) above, we can state that the contemporary phenomenon in this study is strategic BITA. Regarding the boundaries, this study tries to establish evidence that the aspects and its measurement criteria found in theoretical research are indeed representative in executional government organizations. Which relates to one of the gaps this study tries to cover: investigate alignment in specific organizational contexts.

3.1.2 Design

Regarding the design of a case study, there are four different types: (1) holistic single-case design (2) embedded single-case design (3) holistic multiple-case design and (4) embedded multiple-case design (Yin, 2003). The single-case is a common design for doing case studies and analogous to a single experiment. The rationale for performing a single-case study, rather than a multiple-case study, is where the case represents a critical test of the existing theory, a rare case or as revelatory purpose. Other reasons include the prelude to further research, such as a pilot case for a multiple-case study or as an exploratory device. Multiple-case studies are more expensive and time-consuming to conduct but often results in more compelling evidence (Herriott & Firestone, 1983). Although there is no broad distinction between the two designs, they both have advantages and disadvantages, where the choice is mostly based on the research design. Regarding the different type of design, holistic and embedded, depends on whether there is one unit of analysis (an organization/program as a whole) or multiple (different projects within a program, locations, roles et cetera).

This case study regards a holistic single-case design as study contains one case to be examined: RWS, and one unit of analysis: the organization as a whole (strategic level). The goal of the BISAM is to make it fit for other executional government organization as well, this would imply multiple cases. However, due to time constraints and limited resources, this study is performed at one executional government organization.

The object of study is the BISAM developed in the previous chapter. This model is based on extensive theoretical research in which first all general- and public alignment aspects in the literature (to a certain extent and within a set of criteria) are listed. Subsequently, aspects sharing the same intent were merged to one aspect which reduced the total list. Various analysis is done on this list (such as expert opinion and source-count) and a final selection was made. For each aspect on this list, measurement criteria are added to finalize the model and making it fit to use for

this case study. With the purpose to evaluate whether these aspects, with its measurement criteria, form an appropriate base for measuring strategic BITA in executional government organizations.

3.1.3 Data Collection

The data collection is done by adapting the procedure Luftman (2000, 2003ab, 2015 & 2017) proposes, which is also mentioned in the literature review ([1.3.2 Assessing Business-IT Alignment](#)):

- 1) Form an assessment team
- 2) Gather information and decide individual scores
- 3) Assign an overall score and plan improvements

Step 1 – Form an assessment team

Each of the aspects with its measurement criteria should be assessed by individuals from both IT and business. As the scope is set to the strategic level of alignment, decided is to select executives one level below the CEO/CIO. Since these people function high enough in the organization to have knowledge about strategic planning, both from the perspective of business and IT. The number of individuals depends on the number of business departments and should be significant enough to do a valid assessment. Typically, this ranges from 10 to 30 (Luftman J. , 2003a).

RWS consists of seven regional departments, four nationwide process departments, one department for innovation, one department for the scope and one department to support the primary processes of the organization. Due to the fact this study focuses on the strategic level, only executives from the four nationwide process departments and the scope department are interviewed. One of these five departments is the IT department: Centrale Informatievoorziening (CIV – Central Information Services), which manages the data and IT for the organization and supports the business. The business of RWS consists of the other nationwide process departments and the scope department:

- 1) Grote Projecten en Onderhoud (GPO – Major Projects and Maintenance)
- 2) Programma's, Projecten en Onderhoud (PPO – Programmes, Projects and Maintenance)
- 3) Verkeer- en Watermanagement (VWM – Traffic and Water Management)
- 4) Water, Verkeer en Leefomgeving (WVL – Water, Traffic and Environment)

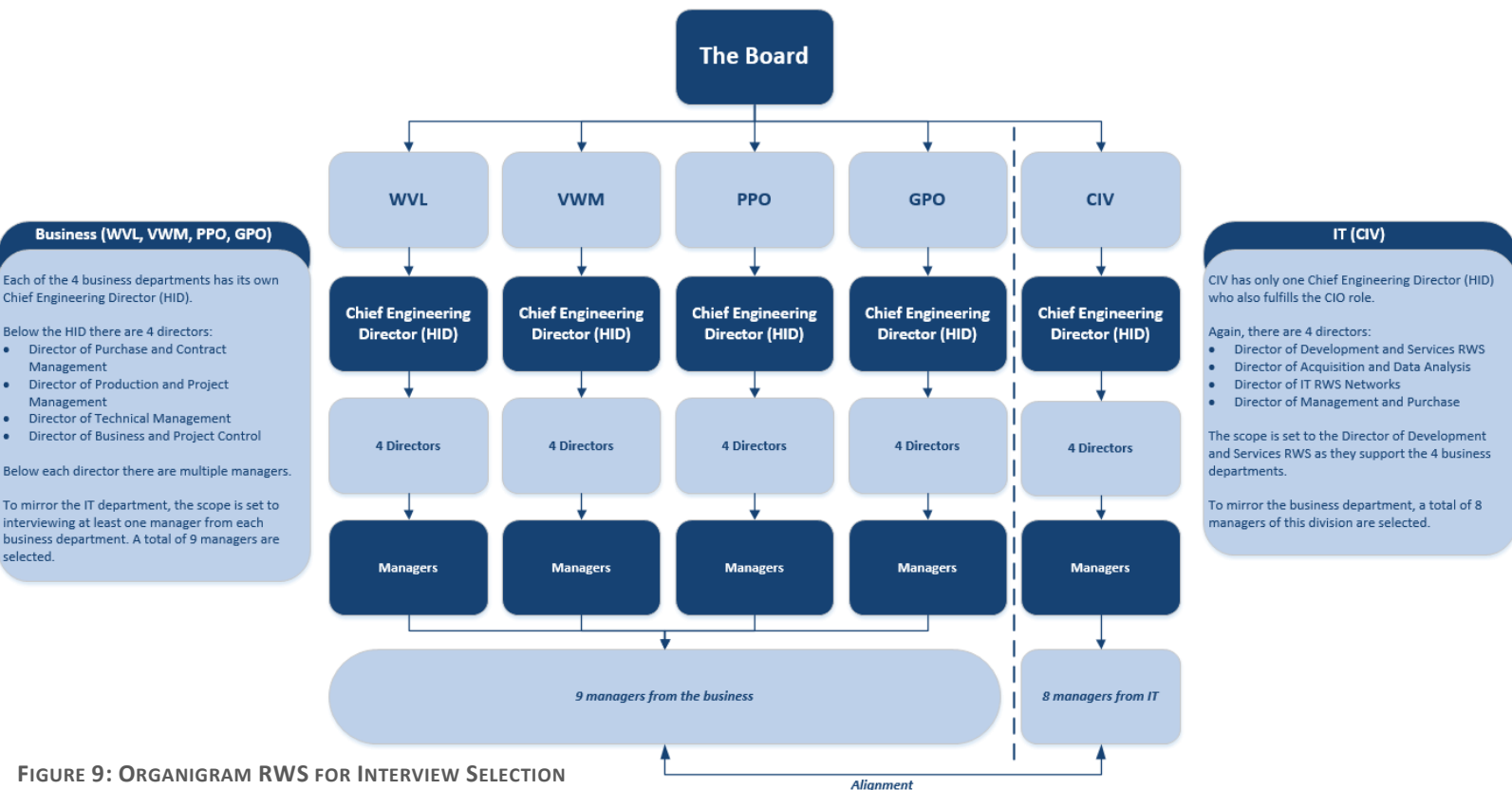


FIGURE 9: ORGANIGRAM RWS FOR INTERVIEW SELECTION

These are the main departments/business processes of RWS, which deliver value to society. The organigram of RWS with the interviewee selection is shown in Figure 9 on the previous page. As can be seen, a total of 17 managers (9 in the business and 8 in the IT department) is selected to achieve insight into the extent of strategic BITA at RWS. For privacy reasons, any personal information of these managers is not published.

The above concerns a non-random sampling method as the interviewees are selected on their position in the organization. All of them were only provided with very basic information about the interviews prior to an agreement. Such as an introduction of the research, the reason why they were selected, compensation/benefits (insight in results and thesis) and if they could meet within a certain period. After agreement, only the outline of the interview protocol (see Appendix D) is shared as agenda. Two managers from the IT (CIV) rejected the invitation due to their busy schedule. Meaning the other 15 managers (9 in the business and 6 in the IT department) accepted the invitation and thus interviewed for gathering information and deciding the scores.

Step 2 – Gather information and decide individual scores

For gathering information, an interview protocol is constructed (see Appendix D). This protocol is used during each of the 15 interviews to ensure consistency among them. The main part of the interview is deciding the individual scores on each of the 22 aspects. This is done by the researcher and not by the interviewee in order to avoid misinterpretation of the aspect and its measurement criteria. For this exact reason, the case study is not done via an online questionnaire but in form of an interview. The aspect is expressed in a question, which allows the interviewees to express freely their opinions and experiences while the researcher, with the consent of the interviewee, determines where this response fits the most on the Five-point Likert scale. The measurement criteria (the five different options) is presented to ease this process. Notes are taken as well to support the chosen option with examples.

A sixth option is added to the scale in case the interviewee does not know the answer or if the aspect is not applicable. A large response on this could indicate the concerned aspect does not fit in the model. These types of concerns will be discussed later on in the data analysis section.

Step 3 - Assign an overall score and plan improvements

When the individual scores are known an overall score of the alignment at RWS can be calculated. Where an overall score of the business and the IT separately could provide interesting insights. Additionally, these scores (accompanied with the notes) are extremely valuable in understanding the current state of alignment in the organization but also how the organization could improve this. How this model and the results could improve the alignment, is discussed in the next and last chapter of this thesis.

3.1.4 Data Analysis

This section concerns the processing of the data, the results of the case study and the analysis of the results.

Processing

The individual scores acquired from the interviews are stored in a spreadsheet. With these scores, several calculations are done, such as the overall alignment score of the organization but also the overall scores of the business and IT separately. In addition, the scores are visualized through a radar graph. With the four categories that are defined, this graph gives a good and clear overview of the overall scores. Likewise, the personal information, the individual scores of the interviewees are not included in this report.

Besides the scores, the interviewees are also asked to give comments on the question and examples to support their chosen option. Additionally, three open questions are asked at the end regarding alignment in general (see interview protocol in Appendix D). This qualitative data (notes) is also stored digitally and used for evaluating the model, drawing conclusions and make recommendations. All the documentation above forms the case study database for this study.

Results

The results of the case study are not published in this report due to the possible sensitive information that could be discovered from the assessment. RWS is a government organization and thus any sensitive information about the inner workings could potentially harm the Ministry and should be held confidential. Meaning, the results will be reported in an external document which stays internal in the organization and is used for input to improve the alignment. However, the process of this assessment is explained extensively, and the model is evaluated on its completeness and validity, details which can be discussed in this thesis.

Analysis

As said, the results are not discussed here. This section focuses on any information provided by interviewees that reflect on the model itself. Apart from these interviews with the business and IT managers, six information managers are interviewed as well. These information managers form a major connection between the business and IT at RWS. They have both the knowledge from business and IT and thus are experts and enablers of BITA. In the interviews (for protocol, see Appendix D) they are not asked to score the aspects but rather whether these aspects contribute to alignment, the importance of it and whether the formulation/criteria of the question is correct.

The information gathered through these two different interviews is analyzed in the following subsections: interviews with business- and IT managers, interviews with information managers.

3.1.4.1 Interviews with business- and IT managers

Overall performance

In general, the model performed well in practice. The participants were able to answer and score all the questions, with some exceptions. In total, 19 (of 330) questions were answered with option six due to the lack of knowledge about that particular subject. Regarding the validity of aspects, only two of them had a significant response on them: question 16 (ITR3) - IT budget allocation, had a response of five and question 22 (ENV2) - influence of stakeholder environment, a response of three. The first IT budget location makes sense as the majority of the response came from the business. The rationale for the other aspect, influence of stakeholder environment, stated that it was a difficult question to answer.

In addition, a participant addressed that wrong conclusions could derive from such an assessment. For example, when a participant shares that a certain aspect is not implemented, this would imply a low alignment score while actually the aspect is implemented, but not of the knowledge of the participant. One can argue that this still implies a low alignment score as the manager is not aware while he or she should be. The sixth option was introduced to tackle this problem, however, it remains a concern when the participant is confident in its decision. A possible solution is to perform the assessment with teams, in which they can complement each other choices. This could arise other concerns such as social desirability which is explained further down. Luftman (2000, 2003) mentions that a group setting is a legitimate approach for an assessment. The dialogue with each other to reach consensus on the alignment maturity and the discussion that arise could be extremely valuable in understanding the problems and opportunities to improve alignment. This could be an interesting approach to be applied in future research/assessments, especially for comparison if different results will arise. Which is not of value to the organization, as is not the question whether the organization is aligned or not, but rather how to improve alignment. However, in terms of assessment approach and the influences of a group setting, it could.

Missing aspects

The participants were also asked if they missed any aspects which are also important for alignment. Of which some of them answered the following (all mentioned once):

- 1) The awareness of the top management.
- 2) Quality of the collaboration, communication and information between the business and IT.
- 3) The understanding of each other domain and achieving common ground.
- 4) The level of knowledge of employees, especially the IT competencies and skills.
- 5) Aspects regarding quality rather than the existence.
- 6) The business knowledge of IT and the IT knowledge of the business.

If we try to match these six aspects to the list in Appendix B, only number two and five cannot be related to the initial aspects that are gathered from the literature. Both refer to the quality of an aspect rather than the existence. Thus, how valuable is the communication and information shared between the business and IT? It is indirectly related to communication aspect (CON2) but discusses the style of the communication rather than the communication quality.

The other four missing aspects can be related to the list in Appendix B, of which the awareness of top management is related to insight of management into IT (not part of the model) and value awareness of IT (part of the model - ITR9). However, these are limited to IT where the participant mainly meant the awareness of the environment.

The second missing aspect, the understanding of each other domain and achieving common ground, relates to the already existing aspect shared domain knowledge (CON6). However, this aspect mainly concerns the process of sharing knowledge not whether the domains actually understand each other and the process of achieving common ground. Currently not part of the model, but certainly important for future research.

The third aspect, the level of knowledge of employees (IT competencies and skills), is directly related to the aspect IT competencies and skills. However, it did not make it through the analysis and thus is not part of the current model. Although, this aspect was identified as a specific government aspect, which indicates it is a valid concern for the public sector.

The last and fourth aspect, the business knowledge of IT and the IT knowledge of the business, also related to the shared domain knowledge aspect (CON6). However, as mentioned earlier, this aspects regards the process of knowledge sharing, not whether the business actually understands the IT and vice versa.

Due to overall positive reactions and lack of support for the missing aspects, which are already related (to a certain extent) to aspects in the current model, no changes are made to the BISAM based on these interviews.

Descriptive statistics

Table 16 presents some descriptive statistics of the quantitative results. The mean is omitted from this table as this represents how well RWS is aligned, and thus confidential. However, the standard deviation, skewness and kurtosis of the four categories are presented to address the variances in the responses of the participants. This table shows that the means do not significantly differ and the skewness and kurtosis are not high, thus raising no concerns regarding the data.

Descriptive Statistics						
	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Business related average (BUR)	15	,63740	-,131	,580	-1,009	1,121
Connection average (CON)	15	,77465	-,184	,580	-,799	1,121
IT related average (ITR)	15	,52363	-,706	,580	,565	1,121
Environment average (ENV)	15	,89043	,091	,580	-1,220	1,121
Valid N (listwise)	15					

TABLE 16: DESCRIPTIVE STATISTICS PER CATEGORY

3.1.4.2 Interviews with information managers

Overall performance

The experts on alignment (information managers) also responded positively on the 22 constructs. They confirmed that the identified aspects indeed influence alignment, are applicable to the public sector and recognized the importance of them. There were only a few comments regarding the formulation of the questions and some of its criteria, which could potentially ease the assessment process but not necessarily influence the results. This is the case where the interviewer scores the aspect and not the interviewee. When the latter applies the formulation is essential. An example is the inconsequent use of 'organization' and 'you'. Organization is correct in this case, but question 8 and 21 use the pronoun 'you'. This could be interpreted as referring to the individual, and not the organization as a whole.

Formulation of aspects and criteria

Regarding the first question, the presence and effectiveness of an advisory board for non-binding strategic advice (question 1 – BUR1), an expert proposed to transfer 'vrijblijvend' (non-binding) to 'ongevraagd' (unsolicited) as it could raise questions. In which the expert was right, as multiple participants asked what is meant with non-binding. After the explanation that, in this context, it means unsolicited, the participants were able to answer the question.

As indicated in the interview protocol, some questions are phrased differently or should be interpreted differently depending on the origin of the participant (business or IT). For example, question four (focus on understanding and supporting the end user – BUR3) in which the definition of the end user should be interpreted differently. The end user of the business is mostly the society, whereas the end user of IT are the employees in the business who use the service or product. The same goes for question 8 and 10, which is not a concern when an expert phrases the question or provide an explanation. Although, when the model is used as a self-assessment, it could result in different interpretations. In this case the model should be revised, however, the model is initially not developed for a self-assessment. An expert on alignment should guide this process, as explained in the next chapter, section [3.2.1 BISAM's Manual](#).

Furthermore, a few comments were made on the aspect communication between IT and business (question 5 - CON2). The first two options of the measurement criteria only state one-way from the business, while it also should be possible that the communication is one-way from the IT department. A fair point and thus the first two options are revised by adding 'one-way from business or IT'.

Regarding question 9, the sophistication of IT and business planning (CON7), the 'level of detail' might not be the correct term in this context. This comment of an information manager is supported by a few participants who required an extra explanation on this aspect. Proposed is to change 'detailniveau' (level of detail) to 'raamwerk' (framework). The intention of this aspect is to check whether a standardized framework exists for developing strategic plans and whether the use of this is enforced, such that the plans are uniform through the organization and eases the evaluation process.

The question hereafter (portfolio management of the business and IT – CON4) also received some comments. Mainly regarding the components of portfolio management, which are not entirely clear. What are the components which should be integrated? There are various standards available in the literature to answer this question. However, it is proposed to ask how well the (current) components are integrated rather than asking to which extent they are integrated. Initially, this is how the statement and criteria were formulated (see [2.2.3 Assessment Model](#)). Yet, the translation to a Dutch questionnaire captured this differently. The aspect in this questionnaire is reformulated to avoid confusion in future assessments.

Question 13 (previous success of IT – ITR6) requires an extra explanation, as mentioned by an information manager. Besides the current examples, it should define success as: the contribution to the goals of the business. For some self-explanatory, but added for emphasize.

Concerning question 15 (adaptation of IT to the organization's goals – ITR1) almost all information managers mention that it contains two questions. That is the contribution and its ability to adapt. Although they are correct, the two concepts are closely related to each other. How could IT contribute to the organization's goals when they cannot adapt? And how could IT adapt to the organization's goals when they do not contribute? As they both relate to the accomplishment of the organization's goals, it is chosen to not divide the question in another question/aspect.

Regarding question 17, IT steering committee (ITR4), it is not clear in the question whether the business should participate in this committee as well. The source of which the measurement criteria is acquired mentions that an IT steering committee should consist of senior-level IT and business management (Luftman et al., 2017). With this note, the question is revised to avoid further confusion.

The last question (22 – influence of stakeholder environment – ENV1) received a lot of response on the complexity of the question. After an explanation, most participants were able to select an option. While the nature of the question and its criteria is good, the question is rephrased slightly to increase the understanding. This applies to the Dutch questionnaire in the interview protocol (Appendix D), not the assessment model presented in the previous chapter.

Lastly, there were some comments about the inconsequent use of RWS terms. This is not applicable to the generic model in this study as executional government organizations use different terms. Nevertheless, the questionnaire for RWS is improved based on these comments to accommodate future assessments.

Missing aspects

The information managers were also asked what aspects they miss in the current model. In response they mentioned the following (all mentioned once):

- 1) Aspects about the interpretation of C-level roles.
- 2) Service Level Agreements (SLA's).
- 3) Ambitions of the business.
- 4) Behavior and culture.

The first two can be indirectly related to the initial list of aspects shown in Appendix B. Whereas, aspects related to C-level roles did not make it through the analysis. The SLA's aspect is somewhat related to the clear and measurable IT and business metrics, which is part of the model (question 11 – CON1). However, this aspect focuses on the integration of business and IT metrics, not the technical- and relationship-oriented metrics between the IT and functional organization.

The other two regards the ambitions, behavior and culture which are more the social mechanisms of alignment. These cannot be related to aspects which were initially found in the literature, however, not less important. In addition, these constructs are interwoven with aspects like communication, relationship and sharing knowledge. These aspects have a behavioral element and contribute to establishing a culture. For this reason, and the lack of support, the missing aspects are not added to the BISAM.

The last concern is not related to the content of the model, but rather the approach of the model. As Luftman et al. (2017) discussed, the five-point Likert scale restricted the interviewees in options and thus could possibly be not their true attitude. One of the participants addressed this concern during the interview: the options are too restricted, the value will be mostly in the examples that are given. Even though the aspects were discussed in the format of open questions, the interviewees are being influenced by the options given and to a certain extent also the social desirability. Which is the case were, even when it is anonymous, the interviewees avoid choosing the extreme options (one or five) due to associating it with being an extremist, while it could be the answer that represents their true attitude. For this reason, it could be valuable in the future to not present the options to the interviewees. In this case, the expert who performing the assessment scores the aspect based on the interviewee's answer. Which is an interesting approach for further research. In this research, the above concern is partly managed by discussing the questions and its options extensively. The researcher actively asked the provide examples for the chosen option, which in some cases, led to a revise in the score.

Based on the analysis done in this section, the BISAM is revised. The revised model can be found in Appendix E.

Summarized, the revisions are:

- **BUR1 – Advisory board for non-binding strategic advice**
The term ‘non-binding’ is changed to ‘unsolicited’.
- **CON2 – Communication between IT and business**
In the first two maturity level criteria, communication one-way from the IT is added as well, instead of only one-way from the business.
- **ITR4 – IT steering committee**
Members of the IT steering committee are added for emphasize (senior level IT and business management).
- **ITR6 – Previous success of IT**
Previous success of IT equals the contribution to the goals of the business, and thus added for emphasize.
- **CON7 – Sophistication of IT and business planning**
‘Level of detail’ is changed to ‘a framework for the format’.

3.1.5 Validity

In terms of validity, four tests have been commonly used to enact the quality of empirical research (Yin, 2003):

- **Construct validity:** establishing correct operational measures for the concepts being studied.
- **Internal validity** (for explanatory or causal studies only, and not for descriptive or exploratory studies): establishing a causal relationship, whereby certain conditions are shown to lead to other conditions. as distinguished from spurious relationships.
- **External validity:** establishing the domain to which a study's findings can be generalized
- **Reliability:** demonstrating that the operations of a study such as the data collection procedures can be repeated, with the same results.

These four tests, also called concerns, with its tactics (Brereton, Kitchenham, Budgen, & Li, 2008) & (Yin, 2003) to achieve and how this is done in this study, can be found in Table 17 below. As internal validity is only for use at explanatory or causal studies, it is not taking into account for this study. In addition, the BISAM is still in an experimental phase, it is unique and not yet applied in other domains. Meaning, it is not possible to identify the domain/theory to which the study findings can be generalized. For this reason, the external validity is also not taken in consideration for this study. However, it is the goal to generalize the model to a wider domain: other executional government organizations. Still, more in-depth research should be done before this goal could be achieved, which is a matter of future research.

Concern	Case study tactic	Done in this study
Construct validity	Use multiple sources of evidence.	A total of 15 managers from both IT and business are consulted for collecting data. In addition, six information managers are consulted for their expert opinion on the validity of the 22 constructs.
	Establish a chain of evidence.	See Figure 10 on the next page.
	Expert review of draft protocols and reports.	Two experts reviewed the interview results.
Internal validity	Show a causal relationship between outcomes and intervention.	Not done in this study.
External validity	Identify the domain to which study finding can be generalized (use theory for single-case studies).	Not done in this study.
Reliability	Use a case study protocol.	The current section contains the protocol used for the case study.
	Develop a case study database.	The scores on the questions and notes taken during interviews are transferred to a digital format.

TABLE 17: CASE STUDY VALIDITY AND RELIABILITY CONCERNS AND ITS APPLICATION

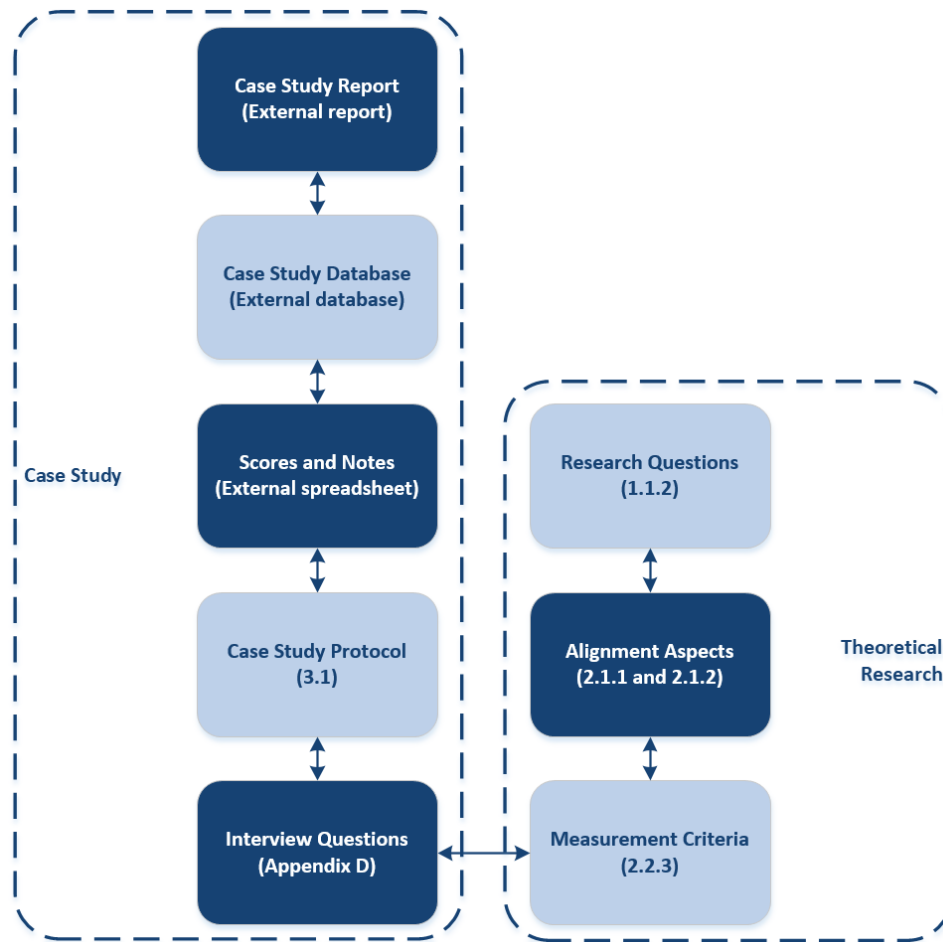


FIGURE 10: CHAIN OF EVIDENCE (ADAPTED FROM YIN, 2003)

The purpose of this chain of evidence is increasing the reliability of the case study (Yin, 2003). Meaning, it allows external researchers to follow the source of evidence from the initial research questions to the case study report. It is also a process, where it allows the external researcher to trace back the steps the researcher took, in each direction. Figure 10 shows the chain of evidence for this case study. Basically, it shows how the literature study (problem investigation and treatment design) relates to the case study (treatment validation) and vice versa. The connection between the two relies on the measurement criteria which is directly related to the questions asked in the interviews. This criterion is the result of the research to alignment aspects which is done based on the research questions. Where the interview questions are part of the protocol used for performing the interviews. Due to this protocol scores and notes are acquired which combined form the case study database. Lastly, this chapter represents the case study report with the exception that an external report for RWS contains the alignment scores.

3.2 Improving Strategic Alignment – The Model in Practice

The final section of this chapter discusses the fourth and last research question: how could the developed model (BISAM) improve strategic alignment? To do so, this section is divided into three parts: the usage of the model in practice, the situational factors of the public sector and how the model provides insight for public organizations into the extent IT supports the business strategy.

3.2.1 BISAM's Manual

How the model should be used by an executional government organization is (to a certain extent) already discussed in the case study protocol. Nonetheless, some more details could be necessary and thus the following steps should be undertaken when using the model in practice. These steps are based on various studies of Luftman (2000, 2003ab, 2015 & 2017) as he uses the same measurement approach and had a significant influence on the development of the BISAM. In addition, the model of Luftman is known as one of the well-established and comprehensive models in the literature of strategic BITA (Mekawy et al., 2009). For this reason, the approach of Luftman is adapted and specified for the BISAM:

1) Form an assessment team

Create a selection of business and IT executives to perform the assessment. Depending on the size of the organization, 10 to 30 executives are usually needed to receive adequate results. As the BISAM focuses on strategic BITA the executives should be one level below the CEO/CIO such that they have sufficient knowledge about the strategic level of the organization.

2) Gather information and decide individual scores

The data collection process can be done in multiple ways, with each their strengths and weaknesses. Such as a group setting, a survey, interviews (done in this study) or a combination of these. In each approach, the goal is to determine for each of the 22 alignment aspects which level (1 to 5) best matches their organization. In which:

- Level 1 indicates an initial/ad-hoc process (low alignment).
- Level 2 indicates a committed process.
- Level 3 indicates an established/focused process.
- Level 4 indicates an improved/managed process.
- Level 5 indicates an optimized process (high alignment).

Each aspect contains criteria for the five maturity levels which accommodates the expert and participants in determining the most appropriate level.

In a survey, the participants are restricted to the five-point Likert scale and potentially influenced by social desirability. Whereas, in a group setting and interview the aspect could be formulated in an open question allowing the participants to freely express their thoughts and opinions on the 22 aspects. The discussions that will arise and the possibility to support the chosen option with examples could be extremely valuable in understanding and improving strategic BITA. Naturally, such an approach requires more time and capacity of the expert(s) whereas a survey is an ideal instrument for collecting a large amount of data.

However, the scores are not the most valuable part of the assessment. The key is to understand the implications for the organization and identify opportunities for improving the alignment in the organization. It could be of value to discuss the results in a group setting. The scores indicate a benchmark of the current situation and thus how mature a public organization is in their strategic BITA. The next score/maturity level then provides the to-be situation in which the criteria indicate what should be done to achieve this stage.

3) Assign an overall score and plan improvements

Calculating the average of the individual scores gives the overall maturity level of the organization. However, a dialogue (in a group setting) for determining this level could be more valuable. Depending on the current maturity level, the next level provides prescriptive opportunities for planning improvements.

It is optional to add weight to the individual scores of the aspects for determining the priorities in planning improvements. The process of identifying the opportunities for improvements and planning those should be done with an evaluation team after completing the assessment, consisting of the business- and IT executives who participated in this assessment. As mentioned before, the discussions that arise in such a setting could be extremely valuable in understanding and improving the alignment.

The assessment also provides a benchmark, allowing to compare with other organizations but also track the progress when the assessment is conducted again. Especially after a strategic change or reorganization, performing the assessment again could be valuable in pinpointing the problems and opportunities over time.

This manual is intended for experts who are responsible for performing the assessment. In most cases, these are (senior) advisors in the organization who advise at a strategic level on issues related to information- and business management. The BISAM is an instrument for determining the current state of strategic BITA and provides prescriptive opportunities for where it needs to go, supporting executional government organizations in achieving, improving and sustaining alignment.

“Identifying an organization’s alignment maturity provides an excellent vehicle for understanding and improving the Business-IT Alignment.” (Luftman, 2015, p. 9)

3.2.2 Situational Factors of the Public Sector

Differences between the private- and public sector are already discussed in chapter [1.3.4 Business-IT Alignment in the Public Sector](#). Table 6 in this chapter shows that the public sector operates in a regulated environment, with many legal and formal constraints. Red tape is the idiom frequently used for describing this bureaucratic environment which hinders or even prevents decision making (Campbell, McDonald, & Sethibe, 2010). In addition, the public sector has fewer incentives for productivity than the private sector. Together with political influences, this creates a complex environment to operate in. This is strengthened by the diverse and large amount of stakeholders with often competing and conflicting interests (Rusu & Viscusi, 2017).

The above are some situational factors of the public sector which could potentially influence the BISAM. If not on the aspects itself, perhaps the highest maturity level (five) could never be achieved due to these factors. For example, the aspect IT budget allocation (ITR3), due to the fixed IT budgets the goal to allocate IT budgets as a value center where IT generates value, could be difficult, or even impossible to achieve. The same goes for IT competencies which are generally lower in the public sector (Winkler, 2013). Highly skilled IT personnel is more likely to apply in the private sector rather than the public sector due to the market-based salaries. However, in the case study, no barriers were found regarding achieving the highest maturity level. In fact, in some cases, the participants selected the highest maturity level as it described the current situation the best. Nevertheless, it should be taken into account as the dynamic environment, especially the political influences could restrict achieving higher maturity from one day to the next.

Other situational factors that potentially influence the model are the shared IT resources. Assumed is that this factor hinders the alignment between the business and IT due to the inflexibility of IT applications and resources. It relates to the aspects ITR1 (adaptation of IT to the organization’s goals) and ITR5 (leadership of IT) which translates to the proactivity of IT in supporting the business.

It has been shown that the organizational structure has an influence on alignment in the public sector (Andrade & Joia, 2012) (Wiredu, 2012) (Tapia, 2009) & (De Souza Bermejo & Tonelli, 2011). This aspect was addressed in the initial selection, however, not addressed in the BISAM due to the analysis and criteria. Studies have shown that the external environment has an influence on the structure of public organizations.

Examples are events such as elections, which could lead to reorganization and thus abrupt changes in the structure. As result, this may lead to misalignment as it hinders the implementation of already planned information systems (Silva & Hirschheim, 2007).

Often, IT innovations in the market are treated as a necessity in the public sector (Winkler, 2013). It is not an unknown discussion that the public sector lags behind the private sector regarding innovations (Fagerberg, Mowery, & Nelson, 2005). The private sector is driven by achieving a competitive advantage, whereas public organizations often follow in adopting new technologies. They tend to implement innovations after it has already been proven in the private sector. This relates to the aspect ITR2 (assessing the strategic importance of emerging technologies), in which the latter statement defines maturity level two. Along with the previously described situational factors, such as the red tape, one can argue that it is unlikely that the public sector will be leading in IT innovations. However, this does not have to be necessarily a bad thing as public organizations simply have formal decision processes and legislation due to their social role. One cannot implement IT innovations without proof of value as it could impact the society in a negative way.

Especially the large number of stakeholders with conflicting goals could significantly impact the BISAM. This concern was also addressed during the interviews with the business- and IT managers. Due to the large variety of stakeholders, different interests are inevitable and hindering the process of alignment. Besides the internal stakeholders, public organizations also have often to deal with external business partners and alliances. The involvement of this group relates to the last two maturity levels of many aspects in the BISAM: BUR 4 – the degree of centralization of decision making, CON 6 – shared domain knowledge, CON3 – integration of IT and business planning, CON7 – sophistication of IT and business planning, CON4 – portfolio management of the business and IT, CON1 – clear and measurable IT and business metrics, ITR4 – IT steering committee, ITR2 – assessing the strategic importance of emerging technologies, ITR7 – prioritization of IT projects and investments and ENV1 – influence of stakeholder environment.

Lastly, in contrast to the private sector, public organizations have multiple and intangible goals (Campbell et al, 2010). Their focus is not on increasing revenue but rather the public value: improving the citizens quality of life. This distinction is reflected in the measurability of these goals. Whereas private organizations steer on more tangible variables like profit margins, cost reduction and market share increase, public organizations aim at public welfare and added value (Rusu & Viscusi, 2017). This makes introducing clear and measurable IT and business metrics (CON1) rather complex in the public sector.

These situational factors described above are confirmed by the case study performed at RWS. Especially the large number of stakeholder is a challenge when trying to align the business and IT strategy at RWS. With more than 9000 employees RWS is considered one of the largest public organizations in the Netherlands. Together with its complex structure and processes, conflicting interests between the internal stakeholders are not exceptional. Without even mentioning the large number of external stakeholders RWS cooperates with: contractors, municipalities, provinces and many other (public) organizations.

However, RWS is an executional government organization (agency) and thus an independent part of the Ministry with its own management. Due to its own budget and financial administration, which is unrelated to the Ministry, RWS has relatively more 'freedom' in choosing its spending. Meaning, regarding the IT innovations, RWS is able to devote more resources to emerging technologies in contrast to other public organizations (non-agencies) who receive budgets beforehand. The case study confirmed this as RWS scored relative high on the aspect ITR2 (assessing the strategic importance of emerging technologies). In fact, they have a division which is completely devoted to evaluating and testing new technologies: the data lab. In addition, many programs and incentives exist to ensure RWS is ready for the future.

Furthermore, the case study at RWS confirmed that introducing clear and measurable IT and business metric is rather complex. As mentioned earlier, factors like multiple and intangible goals hinder this aspect. Not mentioning the integration of these IT and business metrics to measure the contribution of IT to the business. An important situational factor that should be considered when using the BISAM and trying to improve this specific aspect.

Perhaps an appropriate first step in achieving and sustaining alignment: how do we measure the contribution of IT to the business, or even more important: how do we measure public value?

3.2.3 Providing Insight in Strategic Alignment

The last section of this chapter concerns how the BISAM could provide insight to which extent the IT supports the business strategy, which is already introduced in the manual section. The BISAM is a tool for understanding but also improving strategic BITA. It provides insight into the current alignment maturity and simultaneously provides prescriptive opportunities for improving alignment. This due to the criteria for each maturity level per aspect, indicating opportunities for advancing to the next maturity level.

As mentioned earlier, the goal is not to identify whether the organization is aligned or not, but rather how to enhance the harmonious relationship between the business and IT (Luftman, 2015). The developed assessment model, BISAM, serves as a vehicle in achieving this objective. In the assessment, the business- and IT managers have to, as mentioned by Luftman (2015):

- Agree that an aspect scored low and need to be improved;
- Agree that an aspect scored good, but could be implemented better;
- Disagree on how good or bad a certain aspect is;
- Decide the significance of the aspects;
- And desire to focus their efforts on improving alignment.

Repeating the assessment regularly could provide additional insights.

It should be acknowledged that alignment is a two-way street, the business has to become aware of IT and IT has to become business savvy (Huang & Hu, 2007). Also addressed by a business manager in the case study who argued: *“The IT has to support us in becoming a better client”*.

The process of creating insight in alignment, achieve a higher maturity and sustain this, is a long-term journey. Starting with the BISAM to identify the perceptions of the business and IT.

“The journey continues with how business and IT executives work together to close the gaps and improve the performance of the organization. And in the quest for continuous improvement within a dynamic global environment, the journey may never end.” (Luftman, 2015, p. 42)

As argued earlier, alignment is not a static state. It regards a dynamic process for which Luftman (2015), and supported by Henderson & Venkatraman (1996), provides six steps for maximizing the enablers and minimizing the inhibitors of alignment. This process is visualized in Figure 11 of which the first three steps are covered by the BISAM.

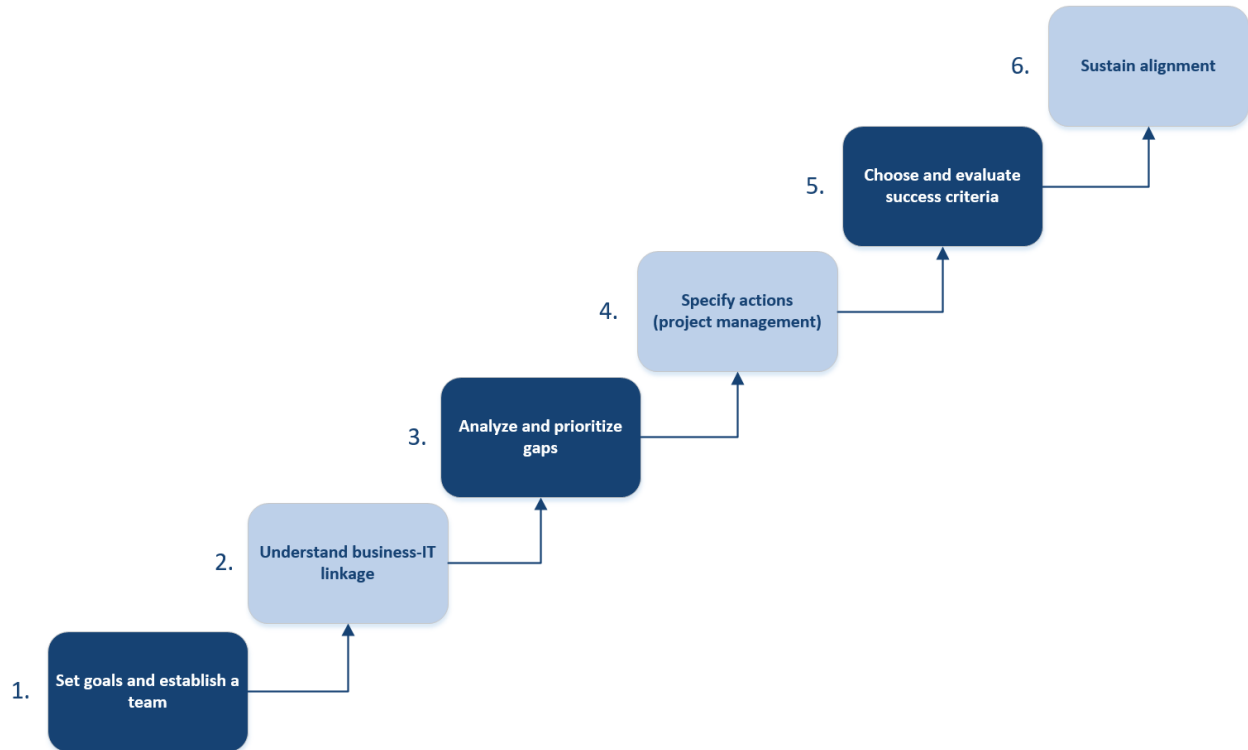


FIGURE 11: ALIGNMENT AS A PROCESS (ADAPTED FROM LUFTMAN, 2015)

This process was introduced by Luftman & Brier (1999) who mentions that this process reflects traditional strategic planning and includes an organizational assessment, in which the BISAM can be used to support this assessment. This six-step approach is discussed in many other studies by, among others, Luftman which were published later on (Luftman J. , 2000), (Sledgianowski & Luftman, 2005) & (Luftman J. , 2015). This process for achieving, improving and sustaining strategic alignment is elaborated in the following text, adapted from Luftman (2015) but specified for this study:

1) Set goals and establish a team

This step is related to the first step of BISAM’s manual: form an assessment team. This team should consist of both business and IT managers and representing the primary business functions (such as marketing, finance, engineering) to perform an appropriate assessment. When a team is established an assessment is performed for evaluating the current strategic alignment maturity. The results are discussed by identifying the opportunities for improving the relationship between the business and IT.

2) Understand business-IT linkage

The BISAM is used for understanding the business-IT linkage. As mentioned earlier, the assessment can be performed via interviews, a questionnaire, in a group setting or a combination. An expert should be assigned for facilitating this assessment.

3) Analyze and prioritize gaps

The results of the assessment allow the team (and expert) to analyze and prioritize the gaps. Which aspects (or category) scored low and should be improved? Which aspects scored good, but can be better? Which aspects have a higher priority? The criteria of the next maturity level could serve as a guideline to identify the opportunities for improving alignment. It is important that the team acknowledges that the goal is not to address the current state of alignment, but rather discuss the gaps for prioritizing the improvements that should be made.

4) Specify actions (project management)

When the gaps are analyzed and prioritized, specific actions should be determined to actually implement the improvements. Regarding project management, one should define the deliverables, ownership, timeframe, resources, risks, budget and measurements for each of the analyzed and prioritized gaps.

5) Choose and evaluate success criteria

These actions should be regularly evaluated if they still meet the success criteria and goals that are set for the implementation. This step concerns the understanding of why objectives are met, but also when they are not met.

6) Sustain alignment

Often the most difficult step, problems that hinder achieving strategic BITA will keep arising. The culture of alignment should be developed and institutionalized. The criteria of the BISAM provides some characteristics of public organizations for linking the IT and business strategies. Endeavors for achieving a higher maturity increases the potential of gaining business value from the IT investments. Hence, alignment should be acknowledged as a continuous process in which a periodical assessment with the BISAM provides insight into how the organization evolves over time in the harmonious relationship between the business and IT.

This process is key when organizations try to improve strategic BITA. It provides guidelines and shows the use of the BISAM for performing an organizational assessment. In addition, it concludes the last research question of this study and thus the last phase of the design cycle. Next, the conclusion and discussion are addressed in the reporting phase for finalizing the research report.

“Achieving and sustaining IT-business alignment remains a persistent and pervasive management concern.”

(Luftman et al., 2017, p. 11)

In this study, only the first three steps are performed at RWS in form of a case study with the BISAM. An external (confidential) report is constructed which includes the results of the assessment but also states some improvements based on the notes taken during the interviews and the criteria of the next maturity levels. Next, RWS should specify actions from this report to undertake improvements in the strategic BITA. As mentioned in the process above, a project management methodology could be used to define a plan for these actions. Subsequently, success criteria should be defined for these actions allowing to regularly evaluate if the objectives are met, or not met. Alignment is a continuous and dynamic process, thus these steps should be done again and again in order to improve the alignment. Establishing a culture of alignment could help in sustaining this. There is no end state, especially with the dynamic and complex environment of the public sector, organizations should continuously show efforts in trying to improve strategic BITA.

4 Reporting

4.1 Conclusion

Recall the main research question: what is an appropriate model that satisfies the need for an assessment of the strategic BITA, such that a large DEGO acquires insight into the extent to which the IT supports the business strategy and how the alignment between these can be improved? To answer this question and tackle the problem statement, four research questions were formulated:

What is business-IT alignment?

The definition of Silvius A. J. (2013) is used as it covers all the concepts discussed in the literature: *“Business and IT Alignment is the degree to which IT application, infrastructure and organization enable and shape the business strategy and processes, as well as the process to develop this.”* There are different approaches to measure this concept, of which one of them is a maturity model. The SAMM of Luftman (2000) is considered one of the most comprehensive and established models. This model is applied in hundreds of organizations worldwide, in which the public sector often scores relatively low. A possible explanation is due to the positive relation between alignment and business performance. Public organizations do not aim for maximizing profits and a better competitive position, meaning the IT and business are organized differently in some ways. In addition, public organizations have often to deal with a large number of stakeholders with competing or opposing interests. The large variety of services provided to the society, complex institutional structure and political exploitation forms a persistent challenge when trying to align the IT and business strategy in the public sector.

How to measure alignment?

A total of 135 aspects were identified during an extensive literature study. These general, but also government aspects influence the level of strategic alignment between the business and IT. Besides the positive aspects (enablers), negative aspects (inhibitors) are taken into account as well because focusing on the problems that might occur may mitigate the barriers and allow the organization to achieve alignment. In general, four approaches exist to measure these aspects: matching and moderation, profile deviation, scoring and maturity model. As mentioned before, Luftman uses the maturity model approach whereas the majority uses the scoring approach.

How could these aspects be combined in an assessment model to measure strategic business-IT alignment?

The purpose of the assessment model is threefold: conceptualize strategic alignment in the public sector, measure aspects that influence the level of alignment between the business and IT and provide insight through a prescriptive and inclusive approach, eventually with the goal to improve alignment. The model is constructed by first reducing the number of aspects through merging aspects with similar intent. With this reduced list various analysis are done to reduce the list even more. Expert opinion, criteria on the source-count and availability of measurement criteria is used to achieve a final selection of 22 aspects. Based on the nature of the aspects they are divided into four categories: business related, connection between business and IT, IT related and environment. The model is called BISAM and finalized by adding measurement criteria to make it fit for a case study at RWS. For this, the maturity model approach is used.

How could this model improve strategic alignment?

An assessment is conducted with the BISAM in which 15 managers from both IT and the business at RWS are consulted. 15 individual interviews are performed to identify for each of the 22 aspects which maturity level best fits the organization. The average scores indicate the overall alignment of RWS, but also shows the differences in divisions and category. In addition, six interviews with experts on alignment at RWS are conducted to evaluate the validity and completeness of the BISAM. Overall, the model performed well and only a few modifications are done that regard the formulation of some aspects and its criteria.

Research has shown that, among others, red tape a situational factor is that could influence this model and impact the assessment and/or aspects. For example, due to political influences, it is possible that the highest maturity level could never be achieved. In addition, especially the shared IT resources, lack of IT innovations, the large number of stakeholders with conflicting goals and multiple and intangible goals are situational factors that could have a significant impact on the behavior of the BISAM. These factors should be taken into consideration when performing an assessment with the BISAM, as they could influence the results and thus the efforts when trying to improve alignment.

Regarding improving strategic BITA, a six-step continuous process was introduced. The BISAM is a tool for performing the first half of the process. Based on the results of the assessment specific actions should be defined, implemented and evaluated on its success criteria. Sustaining alignment is done by developing and institutionalizing the culture of alignment and perform periodical assessments with the BISAM to address the changes over time in the harmonious relationship between the business and IT. Alignment is not an end state, thus this process regards a continuous activity for improving strategic BITA. Especially in the public sector due to its dynamic and complex environment, this journey may never end.

4.2 Discussion and Limitations

This study was initiated by three gaps in the literature to strategic BITA. The BISAM is developed to introduce new research work and empirical evidence to alignment in specific organizational contexts. Research has shown that especially organizations in the public sector have trouble with aligning their business and IT strategy. In this study, we focused specifically on executional government organizations. In addition, previous models were developed 15 to 20 years ago while emerging technologies have changed the role of IT in the business. For this reason, aspects in the BISAM are identified from studies published after the year 2005. Lastly, these models often lack practicality and are descriptive in nature. The BISAM tries a more prescriptive approach instead of abstract and static scales to assess alignment. With the maturity model approach, the BISAM not only serves as a vehicle to assess the current level of alignment but also identifies opportunities for improvement to advance to a higher level of alignment. Despite the promising results, the BISAM has still several limitations and thus require more in-depth research.

First, the 22 aspects of the BISAM are based on an extensive literature study to strategic BITA. However, it should be mentioned that it was not possible to cite each article. This is due to the hundreds of articles about strategic BITA that are available today. I acknowledge that I have not identified every study and apologize for any oversights. This limitation could affect the BISAM as the possibility exist that some aspects are not taken into consideration, and thus not part of the BISAM while they indeed influence alignment significantly. Although, I believe that with the almost 100 articles that are used, I am convinced that there was a sufficient amount of input for developing the BISAM.

Another limitation regards the research design, the design cycle limits to validation in practice whereas the engineering cycle should be used to transfer the validated treatment into the real world by implementing and evaluating. This is related to the examination of one case in this study: RWS. The goal of the BISAM is to also make it fit for measuring alignment in other public organizations, which implies multiple cases. However, due to time constraints and limited resources, only one executional government organization is examined for now. This raises another limitation which regards the use of expert opinion as a research method for determining the relevant aspects for the BISAM. Only two experts at RWS were consulted which increases the possibility that some aspects are omitted from the model while they could be relevant when more cases were examined.

Related to this concern is the three-step process for determining the relevant aspects (as seen in section [2.2.2](#)). An abstract approach is used without support from the literature as such an approach does not exist to this day. With the consent of the supervisors, this approach was used anyhow to avoid a colossal model which would have required much more resources and capacity from the researcher and the participants in the case study. Additionally, as mentioned earlier, only two experts from the same public organization were consulted in this process of determining aspects, and thus some bias may occur.

Furthermore, it is not tested whether the aspects of the BISAM fit the four categories that were defined. These are simply defined through qualitative coding which translates to creating categories from the interpretation of the data. Meaning, the measurement model is not validated through statistical analysis to evaluate concerns such as the multicollinearity.

This study explored the gap of research to alignment in specific organizational contexts. The public sector is considered a challenging environment when trying to align the business and IT strategy. While the private sector is more mature due to a positive relationship between alignment and business performance. Still, BITA remains a persistent and pervasive management concern.

Regarding the approach of the assessment, it could be valuable to not present the five-point Likert scale to the participants, because the participants are restricted in their answer and could be influenced by the options given. In addition, social desirability could be a concern in which the participant will never choose one of the extreme options (either one or five), while this could represent their true attitude.

Lastly, it should also be noted that the research methods used in this study inevitably created subjective results, and thus, some bias may occur.

4.3 Future Research

Future research is recommended to further refine the BISAM to establish a valid and comprehensive assessment model for measuring alignment in the public sector. Especially due to the emerging technologies and dynamic environment, models like the BISAM should be continuously reviewed on its validity. Continuing studies should be done to further refine and validate the components of the BISAM to verify its appropriateness in other public sector organizations as well, specifically executional government organizations. For example, by consulting a larger set of experts to determine the validity of the current set of aspects. The initial list could be used to identify if other aspects should be included in the BISAM, or even omitted. Additionally, establishing a domain of more results generated by the BISAM would increase the external validity as the findings could be generalized.

Another topic of future research is justifying the approach for determining relevant aspects. A more valid approach would be multiple interviews with experts from various public organizations to create consensus on a certain set of aspects and limit the amount of bias. Due to restrictions in time and limited capacity, a more abstract approach was used to reduce the list. Future research should include other researchers performing the same approach in other public organizations to examine whether a similar set of aspects will be established.

Besides the internal validity of the BISAM, the model itself should be implemented in the real world to evaluate the validated treatment in practice. The engineering cycle proposed by Wieringa (2014) could be used to perform these two steps. This cycle contains five phases in which the design cycle comprehends the first three phases: problem investigation, treatment design and treatment validation. All three done in this study. The two additional phases regard treating the described problem with the designed artifact, the BISAM, and evaluating whether this treatment was successful. If not, the researcher may start a new iteration through the cycle by reconsidering the problem statement.

Regarding the multicollinearity, suggested is to perform Structural Equation Modeling (SEM) with the Partial Least Squares (PLS) technique to evaluate the measurement model and whether the four categories/constructs indeed fit the 22 aspects. Hair, Black, Babin, & Anderson (2014) discuss that PLS-SEM is an appropriate method when the research goal is to predict and develop theory. The goal of this analysis is to evaluate the quality of the data based on the characteristics of the measurement model, but also to maximize the explained variance between the dependent constructs. PLS supports the mapping of the observed aspects to constructs and thus should be suitable for evaluating the BISAM. Lastly, an analysis on multi-collinearity could be performed to indicate the distinct role of each of the four categories. Results show whether other categories should be defined or that aspects should be moved to another category.

In addition, further research in other organizational contexts is recommended to establish a more mature knowledge base. Which could be used by practitioners to, finally, overcome the challenge of aligning business and IT in their organization. Examples are the educational and pharmaceutical industries which are also known for their low maturity in BITA. This study, with the development of the BISAM, could be used to explore the applicability and define a more suitable model for their industry with different aspects or criteria for measuring alignment.

Although the BISAM is based on 135 aspects that were discovered in the literature, more inductive and exploratory research is needed to identify other aspects as well. The current studies are still relatively old, while the industry is changing rapidly and has a significant impact on how organizations align their business and IT strategy. Alternative sets of aspects could be derived from this to further refine the BISAM.

Future research and assessments should also explore other data collection techniques. For example, assessments where the expert chooses the option that best fits the participant's answer, instead of the participant him/herself. A group setting could be a legitimate approach for performing the assessment, as valuable discussions could arise when choosing an answer. If the resources are limited, questionnaires could be done to achieve a large amount of data in a short time. However, with this technique, some bias may occur as the aspect and its criteria could be interpreted differently among participants.

Lastly, as mentioned in the literature review and by Coltman, Tallon, Sharma, & Queiroz (2015), the rise of the phenomenon digital business strategy requires to reconsider and extend research on BITA. Due to its immature knowledge base future research is needed to address the implications of digitalization or digital transformation on BITA. Coltman et al. (2015) mentions that the logic of this emerging concept initially makes BITA become less important since IT is the business strategy. Thus, making the IT- and business strategy identical. However, as the researchers also mention, is this really the case? Future research is needed to address this concern.

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Appendices

Appendix A – The Six Alignment Maturity Criteria

Communications	
Understanding of business by IT	<ol style="list-style-type: none"> 1. IT Management not aware 2. Limited IT awareness 3. Senior and mid-management 4. Pushed down through the organization 5. Pervasive
Understanding of IT by business	<ol style="list-style-type: none"> 1. Business management not aware 2. Limited business awareness 3. Emerging business awareness 4. Business-aware of potential 5. Pervasive
Inter/intra-organizational learning	<ol style="list-style-type: none"> 1. Casual, ad-hoc 2. Informal 3. Regular, clear 4. Unified, bonded 5. Strong and structured
Protocol Rigidity	<ol style="list-style-type: none"> 1. Command and control 2. Limited relaxed 3. Emerging relaxed 4. Relaxed, informal 5. Informal
Knowledge Sharing	<ol style="list-style-type: none"> 1. Ad-hoc 2. Semi-structured 3. Structured around key processes 4. Institutionalized 5. Extra-enterprise
Liaison(s) effectiveness	<ol style="list-style-type: none"> 1. None or ad-hoc 2. Limited tactical technology-based 3. Formalized, regular meetings 4. Bonded, effective at all internal levels 5. Extra-enterprise
Value Measurements	
IT Metrics	<ol style="list-style-type: none"> 1. Technical; Not related to business 2. Cost efficiency 3. Traditional financial 4. Cost-effectiveness 5. Extended to external partners
Business Metrics	<ol style="list-style-type: none"> 1. Ad-hoc; Not related to IT 2. At the functional organization 3. Traditional financial 4. Customer-based 5. Extended to external partners
Balanced Metrics	<ol style="list-style-type: none"> 1. Ad-hoc metrics unlinked 2. business and IT metrics unlinked 3. Emerging business and IT metrics linked 4. Business and IT metrics linked 5. Business, partners and IT metrics linked

Service Level Agreements	<ol style="list-style-type: none"> 1. Sporadically present 2. Technical at the functional level 3. Emerging across the enterprise 4. Enterprise-wide 5. Extended to external partners
Benchmarking	<ol style="list-style-type: none"> 1. Not generally practiced 2. Informal 3. Focused on specific processes 4. Routinely performed 5. Routinely performed with partners
Formal Assessments/Reviews	<ol style="list-style-type: none"> 1. None 2. Some; Typically for problems 3. Emerging formality 4. Formally performed 5. Routinely performed
Continuous improvement	<ol style="list-style-type: none"> 1. None 2. Minimum 3. Emerging 4. Frequently 5. Routinely performed
Governance	
Business Strategic Planning	<ol style="list-style-type: none"> 1. Ad-hoc 2. Basic planning at the functional level 3. Some inter-organizational planning 4. Managed across the enterprise 5. Integrated across and outside the enterprise
IT Strategic Planning	<ol style="list-style-type: none"> 1. Ad-hoc 2. Functional tactical planning 3. Focused planning, some inter-organizational 4. Managed across the enterprise 5. Integrated across and outside the enterprise
Reporting/Organization Structure	<ol style="list-style-type: none"> 1. Central/Decentral; CIO reports to CFO 2. Central/Decentral; Some co-location; CIO reports to CFO 3. Central/Decentral; Some federation; CIO reports to COO 4. Federated; CIO reports to COO or CEO 5. Federated; CIO reports to CEO
Budgetary Control	<ol style="list-style-type: none"> 1. Cost Center; Erratic spending 2. Cost Center by functional organization 3. Cost Center; Some investments 4. Investment Center 5. Investment Center; Profit Center
IT Investment Management	<ol style="list-style-type: none"> 1. Cost based; Erratic spending 2. Cost based; Operations and maintenance focused 3. Traditional; Process enabler 4. Cost-effectiveness; Process driver 5. Business value; Extended to business partners

Steering Committee(s)	<ol style="list-style-type: none"> 1. Not formal/regular 2. Periodic organized communication 3. Regular clear communication 4. Formal effective committees 5. Partnership
Prioritization Process	<ol style="list-style-type: none"> 1. Reactive 2. Occasional responsive 3. Mostly responsive 4. Value add, responsive 5. Value added partner
Partnership	
Business Perception of IT Value	<ol style="list-style-type: none"> 1. IT perceived as a cost of business 2. IT emerging as an asset 3. IT is seen as an asset 4. IT is part of the business strategy 5. IT business co-adaptive
Role of IT in Strategic business Planning	<ol style="list-style-type: none"> 1. No seat at the business table 2. Business process enabler 3. Business process driver 4. Business strategy enabler/driver 5. IT business co-adaptive
Shared Goals, Risk, Rewards/Penalties	<ol style="list-style-type: none"> 1. IT takes a risk with little reward 2. IT takes most of the risk with little reward 3. Risk-tolerant; IT some reward 4. Risk acceptance and rewards shared 5. Risk and rewards shared
IT Program Management	<ol style="list-style-type: none"> 1. Ad-hoc 2. Standards defined 3. Standards adhered 4. Standards evolved 5. Continuous improvement
Relationship/Trust Style	<ol style="list-style-type: none"> 1. Conflict/Minimum 2. Primarily transactional 3. Emerging valued service provider 4. Valued service provider 5. Valued partnership
Business Sponsor/Champion	<ol style="list-style-type: none"> 1. None 2. Limited at the functional organization 3. At the functional organization 4. At the HQ level 5. At the CEO level
Scope and Architecture	
Traditional, Enabler/Driver, External	<ol style="list-style-type: none"> 1. Traditional (e.g., accounting, email) 2. Transaction (e.g., ESS, DSS) 3. Expanded scope (e.g., business process enabler) 4. Redefined scope (business process driver) 5. External scope; business strategy driver/enabler

Standards Articulation	<ol style="list-style-type: none"> 1. None or ad-hoc 2. Standards defined 3. Emerging enterprise standards 4. Enterprise standards 5. Inter-enterprise standards
Architectural Integration	
Functional Organization	<ol style="list-style-type: none"> 1. No formal integration 2. Early attempts at integration 3. Integrated across the organization 4. Integrated with partners 5. Evolved with partners
Enterprise	<ol style="list-style-type: none"> 1. No formal integration 2. Early attempts at integration 3. Standard enterprise architecture 4. Integrated with partners 5. Evolved with partners
Inter-Enterprise	<ol style="list-style-type: none"> 1. No formal integration 2. Early concept testing 3. Emerging with key partners 4. Integrated with key partners 5. Evolved with all partners
Architectural Transparency, Flexibility	<ol style="list-style-type: none"> 1. None 2. Limited 3. Focused on communications 4. Effective emerging technology management 5. Across the infrastructure
Skills	
Innovation, Entrepreneurship	<ol style="list-style-type: none"> 1. Discouraged 2. Dependent on the functional organization 3. Risk-tolerant 4. Enterprise, partners, and IT managers 5. The norm
Locus of Power	<ol style="list-style-type: none"> 1. In the business 2. Functional organization 3. Emerging across the organization 4. Across the organization 5. All executives, including CIO and partners
Management Style	<ol style="list-style-type: none"> 1. Command and control 2. Consensus-based 3. Results based 4. Profit/value based 5. Relationship-based
Change Readiness	<ol style="list-style-type: none"> 1. Resistant to change 2. Dependent on the functional organization 3. Recognized need for change 4. High, focused 5. High, focused

Career Crossover	<ol style="list-style-type: none"> 1. None 2. Minimum 3. Dependent on the functional organization 4. Across the functional organization 5. Across the enterprise
Education, Cross-Training	<ol style="list-style-type: none"> 1. None 2. Minimum 3. Dependent on the functional organization 4. At the functional organization 5. Across the organization
Social, Political, Trusting Environment	<ol style="list-style-type: none"> 1. Minimum 2. Primarily transactional 3. Emerging valued service provider 4. Valued service provider 5. Valued partnership

TABLE 18: THE SIX ALIGNMENT MATURITY CRITERIA (ADAPTED FROM LUFTMAN, 2000)

Appendix B – Merging Aspects with Similar Intent

The letter 'G' after an aspect indicates that it is government related, whereas the letter 'N' indicates a negative aspect.

Aspect with similar intent	New aspect
<ul style="list-style-type: none"> Aligning IS strategies with the strategic plan of the organization Define and align IT strategies to corporate strategies and cascade them down in an organization (G) Adapting the goals/objectives of IS to changing goals/objectives of the organization Alignment between IT strategy and corporate plan (G) The degree to which IT is used to realize business goals (G) The goals/objectives of IT are adapted to the changing goals/objective of the organization IT-related opportunities are identified to support the strategic direction of the organization Adapting technology to strategic change Identifying IT-related opportunities to support the strategic direction of the firm 	Adaptation of IT to the organization's goals
<ul style="list-style-type: none"> Corporate advisory councils (G) 	Advisory board for non-binding strategic advice
<ul style="list-style-type: none"> Assessing the strategic importance of emerging technologies 	Assessing the strategic importance of emerging technologies
<ul style="list-style-type: none"> Audit and review (G) 	Audit and review
<ul style="list-style-type: none"> Board of director's approval of IT investments 	Board of director's approval of IT investments
<ul style="list-style-type: none"> There is a clear business ownership for ICT projects 	Business ownership for IT projects and initiatives
<ul style="list-style-type: none"> CIO reporting to the CEO/COO 	CIO reports to CEO
<ul style="list-style-type: none"> Unclear and immeasurable goals (N&G) The presence, reachability and depth of shared business and IT metrics (G) Return on investment analysis Linking between IT projects with a value and alignment measurement tool (G) 	Clear and measurable IT and business metrics
<ul style="list-style-type: none"> Complex IT structure and organization (N) Clearly defined roles and responsibilities Complexity of organization (N) Political and institutional context (N&G) Complex purchase processes (N&G) Complex governance (N&G) Non-executive and executive groups (G) Consolidate IT structures to ensure responsiveness and accountability (G) 	Clearly defined roles and responsibilities
<ul style="list-style-type: none"> CIO-TMT communication, participation and planning 	Communication between CIO and top management

<ul style="list-style-type: none"> • Level of communication between the IT- and business manager • Maintaining effective communication channels • Lack of frequent communication between users and IT department (N) • Clear and open communication between IT and business • Communications between IT and business • Open business planning communications (G) • Encourage and support IT/Business communication and partnership (G) • Miscommunication in IT activities (N&G) • Lack of personal social network (N) • Lack of interpersonal communication skills (N) 	Communication between IT and business
<ul style="list-style-type: none"> • Enterprise architecture (business and IS/IT domains) (G) 	Enterprise architecture
<ul style="list-style-type: none"> • External and legislation mandated annual reporting (G) 	External and legislation mandated annual reporting
<ul style="list-style-type: none"> • Missing focus on customer understanding and customer support (N) • Linking a high level of technical integration with customer services (G) 	Focus on understanding and supporting the end user
<ul style="list-style-type: none"> • Formalization • Lack of organizational integration (N) • Formalization of the IT unit • Formal evaluation process 	Formalization of IT and business
<ul style="list-style-type: none"> • Environmental uncertainty (N) • Power and politics (N&G) • Engage key stakeholders (G) • Political exploitation (N&G) 	Influence of stakeholder environment
<ul style="list-style-type: none"> • Lack of management insight into IT operations (N) 	Insight of management into IT
<ul style="list-style-type: none"> • Institutionalizing the culture of alignment 	Institutionalizing the culture of alignment
<ul style="list-style-type: none"> • The level of connection between IT and business planning • Connection between IT and business planning • Business and ICT planning processes are tightly integrated • Strategic planning (G) • Business managers' participation in strategic IT planning • IT involved in the strategy development • Integrating IT planning with business planning • IT managers' participation in business planning • Incorporation of IS investments in strategic business plan 	Integration of IT and business planning
<ul style="list-style-type: none"> • IT budget control and reporting • Performance management impacts budget allocation • Fixed IT budgets (N&G) • The way that IT investments are managed by budgets (G) 	IT budget allocation

<ul style="list-style-type: none"> • (Financial) inflexibility (N&G) 	
<ul style="list-style-type: none"> • Lack of IT competence and skills (N&G) 	IT competencies and skills
<ul style="list-style-type: none"> • IT project steering committee • IT steering committee 	IT steering committee
<ul style="list-style-type: none"> • IT demonstrates leadership • Proactive IT department • IT leadership • IT leadership to understand the business goals and IT contribution and bring it to the management attention (G) 	Leadership of IT
<ul style="list-style-type: none"> • Organizational culture of learning 	Organizational culture of learning
<ul style="list-style-type: none"> • Portfolio management • Sharing decision-making within IT portfolio management (G) • Business objectives and strategies in request for proposal selection criteria 	Portfolio management of the business and IT
<ul style="list-style-type: none"> • Successful IT history • Prior IS success • Past IT implementation failures (N) • Unsuccessful IT history (N) • Track record of IS department/CIO • Successful IT history • The success of IT unit 	Previous success of IT
<ul style="list-style-type: none"> • Well-prioritized IT projects • Major IT investments are prioritized by their expected impact on business performance • ICT investments are prioritized against business strategy • Political IT priorities (N&G) • The way there is being prioritized (G) 	Prioritization of IT projects and investments
<ul style="list-style-type: none"> • Project governance/management methodologies 	Project management methodologies
<ul style="list-style-type: none"> • Resistance to change (N) • The readiness for change in the organization (G) 	Readiness for change in the organization
<ul style="list-style-type: none"> • Business-IT partnerships • Relationship management • Developing strong relationships between IT and business • Healthy relationship between the user and IT • Relationship/partnership between CIO and TMT • Relationship management • Relationship management between business and IT executives 	Relationship between IT and business
<ul style="list-style-type: none"> • Lack of resources (N) 	Resource management

<ul style="list-style-type: none"> • Senior executive support for IT • Top management not committed to the strategic use of IT (N) • Top management involvement • Lack of management support (N) • High levels of management support (G) • Involve and get support of senior management (G) • Maintaining a mutual understanding with top management on the role of IS in supporting strategy 	Senior executive support for IT
<ul style="list-style-type: none"> • Shared domain knowledge • Shared domain knowledge • Low level of shared domain knowledge (N) • Shared CIO-TMT understanding • Shared CIO-TMT domain knowledge • Shared domain knowledge • Shared domain knowledge of business and IT executives • IT understands the business • Lack of IT understanding (N) • Understanding the strategic priorities of top management 	Shared domain knowledge
<ul style="list-style-type: none"> • Organizational size 	Size of the organization
<ul style="list-style-type: none"> • CIO characteristics, attributes and abilities 	Skills and personality of the CIO
<ul style="list-style-type: none"> • Planning sophistication • The IT plan contains detailed action plans/strategies that support the organization's business objectives and strategies • Collective and collaborative business planning style (G) • The lack of a well-defined IT plan (N&G) 	Sophistication of IT and business planning
<ul style="list-style-type: none"> • Tailor made systems/software (N&G) 	Standardized systems/software
<ul style="list-style-type: none"> • Centralization • Dominance of business executives in decision making (N) • Centralization of decision making • Autonomy of the management (N&G) • Bureaucratic decision process (N&G) • Senior management forum (G) • Top management instructions 	The degree of centralization of decision making
<ul style="list-style-type: none"> • IT value awareness • The business has a good understanding of the impact of ICT • The lack of value realization (N&G) • Educating top management on the importance of IT 	Value awareness of IT

TABLE 19: MERGED ASPECTS WITH SIMILAR INTENT

Appendix C – Aspects with Multiple Measurement Criteria

Aspect	Measurement criteria	Source
<p>(ITR1) Adaptation of IT to the organization's goals</p>	<p>Aligning IS strategies with the strategic plan of the organization</p> <ol style="list-style-type: none"> 1- Entirely unfulfilled 2- Unfulfilled 3- Neutral 4- Fulfilled 5- Entirely fulfilled 	<p>(Newkirk & Lederer, 2006)</p>
	<p>Adapting the goals/objectives of IS to changing goals/objectives of the organization</p> <ol style="list-style-type: none"> 1- Entirely unfulfilled 2- Unfulfilled 3- Neutral 4- Fulfilled 5- Entirely fulfilled 	
	<p>Adapting technology to strategic change</p> <ol style="list-style-type: none"> 1- Entirely unfulfilled 2- Unfulfilled 3- Neutral 4- Fulfilled 5- Entirely fulfilled 	
	<p>Identifying IT-related opportunities to support the strategic direction of the firm</p> <ol style="list-style-type: none"> 1- Entirely unfulfilled 2- Unfulfilled 3- Neutral 4- Fulfilled 5- Entirely fulfilled 	
	<p>The goals/objectives of IT are adapted to the changing goals/objective of the organization</p> <ol style="list-style-type: none"> 1- Strongly disagree 2- Disagree 3- More or less disagree 4- Neither 5- More or less agree 6- Agree 7- Strongly agree 	<p>(Yayla & Hu, 2012)</p>
	<p>IT-related opportunities are identified to support the strategic direction of the organization</p> <ol style="list-style-type: none"> 1- Strongly disagree 2- Disagree 3- More or less disagree 4- Neither 5- More or less agree 6- Agree 7- Strongly agree 	

	<p>The degree to which IT is used to realize business goals (Meines, 2016) → The demonstrated contribution that the IT functions has made to the accomplishment of the organization’s strategic goals is (Luftman et al., 2017):</p> <ol style="list-style-type: none"> 1- Very weak 2- Somewhat weak 3- Neither weak nor strong 4- Somewhat strong 5- Very strong 	<p>Source (Meines, 2016) used measurement criteria from Luftman (2000).</p>
<p>(ITR2) Assessing the strategic importance of emerging technologies</p>	<p>Assessing the strategic importance of emerging technologies</p> <ol style="list-style-type: none"> 1- Entirely unfulfilled 2- Unfulfilled 3- Neutral 4- Fulfilled 5- Entirely fulfilled 	<p>(Newkirk & Lederer, 2006)</p>
	<p>The following statements pertain to the extent of assessment and review of IT investments.</p> <ol style="list-style-type: none"> 1- We do not formally assess and/or review 2- We assess and/or review only after we have a business or IT problem (i.e., failed IT project, market share loss) 3- Assessment and/or reviews are becoming routine occurrences 4- We routinely assess and/or review and have a formal process in place to make changes based on the results 5- We routinely assess and/or review and have a formal process in place to make changes based on the results and measure the changes. Our external partners are included in this process. 	<p>(Luftman et al., 2017)</p> <p>Not a source of the aspects but addressed here due to lack of objective criteria and the relevance to measurement criteria from the questionnaire instrument.</p>
<p>(CON2) Communication between IT and business</p>	<p>Please indicate how much you agree with the following statements regarding the communication between business and IT executives in your organization:</p> <ul style="list-style-type: none"> • Business and IT executives have frequent, direct, informal communication (e.g., face-to-face, telephone, e-mail). • Business and IT executives have frequent, direct, formal communication (e.g., meetings, business memo). • Business and IT executives utilize various channels to communicate with each other (e.g., liaisons, task forces, steering committees). 	<p>(Yayla, 2008)</p> <p>Researcher let interviewees score on each of the five items (seven-point Likert scale), which combined measures the level of communication between IT and business.</p>
	<p>The following question pertains to communications protocol. The IT and business communication style (e.g., ease of access, familiarity of stakeholders) tends to be:</p> <ol style="list-style-type: none"> 1- One-way, from the business; formal and inflexible. 2- One-way, from the business; moderately informal and moderately flexible. 3- Two-way; formal and inflexible. 4- Two-way; moderately informal and moderately flexible. 5- Two-way; informal and flexible. 	<p>(Luftman et al., 2017)</p> <p>Not a source of the aspects but addressed here due to lack of objective criteria and the relevance to measurement criteria from the questionnaire instrument.</p>

<p>(ENV1) Influence of stakeholder environment</p>	<p>Involves the degree of change and instability in the firm’s environment, and the usefulness of data related to the current state of the environment, potential impact of developments, and strategic options available, increases the need for information processing and the importance of the firm’s information systems.</p> <p>Study 1 - Managers evaluated the influence of the following external conditions:</p> <ul style="list-style-type: none"> • Customer preferences and demand patterns. • Competitor moves (pricing, product offerings, etc.). • Regulatory or legislative influence. <p>Study 2 - Administrators reported the influence of:</p> <ul style="list-style-type: none"> • Changing demand for various courses and programs. • Innovations by similar institutions. • Government actions and interference. 	<p>Chan et al. (2006)</p>
	<p>The following statements pertain to the level of disruption caused by business and IT changes (e.g., implementation of a new technology, business process, and merger/acquisition). Most of the time, a business or IT change is:</p> <ol style="list-style-type: none"> 1- Not readily transparent (very disruptive). 2- Transparent at the functional level only. 3- Transparent at the functional level and emerging across all remote, branch, and mobile locations. 4- Transparent across the entire organization. 5- Transparent across the organization and to our business partners/alliances. 	<p>(Luftman et al., 2017)</p> <p>Not a source of the aspects, but addressed here due to lack of objective criteria and the relevance to measurement criteria from the questionnaire instrument.</p>
<p>(CON3) Integration of IT and business planning</p>	<p>The following statements pertain to strategic business planning with IT participation.</p> <ol style="list-style-type: none"> 1- We do no formal strategic business planning or, if it is, done, it is done on an as-needed basis 2- We do formal strategic business planning at the functional unit level with slight IT participation 3- We do formal strategic business planning at the functional unit levels with some IT participation. There is some inter-organizational planning 4- We do formal strategic business planning at the functional unit and across the enterprise with IT participation 5- We do formal strategic business planning at the functional unit, across the enterprise and with our business partners/alliances with IT participation 	<p>(Luftman et al., 2017)</p> <p>Not a source of the aspects but addressed here due to lack of objective criteria and the relevance to multiple measurement criteria from the questionnaire instrument.</p>
	<p>The following statements pertain to strategic IT planning with business participation.</p>	

	<ol style="list-style-type: none"> 1- We do no formal strategic IT planning or, if it is, done, it is done on an as-needed basis 2- We do formal strategic IT planning at the functional unit level with slight business participation 3- We do formal strategic IT planning at the functional unit levels with some business participation. There is some inter-organizational planning 4- We do formal strategic IT planning at the functional unit and across the enterprise with business participation 5- We do formal strategic IT planning at the functional unit, across the enterprise and with our business partners/alliances 	
	<p>The business and IT planning process are tightly connected and integrated.</p> <ol style="list-style-type: none"> 1- Strongly disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly Agree 	(Cumps, et al., 2009)
	<p>Please indicate how much you agree with the following statements regarding the connection between business and IT planning in your organization:</p> <ul style="list-style-type: none"> • Business and IT plans are developed together. • Business and IT plans are integrated. • Business and IT executives both participate in the strategic planning process. • Business and IT executives consider each other’s input during the strategic planning process. 	<p>(Yayla, 2008)</p> <p>Researcher let interviewees score on each of the five items (seven-point Likert scale), which combined measures the integration of IT and business planning.</p>
(ITR3) IT budget allocation	<p>ICT performance management impacts budget allocation.</p> <ol style="list-style-type: none"> 1- Strongly disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly agree 	(Cumps, et al., 2009)
	<p>The way that IT investments are managed by budgets (Meines, 2016) → Our IT function is budgeted as a (Luftman et al., 2017):</p> <ol style="list-style-type: none"> 1- Cost center, with erratic/inconsistent/irregular/changeable spending 2- Cost center, by functional organization 3- Cost center with some projects treated as investments 4- Investment center 5- Profit center, where IT generates revenues 	Source (Meines, 2016) used measurement criteria from Luftman (2000).
(ITR6)	<p>Please indicate how much you agree with the following statements about the IT unit in your organization:</p>	(Yayla, 2008)

Previous success of IT	<ul style="list-style-type: none"> • The IT unit has met its commitments in the past. • The IT unit has been considered as reliable. • The IT unit has been considered as credible. • The major IT projects in the past were considered as successful. • IT plans were implemented successful. 	<p>Researcher let interviewees score on each of the five items (seven-point Likert scale), which combined measures the previous success of IT.</p>
	<p>The demonstrated contribution that the IT functions has made to the accomplishment of the organization’s strategic goals is:</p> <ol style="list-style-type: none"> 1- Very weak 2- Somewhat weak 3- Neither weak nor strong 4- Somewhat strong 5- Very strong 	<p>(Luftman et al., 2017)</p> <p>Not a source of the aspects but addressed here due to the lack of objective criteria and the relevance to measurement criteria from the questionnaire instrument.</p>
(ITR7) Prioritization of IT projects and investments	<p>Major IT investments are prioritized by their expected impact on business performance.</p> <ol style="list-style-type: none"> 1- Strongly disagree 2- Disagree 3- More or less disagree 4- Neither 5- More or less agree 6- Agree 7- Strongly agree 	<p>(Yayla & Hu, 2012)</p>
	<p>ICT investments are prioritized against business strategy.</p> <ol style="list-style-type: none"> 1- Strongly disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly Agree 	<p>(Cumps, et al., 2009)</p>
	<p>The way there is being prioritized (Meines, 2016) → The following statements pertain to how IT projects are prioritized. Our IT project prioritization process is usually:</p> <ol style="list-style-type: none"> 1- In reaction to a business or IT need. 2- Determined by the IT function. 3- Determined by the business function. 4- Mutually determined between senior and mid-level IT and business management 5- Mutually determined between senior and mid-level IT and business management and with consideration of the priorities of any business partners/alliances. 	<p>Source (Meines, 2016) used measurement criteria from Luftman (2000).</p>

(CON5) Relationship between IT and business	<p>Frequency of informal interaction of the CIO with the TMT.</p> <ol style="list-style-type: none"> 1- Daily 2- Weekly 3- Monthly 4- Once a semester 5- Once a year 6- Rarely 7- Never 	<p>(Preston & Karahanna, 2009)</p>
	<p>Please indicate how much you agree with the following statements regarding how business and IT executives manage their relationships with each other:</p> <ul style="list-style-type: none"> • Business and IT executives make an effort to maintain a better relationship with each other. • Business and IT executives invest time and effort in managing relationship with each other. • Business and IT executives use liaisons to foster a good relationship. • Business and IT executives invite each other to their meetings to maintain a close relationship between business and IT departments. 	<p>(Yayla, 2008)</p> <p>Researcher let interviewees score on each of the four items (seven-point Likert scale), which combined measures the relationship between the IT and business.</p>
	<p>The following statements pertain to formally managing the IT/business relationship. To what extent are there formal processes in place that focus on enhancing the partnership relationships that exist between IT and business (e.g., cross-functional teams, training, risk/reward sharing):</p> <ol style="list-style-type: none"> 1- We don't manage our relationships. 2- We manage our relationships on an ad-hoc basis. 3- We have defined programs to manage our relationships, but IT or the business does not always comply with them. Conflict is seen as creative rather than disruptive. 4- We have defined programs to manage our relationships and both IT and the business comply with them. 5- We have defined programs to manage our relationships, both IT and the business comply with them, and we are continuously improving them. 	<p>(Luftman et al., 2017)</p> <p>Not a source of the aspects but addressed here due to the lack of objective criteria and the relevance to measurement criteria from the questionnaire instrument.</p>
(ITR8) Senior executive support for IT	<p>Maintaining a mutual understanding with top management on the role of IS in supporting strategy.</p> <ol style="list-style-type: none"> 1- Entirely unfulfilled 2- Unfulfilled 3- Neutral 4- Fulfilled 5- Entirely fulfilled 	<p>(Newkirk & Lederer, 2006)</p>
	<p>The following statements pertain to business sponsors/champions. Our IT-based initiatives:</p> <ol style="list-style-type: none"> 1- Do not usually have a senior level IT or business sponsor/champion. 2- Often have a senior level IT sponsor/champion only. 	<p>(Luftman et al., 2017)</p> <p>Not a source of the aspects but addressed here due</p>

	<p>3- Often have a senior level IT and business sponsor/champion at the functional unit level.</p> <p>4- Often have a senior level IT and business sponsor/champion at the corporate level.</p> <p>5- Often have a senior level IT and the CEO as the business/sponsor champion.</p>	to the lack of objective criteria and the relevance to measurement criteria from the questionnaire instrument.
(CON6) Shared domain knowledge	<p>Understanding the strategic priorities of top management.</p> <p>1- Entirely unfulfilled 2- Unfulfilled 3- Neutral 4- Fulfilled 5- Entirely fulfilled</p>	(Newkirk & Lederer, 2006)
	<p>Please indicate how much you agree with the following statements regarding how much business and IT executives in your organization share knowledge about each other's domain:</p> <ul style="list-style-type: none"> IT executives have a good understanding of the organization's business environment (problems, tasks, roles). Business executives have a good understanding of the organization's IT environment (problems, tasks, roles). IT executives appreciate the accomplishments of the business executives. Business executive appreciate the accomplishments of the IT executives. 	(Yayla, 2008) Researcher let interviewees score on each of the four items (seven-point Likert scale), which combined measures the shared domain knowledge.
	<p>The following statements pertain to the extent in which there is knowledge sharing (intellectual understanding and appreciation of the problems/opportunities, tasks, roles, objectives, priorities, goals, direction, etc.) between IT and business:</p> <p>1- Knowledge sharing is on an ad-hoc basis. 2- Knowledge sharing is somewhat structured and/or structure is beginning to be created. 3- There is structured sharing around key functional unit processes. 4- There is formal sharing at the functional unit level and at the corporate level. 5- There is formal sharing at the functional unit level, at the corporate level, and with business partners/alliances.</p>	(Luftman et al., 2017) Not a source of the aspects but addressed here due to the lack of objective criteria and the relevance to measurement criteria from the questionnaire instrument.
(CON7) Sophistication of IT and business planning	<p>The IT plan contains detailed action plans/strategies that support the organization's business objectives and strategies.</p> <p>1- Strongly disagree 2- Disagree 3- More or less disagree 4- Neither 5- More or less agree 6- Agree 7- Strongly agree</p>	(Yayla & Hu, 2012)

(BUR4) The degree of centralization of decision making	<p>Please indicate how much you agree with the following statements regarding the structure of the IT unit in your organization:</p> <ul style="list-style-type: none"> • There could be little action taken on major IT projects until the top management approves a decision. • Issues related to major IT investments have to be referred to business executives at the top management. • IT executives frequently inquire the top management regarding major IT related matters. • Usually decisions IT executives make have to have top management’s approval. 	<p>(Yayla, 2008)</p> <p>Researcher let interviewees score on each of the five items (seven-point Likert scale), which combined measures the degree of centralization of decision making.</p>
	<p>The following statement pertain to the cultural locus of power in making IT-based decisions. Our important IT decisions are made by:</p> <ol style="list-style-type: none"> 1- Top business management or IT management at the corporate level only. 2- Top business or IT management at corporate level with emerging functional unit level influence. 3- Top business management at corporate and functional unit levels, with emerging shared influence from IT management. 4- Top management (business and IT) across the organization and emerging influence from our business partners/alliances. 5- Top management across the organization with equal influence from our business partners/alliances. 	<p>(Luftman et al., 2017)</p> <p>Not a source of the aspects but addressed here due to the lack of objective criteria and the relevance to measurement criteria from the questionnaire instrument.</p>
(ITR9) Value awareness of IT	<p>The business has a good understanding of the impact of ICT.</p> <ol style="list-style-type: none"> 1- Strongly disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly Agree 	<p>(Cumps, et al., 2009)</p>
	<p>Educating top management on the importance of IT.</p> <ol style="list-style-type: none"> 1- Entirely unfulfilled 2- Unfulfilled 3- Neutral 4- Fulfilled 5- Entirely fulfilled 	<p>(Newkirk & Lederer, 2006)</p>
	<p>IT is perceived by the business as:</p> <ol style="list-style-type: none"> 1- A cost of doing business. 2- Emerging as an asset. 3- A fundamental enabler of future business activity. 4- A fundamental driver of future business activity. 5- A partner with the business that co-adapts/improvises in bringing value to the firm. 	<p>(Luftman et al., 2017)</p> <p>Not a source of the aspects but addressed here due to the lack of objective criteria and the relevance to measurement criteria from the questionnaire instrument.</p>

TABLE 20: ASPECTS WITH MULTIPLE MEASUREMENT CRITERIA

Appendix D – Interview Protocol

The interview protocol and questions are in Dutch to accommodate the interviewer and assure a natural flow during the interview, without the need to translate on the spot.

Interview Protocol for Business and IT Managers

- 1- **Introductie** (circa 5 minuten)
 - a. Zelf voorstellen (achtergrond, studie, stage et cetera).
 - b. Ondervraagde laten voorstellen (achtergrond, functie, loopbaan et cetera).
 - c. Omschrijving van het onderzoek.
 - d. Doel van dit interview.
 - e. Anonimiteit benadrukken.
 - f. Structuur van het interview toelichten (4 categorieën).

- 2- **Behandelen van de aspecten** (hoofdonderdeel: circa 40 minuten)
 - a. Zie de vragen op de volgende pagina (22 in totaal).
 - b. Per vraag het aspect scoren op een schaal van 1 tot en met 5 op basis van de meetcriteria en het antwoord van de ondervraagde.

- 3- **Algemene vragen** (indien tijd over: circa 10 minuten)
 - a. Missen er nog aspecten welke belangrijk zijn voor alignment?
 - b. Op een schaal van 1 tot en met 5, hoe 'aligned' is de business en IT bij Rijkswaterstaat?
 - c. Wat is de grootste uitdaging in het verbeteren van de alignment?

- 4- **Afsluiting** (circa 5 minuten)
 - a. Bedanken voor de tijd en deelname.
 - b. Vervolgacties toelichten (de verwerking en wat de ondervraagde toegestuurd krijgt achteraf).

Interview Protocol for Information Managers

- 1- **Introductie** (circa 5 minuten)
 - a. Zelf voorstellen (achtergrond, studie, stage et cetera).
 - b. Ondervraagde laten voorstellen (achtergrond, functie, loopbaan et cetera).
 - c. Omschrijving van het onderzoek.
 - d. Doel van dit interview.
 - e. Anonimiteit benadrukken.
 - f. Structuur van het interview toelichten (4 categorieën).

- 2- **Behandelen van de aspecten** (hoofdonderdeel: circa 40 minuten)
 - a. Zie de vragen op de volgende pagina (22 in totaal).
 - b. Per vraag behandelen of dit inderdaad bijdraagt aan alignment, in hoeverre dit belangrijk is en of de vraagstelling/criteria klopt.

- 3- **Algemene vragen** (indien tijd over: circa 10 minuten)
 - a. Missen er nog aspecten welke belangrijk zijn voor alignment?
 - b. Op een schaal van 1 tot en met 5, hoe 'aligned' is de business en IT bij Rijkswaterstaat?
 - c. Wat is de grootste uitdaging in het verbeteren van de alignment?

- 4- **Afsluiting** (circa 5 minuten)
 - a. Bedanken voor de tijd en deelname.
 - b. Vervolgacties toelichten (de verwerking en wat de ondervraagde toegestuurd krijgt achteraf).

Interview Questions

Where the aspects were alphabetically sorted in the research, the aspects here are sorted differently to assure a natural flow during the interview.

Sectie 1 – Business gerelateerd (4 vragen)

1. Is er een adviesraad (of soortgelijk overlegorgaan) die vrijblijvend strategisch advies levert? Zo ja, hoe vaak en worden op basis daarvan ook acties ondernomen?

- 1- Wij hebben geen adviesraad die vrijblijvend strategisch advies levert.
- 2- Er is sprake van een informele adviesraad die soms strategisch advies levert.
- 3- Er sprake van een formele adviesraad welke soms strategisch advies levert, maar we ondernemen zelden actie op basis van de resultaten.
- 4- Er sprake van een formele adviesraad welke periodiek strategisch advies levert, en we nemen regelmatig actie op basis van de resultaten.
- 5- Er sprake van een formele adviesraad welke periodiek strategisch advies levert, en er is een gereguleerd proces voor het ondernemen van actie en het meten van de verbeteringen.
- 6- Niet toepasbaar of geen idee.

In het geval van Rijkswaterstaat bijvoorbeeld: Tactisch Beraad IV (TBIV).

2. Door wie worden de belangrijke IT³ beslissingen gemaakt in de organisatie?

- 1- Door het topmanagement bij de business of IT op bestuurlijk niveau.
- 2- Door het topmanagement bij de business of IT op bestuurlijk niveau met opkomende invloed vanuit de afdelingen.
- 3- Door het topmanagement bij de business op bestuurlijk- en afdelingsniveau, met opkomende en gedeelde invloed van het IT-topmanagement.
- 4- Door het topmanagement van zowel de business als IT (door de organisatie heen) met opkomende invloed van onze business partners/allianties.
- 5- Door het topmanagement door de organisatie heen met gelijke invloed van onze business partners/allianties.
- 6- Niet toepasbaar of geen idee.

3. In hoeverre zijn de rollen en verantwoordelijkheden binnen de organisatie gedefinieerd en helder?

- 1- Wij hebben geen heldere en gedefinieerde rollen en verantwoordelijkheden.
- 2- Wij hebben enigszins informeel gedefinieerde rollen en verantwoordelijkheden.
- 3- Wij hebben formeel gedefinieerde rollen en verantwoordelijkheden.
- 4- Wij hebben formeel gedefinieerde rollen en verantwoordelijkheden welke aantoonbare effectiviteit hebben.
- 5- Wij hebben formeel gedefinieerde rollen en verantwoordelijkheden welke aantoonbare effectiviteit hebben en regelmatig geëvalueerd worden.
- 6- Niet toepasbaar of geen idee.

4. In hoeverre ligt de focus op het begrijpen van de eindgebruiker om deze zo goed mogelijk te ondersteunen?

- 1- De top- en midden managers van de IT/business hebben geen begrip voor de eindgebruiker.
- 2- De top- en midden managers van de IT/business hebben beperkt begrip voor de eindgebruiker.
- 3- De top- en midden managers van de IT/business hebben begrip voor de eindgebruiker.
- 4- Begrip hebben voor de eindgebruiker door alle IT/business medewerkers wordt aangemoedigd en gepromoot door het topmanagement.
- 5- Begrip hebben voor de eindgebruiker is verplicht (bijvoorbeeld gebonden aan functioneringsgesprekken) door de gehele IT/business afdeling.
- 6- Niet toepasbaar of geen idee.

³ In de interviews wordt IV (informatievoorziening) gebruikt in plaats van IT omdat dit de term is die Rijkswaterstaat hanteert.

Sectie 2 – Connectie tussen business en IT (7 vragen)

5. Hoe is de communicatie tussen de IT en de business (zoals de mate van toegankelijkheid, bereikbaarheid en bekendheid met stakeholders)? Is deze formeel/informeel en/of eenrichting/tweeërchtig?

- 1- Eenrichting, vanuit de business. Voornamelijk formeel en eigenzinnig/stijf/hardnekkig.
- 2- Eenrichting, vanuit de business. Enigszins informeel en eigenzinnig/stijf/hardnekkig.
- 3- Tweeërchtig, formeel en nog steeds eigenzinnig/stijf/hardnekkig.
- 4- Tweeërchtig, redelijk (in)formeel en sympathiek/welwillend/aangenaam.
- 5- Tweeërchtig, informeel/gemoedelijk en sympathiek/welwillend/aangenaam.
- 6- Niet toepasbaar of geen idee.

6. In welke mate delen de IT en de business kennis onderling (zoals intellectueel begrip, waardering van problemen/kansen, taken, rollen, doelen, prioriteiten, koers et cetera)?

- 1- Het delen van kennis gebeurt ad-hoc.
- 2- Het delen van kennis is enigszins gestructureerd en/of er wordt aan gewerkt.
- 3- Er wordt gestructureerd kennis gedeeld rondom de afdelingen.
- 4- Er wordt formeel kennis gedeeld tussen de afdelingen en op bestuursniveau.
- 5- Er is sprake van formele kennis deling op afdelingsniveau, bestuursniveau en met business partners/allianties.
- 6- Niet toepasbaar of geen idee.

7. In hoeverre zijn er formele processen ontwikkeld die focussen op het verbeteren van de relatie tussen de IT en de business (zoals multifunctionele teams, training en het delen van risico's/beloningen)?

- 1- Wij managen onze relatie niet.
- 2- Wij managen onze relatie ad-hoc.
- 3- We hebben programma's gedefinieerd voor het managen van onze relatie. Echter, de business of IT houdt zich niet altijd aan de afspraken. Een conflict wordt eerder gezien als creatief dan storend/belemmerend.
- 4- We hebben programma's gedefinieerd voor het managen van onze relatie en zowel de business als IT houden zich aan de afspraken.
- 5- We hebben programma's gedefinieerd voor het managen van onze relatie, zowel de business als IT houden zich aan de afspraken en verbeteren deze continue.
- 6- Niet toepasbaar of geen idee.

8. Doen jullie aan strategische IT/business⁴ planning? Zo ja, wordt dit gedaan met participatie van de IT/business?

- 1- Wij doen geen strategisch IT/business planning, maar als het wordt gedaan, is dit ad-hoc.
- 2- Er is sprake van formele strategische IT/business planning op afdelingsniveau met een geringe participatie van de IT/business.
- 3- Er is sprake van formele strategische IT/business planning op afdelingsniveau met enigszins participatie van de IT/business. Daarnaast is er ook enigszins strategische planning tussen organisatieonderdelen.
- 4- Er is sprake van formele strategische IT/business planning op afdelingsniveau en door de organisatie heen met participatie van de IT/business.
- 5- Er is sprake van formele strategische IT/business planning op afdelingsniveau, door de organisatie heen en met onze business partners/allianties (participatie van de IT).
- 6- Niet toepasbaar of geen idee.

⁴ Afhankelijk van in welk onderdeel de ondervraagde zich bevindt, wordt de vraag anders gesteld. Zie ook de andere vragen, aangeduid met een onderstreping.

9. Met betrekking tot de nuancering van de IT/business planning, in hoeverre voldoen de IT/business plannen aan het detailniveau?

- 1- Er is geen sprake van detailniveau en dit wordt ook niet gehandhaafd.
- 2- Het detailniveau is gedefinieerd en wordt nageleefd op de afdeling maar niet over de verschillende afdelingen heen.
- 3- Het detailniveau is gedefinieerd en wordt nageleefd op de afdeling met opkomende coördinatie over de verschillende afdelingen.
- 4- Het detailniveau is gedefinieerd en wordt nageleefd door alle afdelingen.
- 5- Het detailniveau is gedefinieerd en wordt nageleefd door alle afdelingen met gezamenlijke coördinatie tussen strategisch business partners/allianties.
- 6- Niet toepasbaar of geen idee.

10. Met betrekking tot IT/business portfolio management, in hoeverre zijn de componenten hiervan geïntegreerd?

- 1- Niet goed geïntegreerd.
- 2- Geïntegreerd op de afdeling met opkomende integratie door de afdelingen heen.
- 3- Geïntegreerd door de afdelingen heen.
- 4- Geïntegreerd door de afdelingen heen en onze strategische business partners/allianties.
- 5- In ontwikkeling samen met onze business partners.
- 6- Niet toepasbaar of geen idee.

11. In welke mate wordt er gebruik gemaakt van geïntegreerde IT en business metingen/KPI's voor het meten van de bijdrage van IT aan de business?

- 1- Wij meten niet de waarde van onze IT en business investeringen, of doen dit ad-hoc.
- 2- De waarde metingen van de IT en business zijn niet verbonden met elkaar. Er is beperkt of geen sprake van processen voor formele feedback en het reviewen hiervan, om acties te ondernemen op basis van de resultaten van de metingen.
- 3- De waarde metingen van de IT en business beginnen verbonden te raken en worden geformaliseerd. Daarnaast is er begonnen met het ontwikkelen van processen voor formele feedback en het reviewen hiervan, om acties te ondernemen op basis van de resultaten van de metingen.
- 4- De waarde metingen van de IT en de business zijn verbonden en geformaliseerd. Daarnaast zijn de feedback processen geformaliseerd voor het reviewen, ondernemen van acties op basis van de resultaten van de metingen en het beoordelen van de bijdrage door de afdelingen heen.
- 5- Wij maken gebruik van een multi-dimensionele benadering met passende waardes voor IT en business metingen. Daarnaast hebben we formele feedback processen voor het reviewen en ondernemen van acties op basis van de resultaten van de metingen. Deze metingen zijn opgeschaald naar onze externe partners (zoals leveranciers, uitbesteders en klanten/gebruikers).
- 6- Niet toepasbaar of geen idee.

Sectie 3 – IT gerelateerd (9 vragen)

12. Wat is perceptie van de business op de waarde van IT?

- 1- IT is een kostenpost voor de organisatie.
- 2- IT begint zich te ontwikkelen tot een aanwinst.
- 3- IT is van fundamenteel belang voor het aanzetten/mogelijk maken van toekomstige business activiteiten.
- 4- IT is van fundamenteel belang voor het drijven/besturen van toekomstige business activiteiten.
- 5- IT is een partner van de business die zich gezamenlijk aanpassen en improviseren voor het leveren van waarde aan de organisatie
- 6- Niet toepasbaar of geen idee.

13. In hoeverre heeft IT succes laten zien de afgelopen tijd (zoals het nakomen van afspraken, betrouwbaarheid, geloofwaardigheid, aantal succesvolle implementaties/projecten en afgeleverde producten)?

- 1- Heel weinig.
- 2- Weinig.
- 3- Niet weinig maar ook niet veel.
- 4- Veel.
- 5- Heel veel.
- 6- Niet toepasbaar of geen idee.

14. In welke mate laat IT leiderschap en proactief gedrag zien?

- 1- IT besluit ad-hoc.
- 2- IT maakt de business processen mogelijk.
- 3- IT drijft/stuurt de business processen.
- 4- IT maakt mogelijk of drijft/stuurt de business strategie.
- 5- IT past zich gezamenlijk aan met de business voor het mogelijk maken/drijven van de strategische doelen
- 6- Niet toepasbaar of geen idee.

15. In hoeverre draagt IT bij aan het behalen van de doelen van de organisatie, en past IT zich hierop aan?

- 1- Heel weinig.
- 2- Weinig.
- 3- Niet weinig maar ook niet veel.
- 4- Veel.
- 5- Heel veel.
- 6- Niet toepasbaar of geen idee.

16. Op welke manier wordt het budget voor IT toegewezen?

- 1- Als een kostenpost met inconsequente uitgaves.
- 2- Als een kostenpost gekoppeld aan afdelingsbudgetten.
- 3- Als een kostenpost waarvan sommige projecten worden behandeld als investeringen.
- 4- Als een investering (waarde, kosten en middelen)
- 5- Als een toevoegde waarde (waarde en kosten); IT genereert waarde.
- 6- Niet toepasbaar of geen idee.

17. Is er sprake van een IT-stuurcommissie? Zo ja, in hoeverre is deze effectief?

- 1- Wij hebben geen formele/regelmatige stuurcommissie(s).
- 2- Wij hebben (een) stuurcommissie(s) die informeel en ad-hoc bij elkaar komen.
- 3- Wij hebben formele stuurcommissies die regelmatig bij elkaar komen en enigszins effectief zijn.
- 4- Wij hebben regelmatig formele stuurcommissie vergaderingen met aangetoonde effectiviteit.
- 5- Wij hebben regelmatig formele stuurcommissie vergaderingen met aangetoonde effectiviteit en deelname van strategische business partners die hun beslissingsverantwoordelijkheden delen.
- 6- Niet toepasbaar of geen idee.

In het geval van Rijkswaterstaat bijvoorbeeld: IV portfolio-overleg (PFO).

18. In hoeverre krijgt IT ondersteuning vanuit het hoge niveau van de organisatie (C-rollen, bestuur, directie et cetera)?

- 1- Doorgaans krijgt IT geen ondersteuning van het hoge niveau.
- 2- Regelmatig ondersteuning alleen vanuit het hoge niveau bij IT of business.
- 3- Regelmatig ondersteuning vanuit het hoge niveau bij zowel de IT als de business op afdelingsniveau.
- 4- Regelmatig ondersteuning vanuit het hoge niveau bij zowel de IT als de business op bestuursniveau.
- 5- Regelmatig ondersteuning vanuit het hoge niveau bij IT en de CEO.
- 6- Niet toepasbaar of geen idee.

19. Worden nieuwe opkomende technologieën onderzocht en geëvalueerd of deze ook waarde kunnen leveren in de organisatie?

- 1- Wij evalueren en beoordelen nieuwe technologieën niet.
- 2- Wij evalueren en beoordelen nieuwe technologieën pas nadat ze zich bewezen hebben in andere sectoren.
- 3- Het evalueren en beoordelen van nieuwe technologieën begint een terugkerende bezigheid te worden.
- 4- Regelmatig worden nieuwe technologieën geëvalueerd en beoordeeld, en daarnaast is er een formeel proces om veranderingen door te voeren op basis van de resultaten.
- 5- Regelmatig worden nieuwe technologieën geëvalueerd en beoordeeld, en daarnaast is er een formeel proces om veranderingen door te voeren op basis van de resultaten. Onze externe partners zijn betrokken bij dit proces.
- 6- Niet toepasbaar of geen idee.

20. Op welke manier worden de IT-projecten en investeringen geprioriteerd binnen de organisatie?

- 1- In reactie op een business of IT behoefte.
- 2- Bepaald door de IT zelf.
- 3- Bepaald door de business.
- 4- Onderling bepaald door top- en middenmanagement van zowel de IT als business.
- 5- Onderling bepaald door top- en middenmanagement van zowel de IT als business en met overweging van de prioriteiten van onze business partners/allianties.
- 6- Niet toepasbaar of geen idee.

Sectie 4 – Omgeving (2 vragen)

21. In hoeverre zijn jullie als organisatie klaar en bereid voor verandering?

- 1- Wij hebben de neiging om verandering tegen te gaan.
- 2- Wij erkennen de behoefte voor verandering en veranderingsprogramma's zijn dus in ontwikkeling.
- 3- Er is sprake van veranderingsprogramma's op afdelingsniveau die training en benodigde skills aanbieden voor het doorvoeren van veranderingen.
- 4- Veranderingsprogramma's zijn in plaats op bestuurlijk niveau.
- 5- Veranderingsprogramma's zijn in plaats op bestuurlijk niveau, daarnaast zijn wij proactief en anticiperen wij verandering.
- 6- Niet toepasbaar of geen idee.

22. In hoeverre heeft de (stakeholder) omgeving (zoals de mate van verandering en instabiliteit, bruikbaarheid van de data, potentiële impact van ontwikkelingen, wisselende vraag voor cursussen en programma's, innovaties van vergelijkbare organisaties en overheidsbeslissingen en ingrepen) impact op de business en IT?

- 1- Dit is niet helder en dus nog erg storend.
- 2- Alleen helder op afdelingsniveau.
- 3- Helder op afdelingsniveau en opkomende transparantie bij alle locaties.
- 4- Helder door de hele organisatie heen.
- 5- Helder door de hele organisatie heen en voor onze business partners/allianties.
- 6- Niet toepasbaar of geen idee.

Sequence and Relation to Aspects

Question #	Aspect	Code
Business-related		
1	Advisory board for non-binding strategic advice	BUR1
2	The degree of centralization of decision making	BUR4
3	Clearly defined roles and responsibilities	BUR2
4	Focus on understanding and supporting the end user	BUR3
Connection between Business and IT		
5	Communication between IT and business	CON2
6	Shared domain knowledge	CON6
7	Relationship between IT and business	CON5
8	Integration of IT and business planning	CON3
9	Sophistication of IT and business planning	CON7
10	Portfolio management of the business and IT	CON4
11	Clear and measurable IT and business metrics	CON1
IT related		
12	Value awareness of IT	ITR9
13	Previous success of IT	ITR6
14	Leadership of IT	ITR5
15	Adaptation of IT to the organization's goals	ITR1
16	IT budget allocation	ITR3
17	IT steering committee	ITR4
18	Senior executive support for IT	ITR8
19	Assessing the strategic importance of emerging technologies	ITR2
20	Prioritization of IT projects and investments	ITR7
Environment related		
21	Readiness for change in the organization	ENV2
22	Influence of stakeholder environment	ENV1

TABLE 21: ASPECTS MAPPED TO THE QUESTIONS

Appendix E – Revised BISAM

BISAM – Aspects and Measurement Criteria

Modifications are indicated with **bold-green**.

Aspect	Measurement criteria
<p>(ITR1) Adaptation of IT to the organization's goals</p>	<p>The demonstrated contribution of IT and its ability to adapt to accomplish the organization's strategic goals is:</p> <ol style="list-style-type: none"> 1- Very weak. 2- Somewhat weak. 3- Neither weak nor strong. 4- Somewhat strong. 5- Very strong.
<p>(BUR1) Advisory board for unsolicited strategic advice</p>	<p>Regarding the presence of an advisory board for unsolicited strategic advice:</p> <ol style="list-style-type: none"> 1- We have no advisory board for unsolicited strategic advice. 2- We have an informal advisory board which occasionally delivers strategic advice. 3- We have a formal advisory board which occasionally delivers strategic advice, but we seldom take action based on the findings. 4- We have a formal advisory board which routinely delivers strategic advice and usually actions are taken based on the findings. 5- We have a formal advisory board which routinely delivers strategic advice and have a regulated process in place to take action and measure the changes.
<p>(ITR2) Assessing the strategic importance of emerging technologies</p>	<p>Regarding the assessment and review of the importance of emerging technologies:</p> <ol style="list-style-type: none"> 1- We do not formally assess and/or review emerging technologies. 2- We assess and/or review only after when technologies already have emerged in the private sector. 3- Assessment and/or reviews of emerging technologies are becoming routine occurrences. 4- We routinely assess and/or review emerging technologies and have a formal process in place to make changes based on the results. 5- We routinely assess and/or review emerging technologies and have a formal process in place to make changes based on the results and measure the changes. Our external partners are included in this process.
<p>(CON1) Clear and measurable IT and business metrics</p>	<p>Regarding the integration of IT and business metrics to measure the contribution of IT to the business:</p> <ol style="list-style-type: none"> 1- We do not measure the value of our IT and business investments or do so on an ad-hoc basis. 2- The value measurements for IT and business are not linked. We have limited or no formal feedback processes in place to review and take action based on the results of our measures. 3- The value measurements for IT and business are starting to be linked and formalized. We are also starting to have formal feedback processes in place to review and take actions based on the results of our measures.

	<p>4- We formally link the value measurements of IT and business. We have formal feedback processes in place to review and take actions based on the results of our measures and to assess contributions across functional organizations.</p> <p>5- We use a multi-dimensional approach with appropriate weight given to IT and business measures. We have formal feedback processes in place to review and take action based on the results of our measures. These measures are extended to our external partners (such as vendors, outsourcers and customers).</p>
<p>(BUR2) Clearly defined roles and responsibilities</p>	<p>Regarding the roles and responsibilities in your organization:</p> <ol style="list-style-type: none"> 1- We do not have clearly defined roles and responsibilities. 2- We have some informal defined roles and responsibilities. 3- We have formally defined roles and responsibilities. 4- We have formally defined roles and responsibilities with demonstrated effectiveness. 5- We have formal and clearly defined roles and responsibilities with demonstrated effectiveness and are reviewed regularly.
<p>(CON2) Communication between IT and business</p>	<p>The communication between IT and business (such as ease of access, familiarity of stakeholders) tends to be:</p> <ol style="list-style-type: none"> 1- One-way, from the business or IT. Rather formal and inflexible. 2- One-way, from the business or IT. Moderately informal and moderately flexible. 3- Two-way, formal and inflexible. 4- Two-way, moderately informal and moderately flexible. 5- Two-way, informal and flexible.
<p>(BUR3) Focus on understanding and supporting the end user</p>	<p>Regarding the focus on understanding the end user for supporting them:</p> <ol style="list-style-type: none"> 1- Senior and mid-level <u>IT/business</u> managers do not understand the end user. 2- Senior and mid-level <u>IT/business</u> managers have a limited understanding of the end user. 3- Senior and mid-level <u>IT/business</u> managers have a good understanding of the end user. 4- Understanding the end user by all <u>IT/business</u> members is encouraged and promoted by senior managers. 5- Understanding of the end user is required (e.g. tied to performance appraisals) through the <u>IT/business</u> department.
<p>(ENV1) Influence of stakeholder environment</p>	<p>Regarding the influence of stakeholder environment (such as the degree of change and instability in the organization, the usefulness of data, potential impact of developments, changing demand for various courses and programs, innovations by similar organizations and government actions and interference), in our organization the impact on business and IT is:</p> <ol style="list-style-type: none"> 1- Not readily transparent (very disruptive). 2- Transparent at the functional level only. 3- Transparent at the functional level and emerging across all remote, branch and mobile locations. 4- Transparent across the entire organization. 5- Transparent across the organization and to our business partners/alliances.

<p>(CON3) Integration of IT and business planning</p>	<p>Regarding the integration of strategic IT and business planning:</p> <ol style="list-style-type: none"> 1- We do no formal strategic <u>business/IT</u> planning or, if it is, done, it is done on an as-needed basis. 2- We do formal strategic <u>business/IT</u> planning at the functional unit level with slight <u>IT/business</u> participation. 3- We do formal strategic <u>business/IT</u> planning at the functional unit levels with some <u>IT/business</u> participation. There is some inter-organizational planning. 4- We do formal strategic <u>business/IT</u> planning at the functional unit and across the enterprise with <u>IT/business</u> participation. 5- We do formal strategic <u>business/IT</u> planning at the functional unit, across the enterprise and with our <u>business partners/alliances (with IT participation)</u>.
<p>(ITR3) IT budget allocation</p>	<p>The IT budgets are allocated as a:</p> <ol style="list-style-type: none"> 1- Cost center (costs only) with inconsistent spending. 2- Cost center (costs only) by functional organization. 3- Cost center (costs only) of which some projects treated as investments. 4- Investment center (value, costs and assets). 5- Value center (value and costs) where IT generates value.
<p>(ITR4) IT steering committee</p>	<p>Regarding the presence and effectiveness of the IT steering committee with senior level IT and business management participation:</p> <ol style="list-style-type: none"> 1- We do not have (a) formal/regular steering committee(s). 2- We have (a) committee(s) which meet informally on an as-needed basis. 3- We have formal committees, which meet regularly and have emerging effectiveness. 4- We have formal, regular committee meetings with demonstrated effectiveness. 5- We have formal, regular committee meetings with demonstrated effectiveness that include strategic business partners sharing decision-making responsibilities.
<p>(ITR5) Leadership of IT</p>	<p>Regarding the leadership of IT and its proactive behavior, in our organization:</p> <ol style="list-style-type: none"> 1- IT shows no leadership or acts on an ad-hoc basis. 2- IT enables the business processes. 3- IT drives the business processes. 4- IT enables or drives the business strategy. 5- IT co-adapts with the business to enable/drive strategic objectives.
<p>(CON4) Portfolio management of the business and IT</p>	<p>Regarding portfolio management of the business and IT, the components are:</p> <ol style="list-style-type: none"> 1- Not well integrated 2- Integrated at the functional unit with emerging integration across functional units 3- Integrated across functional units 4- Integrated across functional units and our strategic business partners/alliances 5- Evolving with our business partners

<p>(ITR6) Previous success of IT</p>	<p>The previous success IT has shown (such as contribution to the goals of the business, meeting commitments, reliability, credibility, the number of successful implementations/projects and delivered products) is:</p> <ol style="list-style-type: none"> 1- Very weak. 2- Somewhat weak. 3- Neither weak nor strong. 4- Somewhat strong. 5- Very strong.
<p>(ITR7) Prioritization of IT projects and investments</p>	<p>Regarding the prioritization of IT projects and investments. The prioritization process in your organization is usually:</p> <ol style="list-style-type: none"> 1- In reaction to a business or IT need. 2- Determined by the IT function. 3- Determined by the business function. 4- Mutually determined between senior and mid-level IT and business management 5- Mutually determined between senior and mid-level IT and business management and with consideration of the priorities of any business partners/alliances.
<p>(ENV2) Readiness for change in the organization</p>	<p>Regarding the readiness for change in your organization:</p> <ol style="list-style-type: none"> 1- We tend to resist change. 2- We recognize the need for change and change readiness programs are emerging. 3- Change readiness programs providing training and necessary skills to implement changes are in place at the functional unit level. 4- Change readiness programs are in place at the corporate level. 5- Change readiness programs are in place at the corporate level and we are proactive and anticipate change.
<p>(CON5) Relationship between IT and business</p>	<p>Regarding the relationship between IT and business, to what extent are there formal processes in place that focus on enhancing the relationships that exist between IT and business (such as cross-functional teams, training and risk/reward sharing):</p> <ol style="list-style-type: none"> 1- We don't manage our relationships. 2- We manage our relationships on an ad-hoc basis. 3- We have defined programs to manage our relationships, but IT or the business does not always comply with them. Conflict is seen as creative rather than disruptive. 4- We have defined programs to manage our relationships and both IT and the business comply with them. 5- We have defined programs to manage our relationships, both IT and the business comply with them, and we are continuously improving them.
<p>(ITR8) Senior executive support for IT</p>	<p>Regarding support for IT from senior level, in our organization we:</p> <ol style="list-style-type: none"> 1- Do not usually have senior-level IT or business support. 2- Often have senior-level IT support only. 3- Often have senior level IT and business support at the functional unit level. 4- Often have senior level IT and business support at the corporate level. 5- Often have senior-level IT and the CEO as support.

<p>(CON6) Shared domain knowledge</p>	<p>Regarding sharing knowledge (intellectual understanding and appreciation of the problems/opportunities, tasks, roles, objectives, priorities, goals, direction, etc.) between IT and the business:</p> <ol style="list-style-type: none"> 1- Knowledge sharing is on an ad-hoc basis. 2- Knowledge sharing is somewhat structured and/or structure is beginning to be created. 3- There is structured sharing around key functional unit processes. 4- There is formal sharing at the functional unit level and at the corporate level. 5- There is formal sharing at the functional unit level, at the corporate level, and with business partners/alliances.
<p>(CON7) Sophistication of IT and business planning</p>	<p>Regarding the sophistication of <u>IT/business</u> planning. A framework for the format of our <u>IT/business</u> plans is:</p> <ol style="list-style-type: none"> 1- Non-existent and not-enforced. 2- Defined and enforced at the functional unit level but not across different functional units. 3- Defined and enforced at the functional unit level with emerging coordination across functional units. 4- Defined and enforced across functional units. 5- Defined and enforced across functional units, and with joint coordination among strategic business partners/alliances.
<p>(BUR4) The degree of centralization of decision making</p>	<p>Regarding the degree of centralization of decision making, in our organization important IT decisions are made by:</p> <ol style="list-style-type: none"> 1- Top business management or IT management at the corporate level only. 2- Top business or IT management at corporate level with emerging functional unit level influence. 3- Top business management at corporate and functional unit levels, with emerging shared influence from IT management. 4- Top management (business and IT) across the organization and emerging influence from our business partners/alliances. 5- Top management across the organization with equal influence from our business partners/alliances.
<p>(ITR9) Value awareness of IT</p>	<p>Regarding the value awareness of IT by the business, in our organization the business perceives IT as:</p> <ol style="list-style-type: none"> 1- A cost of doing business. 2- Emerging as an asset. 3- A fundamental enabler of future business activity. 4- A fundamental driver of future business activity. 5- A partner with the business that co-adapts/improvises in bringing value to the firm.

TABLE 22: REVISED BISAM

Dutch Questionnaire

Modifications are indicated with **bold-green**.

Sectie 1 – Business gerelateerd (4 vragen)

1. Is er een adviesraad (of soortgelijk overlegorgaan) die **ongevraagd** strategisch advies levert? Zo ja, hoe vaak en worden op basis daarvan ook acties ondernomen?

- 1- Wij hebben geen adviesraad die **ongevraagd** strategisch advies levert.
- 2- Er is sprake van een informele adviesraad die soms strategisch advies levert.
- 3- Er sprake van een formele adviesraad welke soms strategisch advies levert, maar we ondernemen zelden actie op basis van de resultaten.
- 4- Er sprake van een formele adviesraad welke periodiek strategisch advies levert, en we nemen regelmatig actie op basis van de resultaten.
- 5- Er sprake van een formele adviesraad welke periodiek strategisch advies levert, en er is een gereguleerd proces voor het ondernemen van actie en het meten van de verbeteringen.
- 6- Niet toepasbaar of geen idee.

2. Door wie worden de belangrijke IT beslissingen gemaakt in de organisatie?

- 1- Door het topmanagement bij de business of IT op bestuurlijk niveau.
- 2- Door het topmanagement bij de business of IT op bestuurlijk niveau met opkomende invloed vanuit de afdelingen.
- 3- Door het topmanagement bij de business op bestuurlijk- en afdelingsniveau, met opkomende en gedeelde invloed van het IT-topmanagement.
- 4- Door het topmanagement van zowel de business als IT (door de organisatie heen) met opkomende invloed van onze business partners/allianties.
- 5- Door het topmanagement door de organisatie heen met gelijke invloed van onze business partners/allianties.
- 6- Niet toepasbaar of geen idee.

3. In hoeverre zijn de rollen en verantwoordelijkheden binnen de organisatie gedefinieerd en helder?

- 1- Wij hebben geen heldere en gedefinieerde rollen en verantwoordelijkheden.
- 2- Wij hebben enigszins informeel gedefinieerde rollen en verantwoordelijkheden.
- 3- Wij hebben formeel gedefinieerde rollen en verantwoordelijkheden.
- 4- Wij hebben formeel gedefinieerde rollen en verantwoordelijkheden welke aantoonbare effectiviteit hebben.
- 5- Wij hebben formeel gedefinieerde rollen en verantwoordelijkheden welke aantoonbare effectiviteit hebben en regelmatig geëvalueerd worden.
- 6- Niet toepasbaar of geen idee.

4. In hoeverre ligt de focus op het begrijpen van de eindgebruiker om deze zo goed mogelijk te ondersteunen?

- 1- De top- en midden managers van de IT/business⁵ hebben geen begrip voor de eindgebruiker.
- 2- De top- en midden managers van de IT/business hebben beperkt begrip voor de eindgebruiker.
- 3- De top- en midden managers van de IT/business hebben begrip voor de eindgebruiker.
- 4- Begrip hebben voor de eindgebruiker door alle IT/business medewerkers wordt aangemoedigd en gepromoot door het topmanagement.

⁵ Afhankelijk van in welk onderdeel de ondervraagde zich bevindt, wordt de vraag anders gesteld. Zie ook de andere vragen, aangeduid met een onderstreping.

- 5- Begrip hebben voor de eindgebruiker is verplicht (bijvoorbeeld gebonden aan functioneringsgesprekken) door de gehele IT/business afdeling.
- 6- Niet toepasbaar of geen idee.

Sectie 2 – Connectie tussen business en IT (7 vragen)

5. Hoe is de communicatie tussen de IT en de business (zoals de mate van toegankelijkheid, bereikbaarheid en bekendheid met stakeholders)? Is deze formeel/informeel en/of eenrichting/tweerichting?

- 1- Eenrichting, vanuit de business **of IT**. Voornamelijk formeel en eigenzinnig/stijf/hardnekkig.
- 2- Eenrichting, vanuit de business **of IT**. Enigszins informeel en eigenzinnig/stijf/hardnekkig.
- 3- Tweerichting, formeel en nog steeds eigenzinnig/stijf/hardnekkig.
- 4- Tweerichting, redelijk (in)formeel en sympathiek/welwillend/aangenaam.
- 5- Tweerichting, informeel/gemoedelijk en sympathiek/welwillend/aangenaam.
- 6- Niet toepasbaar of geen idee.

6. In welke mate delen de IT en de business kennis onderling (zoals intellectueel begrip, waardering van problemen/kansen, taken, rollen, doelen, prioriteiten, koers et cetera)?

- 7- Het delen van kennis gebeurt ad-hoc.
- 1- Het delen van kennis is enigszins gestructureerd en/of er wordt aan gewerkt.
- 2- Er wordt gestructureerd kennis gedeeld rondom de afdelingen.
- 3- Er wordt formeel kennis gedeeld tussen de afdelingen en op bestuursniveau.
- 4- Er is sprake van formele kennis deling op afdelingsniveau, bestuursniveau en met business partners/allianties.
- 5- Niet toepasbaar of geen idee.

7. In hoeverre zijn er formele processen ontwikkeld die focussen op het verbeteren van de relatie tussen de IT en de business (zoals multifunctionele teams, training en het delen van risico's/beloningen)?

- 1- Wij managen onze relatie niet.
- 2- Wij managen onze relatie ad-hoc.
- 3- We hebben programma's gedefinieerd voor het managen van onze relatie. Echter, de business of IT houdt zich niet altijd aan de afspraken. Een conflict wordt eerder gezien als creatief dan storend/belemmerend.
- 4- We hebben programma's gedefinieerd voor het managen van onze relatie en zowel de business als IT houden zich aan de afspraken.
- 5- We hebben programma's gedefinieerd voor het managen van onze relatie, zowel de business als IT houden zich aan de afspraken en verbeteren deze continue.
- 6- Niet toepasbaar of geen idee.

8. Is er sprake van strategische IT/business planning in de organisatie? Zo ja, wordt dit gedaan met participatie van de IT/business?

- 1- Wij doen geen strategisch IT/business planning, maar als het wordt gedaan, is dit ad-hoc.
- 2- Er is sprake van formele strategische IT/business planning op afdelingsniveau met een geringe participatie van de IT/business.
- 3- Er is sprake van formele strategische IT/business planning op afdelingsniveau met enigszins participatie van de IT/business. Daarnaast is er ook enigszins strategische planning tussen organisatieonderdelen.
- 4- Er is sprake van formele strategische IT/business planning op afdelingsniveau en door de organisatie heen met participatie van de IT/business.

- 5- Er is sprake van formele strategische IT/business planning op afdelingsniveau, door de organisatie heen en met onze business partners/allianties (participatie van de IT).
- 6- Niet toepasbaar of geen idee.

9. Met betrekking tot de nuancering van de IT/business planning, in hoeverre voldoen de IT/business plannen aan een vastgesteld raamwerk/format?

- 1- Er is geen sprake van vastgesteld raamwerk/format en dit wordt ook niet gehandhaafd.
- 2- Het format is gedefinieerd en wordt nageleefd op de afdeling maar niet over de verschillende afdelingen heen.
- 3- Het format is gedefinieerd en wordt nageleefd op de afdeling met opkomende coördinatie over de verschillende afdelingen.
- 4- Het format is gedefinieerd en wordt nageleefd door alle afdelingen.
- 5- Het format is gedefinieerd en wordt nageleefd door alle afdelingen met gezamenlijke coördinatie tussen strategisch business partners/allianties.
- 6- Niet toepasbaar of geen idee.

10. Met betrekking tot portfolio management van de business en IT, hoe goed zijn de componenten geïntegreerd?

- 1- Niet goed geïntegreerd.
- 2- Geïntegreerd op de afdeling met opkomende integratie door de afdelingen heen.
- 3- Geïntegreerd door de afdelingen heen.
- 4- Geïntegreerd door de afdelingen heen en onze strategische business partners/allianties.
- 5- In ontwikkeling samen met onze business partners.
- 6- Niet toepasbaar of geen idee.

11. In welke mate wordt er gebruik gemaakt van geïntegreerde IT en business metingen/KPI's voor het meten van de bijdrage van IT aan de business?

- 1- Wij meten niet de waarde van onze IT en business investeringen, of doen dit ad-hoc.
- 2- De waarde metingen van de IT en business zijn niet verbonden met elkaar. Er is beperkt of geen sprake van processen voor formele feedback en het reviewen hiervan, om acties te ondernemen op basis van de resultaten van de metingen.
- 3- De waarde metingen van de IT en business beginnen verbonden te raken en worden geformaliseerd. Daarnaast is er begonnen met het ontwikkelen van processen voor formele feedback en het reviewen hiervan, om acties te ondernemen op basis van de resultaten van de metingen.
- 4- De waarde metingen van de IT en de business zijn verbonden en geformaliseerd. Daarnaast zijn de feedback processen geformaliseerd voor het reviewen, ondernemen van acties op basis van de resultaten van de metingen en het beoordelen van de bijdrage door de afdelingen heen.
- 5- Wij maken gebruik van een multi-dimensionele benadering met passende waardes voor IT en business metingen. Daarnaast hebben we formele feedback processen voor het reviewen en ondernemen van acties op basis van de resultaten van de metingen. Deze metingen zijn opgeschaald naar onze externe partners (zoals leveranciers, uitbesteders en klanten/gebruikers).
- 6- Niet toepasbaar of geen idee.

Sectie 3 – IT gerelateerd (9 vragen)

12. Wat is perceptie van de business op de waarde van IT?

- 1- IT is een kostenpost voor de organisatie.
- 2- IT begint zich te ontwikkelen tot een aanwinst.
- 3- IT is van fundamenteel belang voor het aanzetten/mogelijk maken van toekomstige business activiteiten.
- 4- IT is van fundamenteel belang voor het drijven/besturen van toekomstige business activiteiten.
- 5- IT is een partner van de business die zich gezamenlijk aanpassen en improviseren voor het leveren van waarde aan de organisatie
- 6- Niet toepasbaar of geen idee.

13. In hoeverre heeft IT succes laten zien de afgelopen tijd (zoals de bijdrage aan de doelstellingen van de business, het nakomen van afspraken, betrouwbaarheid, geloofwaardigheid, aantal succesvolle implementaties/projecten en afgeleverde producten)?

- 1- Heel weinig.
- 2- Weinig.
- 3- Niet weinig maar ook niet veel.
- 4- Veel.
- 5- Heel veel.
- 6- Niet toepasbaar of geen idee.

14. In welke mate laat IT leiderschap en proactief gedrag zien?

- 1- IT besluit ad-hoc.
- 2- IT maakt de business processen mogelijk.
- 3- IT drijft/stuurt de business processen.
- 4- IT maakt mogelijk of drijft/stuurt de business strategie.
- 5- IT past zich gezamenlijk aan met de business voor het mogelijk maken/drijven van de strategische doelen
- 6- Niet toepasbaar of geen idee.

15. In hoeverre draagt IT bij aan het behalen van de doelen van de organisatie, en past IT zich hierop aan?

- 1- Heel weinig.
- 2- Weinig.
- 3- Niet weinig maar ook niet veel.
- 4- Veel.
- 5- Heel veel.
- 6- Niet toepasbaar of geen idee.

16. Op welke manier wordt het budget voor IT toegewezen?

- 1- Als een kostenpost met inconsequente uitgaves.
- 2- Als een kostenpost gekoppeld aan afdelingsbudgetten.
- 3- Als een kostenpost waarvan sommige projecten worden behandeld als investeringen.
- 4- Als een investering (waarde, kosten en middelen)
- 5- Als een toevoegde waarde (waarde en kosten); IT genereert waarde.
- 6- Niet toepasbaar of geen idee.

17. Is er sprake van een IT-stuurcommissie met participatie van het senior niveau IT en business management?

Zo ja, in hoeverre is deze effectief?

- 1- Wij hebben geen formele/regelmatige stuurcommissie(s).
- 2- Wij hebben (een) stuurcommissie(s) die informeel en ad-hoc bij elkaar komen.
- 3- Wij hebben formele stuurcommissies die regelmatig bij elkaar komen en enigszins effectief zijn.
- 4- Wij hebben regelmatig formele stuurcommissie vergaderingen met aangetoonde effectiviteit.
- 5- Wij hebben regelmatig formele stuurcommissie vergaderingen met aangetoonde effectiviteit en deelname van strategische business partners die hun beslissingsverantwoordelijkheden delen.
- 6- Niet toepasbaar of geen idee.

18. In hoeverre krijgt IT ondersteuning vanuit het hoge niveau van de organisatie (C-rollen, bestuur, directie et cetera)?

- 1- Doorgaans krijgt IT geen ondersteuning van het hoge niveau.
- 2- Regelmatig ondersteuning alleen vanuit het hoge niveau bij IT of business.
- 3- Regelmatig ondersteuning vanuit het hoge niveau bij zowel de IT als de business op afdelingsniveau.
- 4- Regelmatig ondersteuning vanuit het hoge niveau bij zowel de IT als de business op bestuursniveau.
- 5- Regelmatig ondersteuning vanuit het hoge niveau bij IT en de CEO.
- 6- Niet toepasbaar of geen idee.

19. Worden nieuwe opkomende technologieën onderzocht en geëvalueerd of deze ook waarde kunnen leveren in de organisatie?

- 1- Wij evalueren en beoordelen nieuwe technologieën niet.
- 2- Wij evalueren en beoordelen nieuwe technologieën pas nadat ze zich bewezen hebben in andere sectoren.
- 3- Het evalueren en beoordelen van nieuwe technologieën begint een terugkerende bezigheid te worden.
- 4- Regelmatig worden nieuwe technologieën geëvalueerd en beoordeeld, en daarnaast is er een formeel proces om veranderingen door te voeren op basis van de resultaten.
- 5- Regelmatig worden nieuwe technologieën geëvalueerd en beoordeeld, en daarnaast is er een formeel proces om veranderingen door te voeren op basis van de resultaten. Onze externe partners zijn betrokken bij dit proces.
- 6- Niet toepasbaar of geen idee.

20. Op welke manier worden de IT-projecten en investeringen geprioriteerd binnen de organisatie?

- 1- In reactie op een business of IT behoefte.
- 2- Bepaald door de IT zelf.
- 3- Bepaald door de business.
- 4- Onderling bepaald door top- en middenmanagement van zowel de IT als business.
- 5- Onderling bepaald door top- en middenmanagement van zowel de IT als business en met overweging van de prioriteiten van onze business partners/allianties.
- 6- Niet toepasbaar of geen idee.

Sectie 4 – Omgeving (2 vragen)

21. In hoeverre is de organisatie klaar en bereid voor verandering?

- 1- Wij hebben de neiging om verandering tegen te gaan.
- 2- Wij erkennen de behoefte voor verandering en veranderingsprogramma's zijn dus in ontwikkeling.
- 3- Er is sprake van veranderingsprogramma's op afdelingsniveau die training en benodigde skills aanbieden voor het doorvoeren van veranderingen.
- 4- Veranderingsprogramma's zijn in plaats op bestuurlijk niveau.
- 5- Veranderingsprogramma's zijn in plaats op bestuurlijk niveau, daarnaast zijn wij proactief en anticiperen wij verandering.
- 6- Niet toepasbaar of geen idee.

22. Betreft de (stakeholder) omgeving (zoals de mate van verandering en instabiliteit, bruikbaarheid van de data, potentiële impact van ontwikkelingen, wisselende vraag voor cursussen en programma's, innovaties van vergelijkbare organisaties en overheidsbeslissingen en ingrepen), is het helder in de organisatie wat voor impact dit heeft op de business en IT?

- 1- Dit is niet helder en dus nog erg storend.
- 2- Alleen helder op afdelingsniveau.
- 3- Helder op afdelingsniveau en opkomende transparantie bij alle locaties.
- 4- Helder door de hele organisatie heen.
- 5- Helder door de hele organisatie heen en voor onze business partners/allianties.
- 6- Niet toepasbaar of geen idee.

Bridging the Gap

Developing an Assessment Model to Measure Strategic Business IT-Alignment within a Large Public Organization

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Abstract. Strategic business-IT alignment has been proven to enhance business performance. Although its long existence, current measurement models lack practicality, research to specific organizational contexts and are outdated due to emerging technologies. This study tries to fill these gaps by developing an assessment model that combines IT and business aspects to enhance strategic business-IT alignment, specifically for the public sector. The model is applied and validated in a large Dutch executional government organization, Rijkswaterstaat, by performing a case study. Overall, the model performed well and considered eligible for measuring strategic business-IT alignment in the public sector. However, future research is necessary to further refine and validate the model to verify its appropriateness in other public sector organizations as well, specifically executional government organizations.

Keywords: Strategic business-IT alignment, public sector, assessment model, maturity, case study

1 Introduction

Information Technology (IT) plays a crucial role in organizations for the support, sustainability and growth of the business [1]. An adequate alignment between IT and business enhances the success of an organization in many ways. Specifically, it enables organizations to:

- *Maximize the impact of investments in IT* [2, 3];
- *Achieve harmony between IT and business* [4];
- *And increase their competitive advantage, profit margins and growth* [2].

The concept ‘business-IT alignment’ (BITA) comprehends the dynamic process for achieving this. BITA is defined in multiple ways throughout the studies that have been conducted over the last two decades. The definition of Silvius [5] covers the essential components of BITA in the literature:

“Business and IT Alignment is the degree to which IT application, infrastructure and organization enable and shape the business strategy and processes, as well as the process to develop this.”

In fact, BITA is one of the first research domains in Information Systems (IS) literature [6]. Still, many IT executives see this concept as one of their key issues [7, 8, 9, 10, 11, 12, 13, 14, 15]. While various studies have shown that organizations who successfully adopt BITA, outperform organizations who lack in the alignment of the business and IT [16].

Several studies propose models or frameworks to conceptualize BITA. A well-known model is the Strategic Alignment Model (SAM) of Henderson & Venkatraman [17], but also the ‘9-squares’ model of Maes, Rijsenbrij, Truijens, & Goedvolk [18] is referred to numerous times in BITA literature. Additionally, many elaborations have been done on these models. Mekawy, Rusu, & Ahmed [19] evaluated multiple of these models and provided an evaluation based on 23 criteria points. The Strategic Alignment Maturity Model (SAMM) of Luftman [20] was concluded as the most comprehensive and established model for BITA. This model is based on the SAM of Maes [18] and many times referred to as one of the most valuable tools in the research to BITA in terms of validity [21].

Although many models exist, one of the major points of criticism in the literature is that these models are too theoretical and descriptive in nature, and thus fail to be used in practice [5, 16]. The SAMM by Luftman [20] shows more prescriptive insights and provides guidelines on how to achieve alignment. However, even though some of these models exist which are suitable to be applied in practice, their application to specific organizational contexts is still lacking [5]. Especially in the public sector, as research into BITA is more mature in the private sector [22]. The reason for this is most likely due to the positive relationship between business performance and BITA [23]. In addition, public organizations do not strive for competitive advantage. However, they do have the responsibility to society to deliver services, cost-effectively as possible, to their stakeholders. Doing so by improving their internal operation as much as possible [24].

Another motivation for this study is the evolving role of IT. Many important studies on BITA were conducted 15 to 25 years ago. Nowadays, new technologies have emerged and are emerging which face new challenges, but also opens up new markets and innovates the business [25]. This evolving role of IT influences the approach of achieving alignment in an organization. Additionally, alignment should not only be focused on how the IT is aligned with the business but also the other way around: how the business aligns with the IT [26].

These three gaps that currently exist in the literature are the motivation and reason for conducting this study. Specifically, the goal of this study is twofold: to develop an assessment model that combines IT and business aspects to enhance strategic BITA,

specifically for the public sector and to apply and validate this model by consulting experts at a large Dutch Executional Government Organization (DEGO) and performing a case study there. A DEGO is a government agency who independently delivers products and/or services to organizations within the government, against payment. Rijkswaterstaat (RWS) is such an agency and the case company examined in this study. For context, they are the executional organization of the Ministry of Infrastructure and Water Management and have the mission to protect the Netherlands against floods, develop a sustainable environment, ensure sufficient and clean water, make safe and efficient travel from A to B possible and provide trustworthy information.

In some literature, alignment is understood as the leverage of maturity in the IT and business [27]. Whereas in other studies, alignment is described as the communication and mutual understanding between the IT and business [27]. Alignment is also considered as the mutual shaping of the IT- and business strategy, hence the SAM of Henderson & Venkatraman [17]. The SAMM of Luftman [20] combines the strategic and maturity interpretation of alignment. In this study, we focus on the latter: the mutual shaping of the IT- and business strategy.

The scope is also limited to the public sector. As described earlier, public organizations do not aim for maximizing profits and a better competitive position. Due to this reason, the IT and business are organized differently in certain ways. These are not the only characteristics that distinguish a public organization from a private organization. The large size of stakeholders and the variety of services provided to their citizens also plays an important role [28]. In addition, these stakeholders often have competing or opposing interests. Together with a complex institutional structure and political powers, this forms a persistent challenge for alignment in the public sector [29]. This is confirmed by several studies in which the SAMM [20] is applied in practice [26, 30], as the public sector often scores relatively low. The participants in these studies mention that the reason for this low score is due to the unclear and immeasurable goals and political exploitation. Resulting in conflicts when trying to align IT with their business strategy.

The remainder of this paper presents the *methods* that are used and the *results* which derived from using these. In the fourth chapter a *conclusion* is given and the interpretations, limitations are future research suggestions are presented in the fifth and last chapter: the *discussion*.

2 Methods

The general method used for the design of the research is the design cycle by Wieringa [31]. It consists of three phases in which various research methods are used to answer the research questions. The first phase regards the problem investigation consisting of a literature review to address the gap that currently exists in the literature. In addition, company documents are reviewed and unstructured interviews are performed to achieve information for defining the problem statement. The second

phase concerns the treatment design in which the assessment model is developed based on an extensive literature study and expert opinion. In the last phase, treatment validation, a case study is performed at RWS to validate the model. Interviews with 15 managers from both the IT and business at RWS are performed to evaluate the behavior of the model in practice. The research framework proposed by [32] is used to support this rational problem-solving process.

Regarding the case study, a protocol [33, 34] is used as a method providing a template for conducting the case study and improving the reliability. Four relevant items of the template are used: *design, data collection, data analysis and results*.

2.1 Design

This case study regards a holistic single-case design as study contains one case to be examined: RWS, and one unit of analysis: the organization as a whole (strategic level). The goal of the assessment model is to make it fit for other executional government organization as well, this would imply multiple cases.

The object of study is the assessment model. In short, this model is based on extensive theoretical research in which first all general- and public alignment aspects that influence strategic BITA are identified in the literature (to a certain extent and within a set of criteria). Subsequently, aspects sharing the same intent were merged to one aspect which reduced the total list. Various analyses are done on this list (such as expert opinion, source-count and availability of measurement criteria) and a final selection was made. For each aspect on this list, measurement criteria are added to finalize the model and making it fit to use for this case study. With the purpose to evaluate whether these aspects, with its measurement criteria, form an appropriate base for measuring strategic BITA in executional government organizations.

The development of the model with its aspects and measurement criteria is further discussed in the *results* section.

2.2 Data collection

For the data collection process, the procedure proposed by [20, 35, 36, 37, 38] is adapted. It consists of three steps to conduct an assessment:

1. *Form an assessment team*
2. *Gather information and decide individual scores*
3. *Assign an overall score and plan improvements*

Step 1 – Form an assessment team

The assessment should be done with individuals from both IT and business. As the scope is set to the strategic level of alignment, decided is to select executives one level below the CEO/CIO. Since these people function high enough in the organization to have knowledge about strategic planning, both from the perspective of

business and IT. The number of individuals depends on the number of business departments and should be significant enough to do a valid assessment. Typically, this ranges from 10 to 30 [35].

A non-random sampling method is used as the individuals are selected on their position in the organization. All of them were only provided with very basic information about the interviews prior to an agreement. Such as an introduction of the research, the reason why they were selected, compensation/benefits (insight in results and thesis) and if they could meet within a certain period. After agreement, only the outline of the interview protocol is shared as agenda. Two managers from the IT department rejected the invitation due to their busy schedule. Meaning the other 15 managers (9 in the business and 6 in the IT department) accepted the invitation and thus interviewed for gathering information and deciding the scores.

Step 2 – Gather information and decide individual scores

For gathering information, an interview protocol is constructed. This protocol is used during each of the 15 interviews to ensure consistency among them. The main part of the interview is deciding the individual scores of the aspects in the assessment model. This is done by the researcher and not by the interviewee in order to avoid misinterpretation of the aspect. For this exact reason, the case study is not done via an online questionnaire but in form of an interview. The aspect is expressed in a question, which allows the interviewees to express freely their opinions and experiences while the researcher, with the consent of the interviewee, determines where this response fits the most on a Five-point Likert scale. It is chosen to use the maturity model approach for measuring alignment, and thus the scale adheres to the five maturity levels as described by the well-known Capability Maturity Model developed by Carnegie Mellon's Software Engineering Institute. Notes are taken as well to support the chosen option on the scale with examples.

Step 3 - Assign an overall score and plan improvements

When the individual scores are known an overall score of the alignment at RWS can be calculated. Where an overall score of the business and the IT separately could provide interesting insights. Additionally, these scores (accompanied with the notes) are extremely valuable in understanding the current state of alignment in the organization but also how the organization could improve this.

2.3 Data analysis

Processing

The individual scores acquired from the interviews are stored in a spreadsheet. With these scores, several calculations are done, such as the overall alignment score of the organization but also the overall scores of the business and IT separately. In addition, the scores are visualized through a radar graph. With the four categories that are defined, this graph gives a good and clear overview of the overall scores.

Besides the scores, the interviewees are also asked to give comments on the question and examples to support their chosen option. Additionally, three open questions are asked at the end regarding alignment in general. This qualitative data (notes) is also stored digitally and used for evaluating the model, drawing conclusions and make recommendations. All the documentation above forms the case study database for this study.

The results of the case study and the analysis of the gathered data are discussed in the next chapter, the *results*.

2.4 Validity

In terms of validity, four tests have been commonly used to enact the quality of empirical research: construct validity, internal validity, external validity and reliability [33, 34]. To assure the construct validity, multiple sources of evidence are used, a chain of evidence is established and experts are consulted for reviewing the draft protocols and reports. Regarding the reliability, a case study protocol is used and a case study database is developed. Internal validity is not taking into account as this only applies for explanatory or causal studies. The same goes for the external validity as the BISAM is still in an experimental phase. It is unique and not yet applied in other domains. Meaning, it is not possible to identify the domain/theory to which the study findings can be generalized.

3 Results

3.1 Developing the Model

The purpose of the assessment model is threefold: conceptualize strategic alignment in the public sector, measure aspects that influence the level of alignment between the business and IT and provide insight through a prescriptive and inclusive approach, eventually with the goal to improve alignment.

First, an extensive literature study was done for listing general- and public sector related aspects that influence strategic BITA. This step resulted in a total of 135 aspects which are either positive (enablers) or negative (inhibitors). Negative aspects are listed as well as focusing on the problems that might occur may mitigate the barriers and allow organizations to achieve alignment. Subsequently, four measurement approaches were identified in the literature [39] to determine which approach is going to be used for measuring the aspects: matching and moderation, profile deviation, scoring and maturity model. Due to its benefits, the latter approach was chosen.

In order to reduce this list to make it more manageable, determine which aspects have more support from the literature and which aspects are applicable to the public sector, three steps are taken to determine the relevant aspects:

1. Aspects with similar intent are merged and titled as an aspect that covers all the merged aspects.
2. Multiple analyses are done on this reduced list, such as the number of sources the aspect consists of, whether the aspect has already criteria for measurement and the expert opinion of two experts at RWS.
3. Based on the criteria set for each of the three analyses, a final selection is made which are the building blocks of the assessment model.

These steps resulted in a list of 22 aspects for measuring strategic BITA in DEGOs. Through qualitative coding, the aspects are divided into four categories to conceptualize strategic BITA. It translates to creating categories from the interpretation of the data [40]. In addition, a code is added to each aspect and category to make future reference more convenient. The above is visualized in Table 1 below.

Business-related (BUR)	
Advisory board for unsolicited strategic advice	BUR1
Clearly defined roles and responsibilities	BUR2
Focus on understanding and supporting the end user	BUR3
The degree of centralization of decision making	BUR4
Connection between business and IT (CON)	
Clear and measurable IT and business metrics	CON1
Communication between IT and business	CON2
Integration of IT and business planning	CON3
Portfolio management of the business and IT	CON4
Relationship between IT and business	CON5
Shared domain knowledge	CON6
Sophistication of IT and business planning	CON7
IT related (ITR)	
Adaptation of IT to the organization's goals	ITR1
Assessing the strategic importance of emerging technologies	ITR2
IT budget allocation	ITR3
IT steering committee	ITR4
Leadership of IT	ITR5
Previous success of IT	ITR6
Prioritization of IT projects and investments	ITR7
Senior executive support for IT	ITR8
Value awareness of IT	ITR9
Environmental related (ENV)	
Influence of stakeholder environment	ENV1
Readiness for change in the organization	ENV2

Table 1. Final list of aspects

The assessment model is finalized through adding measurement criteria to each of the 22 aspects, making it fit for performing the case study. As mentioned earlier, the

maturity model approach is used for measuring the alignment. With this in mind, literature is consulted to determine the appropriate criteria. This is either done through the source of the aspects itself, other literature such as the questionnaire instrument of Luftman [38] or/and using experts- and professional judgment.

This procedure finalized the assessment model and is given the name **BISAM (Business-IT Strategic Alignment Model)**. This model, used as an instrument in the case study, could be found in Appendix A.

3.2 Case Study

In accordance with the policy of RWS, the results of the case study (more specifically: the scores) are considered confidential. For this reason, this information is only shared internally. However, results regarding the behavior of the model are not confidential and thus analyzed.

Analysis

Overall, the model performed well in practice. Apart from these interviews with the business and IT managers, six information managers are interviewed as well. These information managers form a major connection between the business and IT at RWS. They have both the knowledge from business and IT and thus are experts and enablers of BITA. In the interviews, they are not asked to score the aspects but rather whether these aspects contribute to alignment, the importance of it and whether the formulation/criteria of the question is correct. Based on their input, the BISAM is revised.

Some descriptive statistics are done as well. The standard deviation, skewness and kurtosis of the four categories are evaluated to address the variances in the responses of the participants. Table 2 shows that the means do not significantly differ and the skewness and kurtosis are not high, thus raising no concerns regarding the data.

Descriptive Statistics

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Business related average (BUR)	15	,63740	-,131	,580	-1,009	1,121
Connection average (CON)	15	,77465	-,184	,580	-,799	1,121
IT related average (ITR)	15	,52363	-,706	,580	,565	1,121
Environment average (ENV)	15	,89043	,091	,580	-1,220	1,121
Valid N (listwise)	15					

Table 2. Descriptive statistics

The results of an assessment with the BISAM indicate the current maturity level in alignment, but also indicates opportunities for improvement. The next maturity level provide prescriptive opportunities for advancing to a higher maturity. As alignment should be seen as a dynamic process, a six-step continues process is suggested for improving strategic BITA (adapted from [37]), where the BISAM serves as a vehicle for performing the first half of the process:

1. *Set goals and establish a team*
2. *Understand business-IT linkage*
3. *Analyze and prioritize gaps*
4. *Specify actions (project management)*
5. *Choose and evaluate success criteria*
6. *Sustain alignment*

4 Conclusion

The definition of Silvius [5] is used as it covers all the concepts discussed in the literature: “*Business and IT Alignment is the degree to which IT application, infrastructure and organization enable and shape the business strategy and processes, as well as the process to develop this.*” There are different approaches to measure this concept, of which one of them is a maturity model. The SAMM of Luftman [20] is considered one of the most comprehensive and established models. This model is applied in hundreds of organizations worldwide, in which the public sector often scores relatively low. A possible explanation is due to the positive relation between alignment and business performance. Public organizations do not aim for maximizing profits and a better competitive position, meaning the IT and business are organized differently in some ways. In addition, public organizations have often to deal with a large number of stakeholders with competing or opposing interests. The large variety of services provided to the society, complex institutional structure and political exploitation forms a persistent challenge when trying to align the IT and business strategy in the public sector.

A total of 135 aspects were identified during an extensive literature study. These general, but also government aspects influence the level of strategic alignment between the business and IT. Besides the positive aspects (enablers), negative aspects (inhibitors) are taken into account as well because focusing on the problems that might occur may mitigate the barriers and allow the organization to achieve alignment. In general, four approaches exist to measure these aspects: matching and moderation, profile deviation, scoring and maturity model. As mentioned before, Luftman uses the maturity model approach whereas the majority uses the scoring approach.

The purpose of the assessment model is threefold: conceptualize strategic alignment in the public sector, measure aspects that influence the level of alignment between the business and IT and provide insight through a prescriptive and inclusive approach, eventually with the goal to improve alignment. The model is constructed by first

reducing the number of aspects through merging aspects with similar intent. With this reduced list various analyses are done to reduce the list even more. Expert opinion, criteria on the source-count and availability of measurement criteria is used to achieve a final selection of 22 aspects. Based on the nature of the aspects they are divided into four categories: business related, connection between business and IT, IT related and environment. The model is called BISAM and finalized by adding measurement criteria to make it fit for a case study.

An assessment is conducted with the BISAM in which 15 managers from both IT and the business at RWS are consulted. 15 individual interviews are performed to identify for each of the 22 aspects which maturity level best fits the organization. The average scores indicate the overall alignment of RWS, but also shows the differences in divisions and category. In addition, six interviews with experts on alignment at RWS are conducted to evaluate the validity and completeness of the BISAM. Overall, the model performed well and only a few modifications are done that regard the formulation of some aspects and its criteria.

Red tape is a situational factor that could influence this model and impact the assessment and/or aspects. For example, due to political influences, it is possible that the highest maturity level could never be achieved. In addition, especially the shared IT resources, lack of IT innovations, a large number of stakeholders with conflicting goals and multiple and intangible goals are situational factors that could have a significant impact on the behavior of the BISAM.

For improving strategic alignment, a six-step continuous process was suggested. The BISAM is a tool for performing the first half of the process. Based on the results of the assessment specific actions should be defined, implemented and evaluated on its success criteria. Sustaining alignment is done by developing and institutionalizing the culture of alignment and perform periodical assessments with the BISAM to address the changes over time in the harmonious relationship between the business and IT.

5 Discussion

The 22 aspects of the BISAM are based on an extensive literature study to strategic BITA. However, it should be mentioned that it was not possible to cite each article. This is due to the hundreds of articles about strategic BITA that are available today. I acknowledge that I have not identified every study and apologize for any oversights. This limitation could affect the BISAM as the possibility exist that some aspects are not taken into consideration, and thus not part of the BISAM while they indeed influence alignment significantly. Although, I believe that with the almost 100 articles that are used, I am convinced that there was a sufficient amount of input for developing the BISAM. Nevertheless, future research is recommended to further refine the BISAM to establish a valid and comprehensive assessment model for measuring alignment in the public sector. Especially due to the emerging technologies and

dynamic environment, models like the BISAM should be continuously reviewed on its validity.

Another limitation is the examination of one case in this study. The goal of the BISAM is to also make it fit for measuring alignment in other public organizations, which implies multiple cases. However, due to time constraints and limited resources, only one public organization is examined for now. Future research should involve continuing studies to further refine and validate the BISAM to verify its appropriateness in other public sector organizations as well, specifically executional government organizations. Additionally, establishing a domain of more results generated by the BISAM would increase the external validity as the findings could be generalized.

Furthermore, it is not tested whether the aspects fit the four categories. These are simply defined through qualitative coding which translates to creating categories from the interpretation of the data. Meaning, the measurement model is not validated through statistical analysis to evaluate concerns such as the multicollinearity. Suggested is to perform Structural Equation Modeling (SEM) with the Partial Least Squares (PLS) technique to evaluate the measurement model and whether the four categories/constructs indeed fit the 22 aspects. A study by Hair, Black, Babin & Anderson [41] discusses that PLS-SEM is an appropriate method when the research goal is to predict and develop theory. The goal of this analysis is to evaluate the quality of the data based on the characteristics of the measurement model, but also to maximize the explained variance between the dependent constructs. PLS supports the mapping of the observed aspects to constructs and thus should be suitable for evaluating the BISAM. Lastly, an analysis on multi-collinearity could be performed to indicate the distinct role of each of the four categories. Results show whether other categories should be defined or that aspects should be moved to another category.

This study explored the gap of research to alignment in specific organizational contexts. The public sector is considered a challenging environment when trying to align the business and IT strategy. While the private sector is more mature due to a positive relationship between alignment and business performance. BITA remains a persistent and pervasive management concern, further research in other organizational contexts is recommended to establish a more mature knowledge base. Which could be used by practitioners to, finally, overcome the challenge of aligning business and IT in their organization. Examples are the educational and pharmaceutical industries which are also known for their low maturity in BITA. This study, with the development of the BISAM, could be used to explore the applicability and define a more suitable model for their industry with different aspects or criteria for measuring alignment.

Regarding the approach of the assessment, it could be valuable to not present the five-point Likert scale to the participants, because the participants are restricted in their answer and could be influenced by the options given. In addition, social desirability could be a concern in which the participant will never choose one of the extreme options (either one or five), while this could represent their true attitude. Future research

and assessments should explore the difference in results when an expert chooses the option that best fits the participant's answer. A group setting could also be a legitimate approach for performing the assessment, as valuable discussions could arise when choosing an answer.

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Appendix A: BISAM – Aspects and Measurement Criteria

Aspect	Measurement criteria
(ITR1) Adaptation of IT to the organization's goals	<p>The demonstrated contribution of IT and its ability to adapt to accomplish the organization's strategic goals is:</p> <ol style="list-style-type: none"> 1- Very weak. 2- Somewhat weak. 3- Neither weak nor strong. 4- Somewhat strong. 5- Very strong.
(BUR1) Advisory board for unsolicited strategic advice	<p>Regarding the presence of an advisory board for unsolicited strategic advice:</p> <ol style="list-style-type: none"> 1- We have no advisory board for unsolicited strategic advice. 2- We have an informal advisory board which occasionally delivers strategic advice. 3- We have a formal advisory board which occasionally delivers strategic advice, but we seldom take action based on the findings. 4- We have a formal advisory board which routinely delivers strategic advice and usually actions are taken based on the findings. 5- We have a formal advisory board which routinely delivers strategic advice and have a regulated process in place to take action and measure the changes.
(ITR2) Assessing the strategic importance of emerging technologies	<p>Regarding the assessment and review of the importance of emerging technologies:</p> <ol style="list-style-type: none"> 1- We do not formally assess and/or review emerging technologies. 2- We assess and/or review only after when technologies already have emerged in the private sector. 3- Assessment and/or reviews of emerging technologies are becoming routine occurrences. 4- We routinely assess and/or review emerging technologies and have a formal process in place to make changes based on the results. 5- We routinely assess and/or review emerging technologies and have a formal process in place to make changes based on the results and measure the changes. Our external partners are included in this process.
(CON1) Clear and measurable IT and business metrics	<p>Regarding the integration of IT and business metrics to measure the contribution of IT to the business:</p> <ol style="list-style-type: none"> 1- We do not measure the value of our IT and business investments or do so on an ad-hoc basis. 2- The value measurements for IT and business are not linked. We have limited or no formal feedback processes in place to review and take action based on the results of our measures. 3- The value measurements for IT and business are starting to be linked and formalized. We are also starting to have formal feedback processes in place to review and take actions based on the results of our measures. 4- We formally link the value measurements of IT and business. We have formal feedback processes in place to review and take actions based on the results of our measures and to assess contributions across functional organizations.

	<p>5- We use a multi-dimensional approach with appropriate weight given to IT and business measures. We have formal feedback processes in place to review and take action based on the results of our measures. These measures are extended to our external partners (such as vendors, outsourcers and customers).</p>
<p>(BUR2) Clearly defined roles and responsibilities</p>	<p>Regarding the roles and responsibilities in your organization:</p> <ol style="list-style-type: none"> 1- We do not have clearly defined roles and responsibilities. 2- We have some informal defined roles and responsibilities. 3- We have formally defined roles and responsibilities. 4- We have formally defined roles and responsibilities with demonstrated effectiveness. 5- We have formal and clearly defined roles and responsibilities with demonstrated effectiveness and are reviewed regularly.
<p>(CON2) Communication between IT and business</p>	<p>The communication between IT and business (such as ease of access, familiarity of stakeholders) tends to be:</p> <ol style="list-style-type: none"> 1- One-way, from the business or IT. Rather formal and inflexible. 2- One-way, from the business or IT. Moderately informal and moderately flexible. 3- Two-way, formal and inflexible. 4- Two-way, moderately informal and moderately flexible. 5- Two-way, informal and flexible.
<p>(BUR3) Focus on understanding and supporting the end user</p>	<p>Regarding the focus on understanding the end user for supporting them:</p> <ol style="list-style-type: none"> 1- Senior and mid-level <u>IT/business</u>¹ managers do not understand the end user. 2- Senior and mid-level <u>IT/business</u> managers have a limited understanding of the end user. 3- Senior and mid-level <u>IT/business</u> managers have a good understanding of the end user. 4- Understanding the end user by all <u>IT/business</u> members is encouraged and promoted by senior managers. 5- Understanding of the end user is required (e.g. tied to performance appraisals) through the <u>IT/business</u> department.
<p>(ENV1) Influence of stakeholder environment</p>	<p>Regarding the influence of stakeholder environment (such as the degree of change and instability in the organization, the usefulness of data, potential impact of developments, changing demand for various courses and programs, innovations by similar organizations and government actions and interference), in our organization the impact on business and IT is:</p> <ol style="list-style-type: none"> 1- Not readily transparent (very disruptive). 2- Transparent at the functional level only. 3- Transparent at the functional level and emerging across all remote, branch and mobile locations. 4- Transparent across the entire organization. 5- Transparent across the organization and to our business partners/alliances.

¹ Depending on the position of the executive (business or IT), the question/criteria is phrased differently. See also other aspects, indicated with an underscore.

<p>(CON3) Integration of IT and business planning</p>	<p>Regarding the integration of strategic IT and business planning:</p> <ol style="list-style-type: none"> 1- We do no formal strategic <u>business/IT</u> planning or, if it is, done, it is done on an as-needed basis. 2- We do formal strategic <u>business/IT</u> planning at the functional unit level with slight <u>IT/business</u> participation. 3- We do formal strategic <u>business/IT</u> planning at the functional unit levels with some <u>IT/business</u> participation. There is some inter-organizational planning. 4- We do formal strategic <u>business/IT</u> planning at the functional unit and across the enterprise with <u>IT/business</u> participation. 5- We do formal strategic <u>business/IT</u> planning at the functional unit, across the enterprise and with our <u>business partners/alliances</u> (with IT participation).
<p>(ITR3) IT budget allocation</p>	<p>The IT budgets are allocated as a:</p> <ol style="list-style-type: none"> 1- Cost center (costs only) with inconsistent spending. 2- Cost center (costs only) by functional organization. 3- Cost center (costs only) of which some projects treated as investments. 4- Investment center (value, costs and assets). 5- Value center (value and costs) where IT generates value.
<p>(ITR4) IT steering committee</p>	<p>Regarding the presence and effectiveness of the IT steering committee with senior level IT and business management participation:</p> <ol style="list-style-type: none"> 1- We do not have (a) formal/regular steering committee(s). 2- We have (a) committee(s) which meet informally on an as-needed basis. 3- We have formal committees, which meet regularly and have emerging effectiveness. 4- We have formal, regular committee meetings with demonstrated effectiveness. 5- We have formal, regular committee meetings with demonstrated effectiveness that include <u>strategic business partners sharing decision-making responsibilities</u>.
<p>(ITR5) Leadership of IT</p>	<p>Regarding the leadership of IT and its proactive behavior, in our organization:</p> <ol style="list-style-type: none"> 1- IT shows no leadership or acts on an ad-hoc basis. 2- IT enables the business processes. 3- IT drives the business processes. 4- IT enables or drives the business strategy. 5- IT co-adapts with the business to enable/drive strategic objectives.
<p>(CON4) Portfolio management of the business and IT</p>	<p>Regarding portfolio management of the business and IT, the components are:</p> <ol style="list-style-type: none"> 1- Not well integrated 2- Integrated at the functional unit with emerging integration across functional units 3- Integrated across functional units 4- Integrated across functional units and our strategic business partners/alliances 5- Evolving with our business partners

<p>(ITR6) Previous success of IT</p>	<p>The previous success IT has shown (such as contribution to the goals of the business, meeting commitments, reliability, credibility, the number of successful implementations/projects and delivered products) is:</p> <ol style="list-style-type: none"> 1- Very weak. 2- Somewhat weak. 3- Neither weak nor strong. 4- Somewhat strong. 5- Very strong.
<p>(ITR7) Prioritization of IT projects and investments</p>	<p>Regarding the prioritization of IT projects and investments. The prioritization process in your organization is usually:</p> <ol style="list-style-type: none"> 1- In reaction to a business or IT need. 2- Determined by the IT function. 3- Determined by the business function. 4- Mutually determined between senior and mid-level IT and business management 5- Mutually determined between senior and mid-level IT and business management and with consideration of the priorities of any business partners/alliances.
<p>(ENV2) Readiness for change in the organization</p>	<p>Regarding the readiness for change in your organization:</p> <ol style="list-style-type: none"> 1- We tend to resist change. 2- We recognize the need for change and change readiness programs are emerging. 3- Change readiness programs providing training and necessary skills to implement changes are in place at the functional unit level. 4- Change readiness programs are in place at the corporate level. 5- Change readiness programs are in place at the corporate level and we are proactive and anticipate change.
<p>(CON5) Relationship between IT and business</p>	<p>Regarding the relationship between IT and business, to what extent are there formal processes in place that focus on enhancing the relationships that exist between IT and business (such as cross-functional teams, training and risk/reward sharing):</p> <ol style="list-style-type: none"> 1- We don't manage our relationships. 2- We manage our relationships on an ad-hoc basis. 3- We have defined programs to manage our relationships, but IT or the business does not always comply with them. Conflict is seen as creative rather than disruptive. 4- We have defined programs to manage our relationships and both IT and the business comply with them. 5- We have defined programs to manage our relationships, both IT and the business comply with them, and we are continuously improving them.
<p>(ITR8) Senior executive support for IT</p>	<p>Regarding support for IT from senior level, in our organization we:</p> <ol style="list-style-type: none"> 1- Do not usually have senior-level IT or business support. 2- Often have senior-level IT support only. 3- Often have senior level IT and business support at the functional unit level. 4- Often have senior level IT and business support at the corporate level. 5- Often have senior-level IT and the CEO as support.

<p>(CON6) Shared domain knowledge</p>	<p>Regarding sharing knowledge (intellectual understanding and appreciation of the problems/opportunities, tasks, roles, objectives, priorities, goals, direction, etc.) between IT and the business:</p> <ol style="list-style-type: none"> 1- Knowledge sharing is on an ad-hoc basis. 2- Knowledge sharing is somewhat structured and/or structure is beginning to be created. 3- There is structured sharing around key functional unit processes. 4- There is formal sharing at the functional unit level and at the corporate level. 5- There is formal sharing at the functional unit level, at the corporate level, and with business partners/alliances.
<p>(CON7) Sophistication of IT and business planning</p>	<p>Regarding the sophistication of <u>IT/business</u> planning. A framework for the format of our <u>IT/business</u> plans is:</p> <ol style="list-style-type: none"> 1- Non-existent and not-enforced. 2- Defined and enforced at the functional unit level but not across different functional units. 3- Defined and enforced at the functional unit level with emerging coordination across functional units. 4- Defined and enforced across functional units. 5- Defined and enforced across functional units, and with joint coordination among strategic business partners/alliances.
<p>(BUR4) The degree of centralization of decision making</p>	<p>Regarding the degree of centralization of decision making, in our organization important IT decisions are made by:</p> <ol style="list-style-type: none"> 1- Top business management or IT management at the corporate level only. 2- Top business or IT management at corporate level with emerging functional unit level influence. 3- Top business management at corporate and functional unit levels, with emerging shared influence from IT management. 4- Top management (business and IT) across the organization and emerging influence from our business partners/alliances. 5- Top management across the organization with equal influence from our business partners/alliances.
<p>(ITR9) Value awareness of IT</p>	<p>Regarding the value awareness of IT by the business, in our organization the business perceives IT as:</p> <ol style="list-style-type: none"> 1- A cost of doing business. 2- Emerging as an asset. 3- A fundamental enabler of future business activity. 4- A fundamental driver of future business activity. 5- A partner with the business that co-adapts/improvises in bringing value to the firm.