# Maturity model for the IT-department when migrating to SaaS-environment

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**MASTER OF SCIENCE**

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by

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# Preface

This report describes my thesis project on the development of a maturity model that can support organizations' IT-departments when migrating to a SaaS-environment. This project is written in the fulfillment of the requirements for the Master's degree of Complex Systems Engineering & Management with a specialization in the Information & Communication track at the Delft University of Technology. This project is done in combination with an internship at Accenture, which facilitated this research process

In this preface, I would like to thank my graduation committee. Firstly, I would like to thank Marijn, for guiding me through this whole process. He was always available for questions and gave me valuable feedback during the past months. Thanks to him, I was able to steer this research in the right direction. Secondly, I would like to thank Hadi, for being my second supervisor and attending the most important meetings. The extra feedback he gave me was always really helpful and gave me more insights to think about. Both my supervisors always provided critical, but relevant feedback on the moments it was necessary.

Also, I would like to thank my supervisors of Accenture: Thomas and Sargis. Thank you for being there whenever I had questions and introducing me to people within Accenture. And last, but not least, I would like to thank my career counselor of Accenture. Tim, thank you for all your calls you made from your car and providing the help I needed during this project. Due to Accenture, and more specifically your help, I was able to take this project to the next level for which I'm very grateful.

Justus Rijnveld

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# Executive summary

In a period where digitization rapidly influences the corporate world, Cloud Computing has emerged over the past years as well. Cloud Computing refers to offering hardware, software, and data by a provider over a network. More and more companies tend to make use of 'The Cloud', as this can benefit organizations enormously regarding cost efficiency, operational excellence, and innovation. Using this disruptive technology, organizations can order computing resources on demand and can get rid of unnecessary hardware and software. Moreover, it allows organizations to use and release computing resources when needed.

Although the use of Cloud Computing can bring many benefits, risks are involved as well. One of those risks is related to the impact that this disruptive technology can have on the organization of the IT-department. In literature, research has been done on the effect of Cloud-migration on the functionality of the IT-department. However, these studies lack generalizability. Within the concept of Cloud Computing different service models and deployment models exist, which refer to the type of service that is offered and the way how this service is deployed. In literature, no differentiation has been made between the service models and deployment models that exist, when assessing the effect of Cloud Computing on the IT-department. Further, there is a lack of cross-industrial research on this subject in literature. In this study, the effect of the Cloud service model Software-as-a-Service (SaaS) on the organization of the IT-department of large firms will be examined. The use of SaaS allows organizations to deploy and use complete applications over the internet, which means that the installation of physical hardware or software is not necessary. How the organization of the IT-department exactly changes in a SaaS-environment is not yet defined in literature, and no scientifically based design exists that can guide organizations change the organization of their IT-department when migrating to SaaS. Hence, the research goal of this study goes as follows: *To develop a framework that can help organizations improve the performance of the IT-department when migrating to a SaaS-environment.*

To achieve the research goal and develop this supporting framework, this study is constructed according to the Design Science Research framework by Peffers, Tuunanen, Rothenberger, & Chatterjee (2008). A modified version of this framework, which includes four phases, is used to conduct this research. During the Problem Identification & Motivation phase, the research problem, research objective, and research scope are defined. Further, the research questions are formulated and an in-depth definition of SaaS is given by conducting literature research. This phase is followed by the 'Definition of Objectives for a Solution' phase, in which a theoretical framework is developed and a case study is conducted to collect empirical data. Then, the empirical data gathered during the case study will be used as input for the development of the framework in the next phase: 'Design & Development'. Finally, the 'Demonstration' phase is initiated in which the developed framework is evaluated by conducting interviews with experts specialized in SaaS-migrations.

By conducting an extensive literature research, a theoretical framework is developed based on the Resource-Based View of the Firm. This perspective sees the firm as a complex bundle of resources and capabilities that should be exploited for the firm to perform. From the literature research and conducting questionnaires with Cloud-experts, it came forward that the following resources and capabilities of the IT-department might be affected when migrating to a SaaS-environment: *financial assets, organizational structure, management systems, skills, knowledge, training, culture, organizational structure, contractual governance, and relational governance*. For each of these resources, a proposition is formulated

on how it might be affected by migrating to a SaaS-environment, based on literature and the expert interviews.

A case study research is performed to collect empirical data regarding the impact of SaaS-migrations on the organization of the IT-department. At three large organizations, interviews are conducted with IT-employees with different functions and backgrounds. During these interviews, they are asked if they experienced changes within IT-department related to each of the resources. Moreover, they are asked for their opinion on how each of these resources should ideally be exploited when migrating to a SaaS-environment. Then, a cross-case analysis is performed on the findings of the interviews. The results of this cross-case analysis are compared with the propositions formulated earlier, which resulted in some interesting insights related to each of the resources.

SaaS does not necessarily lead to cost reduction of the IT-operation, this is highly dependent on the type of application and the underlying reason for migrating to SaaS. On the other hand, the costs of the IT-department will increase during migration due to double licensing costs and the need for additional resources. Further, it came forward that, on short term, the use of SaaS does not lead to shrinkage of the IT-department, even though many tasks are outsourced. Although the size of the IT-department does not decrease, there is a need for highly skilled IT-employees that are able to perform integration and procurement tasks. In general, it can be concluded that the use of SaaS causes a shift from 'technical' tasks to 'functional' tasks within the IT-department. Moreover, the use of DevOps processes is recommended in the IT-department to improve communication, collaboration, and integration when migrating to SaaS. One of the most significant changes within the IT-department is related to skills and knowledge. Due to the outsourcing of technical tasks, technical skills become less necessary. On the other hand, soft skills such as coordination skills, communication skills, procurement skills and delivery management skills become increasingly important in the IT-department. Also, IT-employees require a broader knowledge of the SaaS-application, compared to 'on premise' applications. To acquire these new skills and knowledge, training is required in a SaaS-environment. It is essential to give awareness training, key-user training, communication training and training related to working with the new application and DevOps. Further, it is important to have IT-employees with a proactive and open-minded mindset, that are open to change. To keep IT-employees motivated and stimulated when migrating to SaaS, it is crucial to clearly communicate the changes within IT-department, ensure employees of their future in the department and reward them with a financial bonus if they successfully work with the new application. Contractual and relational governance become important capabilities when migrating to SaaS; strict SLAs should be made, meetings with the vendor should be held on regular basis and communication should be clear, for a successful collaboration with the SaaS-provider.

Based on these findings, the supporting framework is developed in the form of a maturity model. This maturity model can be used by IT-managers and other decision makers to assess the state of each of the resources and capabilities of the IT-department, in case they are migrating to a SaaS-environment. Using this assessment, unexploited resources and capabilities can be identified and can provide guidance of where improvements should be made.

Although this maturity model can be useful for organizations migrating to SaaS, it should be taken into consideration that the model requires continuous improvement in the future to remain useful, due to the constantly developing technology that is SaaS.

# Table of Contents

# List of Figures



# List of Tables



# List of Abbreviations

| | |
|---|---|
| **CC** | Cloud Computing |
| **CMM** | Capability Maturity Model |
| **CRM** | Customer Relationship Management |
| **ERP** | Enterprise Resource Planning |
| **IT** | Information Technology |
| **RBV** | Resource-Based View of the Firm |
| **RC** | Remote Collaboration |
| **SaaS** | Software as a Service |
| **SM** | Strategic Management |

# 1 Introduction

## 1.1 Situation

In a period where digitization rapidly influences the corporate world, Cloud Computing has emerged over the past years as well. More and more companies tend to make use of 'The Cloud', as this can benefit organizations enormously regarding cost efficiency, operational excellence, and innovation (Phaphoom, Wang, & Abrahamsson, 2013). Moreover, new and innovative services can be enabled, creating new business models and attract customers in a novel way (Müller, Holm, & Søndergaard, 2015). But what exactly is Cloud Computing, and why is it so beneficial? Simply put, Cloud Computing means offering hardware, software, and data by a provider over a network, which mostly is the internet. Applications, data, runtime, middleware, operating systems, virtualization, hardware, data storage are examples of tasks and system resources that are shifted from a company's own IT-system to the Cloud.

When comparing Cloud Computing to 'on premise' computing, where computing resources are traditionally owned, hosted, and managed by the organization, three new aspects can be noticed which are beneficial for the cloud user (Armbrust et al., 2010). First of all, as cloud users can order required computing resources on demand and infinite resources are available, there is no need for users to make provisioning plans. Second, there is no up-front commitment for users, which allows companies to start small and only increase their use of resources when necessary. Last, as the use of computing resources is made available on a short-term basis and on-demand, users have the possibility to use and release resources only when needed, allowing them to get rid of unnecessary hardware, software, and jobs. Moreover, Zhang, Cheng, & Boutaba (2010) argue that other benefits that come with the transition to Cloud Computing are lower operating costs, high scalability, easy access and reduction of business risks and maintenance expenses. These benefits can give companies a significant reason to consider switching to Cloud Computing.

However, migrating to a Cloud-based environment does not come without challenges. This new paradigm involves many challenges and the complexity of Cloud adoption should be addressed. Some of the issues that arise when switching to the Cloud are related to policy challenges, such as the security of the user's data, privacy issues, loss of governance, and vendor lock-in (Bokhari, Makki, & Tamandani, 2018; M'rhaoaurh, Okar, Namir, & Chafiq, 2018). Also, a significant amount of technological challenges should be overcome when organizations decide to migrate to the Cloud. For example, issues regarding the availability of the service may arise, when the Cloud-vendor has technological problems (M'rhaoaurh et al., 2018). So, dependency on an external party can increase. Moreover, accidental removal of data from the cloud-provider's side or an unexpected calamity could lead to the permanent leakage of organizations' data. Interoperability issues should be taken into account as well. It can be difficult to have existing systems cooperate with the new Cloud-systems, and requires a lot of effort (M'rhaoaurh et al., 2018). Next to these technical and policy-related issues, Cloud-migration involves issues on organizational level as well. Significant changes occur within the organization of companies when they are migrating to the Cloud. Due to the outsourcing of tasks and functions in Information Technology (IT), there can be a major shift in the function and organization of IT-departments (Willcocks, Venters, & Whitley, 2013). This means that new roles, new business processes and new skills might be necessary. Moreover, disaster recovery and contingency plans to deal with unexpected technical issues in cloud environment might be needed and data re-migration plans at the end of the cloud contract should be made (Dutta, Peng, & Choudhary, 2013). Hence, from a managerial perspective, Cloud adoption is more

complex for the IT-department than one might think. Despite the numerous benefits, it is important that organizations are aware of the challenges and difficulties that CC brings and should therefore not have an over-optimistic view of this disruptive technology (Dutta et al., 2013).

## 1.2 Research Problem

As mentioned in the previous section, besides the benefits that companies can gain by CC, important challenges arise as well. One of these challenges is that migrating to CC can affect the organization of the IT-department of enterprises. As Willcocks et al. (2013) argued, a significant shift in the organization of the IT-department can occur, which entails major changes in the roles that IT-employees carry out. If the IT-departments of Cloud-using enterprises do not correctly adapt to the requirements that the use of CC demands, they can shrink and underperform (Vithayathil, 2018). So, how can CC affect the IT-department and what is known regarding this matter?

### 1.2.1 Research Gap

In current literature, the technical impact on the IT-operation when migrating to CC is well-known and defined by multiple authors (Bokhari et al., 2018; Goyal, 2014; Jansen & Grance, 2011; Wang & Von Laszewski, 2008; Zhang et al., 2010). These studies explain and describe what impact CC has on the IT infrastructure, operating system and application, which gives a clear definition of change on a technological level. However, as mentioned above, the transition to CC does not only affect the IT-operation at technological level, but also at organizational level. Until now, some research has been done on assessing the impact of the transition to the Cloud on enterprises from an organizational perspective. However, these studies have limitations. To give more insight into the research that has already been performed regarding this matter, an overview of similar studies will be given and their limitations will be discussed.

Qian & Palvia (2014) have assessed the impact of CC on organizations' IT-strategies. The authors argue that three shifts occur regarding the management of IT when adopting CC; more service-oriented management focus, IT-employees engage in more value-generating activities and vendor relationship management becomes more important. Also, it is mentioned that the IT-headcount does not necessarily decrease, the change lies in the skill set that is required from the people in the IT-department when migrating to the Cloud. Al-lawati & Al-Badi (2016) have studied the organizational impact of Cloud migration on the IT-department. This study pointed out that Cloud migration does not necessarily lead to the elimination of IT-employees, it merely changes their roles and tasks within the department. However, both these studies did not differentiate between service and deployment models that exist in CC (a further explanation of service and deployment models is given in Section 2.2), nor did they make a difference between the characteristics of the concerned organizations. These limitations can be an issue for further generalization of the results.

Unlike the studies mentioned above, Janssen & Joha (2011) and Khajeh-Hosseini et al. (2010b) did carry out studies identifying the impact and challenges of adopting a specific Cloud service model. Janssen & Joha (2011) focused on the impact and challenges of adopting SaaS in the public sector. They revealed that there is a large change in organizational governance and a fundamental renovation in the organization of the IT-operation. Still, one of its limitations is that this study is carried out in the public sector and the question remains whether this result is applicable to other sectors. On the other hand, the study of Khajeh-Hosseini et al. (2010b) focused on migrating to an IaaS-environment. The results of this research indicated that there are major socio-technical issues within the IT-department that should be dealt with when migrating from an enterprise IT-

system to IaaS, to maintain a good performance of the IT-department. However, this study is also constrained due to the lack of a cross-industrial perspective.

In 2017, Ali et al. have developed a model that can support business service providers regarding risk management when migrating to the Cloud, focusing on service risks, technology risks, and process risks. Although this model is proven to be effective, it does have some limitations. First of all, the data used to substantiate this research is collected exclusively by doing literature research and no hard data has been used. Moreover, the authors do not differentiate between different deployment models and service models. Hence, it is unknown if this model is applicable to other organizations. Another study by Khajeh-Hosseini et al. (2010a) has been conducted to help organization's decision makers address feasibility challenges when migrating to the cloud. In this study, a model was developed that can be used to assess the organizational fit and feasibility of the migration to the cloud. However, just as the previous study, no difference is made between service or deployment models, which makes these studies difficult to generalize.

*Table 1. Existing literature on the impact of SaaS and its limitations*

| | Does not differentiate between service models | Does not differentiate between deployment models | Not cross-industrial |
|---|---|---|---|
| *Qian & Palvia (2014)* | **x** | **x** | |
| *Al-lawati & Al-Badi (2016)* | **x** | **x** | **x** |
| *Janssen & Joha (2011)* | | **x** | **x** |
| *Khajeh-Hosseini et al. (2010b)* | | **x** | |
| *Ali et al. (2017)* | **x** | **x** | |
| *Khajeh-Hosseini et al. (2010a)* | **x** | **x** | **x** |

Overall, significant research can be found in literature concerning the impact of Cloud migration on the IT-department on an organizational level. However, most of these studies do not differentiate between service models and deployment models, even though there is a difference between the characteristics of these models. Moreover, industry characteristics and organizational characteristics are not taken into account. It is important to consider the size and the industry of the organization when performing research since the effect and benefits of CC can differ per organization (Aljabre, 2012). Also, for generalization of the results, it is critical that the study should have a cross-industrial perspective. Otherwise, the results of these studies can be difficult to generalize and to apply to other organizations. Table 1 shows an overview of the existing literature on the impact of CC on the IT-department and the limitations mentioned in this section.

To conclude, Gutierrez & Boukrami (2015) argue that research is still needed to identify how organizations should adapt to Cloud Computing, and questions remain surrounding this transition. Organizations should not think: "Use Cloud Computing and all of your problems will be solved". The performance of a new technology depends on how organizations utilize it and not on the technology itself. Therefore, there is a need for a clear conceptualization of the organizational impact that the transition to Cloud Computing has on the IT-department and how organizations should adapt to such changes, taking into account the difference between service/deployment models and organizations' characteristics.

### 1.2.2 Research Scope

This research will build further upon the limitations of the studies showed in Table 1. It came forward that these studies did not differentiate between service models and deployment models and did not use a cross-industrial perspective. Based on these limitations, the scope of this research will be defined in the following paragraphs.

First, the effect of Cloud migration on organizations could differ due to the number of employees that will be affected by the technology change. For example, large organizations generally have more employees in the IT-department, which can make the impact greater on these organizations because more employees can be affected. For this reason, this study will focus on large organizations.

Second, it is important to identify which service and deployment models the organizations apply that will be studied in this research. The Public Cloud deployment model indicates that the cloud operation is managed by an external company. When an organization decides to make use of a Public Cloud service, a certain part of the IT-system will be the responsibility of an external organization and is no longer controlled by the user. Consequently, the transition to Public Cloud can have an impact on the IT-department of a company due to this transfer of managing and control. In fact, organizations may experience hampered effectiveness in different business scenarios due to the lack of control over data, network and security settings (Zhang et al., 2010). Even more, the impact of Public Cloud Computing could be greater than that of other deployment models, as using Public Clouds shifts (part of) the control over the IT-operation to the cloud-provider. For this reason, this study will focus on organizations that have migrated to a Public Cloud.

Then, the difference between service models should be discussed. Most organizations do not use one specific service model. Often, a combination of IaaS, PaaS, and SaaS for different applications in the organization is used (BTA, n.d.). This research aims to study the impact of the transition to the Cloud while differentiating between service models. However, due to time constraints, one type of service model will be examined in this study. Most control over the application and its underlying infrastructure are given out of hands by organizations when making use of SaaS (Goyal, 2014). Hence, the use of SaaS-applications could have a large impact on the organization of the IT-department. Therefore, this study will focus on organizations that have recently migrated to a SaaS-environment.

Finally, the sector in which the studied organizations operate is of importance. To draw common, cross-industry conclusions from this research and achieve generalizable results, the organizations studied in this research should operate in different sectors.

For the sake of the generalizability of this study, this research will focus on organizations with the following characteristics:

- The organizations should have recently migrated to SaaS using a Public Cloud.
- The organizations should operate in different sectors.
- The organizations should be large.

## 1.3 Research Objective

To study the changes within the organization of the IT-department of companies, extensive research will be done to assess these changes. As mentioned in the previous paragraph, there is no clear conceptualization of how organization's IT-departments should change to successfully migrate to a SaaS-environment. In current literature, there is a lack of conceptualization on how to maintain a good performance of the IT-department when migrating to SaaS. Hence, the aim of this study is to assess the effects of the migration to SaaS on the IT-department on organizational level and develop a framework that can be used by these organizations to improve the organization of the IT-department when migrating to a SaaS-environment. The following research goal is formulated based on the aim of this study:

***To develop a framework that can help organizations improve the performance of the IT-department when migrating to a SaaS-environment***

## 1.4 Scientific Relevance

As was mentioned in Section 1.2.1, there is a need for a conceptualization of the impact that the use of SaaS has on the organization of the IT-department. In current literature, research has been done on the impact of CC on the IT-department, but in these studies, the authors do not differentiate between service models and deployment models. Moreover, the studies lack a cross-industrial perspective, which makes the results of these studies difficult to generalize. Therefore, this study can contribute to the literature that exists related to the organizational impact of CC, by focusing on the use of SaaS in large organizations with a cross-industrial perspective. Moreover, in current literature, there is a lack of models that can guide companies to organize the IT-department when migrating to SaaS. This study can fill this gap in literature.

## 1.5 Societal Relevance

From a societal perspective, the result of this study can be of relevance for two parties: organizations that are migrating to SaaS and Accenture, the IT-consultancy company that is involved in conducting this research. Within Accenture, it was noticed that clients are often not aware of how they should adapt when migrating to SaaS, especially related to the IT-department. Accenture facilitates many SaaS-migrations for their clients and issues related to the organization of the IT-department often come forward. According to consultants of Accenture, the use of a model that can guide the client to improve the organization of the IT-department would be a helpful tool. First of all, organizations that migrate to SaaS can benefit from such a model, due to the guidance that this tool can provide when migrating. Second, Accenture could benefit from the model, because it allows them to improve the facilitation of SaaS-migrations for the client, by understanding the changes that can occur within the IT-department of the client.

## 1.6 Research Methodology

The overarching research method that will be used in this study to achieve the research goal is Design Science Research (DSR). This type of research mainly intends to design artifacts that can be used to solve identified organizational problems with Information Systems (IS) (Hevner, March, Park, & Ram, 2004). In this study, the lack of understanding of the organizational changes due to SaaS-migration is the organizational problem to be studied. According to (Offermann, Blom, Schönherr, & Bub, 2010), eight types of IT-design artefacts exist as an output of DSR (Appendix D). When taking these types of artefacts into consideration, it can be argued that two types of artefacts will be designed in this study: *requirements* and *guidelines*. When elaborating on research

questions 2 and 3, a further explanation will be given on the artefacts. DSR can be a useful approach for developing the framework in this study. Peffers et al. (2008) argue that DSR "incorporates principles, practices, and procedures required to carry out such research and meets three objectives: it is consistent with prior literature, it provides a nominal process model for doing DSR, and it provides a mental model for presenting and evaluating DSR in IS." Moreover, the concerned authors have developed a framework that can be used to understand, execute and evaluate a DSR by following a series of steps. These steps include Problem Identification & Motivation, Definition of Objectives for a Solution, Design & Development, Demonstration, Evaluation and Communication. However, due to time constraints, only the four steps of this framework will be conducted in this study. To successfully conduct this study and achieve the research goal, these four steps will be followed and performed and are indicated in the Research Flow Diagram in Figure 1.

The 'Problem Identification & Motivation' refers to defining the specific research problem and the justification of the value of the solution. In this chapter, a part of this phase is already conducted, by defining the research problem, the research scope and the research objectives of this study. This phase will be extended by giving a more detailed description of CC, SaaS and the challenges that are related to the use of SaaS for the IT-department. The following sub-question is formulated for the further exploration of this phase:

1. **What are the differences between a situation with and without SaaS?**

By conducting an extensive literature review in Chapter 2, a more detailed description of CC and SaaS and will be given. Also, a brief elaboration will be given on the structure of IT-departments in general. Moreover, the benefits, the risks, and most importantly the challenges of SaaS related to the organization of the IT-department will be discussed. The answers on this sub-question will serve as input for the next step of the DSR framework: 'Definition of Objectives for a Solution'. For defining the objectives for the solution, the following research question is formulated:

2. **How do organizations' IT-departments change from an organizational perspective when migrating to a SaaS-environment?**

In Chapter 3, a theoretical framework will be developed by conducting an extensive literature research and expert questionnaires with Cloud-experts at Accenture. The theoretical framework and its propositions can be seen as the first type of artefact to be designed in this study: *requirements*. The type of artefact called *requirements* refers to those artefacts that serve as statements about a system and constraint the design space of a system design (Offermann et al., 2010). The propositions and theoretical framework in this study give direction for the further study and serve as boundaries for the development of the final framework. Therefore, the theoretical framework can be seen as a *requirements* artefact. Based on the literature review and the results of the questionnaires, the propositions will be formulated related to the perceived changes that will occur within the IT-department when migrating to SaaS. The theoretical framework and formulated propositions will form the basis for the case study that will be conducted to collect the qualitative data related to the impact of SaaS on the IT-department. In Chapter 4, a design will be made for the case study and will be followed by conducting the case study in Chapter 5. During the case study, IT-employees with different functions and backgrounds will be interviewed at three different organizations and company documents will be studied. This empirical research will give insight into the changes that the SaaS-migration caused within the IT-department of each case and will provide recommendations about the ideal organization of the IT-department when migration to SaaS. In Chapter 5, a cross-case analysis will be performed to reveal similarities between the cases.

The results of the case study will be discussed by comparing them with the propositions formulated in Chapter 3. These findings will be used as input for the next phase: 'Design & Development'. For the design and development of the supporting framework, the following sub-question is formulated:

**3. What would a framework look like that can support organization's IT-departments to migrate to a SaaS-environment?**

Based on the identified changes that occur within the IT-department and the recommendations made by the interviewees in the case study, a supporting framework will be developed in Chapter 7, which can be seen as the second artefact to be designed in this study. This artefact can be considered a *guideline*, according to Offermann's artefact types (Appendix D). Such artefacts can serve as generalized suggestions regarding behavior in a particular situation (Offermann et al., 2010). In this study, the framework to be designed can serve as a tool for making suggestions regarding the situation where the IT-department is migrating to SaaS. Hence, this framework can be seen as the second artefact; a *guideline* artefact. This framework will be developed in the form of a maturity model, which can be used to indicate where improvements should be made within the organization of the IT-department when migrating to SaaS. This is followed by the next step: 'Demonstration'. To demonstrate how the developed framework can be used, the following sub-question is formulated:

**4. What are the benefits of the use of this framework?**

At the end of Chapter 7, the assessment of the maturity model will be illustrated. Moreover, to demonstrate the usability and applicability of the maturity model, two evaluation interviews will be conducted with two Cloud-experts of Accenture with significant experience with SaaS-migrations. During these interviews, the content of the maturity model will be validated and the usability and applicability for both Accenture and the organization that is migrating to SaaS will be discussed.

This study will be finalized in Chapter 8, by means of a conclusion and a discussion. In the conclusion, the research questions will be answered based on the results of the study. In the discussion, an elaboration will be given on the limitations of the research, the recommendations for future research, the reflection and further recommendations. In Figure 1, the Research Flow diagram is shown, which indicates the steps taken to conduct this research.

## 1.7 Chapter Conclusion

In this chapter, the research problem, research objectives, and the research methodologies have been described. The research problem identified that in current literature there is a lack of information on how the organization of IT-departments of large organizations changes when migrating to a SaaS-environment and how organizations can adapt to these changes. Therefore, the research objective of this study aims to assess these changes and develop a framework that can help organizations successfully migrate to a SaaS-environment. Hence, the research goal is formulated as follows: *To develop a framework that can help organizations improve the performance of the IT-department when migrating to a SaaS-environment.* To achieve this research goal, the first four steps of Peffers' DSR framework will be executed: Problem Identification & Motivation, Definition of Objectives for a Solution, Design & Development and Demonstration. For each of these steps, a research question has been formulated that will be answered in this study to achieve the main research goal.

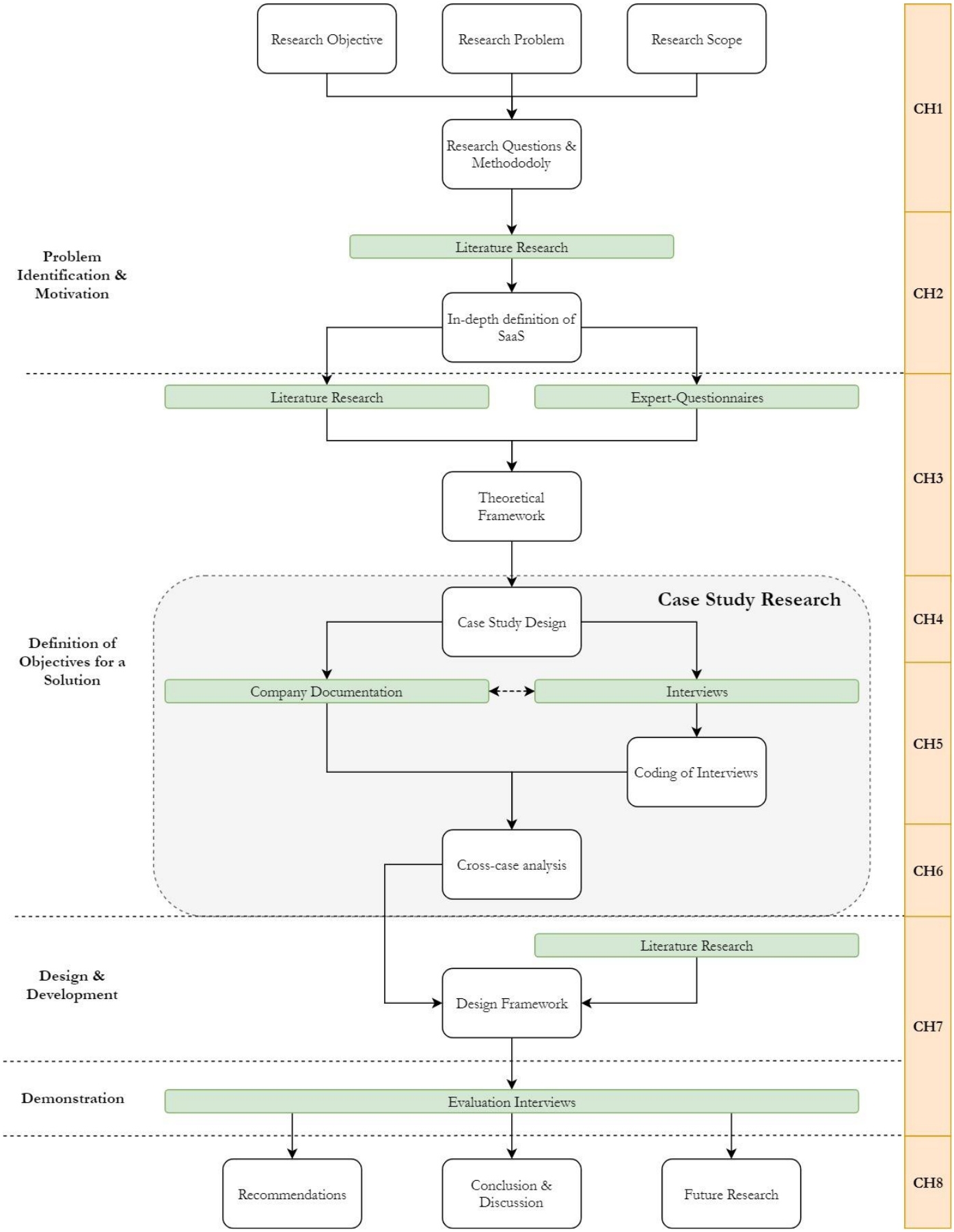


*Figure 1. Research Flow Diagram*

# 2 Cloud Computing

## 2.1 Chapter Introduction

In this chapter, a literature review will be conducted to give a better understanding of SaaS, the structure of the IT-department, and the challenges regarding the use of SaaS for the IT-department. By conducting this literature review and giving a better insight into the use of SaaS and its challenges, the first step of Peffers' DSR framework will be executed: 'Problem Identification & Motivation'.

First, a general description of CC will be provided in Section 2.2, elaborating on the service models and deployment models that exist. Then, the concept of SaaS will be explained, including its characteristics, benefits, and risks (Section 2.3). This section will be followed by a brief explanation of the structure, functions, and tasks of a conventional IT-department (Section 2.4). Finally, this chapter will close with an exploration of the challenges that exist for the IT-department when migrating to a SaaS-environment in Section 2.5.

## 2.2 Cloud Computing

Although CC has become well known and widely used in the last two decades, the concepts of CC have been around for many years before. More specifically, the foundation of CC was laid in the 1950s, when organizations were using terminals to give access to a central computer by multiple employees, which allowed the users to access the mainframe. Buying and maintaining a mainframe computer for every user was simply too expensive, and employees did not need the storage capacity and processing power of a personal mainframe computer. Therefore, the solution was to have shared access to one central mainframe computer, called *mainframe computing* (Neto, 2014). Then, in the 1970s, virtual machines (VM's) were created. VM software allowed running several different operating systems simultaneously in the same environment. Consequently, the development of VM's took mainframe computing to a higher level and became an important driver in the evolution of IT (Neto, 2014). The 1990s was the decade when telecommunication companies started using virtualization and began to provide virtualized private network connections, also known as VPN (Neto, 2014). Now, users could access the same physical infrastructure, instead of developing more physical infrastructure to provide access to multiple users. Furthermore, the development of standards for interoperability software and high-speed bandwidth contributed to the development of CC as well. Altogether, this brought CC to the level where it now is.

All these developments in IT led to the current state of CC. So, what exactly is CC? As this concept has been studied by many researchers, several definitions exist in literature. It is important to give a clear definition of what CC is, in order to lay a good foundation for the rest of this research. A definition used in many studies is that of the U.S. National Institute of Standards and Technology (NIST) (Al-lawati & Al-Badi, 2016; Rostami, Akbari, & Javan, 2014; Schneider & Sunyaev, 2016; Zhang et al., 2010). In this report, CC is defined as follows (Mell & Grance, 2006):

*"Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."*

Furthermore, CC has five essential characteristics according to NIST (Mell & Grance, 2006). First of all, CC allows *on-demand self-service*. Computing resources are unilaterally available for the Cloud-

user and can be provided without the need for human interaction. Secondly, CC provides *broad network access*, because the computing resources are provided over the internet and can be accessed from multiple devices (such as laptops, tablets, and mobile phones). Moreover, this allows multiple users to simultaneously use the computing resources or applications. Thirdly, CC allows *pooling of resources*, which refers to the ability to pool computing resources and serving multiple customers by using a multi-tenant model. Fourthly, *rapid elasticity* is provided by using CC. This means that the capabilities of the Cloud can be quickly provisioned and released by the vendor. On the other hand, Cloud-users have the ability to use the computing resources offered by the vendor at any time. Therefore, CC increases firms' elasticity regarding the use of computing resources. Lastly, CC offers a *measured service*, which refers to the fact that use of the computing resources can be controlled, monitored, and reported to the consumer. This increases transparency for both the Cloud-vendor as the Cloud-user.

### 2.2.1 Deployment Models

A distinction can be made in the way the cloud-service is provided by the vendor, called deployment models. Three major deployment models exist: Public Clouds, Private Clouds and Hybrid Clouds (Zhang et al., 2010).

- **Public Cloud:** The Public Cloud model refers to the provision of computing resources and services by a Cloud-vendor, available for multiple tenants and the tenants normally pay per use. So, the Cloud-user does not need to buy and maintain their own physical computing resources, but is provided by the vendor over the network when needed. This can be very beneficial for the cloud-user, as initial capital costs are eliminated and risks are on account of the provider. However, the lack of control over the network, data and security settings can be seen as downsides.
- **Private Cloud:** Private Clouds, also known as internal clouds, are created for a single tenant. The Cloud-service is developed and formed to the needs of the tenant and can be fully controlled by the tenant itself or by an external organization. When using a Private Cloud, the firm's own IT is virtualized and can to advantages such as economies of scale, while keeping control over the IT infrastructure. Overall, Private Clouds score higher on performance, reliability, and security, but come at a greater cost (Goyal, 2014).
- **Hybrid Cloud:** Then, there are Hybrid Clouds which are a combination of Public and Private Clouds. This means that some parts of the organization's IT-infrastructure are run on a Public Cloud and some on a Private Cloud, to eliminate shortcomings and limitations of each approach. Hybrid Clouds are known to be more flexible than the two other deployment models. However, development and 'defining the split' of Hybrid Clouds is time- and cost consuming (Zhang et al., 2010).

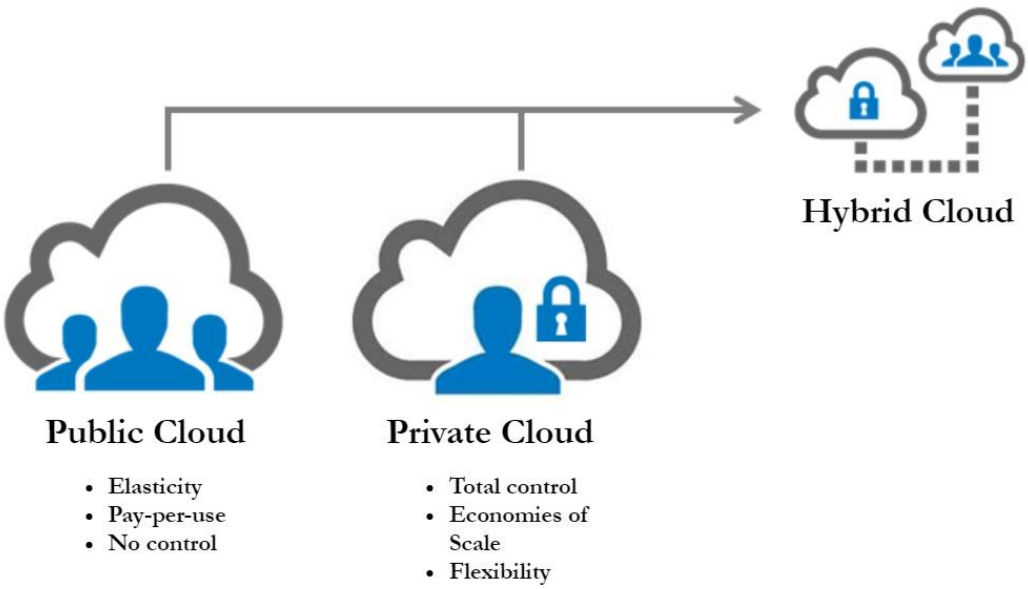


*Figure 2. Cloud Deployment Models*

Using Public Cloud forces organizations to give away (part) of the control over the IT-infrastructure to the Cloud-provider, and can therefore cause significant changes in the business processes of the Cloud-user (Zhang et al., 2010). Consequently, this can have large implications on the organization of the IT-department and how the IT-department operates. Therefore, Public Cloud is chosen as the deployment model to be studied in this research. Hence, if the term CC or SaaS is used further on in this research, it refers to the use of a Public Cloud.

### 2.2.2 Service Models

The degree of customization of the IT-infrastructure when providing CC can be distinguished by three main types, called service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) (Zhang et al., 2010). Although overlap can exist between the three models, and there are no crisp lines that distinguish them (Armbrust et al., 2010), it is possible to explain the differences in a concise way.

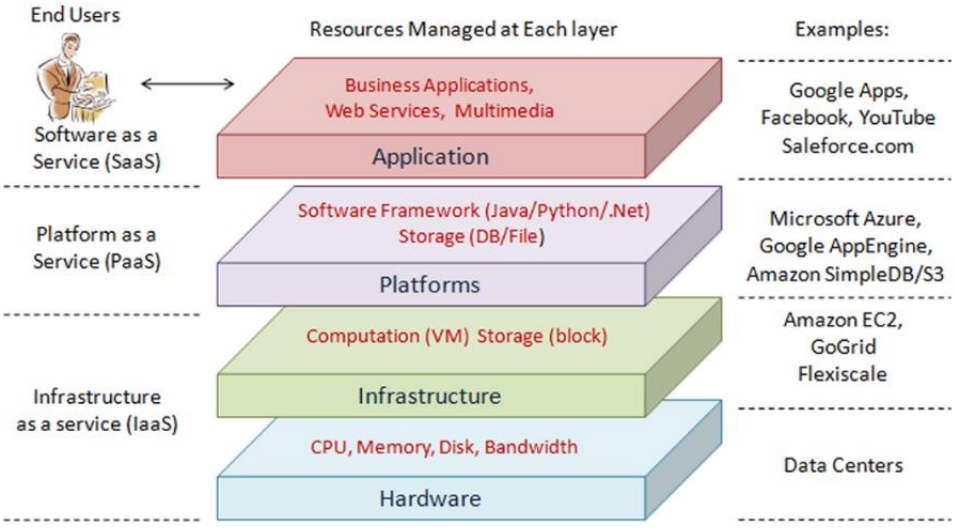


*Figure 3. Cloud Computing Architecture and Service Models (Zhang et al., 2010)*

- **Infrastructure-as-a-Service**: IaaS can be seen as the most basic service model; companies using IaaS let the underlying IT-infrastructure be managed by Cloud-providers. This entails networking, storage, servers, and virtualization. Still, the operating system, middleware, runtime, data, and application are controlled by the Cloud-user. IaaS can be seen as the basis of the CC services and provides computing instances very easily. Virtualization is an important aspect of IaaS, which allows the user to work with multiple operating systems on one physical system.
- **Platform-as-a-Service**: When organizations make use of the PaaS service model, the Cloud-provider is responsible for the underlying infrastructure, as well as the operating system, middleware, and runtime. This gives organizations the opportunity to develop, test, and manage applications, without needing the physical infrastructure. Therefore, PaaS-applications are especially beneficial for developers, because it allows them to freely focus on the development of new applications instead of managing the underlying infrastructure and operating system. The developer can write applications one the Cloud-provider's development platform.
- **Software-as-a-Service:** In a case when SaaS is used as a service model for the Cloud, the complete application is provided and managed by the service provider. This means that the Cloud-user has access to applications provided by the Cloud-vendor on a Cloud-infrastructure. As can be seen in (Figure 3), the complete application and the underlying infrastructure is controlled by the vendor. This allows the user to use the application when required and pay through, for example, a subscription.

Because the SaaS model allows the vendor to manage and control the complete application and the underlying infrastructure, a large part of the responsibilities regarding the management of IT moves to the vendor. Consequently, this can have an impact on the organization of the IT-department. Therefore, this research focuses on SaaS-applications. In the following section, an in-depth definition of SaaS will be given.

## 2.3 Software-as-a-service

For the sake of the completeness of this research, the concept of SaaS will be further defined in the next sections. This includes the characteristics of SaaS, the types of SaaS-applications that exist, and the related benefits and risks.

#### *2.3.1.1 Characteristics*

As mentioned before, SaaS allows users to deploy and use applications over the internet, so there is no need for the installation of physical hardware or software. Run from an internet browser, applications can be accessed through web-based interfaces. The complete application is provided by the Cloud-vendor, which means that monitoring, maintenance, and solving issues is on the account of the vendor. Moreover, the vendor provides systemic support of the SaaS-application, instead of updating the software and fixing issues on a yearly basis (Goyal, 2014). The use of SaaS has become increasingly popular in businesses, due to the unique characteristics that SaaS-applications have. To give a better picture of how SaaS differs from the regular 'on premise' model, some of the most important characteristics of SaaS will be discussed below. SaaS has a different business model than on-premise software. The user only pays if the software is required and used, called the pay-as-you-use model (Goyal, 2014). Instead of paying for licensing, installing and maintaining software, SaaS-applications are typically is sold by subscription. Therefore, the user is flexible and can stop the subscription at any time. Moreover, SaaS-users have the option to share the application with other users or use the application privately and don't share information and

data. For example, Salesforce, a well-known SaaS-application, allows customer relationship management with customers and partners from one central platform. This means that the application is used simultaneously with multiple users. On the other hand, Microsoft Office 365 offers office software in the Cloud, where users can choose to work in documents privately. Another characteristic of SaaS is that users can benefit from the newest technological innovations of the vendor, without being disrupted by updates and upgrades. These are automatically performed by the vendor, without disrupting the business processes of the user. Moreover, the user is not accountable for the costs related to updates and upgrades. Additionally, other costs related to deploying hardware and software are avoided using SaaS-applications, as this is all for the account of the Cloud-vendor.

To give some insight into the applicability of SaaS, an overview of the most common types of SaaS-applications that are used by organizations will be given. Additionally, well-known providers of each type will be discussed.

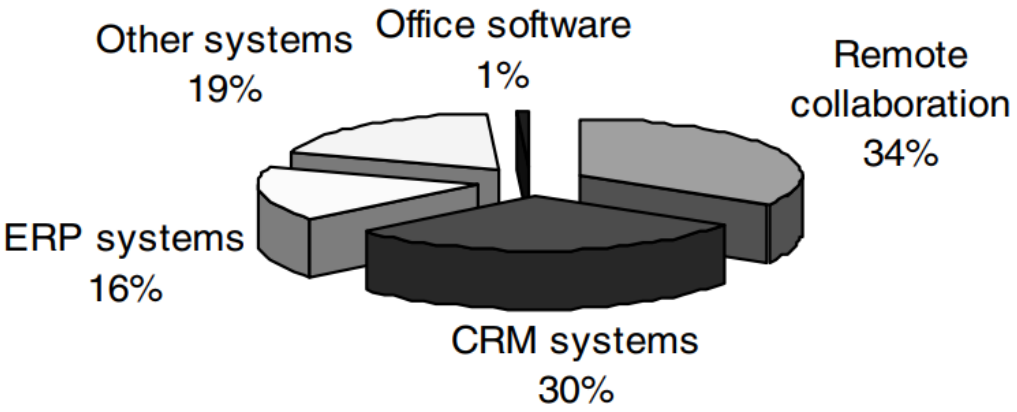


*Figure 4. Popularity of SaaS-applications (Lenart, 2011)*

As can be seen in Figure 4, remote collaboration applications (RC) and customer relationship management applications (CRM) have the biggest share when it comes to the popularity of SaaS-based business solutions (Lenart, 2011). Enterprise resource systems (ERP) are much used as well, but have a significantly smaller share than RC and CRM. Office software provided over the Cloud is the least used. Finally, 19% of SaaS-based business solutions have other functions. In the following paragraphs, the discussed types of SaaS-applications will be elaborated on and some examples of providers will be given.

- **Remote Collaboration**: RC-applications are used to solve limitations related to geographical locations and aim to improve communication between employees. Users can organize meetings, have video calls and conferences, and share documents via an online platform or app. Geographical barriers are eliminated and collaboration can increase.
  Examples: *Slack*, *Dropbox*, *Skype*, *Google Drive*

- **CRM-systems**: CRM-applications aim to improve and maintain the relationship with organizations' customers. By automation and integration of customer support, marketing and sales, the web-based application can provide an overview of customer information. Moreover, through marketing, observing the collaboration with the customer, and analyzing customer data, CRM-applications can improve customer service.
  Examples: *Salesforce*, *Freshsales*, *Zoho, Pipedrive*
- **ERP-systems**: ERP-applications aim to integrate and automate several business units within the user's organization and exist out several modules that each have a specific task. Before ERP-systems existed, companies owned various separate programs to execute the business processes, such as Human Resource Management systems, Business Intelligence systems, and even CRM-systems. Using ERP-systems, all these programs are operated and managed from one central platform.
  Examples: *Workday*, *NetSuite*, *Epicor, Oracle*
- **Office Software**: SaaS-based office applications are simple web-based applications, which the client can use to create documents, do calculations, make presentations, and so forth.
  Examples: *Microsoft Office 365*, *Google Apps*
- **Other**: Next to the previously mentioned types of SaaS-applications, several other applications exist that can be used as business solutions. Humans Resource software is an example, which can keep track of working hours, create schedules, and automate payrolls. Other SaaS-based business solutions are accounting software, billing- and invoice software, and E-commerce software. SaaS-applications can also be customized and designed according to the demands of the customer. Many ERP-systems are customized due to firm-specific business processes (Choudhary & Vithayathil, 2013).

#### *2.3.1.2 Benefits of SaaS*

In recent years, many organizations, from start-ups to multinationals, have decided to use SaaS-applications as business solutions. As mentioned in the previous paragraphs, several applications have been developed by Cloud-vendors to provide companies of software, and there is an increasing number of companies entering this market (Percy, 2019). Even more, IT-consulting company Gartner (2019) predicts that global revenue of the SaaS-providing companies will increase with 50% to almost 150 billion US dollars. They say that the provision of SaaS and other Cloud services are "shaking up the market". So, what are the main reasons behind the increased attractiveness of the use of SaaS-applications for businesses?

Firstly, the installation, testing, and maintenance of software are not required when using SaaS-applications (Goyal, 2014; Janssen & Joha, 2011). Consequently, there is no need for software expertise because these responsibilities are on account of the Cloud-provider. Hence, this allows firms to focus on their core business and avoid wasting time on managing software.

Secondly, SaaS allows companies to open up for new software applications that are not reachable when 'on premise' (Janssen & Joha, 2011). Simply because some software is too expensive when managed by the company itself, the pay-as-you-use model of SaaS makes software more affordable. Therefore, organizations can keep innovating and use the latest technologies.

Thirdly, the use of SaaS allows greater scalability of the application. If organizations grow, their need for computing resources can increase simultaneously. When using SaaS, the use of the application can easily grow in line with the need for computing resources, as new features and users can be easily added (Bibi, Katsaros, & Bozanis, 2012).

Fourthly, the pay-as-you-use model makes the expected costs for the user significantly transparent (Janssen & Joha, 2011). The consumer only pays for the amount of time that the application is used, so the user can predict exactly what the costs will be. Moreover, unexpected costs such as software updates and solving of software issue are avoided, which increases the transparency of costs for the user.

Fifthly, no up-front costs are needed to spent when using SaaS-applications (Goyal, 2014; Janssen & Joha, 2011). Organizations can directly have access to the applications as soon as the payment is made that is agreed in the subscription. Moreover, direct costs of managing IT can decrease.

Finally, SaaS-applications can be accessed at any time at any location (Goyal, 2014). The user requires an internet connection and a device to open the application. Hence, collaboration issues due to the geographical distance between employees can be solved.

#### *2.3.1.3 Risks of SaaS*

Although SaaS can be very beneficial for organizations, its use does involve risks that should be mentioned. In this section, the risks and disadvantages of the use of SaaS-applications will be discussed.

A first disadvantage of SaaS is that providers have different rates of pricing for the SaaS-software that they provide. There is not a standard amount of how much a subscription on a SaaS-application should cost. Pricing is based on the business model of the Cloud-vendor and is not defined by supply and demand. Due to these differences in pricing, consumers can get confused (Goyal, 2014).

Furthermore, the use of SaaS-applications increases the dependency on the Cloud-provider. If issues regarding the software occur, the user has no control over solving the issues, as this is the responsibility of the vendor. For the user, solving software related issues should be solved quickly, because software disruptions could cause huge losses for organizations (Guo & Wang, 2009). This loss of control can make organizations feel dependent since they have no clear visibility of the application's architecture.

Because SaaS-applications are deployed over the internet and most of the times run via a web-browser, organizations that use SaaS are dependent on the connection of the internet. In case of connectivity issues, the performance of the application can decrease or even shut down. As mentioned before, the disruption of working software can cause enormous losses for the organization. Hence, dependency on internet connection is another disadvantage of SaaS.

Security and privacy risks are also involved in the application of SaaS-software. Security of company data is an important issue for organizations, and therefore strict security and privacy policies are required. In case of 'on premise' software, the user has control over his own data. However, data generated by SaaS-applications is owned and controlled by the vendor, which can be an issue for some organizations (Goyal, 2014; Janssen & Joha, 2011). For example, in case of bankruptcy of the Cloud-provider, the user's data could be lost. Therefore, organizations see privacy and security of data as a big risk of SaaS.

Organizations have certain expectations of the software that they use for their business processes. Since applications are developed by the vendor, organizations have no or little control over the functionality of the software. If the expected level of service of the SaaS-software is not achieved, the user may be unsatisfied with the performance of the application (Goyal, 2014).

Another important issue regarding the functionality of SaaS-applications is interoperability. Most organizations have multiple applications in use for different business processes. The integration of new SaaS-applications could lead to interoperability issues between applications. Moreover, ERP-systems aim to integrate a large part of the organization's applications for various business processes. Consequently, this integration should be supported by all other applications, or the performance of day-to-day operations can decrease (Goyal, 2014).

Finally, one of the most important issues that forms the basis of the problem statement of this study, is related to the organization and functionality of the IT-department. Activities such as installing, testing, and maintenance of software is outsourced when using SaaS-applications. These tasks are the responsibility of the IT-department in an 'on premise' environment. However, in a SaaS-environment, many tasks are taken over by the vendor and this can consequently affect the function of the IT-department, which can lead to a large shift in organizational governance (Janssen & Joha, 2011).

This raises the question: how does SaaS impact the functionality of the IT-department, and what are the main challenges to overcome related to this? To give more insight into the IT-department and how migration to SaaS can impact the IT-department, the organization of the IT-department will be defined (Section 2.4). Moreover, the challenges for the IT-department regarding the use of SaaS-applications will be elaborated on in Section 2.5.

*Table 2. Benefits and risks of SaaS*

| **Benefits of SaaS** | **Risks of SaaS** |
|---|---|
| • No need for software expertise | • Confusing price rates |
| • Allows the use of new, high-end applications | • Dependency on SaaS-provider |
| • Scalability of the application | • Dependency on internet connection |
| • Transparency of costs | • Security and privacy risks |
| • No up-front costs | • No control over functionality of application |
| • Instant access to the application | • Interoperability issues |
| | • Change of functionality of IT-department |

## 2.4 Defining the IT-department

In order to clarify how the IT-department is organized in an 'on-premise' environment, this section will aim to briefly define how the IT-department of organizations operates. Although the structure and function of the IT-department vary per firm, the most common functions and tasks can be found in literature.

### 2.4.1 Functions and structure

In every modern organization that makes use of computers, an IT-department is necessary to maintain the complete IT-operation. In general, the IT-department has three major functions: systems development, operations governance, and technical support (Lo, 2007). *Systems developing* refers to developing, testing, and maintaining new applications. For organizations, it is important to keep innovating within the IT-operation to increase performance (Thiadens, 2000). A second function of the IT-department is *operations governance*, which refers to maintaining operational hardware components such as databases, computers, the network, etc. The IT-department is responsible for the upkeep of the IT-operation and ensures functionality and security. Another function is *technical support*, which includes helping end-users with IT-related issues, installing new software, administration of databases. In short, everything related to solving technical issues.

In order to fulfill these functions, the IT-department has several employees with each a different role. In this paragraph, the most common roles within the IT-department are briefly described. Furthermore, Figure 5 shows the general structure of an IT-department.

- **IT-manager**: responsible for monitoring and improving the performance of the complete IT-operation.
- **Security Administrator**: responsible for maintaining and enhancing the security of data and hardware. Moreover, creating awareness of security risks.
- **Developer**: responsible for developing and testing new technological and functional specifications.
- **Computer Operator**: responsible for monitoring and improving the performance of computer systems.
- **Network Administrator**: responsible for monitoring and improving the organization's network. Moreover, installing and configuration of new computer networks falls under the networks administrator's responsibilities.
- **IT-operations Analyst**: responsible for monitoring IT-services and reporting performance of service levels.
- **Web Administrator**: responsible for identification of interoperability issues, analyzing web usage data and improving web operations.
- **Database Manager**: responsible for storing and organizing the organization's data and maintaining the database.
- **IT Helpdesk**: responsible for solving technical issues for end-users and repairing or replacing defect equipment.

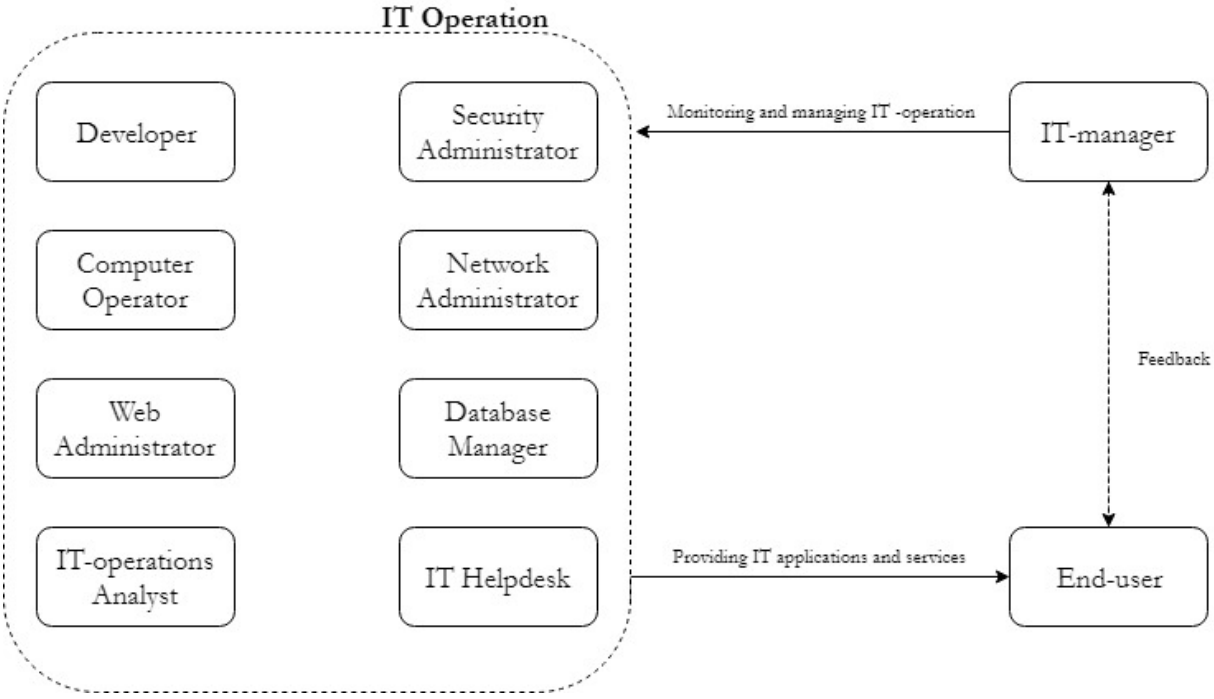


*Figure 5. General structure of the IT-department of the firm*

### 2.4.2 Tasks

Thiadens (2000) argues that the tasks of the IT-department of companies can be divided into three main categories. The first category is *exploitation*, which entails maintaining the operational IT-systems. Then there are the *functional* tasks, which are tasks for maintaining the functionality of the IT-operation. Lastly, *application management*, which takes care of maintaining the software that realizes the functionality of the applications. Table 3 shows a short overview of the tasks of the IT-department that belong to each category.

*Table 3. Tasks of the IT-department (Thiadens, 2000)*

| **Exploitation tasks** | **Functional tasks** | **Application management tasks** |
|---|---|---|
| Managing IT exploitation | Managing implementation projects | Managing application development projects |
| Staff IT Helpdesk | Managing functionality of applications (business) | Analyzing information |
| Managing configurations | Managing functionality of applications (personal) | Functional design |
| System administration | Managing functionality of intra- and extranet applications | Technical design |
| Network administration | | Coding |
| Internet administration | | Web-application administration |
| Support personal computer use | | Managing application administration |
| | | Application architecture |

## 2.5 SaaS and the IT-department

In Section 2.4, the general tasks of the IT-department in an 'on-premise'-environment was discussed. It can be concluded that most of the tasks are related to technical issues; maintenance of hardware, developing applications and solving IT-related problems for end-users. According to a significant amount of studies, the migration to a disruptive technology such as CC and in particular SaaS, can have a large impact on the functionality of the IT-department.

Where in an 'on-premise' environment the IT-department's biggest role is local installation and maintenance, SaaS-migration forces a shift towards managing a Cloud-vendor that is operating from a different location (Janssen & Joha, 2011). Managing the performance of the software is no longer on account of the IT-department, but is taken over by the Cloud-vendor. Therefore, organizations should manage the collaboration with the provider to ensure the required level of service and solve issues in an efficient way. Qian & Palvia (2014) argue that this responsibility is for the IT-department, consequently forcing a large shift towards vendor relationship management within the IT-department. Next to facing issues with the external Cloud providers (such as evaluation, procurement, billing, and monitoring), the IT-department's focus could shift more towards solving internal issues within the organization, such as increasing the business value of other employees by improving the IT-service, improving internal standards and perform IT-business consulting (Vithayathil, 2018) (Figure 6).

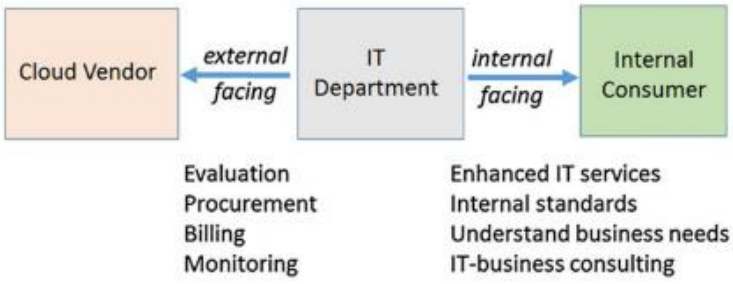


*Figure 6. Transformed roles of the IT-department (Vithayathil, 2018)*

Further, the potential shift towards new roles within the IT-department, could require new skills and knowledge for IT-employees. Al-lawati & Al-Badi (2016) and Willcocks et al. (2013) argue that, to cope with this new disruptive technology, new skills are required. More specifically, 'soft skills' such as business analytics and strategic planning could be of great importance within the IT-department after migration to SaaS. Moreover, migration to a SaaS-environment could lead to shrinking of the IT-department (Khajeh-Hosseini, Greenwood, & Sommerville, 2010; Willcocks et al., 2013). Due to outsourcing of many software related tasks, some functions may become unnecessary. Consequently, IT-employees could lose their job or could be transferred to another department, which could lead to a decrease in job satisfaction among employees. Overall, the main goal of the IT-department can change towards enhancing the collaboration with SaaS-software and the provider, in order to fulfill the current and future needs of the organization (Choudhary & Vithayathil, 2013). However, in current literature a scientific model does not yet exist that can guide organizations to transform their IT-department when migrating to a SaaS-environment.

## 2.6 Chapter Conclusion

In this chapter, extensive literature research was conducted to execute the 'Problem Identification & Motivation' phase. From this literature research, it came forward that significant differences exist between a situation with and without SaaS. First, the origination of Cloud Computing and the existing service- and deployment models were defined to give a clear image of where SaaS comes from. Then, an in-depth definition of SaaS was provided to identify the differences between a situation with and without SaaS. The most important differences that came forward from the literature research was that IT-equipment and IT-tasks are outsourced when using SaaS, while in an 'on premise' environment these are the responsibility of the IT-department. The physical IT-infrastructure such as servers and databases are unnecessary when using SaaS, and the complete application is managed by the SaaS-provider. Moreover, SaaS-applications have a different business model than 'on premise' software, because SaaS is 'paid-per-use'. Further, the literature research showed that the use of SaaS allows for several benefits such as cost transparency, scalability, reduction of up-front costs and global accessibility, but does also involve several risks compared to the use of 'on premise' software. Namely, the use of SaaS increases dependency on the provider and the internet, involves security and privacy risks, and can cause interoperability issues. But above all, the use of SaaS asks for a different organization of the IT-department, due to the outsourcing of responsibilities of the IT-department and outsourcing a part of the IT-operation. A conventional IT-department has three main functions: systems developing, operations governance, and technical support. Whereas these functions are predominantly related to technical tasks, literature shows that the use of SaaS makes several technical functions unnecessary. Overall, the use of SaaS asks for a different set of skills for IT-employees and a different organization of the IT-department. How the organization of the IT-department exactly changes in a SaaS-environment is not yet defined in literature, and no scientifically based design exists that can help organizations change the organization of their IT-department when migrating to SaaS. In the next chapter, a theoretical framework will be developed that can be used for assessing the changes that the use of SaaS causes.

# 3 Theoretical Background

## 3.1 Chapter Introduction

In this chapter, a theoretical framework will be developed that forms the basis for conducting the case study further on in this study. This chapter can be seen as the start of the 'Definition of Objectives for a Solution' phase of Peffers' DSR framework.

In Section 3.2, the need for Strategic Management is explained, including the different paradigms that exist within this field. Then, the choice for the Resource-Based View of the Firm as the underlying theory for this study will be explained in Section 3.4. This section will be followed by the identification of resources and capabilities of the IT-department that could change due to a migration to a SaaS-environment by doing an extensive literature research and conducting questionnaires with Cloud-experts from Accenture. Also, propositions will be formulated in this section related to these perceived changes (Section 3.5). Finally, the final theoretical framework will be shown and elaborated on in Section 3.7.

## 3.2 Strategic Management

As discussed before, the migration to a SaaS-environment can have a significant impact on the functioning of organizations' IT-departments. The roles of employees change, a different set of skills is required and the structure of IT will need to adapt to gain advantage out of a migration to the Cloud (Janssen & Joha, 2011). In other words, IT-departments should change and manage their strategy in order to perform well and keep thriving. Otherwise, both the size and the functioning of the IT-department will shrink and atrophy (Vithayathil, 2018). Therefore, this study will be seen from a Strategic Management perspective.

Simply put, Strategic Management (SM) aims to achieve competitive advantage and maintain this over a longer period by adapting, reconfiguring and integrating internal and external skills, functional competences and resources (Teece, Pisano, & Shuen, 1997). Employees of an IT-department in a SaaS-environment also need significant adaptations regarding knowledge and skills, to enable the full potential of SaaS (Loukis, Janssen, & Mintchev, 2019). Furthermore, Vithayathil (2018) argues that Cloud-based IT-departments should transform into a new role that can help the organization thrive and grow. Hence, SM could be a helpful theory to study how IT-departments should adapt to gain and maintain competitive advantage in a SaaS-environment.

Although SM has been well-explored and applied on numerous studies, there is not one specific definition of what it exactly entails. According to Teece et al. (1997), four major paradigms exist within the field of SM: the Competitive Forces approach, the Strategic Conflict approach, the Resource-Based View of the Firm and the Dynamic Capabilities approach. In literature, several other paradigms have been developed that are extensions of SM, but for maintaining the focus of this study, these four paradigms are considered. In the next paragraphs, the paradigms will be briefly explained and a choice is made on which paradigm will be used as a guideline for this research.

### 3.2.1 Competitive Forces

The Competitive Forces approach was a dominant paradigm of the Strategic Management perspective in the 1980s. According to this perspective, gaining competitive advantage is strongly dependent on the sector or sectors in which an organization competes (Porter, 1980). The profit

potential of an organization is determined by five industry level forces: entry barriers, threat of substitution, bargaining power of buyers, bargaining power of suppliers, and rivalry among industry incumbents (Teece et al., 1997). This 'competitive forces' framework can help to determine how these forces affect the profitability of industries or industry segments and what actions an organization can undertake to ensure a strong defense against other competitive forces on the market.

### 3.2.2 Strategic Conflict

The Strategic Conflict approach focuses on market imperfections, entry deterrence, and strategic interactions. In this approach, game theory tools are used to analyze the nature of competitive interaction between rival firms (Teece et al., 1997). The idea behind this perspective is that organizations can become more profitable by manipulating the market environment in which they operate using these tools.

### 3.2.3 Resource-Based View of the Firm

The Resource-Based View of the Firm stresses that firm-specific resources and capabilities are the most important assets of an organization to ensure competitive advantage. It is important to manage internal resources and capabilities to gain and sustain competitive advantage over other firms (Barney, 1991). Here, resources are all assets, capabilities, knowledge, information and processes that an organization owns to produce a final product or service. Capabilities can be seen as an organization's capacity to deploy these resources to effect a desired end (Cabrera-Suárez, De Saá-Pérez, & García-Almeida, 2001).

### 3.2.4 Dynamic Capabilities

The Dynamic Capabilities approach is an extension of the RBV and was developed due to the incapability of the RBV to achieve new forms of competitive advantage in a changing market (Teece et al., 1997). Therefore, this approach is suitable for analyzing the resources and methods that should be exploited by a firm to gain competitive advantage in a rapidly growing environment. Moreover, the DC approach stresses that resources and capabilities should be renewed in order to adapt to these changes.

## 3.3 Resource-Based View of the Firm

Although all four of the paradigms could provide interesting insights for the rest of this study, the Resource-Based View of the Firm (RBV) is chosen as the underlying theoretical basis of this study. In the following sections, the principles of the RBV will be explained and the choice for RBV for this study will be elaborated on.

In 1959, Penrose laid the foundations of the RBV in one of her studies in which she stated that a firm can be perceived as an administrative organization and a collection of resources that can be both human and physical. According to Penrose, resources can provide the organization of several services depending on how the organization works with them. In the following decades, numerous studies have been dedicated to improve this theory, which resulted in the development of the Resource-Based View of the Firm. Although there is not one definition of the RBV, a brief explanation of this theory will be provided here.

The RBV looks into how organizations succeed or fail in the market place from in 'inside-out'-perspective (Madhani, 2010). The term 'inside-out' refers to the fact that the RBV focuses on the internal resources and capabilities to explain the success and value of the firm (Barney, 1991; Grant, 1991; Wernerfelt, 1984). The RBV sees the firm as a bundle of unique resources (Spanos & Lioukas,

2001). According to this perspective, exploiting internal, firm-specific resources and capabilities are essential to gain and sustain competitive advantage in the market-place. In section 3.2.3, the definition of resources has been briefly explained. According to Barney (1991), three types of resources can be distinguished within the firm: physical resources (e.g. physical, financial, technological, plant or equipment), human resources (e.g. training, skills, experiences or insights) and organizational resources (e.g. formal structure, planning). Moreover, resources can be both tangible or intangible. Capabilities are necessary to 'transform' these resources into value for the firm and can be seen as the capacity of a firm to deploy resources (Cabrera-Suárez et al., 2001). Unlike resources, capabilities are information based, tangible or intangible, firm-specific processes that are used to improve the productivity of the other resources possessed by the firm.

In order to gain competitive advantage and sustainable performance, resources and capabilities should adhere to 'VRIN' criteria explained below (Barney, 1991).

- *Valuable*: The resource or capability should add value to the firm's performance.
- *Rare*: The resource or capability should be difficult or impossible to find among other competitors of the firm.
- *Imperfectly Imitable*: The resource or capability should be difficult or impossible to imitate by other competitors of the firm.
- *Non-substitutable*: The resource or capability should not be replaceable by another resource or capability.

By following these criteria for exploiting resources and capabilities, it enables organizations to implement strategies that can improve efficiency and effectiveness. RBV helps to understand how resources and capabilities should be used in order to increase business performance (Madhani, 2010). Hence, it is important to identify the resources and capabilities that can improve an organization's performance and how to exploit these to increase performance and consequently sustain competitive advantage. Figure 7 shows a simple visualization of the RBV.

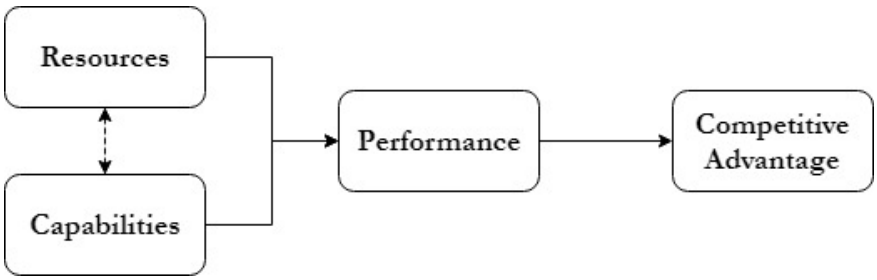


*Figure 7. The Resource-Based View of the Firm*

As mentioned before, when migrating to SaaS, the strategy of the IT-department will and should change in order to keep performing (Vithayathil, 2018). So, it is important to identify what resources and capabilities of the IT-operation in a SaaS-environment should be exploited to sustain performance and eventually gain competitive advantage for the firm. For this reason, the RBV is chosen as the perspective for this study. In the next section, a more explicit elaboration will be given on the choice for RBV.

## 3.4 Explanation of choice for RBV

First of all, identifying resources and capabilities is critical for developing a successful strategy and gain and maintain competitive advantage (Figurska, 2015; Grant, 1991; Schoemaker & Amit, 1994). It can help organizations to make better use of their resources, and consequently design a strategy that aligns with the exploitation of their resources. Therefore, RBV can contribute to identifying crucial resources and capabilities of the IT-department in a SaaS-environment and develop a suitable strategy.

Secondly, RBV is a widely accepted and well-explored theory for analyzing the internal success factors of private organizations. Many authors have studied RBV and made extensions or improvements to this theory to improve its performance (Curado, 2014; Grant, 1991; Lavie, 2006; Teece et al., 1997). Moreover, the RBV theory has proven to be effective for identifying and analyzing essential resources and capabilities, as numerous studies regarding this subject have successfully been conducted based on RBV (Cabrera-Suárez et al., 2001; Del Canto & Gonzalez, 1999; Espino-Rodriguez & Padron-Robaina, 2005; Mariz-Pérez & García-Álvarez, 2009). Hence, RBV would be a suitable choice for analyzing the critical success factors of a SaaS-based IT-department.

Thirdly, although the Dynamic Capabilities approach could be applicable for this study, the RBV does seem to be more suitable to follow as a guideline. DC focuses on identifying the ability or capacity of a firm to adapt to a changing environment or market. Migrating to a SaaS-environment can be categorized as a change in an organization's environment, as there is a significant shift on technological and organizational level. Therefore, analyzing an organization's ability to adapt to these changes could be helpful for a SaaS-migration. However, this research aims to discover which resources should be exploited for a successful SaaS-migration and does not focus on adaptation capacities. Hence, RBV is chosen over DC as the perspective for this study.

Fourthly, in contradiction to DC, the Competitive Forces and Strategic Conflict approach are significantly less applicable to this study compared to RBV and DC. The former focuses on market imperfections to gain competitive advantage instead of focusing on the internal assets of an organization like RBV and DC. Identifying market imperfections does not create value for an IT-department, because the IT-department should create internal value by exploiting their resources instead of looking at what is going wrong in the market (Vithayathil, 2018). Therefore, the RBV is chosen over the Competitive Forces approach and the Strategic Conflict approach.

### 3.4.1 Limitations of the RBV

According to the RBV, organizations should adhere to the 'VRIN' criteria mentioned before; resources and capabilities should be *valuable*, *rare*, *imperfectly imitable* and *non-substitutable* to increase performance. In this research, the resources and capabilities of the IT-department in general will be examined, and not of one specific firm. As the last three criteria are related to the comparison with resources of other firms, these characteristics are not relevant for this study. Hence, the only criterium that the resources in this research should adhere to, is the *value* that the resource adds to the firm.

## 3.5 Resources & Capabilities

As mentioned in the previous sections, firms' resources and capabilities are crucial determinants for performing well, thus gaining and sustaining competitive advantage. Therefore, it is important for firms to identify these resources and capabilities and learn how to exploit them. Hence, in this study, the focus will be on identifying the resources and capabilities that are crucial for the IT-department to perform well in a SaaS-environment.

The following section will provide a literature review on the most important resources and capabilities, that can be used as variables for the case study. Of course, not all resources and capabilities are applicable to every company or situation, so it is of importance to stress the most important resources and capabilities in IT-departments.

For all of the resources and capabilities found in the literature, a proposition is formulated that will be studied in the case study. Propositions help to direct attention to subjects that should be examined within the scope of the case study research. Additionally, they help reflect on important theoretical issues and indicate where to look for relevant evidence (Yin, 2009). The relevance of the resources and capabilities found in literature was validated by conducting a short questionnaire with several Cloud-experts of Accenture. The protocol for the expert-questionnaires can be found in Appendix A. An overview of the Cloud-experts that filled in the questionnaire is shown in Table 4.

*Table 4. Overview of Cloud-experts*

| Questionnaire | Expert | Function | Years in Function |
|---|---|---|---|
| **Q1** | Exp1 | Cloud Transformation & Migration Analyst | 2 |
| **Q2** | Exp2 | Associate Manager - Intelligent Cloud | 8 |
| **Q3** | Exp3 | Cloud Transformation & Migration Manager | 7 |
| **Q4** | Exp4 | Cloud Migration and Implementation Delivery Analyst | 1 |
| **Q5** | Exp5 | Cloud Migration Associate Manager | 7 |

So, what exactly are resources? In current literature, several definitions are given of what firms' resources represent. Very broadly, resources can be defined as all the assets, either tangible or intangible, that are either owned or controlled by a firm (Schoemaker & Amit, 1994; Spanos & Lioukas, 2001). Anything that can be seen a as strength or a weakness of the firm can be seen as a resource (Wernerfelt, 1984). Moreover, in order to be defined as a resource, several authors have stated that these assets should be 'semi-permanently' tied to the firm, which means that the assets can be gained and released over time (Maijoor & Van Witteloostuijn, 1996; Spanos & Lioukas, 2001; Wernerfelt, 1984). To be more specific, resources can include organizational processes, firm attributes, information or knowledge controlled by a firm that can be used to implement a strategy (Barney, 1991; Madhani, 2010). Based on these characteristics, the following definition of the term *resources* for the rest of this research is formulated as follows:

*The semi-permanently tied, tangible and intangible assets of the firm that can be seen as a weakness or a strength and that can be used to implement a strategy.*

Looking at the mentioned definitions, it can be concluded that the term 'resource' is very broadly defined. Therefore, it is important to make a distinction between different types of resources. Barney (1991), in an important study regarding the RBV, divided a firm's resources into four different categories: *physical resources, organizational resources, human resources,* and *capabilities*. An extensive literature research and questionnaires with Cloud-experts from Accenture are conducted to give a definition of these resources and to identify the most important resources of the IT-department that can be affected when migrating to SaaS. In the following paragraphs, further elaboration will be given on these resources and how they could relate to the IT-department in a SaaS-environment.

## 3.5.1 Physical Resources

From literature, it comes forward that physical resources are typically tangible assets, such as equipment, IT, raw materials, financial assets, and geographical locations (Barney, 1991; Madhani, 2010; Newbert, 2008). Hence, the following definition can be given for physical resources:

*All tangible assets owned by the firm.*

For this study, only financial assets are chosen as one of the potential important physical resources for the IT-department in a SaaS-environment. Other physical resources such as geographical locations, IT-equipment and -systems are left out of the scope because this study focuses on the organizational level of the IT-department and not the operational level. In the next paragraph, the resource 'financial assets' and its relation to the IT-department will be elaborated on.

#### *3.5.1.1 Financial Assets.*

Cost reduction is one of the reasons why companies choose to migrate to SaaS-applications. IT-departments can get rid of unnecessary hardware and software, since the cloud vendor takes over this responsibility. Hence, this can lead to lower capital costs. Furthermore, the operational costs of the IT-department could also decrease, because maintenance and other responsibilities are taken over by the vendor. So, SaaS-migration could lead to a decrease in direct costs for the IT-department (Chou & Chou, 2008; Janssen & Joha, 2011). Moreover, the total cost of ownership for SaaS-applications are significantly lower compared to on-premise applications (Bibi et al., 2012). If this line of reasoning is followed, it could be concluded that fewer financial assets are needed in a SaaS-environment. However, this line of reasoning is too straightforward. Studies have argued that the migration to Cloud causes and requires big changes in the organization of the IT-department, such as re-training of IT-employees (Al-lawati & Al-Badi, 2016). Consequently, this re-organization of the IT-department can initially involve higher costs. Hence, the following propositions are formulated:

| |
|---|
| **P1: The IT department will require extra financial assets when migrating to a SaaS-environment, due to re-organization.** |
| **P2: The operational costs of the IT-department will decrease over time when migrating to a SaaS-environment.** |

### 3.5.2 Organizational Resources

Organizational resources can be tangible, such as formal planning-, command-, control- and management systems. On the other hand, intangible organizational resources exist as well, such as formal structure (Barney, 1991; Madhani, 2010). A brief definition can be given of organizational resources:

*The tangible and intangible assets that can contribute to the organization and management of the firm.*

In the literature research, organizational structure and management systems came forward as potential important organizational resources of the IT-department. Other tangible and intangible organizational resources are not included in this research. The reason for this choice will be explained in the following paragraphs.

#### *3.5.2.1 Organizational Structure*

Formal organizational structure, or simply organizational structure, is one of the organizational resources stressed by Madhani (2010) that should be exploited to improve the firm's performance. Structure refers to the hierarchical arrangement of relationships between different jobs and functions within the organization. In other words, it defines and assigns competencies, roles and responsibilities, and clarifies who reports to whom. In organizations, having a clear organizational structure is important when managing multiple employees, because it unites activities, processes, and people and sets common goals. Firms should not underestimate the importance of organizational structure, as it is a crucial element in the diffusion of technological innovation within the organization (DeCanio, Dibble, & Amir-Atefi, 2000). Therefore, it can be stated that defining the right organizational structure of the IT-department is necessary when migrating to a SaaS-environment.

Willcocks et al. (2013) argue that roles and responsibilities within the IT-department change after a migration to the Cloud. The authors claim that the number of employees in the IT-department will shrink, but that the quality of these employees should significantly increase. Due to the shift of many tasks and responsibilities to the Cloud-vendor, fewer employees could be needed in the IT-department. On the other hand, new roles and responsibilities can arise to keep up with the new technology (Al-lawati & Al-Badi, 2016). So, the following propositions for the case study are formulated:

| **P3: The size of the IT-department will decrease when migrating to a SaaS-environment.** |
|---|
| **P4: The IT-department requires highly skilled employees that are able to handle new roles and responsibilities when migrating to a SaaS-environment.** |

#### *3.5.2.2 Management Systems*

To ensure that firms can fulfill the tasks required to achieve its objectives, management systems are used. The set of policies, processes, and procedures used by the organization to achieve these goals can be seen as management systems. Cloud-migration can cause a change in the objectives and goals of the IT-department, as the function of the IT-department could shift towards managing the vendor and business analytics (Janssen & Joha, 2011; Qian & Palvia, 2014; Vithayathil, 2018). Consequently, this could cause the management systems to be re-designed to adapt to the new goals and objectives of the IT-department in a SaaS-environment. Hence, the following proposition is formulated:

**P5: Management systems of the IT-department require re-design when migrating to a SaaS-environment, due to new objectives and goals.**

### 3.5.3 Human Resources

Human resources are intangible resources related to the firm's employees (Barney, 1991; Madhani, 2010). Holding on to the well-described and relevant definition of Dess & Picken (1999), human resources can be defined as follows:

*The individual's capabilities, knowledge, skills and experience of the firm's employees and managers, as well as the capacity to add to this reservoir of knowledge, skills, and experience through individual learning.*

For the case study, skills, knowledge, training, and organizational culture came forward from the literature research as potential important human resources for the IT-department in a SaaS-environment.

#### *3.5.3.1 Skills*

Skills is one of the human resources that should be exploited by the firm in order to perform and gain competitive advantage (Barney, 1991). Skills can be defined as the ability to apply knowledge in context and getting the expected results out of this. Without skills, employees will not be able to transform the knowledge they have into a desirable result. So, it is essential for firms to exploit and keep developing skills of their employees. Moreover, with the emergence of new technologies within firms, new skills are needed. Al-lawati & Al-Badi (2016) argue that the migration to the Cloud requires new skills for the employees of the IT-department, to keep up with the new technology. Also, 'soft skills' across all roles can be required within the IT-department due to Cloud-migration (Willcocks et al., 2013). Al-lawati & Al-Badi (2016) and Ecar (2015) argue that there is a shift from 'hard skills' like maintenance of hardware to business analytics and strategic planning ('soft skills'). Hence, the following proposition is formulated:

**P6: IT-employees require a new set of 'soft' skills when migrating to a SaaS-environment.**

#### *3.5.3.2 Knowledge*

In current literature, knowledge has been broadly defined. There is not one specific definition of knowledge, and the definition of what knowledge is has intrigued many researchers and philosophers in history. Grant (1996) makes a distinction between tacit and explicit knowledge. Tacit knowledge refers to *knowing how* and is revealed through its application. Therefore, skills (mentioned in the previous paragraph) can be seen as tacit knowledge. On the other hand, explicit knowledge refers to *knowing about* facts and information and is revealed by its communication. In this study, the term knowledge refers to explicit knowledge. Explicit knowledge can be transferred between employees more easily than tacit knowledge. The ease of communication is a fundamental property of explicit knowledge.

IT-employees are knowledge-workers; to perform and succeed in doing their job, employees should have enough knowledge. They should know how the IT-operation of the firm works and how to solve problems if these occur. Moreover, knowledge is one of the most important resources within the firm (Curado, 2014). Al-lawati & Al-Badi (2016), Ecar (2015) and Willcocks et al. (2013) argued that a large shift in skills arises within the IT-department after Cloud-migration. Consequently, IT-employees should acquire new knowledge to be able to cope with the new technology and gain new skills. Hence, the following proposition is formulated:

**P7: IT-employees require other knowledge when migrating to a SaaS-environment.**

#### *3.5.3.3 Training*

Training of employees is essential in organizations. By training, employees can gain new skills, knowledge, insights, and experiences to improve performance in their roles and keep up with new trends within the organization and market. Moreover, training can positively affect employee motivation and commitment (Meyer & Allen, 1991; Saeed et al., 2013). Hence, training of employees is important for the overall performance of the firm. Coping with a disruptive technology such as SaaS could require training. As mentioned in the previous two paragraphs, SaaS-migration could lead to the need for the acquirement of new skills and knowledge of the IT-employees of the firm. By training IT-employees, new skills and knowledge can be acquired that are required when migrating to a SaaS-environment. Hence, the following proposition is formulated.

**P8: IT-employees require training to acquire new skills and knowledge when migrating to a SaaS-environment.**

#### *3.5.3.4 Organizational Culture*

Madhani (2010) stresses organizational culture as one of the human resources of the firm that should be exploited to gain competitive advantage. Hall (1992) defines culture as follows: "Culture constitutes the beliefs, knowledge, attitudes of mind and customs to which individuals are exposed in an organization, as a result of which they acquire a language, values, habits of behavior and thought." Moreover, organizational culture can be seen as the product of beliefs of the firm's management. Few studies have been conducted on the effect of SaaS-migration on the organizational culture of the firm. However, it can be assumed that changes in organizational culture occur due to migration to a SaaS-environment. For example, Khajeh-Hosseini, Greenwood, & Sommerville (2010) argue that the use of SaaS-application can cause a decrease in job satisfaction of employees of the IT-department. So, it could be stated that a change in organizational culture could be required to resolve this. Even more, when using new technologies, organizations should create a culture within the firm that thrives on change (Kanter, 1983). Hence, the following proposition is formulated:

**P9: The IT-department requires a different organizational culture when migrating to a SaaS-environment, to cope with the decrease in job satisfaction.**

### 3.5.4 Capabilities

Capabilities are a type of resource, that is there to bring the previously discussed resources together and enable them to be deployed. In literature, there many definitions given of what capabilities are. For this research, it is important to give one clear definition of the firm's capabilities. According to Dierickx & Cool (1989), capabilities are different from other resources as they cannot be given monetary value and are embedded so deeply in the organizational processes that they cannot be imitated or traded. To be more precise, capabilities can be seen as complex bundles of skills and knowledge practiced throughout the organizational processes of the firm, that are used to transform inputs into outputs (Day, 1994; Grant, 1991). Where resources refer to what a firm owns, capabilities refer to what a firm can do to exploit these resources. Furthermore, capabilities can range from skills such as managerial ability, to processes such as knowledge sharing. Hence, the following definition for capabilities in this research is formulated as follows:

*The abilities of the firm to transform resources into value for the firm, by using knowledge and skills practiced throughout the organizational processes of the firm.*

From the literature research and questionnaires, contractual governance and relational governance came forward as potential important capabilities of the IT-department in a SaaS-environment.

#### *3.5.4.1 Contractual Governance*

When companies decide to migrate to a SaaS-environment, they should find a suitable Cloud vendor for the providing of the desired application. The user and the vendor negotiate and discuss what both parties expect from the collaboration and set up a contract. Most of the times in CC, such contracts are in the form of a Service Level Agreement (SLA), which are explicit statements of obligations and expectations that exist in the business relationship between a service customer and a service provider (Wu & Buyya, 2010). The following components are usually contained in an SLA:

- Purpose: the goals of the SLA to be achieved.
- Restrictions: the actions that are required to provide the desired level of service.
- Validity Period: the working time of the SLA.
- Scope: a clarification of the services that will provided to the customer, and what services will not be provided by the provider.
- Parties: all involved organization and individuals and their roles.
- Service-Level Objectives (SLO): the levels of service that should be provided that all parties agree upon.
- Penalties: if the desired level of the service is not provided, some form of penalties will be given.
- Optional Services: Services that are not obligatory, but might be useful.
- Administration: the processes that are used to guarantee the achievement of the SLO's.

For the Cloud-user, it is important to manage the SLA and clarify what is expected from both parties in the agreement, in order to gain protection against opportunism. If one of the parties violates the rules in the SLA, the level of trust between the parties can significantly decrease, which could lead to catastrophic issues in the collaboration (Hani, Paputungan, & Fadzil Hassan, 2014). Therefore, it is crucial to manage and govern these contracts to ensure good collaboration between Cloud-user and Cloud-provider. Qian & Palvia (2014) argue that the migration to CC in general, causes the focus of the IT-department to shift towards vendor performance and contract management. From this, it can be concluded that contractual governance could be an important

capability within the IT-department when migrating to SaaS, where contractual governance refers to safeguarding the exchange between user and provider through formal contracts. Hence, the following proposition is formulated:

**P10: The IT-department requires contractual governance when migrating to a SaaS-environment, to safeguard good collaboration with the vendor.**

#### *3.5.4.2 Relational Governance*

Although contractual governance aims to safeguard the collaboration and relationship between Cloud-user and Cloud-provider, it does have some limitations. Formal contracts may be costly and inefficient, so companies should also make use of other organizational institutions to protect valuable knowledge (Addae-Boateng, Wen, & Brew, 2015). Due to the limitations and rigidity of contractual governance, firms require another type of governance: relational governance. Relational governance can be defined as governing transactions between user and provider through social processes and norms. According to Poppo, Zhou, & Zenger (2008), successful relational governance can be achieved by cooperation, trust, open communication, sharing of information, and dependence. When migrating to SaaS and thus setting up an SLA between the user and the vendor, relational governance could be of great importance to fill the gap where contractual governance comes short. Literature shows that SaaS-migration can cause a large shift within the IT-department towards relational governance with the Cloud-vendor and towards focusing on managing the relationship with different vendors (Janssen & Joha, 2011; Qian & Palvia, 2014). Hence, the following proposition is formulated:

**P11: The IT-department requires relational governance when migrating to a SaaS-environment, to maintain a good relationship with the Cloud-vendor.**

## 3.6 Change Management

Besides the exploitation of resources to increase the performance of the IT-department, there is another aspect that should be taken into account when migrating to a SaaS-environment: how to manage change. Where the RBV can guide in indicating which resources should change when migrating to SaaS, it is important to find ways on how to deal with these changes from a managerial perspective. Hence, applying *change management* techniques is a key factor for success when migrating to a Cloud-environment and overcome issues as a result of change (Abdelsalam, Maly, Mukkamala, Zubair, & Kaminsky, 2009; Akande, April, & Van Belle, 2013). It can be assumed that the transition to SaaS requires change management as well, due to the disruptive nature of this technology and the fact that CC in general requires change management. As the transition to SaaS might lead to changes in roles, tasks and the function of the IT-department, change management could be helpful for guiding this transformation.

Change management is a collective term for all approaches to prepare, support, and help individuals, teams, and organizations in making organizational change. Moreover, applying change management allows for a clear and structured approach to ensure that organizational changes can be realized efficiently and successfully to achieve eventual benefits from these changes (Todnem By, 2005). In literature, several approaches and methods exist that can guide in the management of change in the organization, such as *Lewin's Change Model, the McKinsey 7S Model, Kotter's Theory, the ADKAR Model* and *Bridges' Transition Model*. Whereas the first four models focus primarily on organizational changes such as structural, economic, and technological change, the Bridges' Transition Model focuses on *transition*. Transition refers to the psychological process of employees that is involved with organizational change, which cannot be planned or managed by the same formulae that work with organizational change (Bridges, 1986). Because the RBV focuses mainly on the organizational changes that should be conducted to perform in a SaaS-environment, Bridges' Transition Model could be helpful in assessing how the IT-employees can be guided through the transformation that the IT-department goes through when migrating to SaaS. A migration to SaaS might lead to unsatisfied IT-employees due to the disruptive nature of this technology (Khajeh-Hosseini, Greenwood, & Sommerville, 2010). Hence, proper guidance for these employees during the migration might be required to keep them satisfied in the new situation.

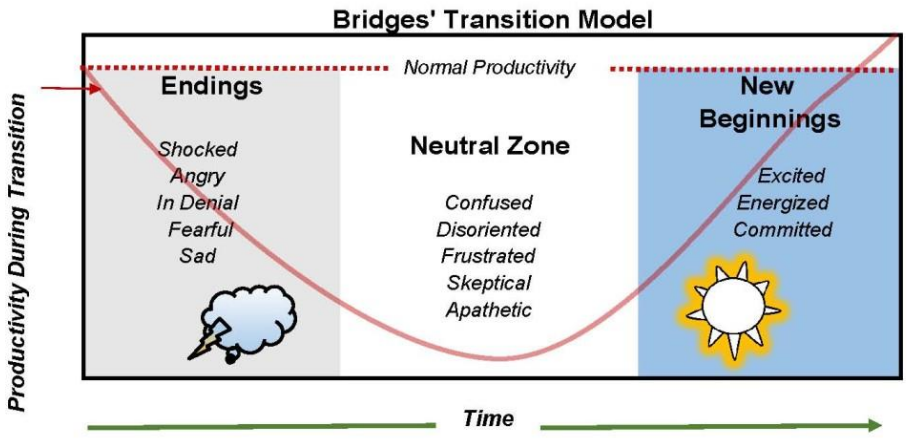


*Figure 8. Bridges' Transition Model*

According to Bridges, three phases exist that employees in transition go through (Bridges, 1986):

1. *The ending phase*: during this phase, employees need to let go of the old situation and the old identity that went with this. Employees might feel disengaged and disidentified to the new situation. Moreover, the new situation might cause disenchantment amongst employees. Productivity goes down.
2. *The neutral zone*: during this phase, it is very unclear for employees what the new situation is, because they have let go of the old situation but are not aware of the what the new situation entails. Employees might feel disoriented and confused. Also, employees might feel disintegrated, as if everything 'is falling apart'. Productivity is low.
3. *The new beginning*: during this phase, employees have embraced the new situation and start developing new competencies, new plans, etc. as a new start. Productivity increases and might reach a higher level of productivity compared to the initial situation.

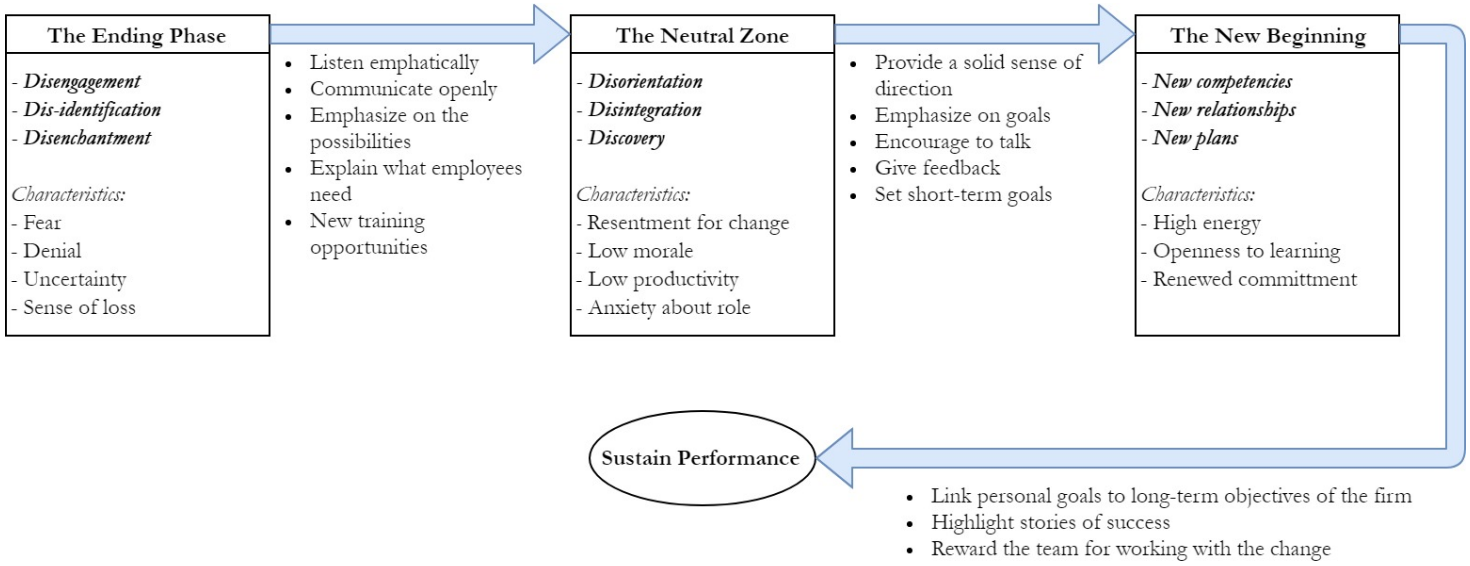


*Figure 9. Bridges' Transition Phases and Techniques*

As can be seen in Figure 8, the productivity of employees decreases when transitioning to the second phase and increases again in the third phase. Hence, it is important to guide employees in a proper way through these phases towards the third phase in order to increase productivity and thus performance (Bridges, 1986). Figure 9 shows the three phases, their characteristics and techniques on how to reach the next phase and sustain high performance, based on Bridges' study. From this theory, it can be argued that the migration to a SaaS-migration can cause a transition amongst IT-employees, which can be a reason for the complexity of SaaS-migrations for the IT-department. When migrating to SaaS, applying change management and Bridges' Transition Model could be beneficial for the performance of the IT-department.

## 3.7 Chapter Conclusion

The following theoretical model is developed (Figure 10), based on the conducted literature review and expert questionnaires. This model is based on the structure of the RBV (Figure 7) and will be used to structure the collection and analysis of the empirical data that will be collected in the case studies. It only serves for guiding the structure of information and forms the basis of the formulated propositions. From the literature research and expert questionnaires, it came forward that the following resources and capabilities of the IT-department could change when migrating to a SaaS-environment: *financial assets, organizational structure, management systems, skills, knowledge, training, organizational culture, contractual governance and relational governance.* For each of these resources and capabilities, a proposition was formulated based on the findings of the literature research and expert questionnaires. Additionally, it came forward from the literature research that change management might be essential for guiding the transition to a SaaS-environment.

The model in Figure 10 indicates the types of resource within the IT-department that could change due to SaaS-migration. Furthermore, it shows the relation between these resources, the performance of the IT-department, and gaining competitive advantage. However, the relation with gaining competitive advantage due to better performance of the IT-department is kept out of the scope of this study, because this study only aims to study how to improve the performance of the IT-department by means of exploiting resources and capabilities. Last, the relation of change management on the performance of the IT-department is included in the framework. This theoretical model forms the theoretical basis for conducting the case study further on in this research.

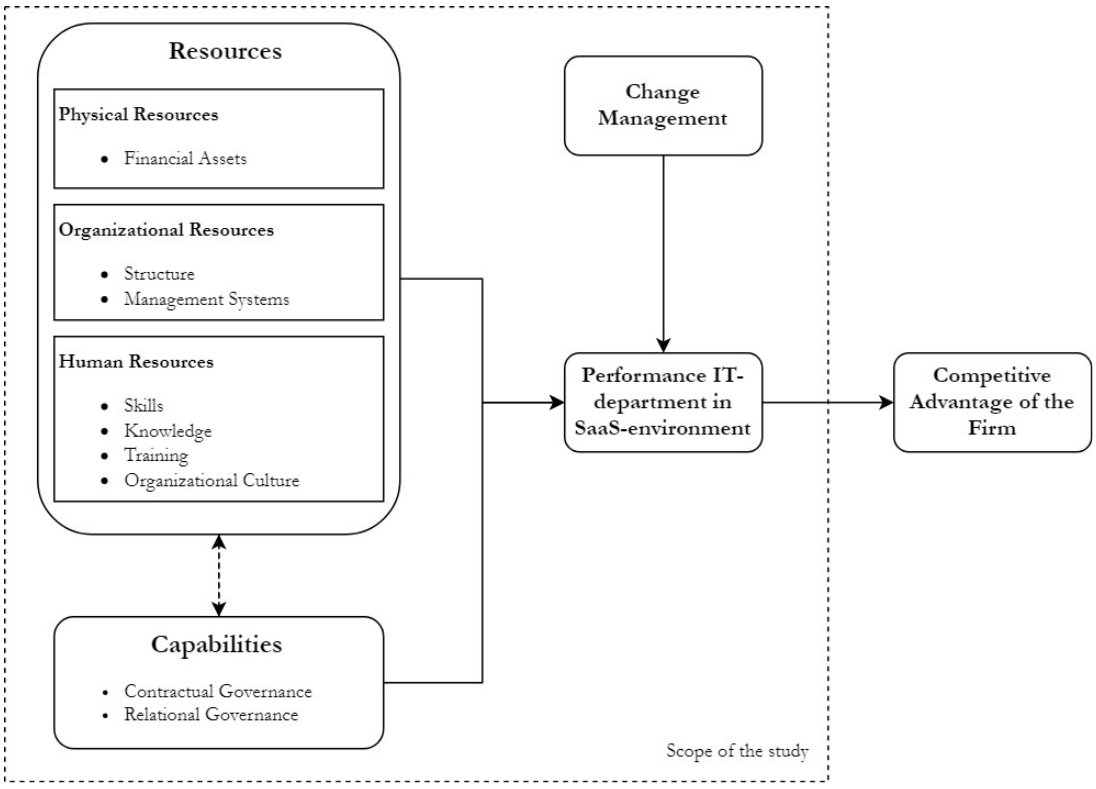


*Figure 10. Theoretical Model*

# 4 Case Study Design

## 4.1 Chapter Introduction

In this chapter, a design for the case study is made, that will be used to collect qualitative data regarding the changes that the migration to SaaS causes within the IT-department and how organizations should adapt to these changes. For the design of the case study, the methodology for designing a Case Study Research (CSR) by Yin (2009) will be followed.

First, the choice for CSR will be elaborated on in Section 4.2, which will be followed by explaining the purpose of this case study (Section 4.3) Then, the use of the propositions formulated in the previous chapter will be explained in Section 4.4. Consequently, the unit of analysis of this case study will be defined (Section 4.5) and the selection of the cases will be elaborated on (Section 4.6). Then, an explanation of how the data for the case study will be collected and how the data will be analyzed will be given in Section 4.7 and Section 4.8, respectively. Finally, this chapter will end with an elaboration on how to assure the quality of the CSR (Section 4.9)

## 4.2 Choice for Case Study Research

The case study is used in many situations as a research method, including organizational and management studies. According to Yin (2009), who is known for his work on CSR, conducting a case study is preferred over other qualitative research methods (conducting experiments, surveys, history or archival records) when the research meets three specific conditions. Firstly, the research question of the study should be either a *why*-question or a *how*-question. In other words, the research should be an explanatory research. Secondly, the research should be focused on a contemporary set of events instead of historical events. Finally, the researcher should have no or little control over behavioral events. If the research meets all three conditions, case studies are pertinent (Yin, 2009).

*Table 5. Relevant situations for different research methods (Yin, 2009)*

| Research method | Form of research question | Focuses on contemporary events? | Requires control over behavioral events? |
|---|---|---|---|
| *Experiment* | How, why | Yes | Yes |
| *Survey* | Who, what, where | Yes | No |
| *Archival Analysis* | Who, what, where | Yes/no | No |
| *History* | How, why | No | No |
| ***Case Study*** | **How, why** | **Yes** | **No** |

This research meets all the criteria for which CSR is the most suitable research method. First of all, the main research question of this study is a *how*-question. Although the main research question is not formulated as a question, but as a goal, the research goal is still of explanatory nature. The goal of this research is to find *how* the organization of the IT-department of firms change due to the migration to a SaaS-environment. Hence, it can be concluded that the main research question addresses the *how*. Second, organizational change within the IT-department due to SaaS-migration can be interpreted as a contemporary event; it is a continuous process. SaaS-providers keep innovating and organizations should keep adapting to cope with these innovations (Chou & Chou, 2008; Kim, Lee, & Altmann, 2013). Therefore, this research focuses on contemporary events. Last, the investigator of this research has no control over the behavioral events that are studied. Me

being the investigator, I have no competence nor the intention to manipulate the behavior or opinions of the interviewees in this research. Behavioral events within the IT-department simply occur by themselves and cannot be manipulated by the investigator. Hence, this research does not require control over behavioral events. This research meets all the criteria mentioned by Yin (2009) and therefore CSR is highly suitable as the research method for this study.

Besides, case studies allow identifying other important resources and capabilities that have not been included in the theoretical model developed in Section 3.5, whereas other methods are less appropriate for generating additional findings (Yin, 2009). It is important to identify other possible resources that affect the performance of the IT-department in a SaaS-environment, in order to strengthen the validity and the completeness of the empirical findings. Therefore, CSR is chosen as the research method for this study.

## 4.3 Case Study Purpose

The purpose of this case study is to identify the most important resources and capabilities of the IT-department in a SaaS-environment and to discover how these resources and capabilities should be exploited to improve the performance of the IT-department when migrating to SaaS. Additionally, the relation between these resources and capabilities and the performance of the IT-department will be studied, to get more insight into how these resources should be exploited. Moreover, it is of importance to identify which resources and capabilities will become unnecessary in a SaaS-based IT-department. Lastly, as was also mentioned in the previous section, other resources and capabilities might be identified. In the case study, interviewees will be asked their opinion on the importance of the resources and capabilities from the theoretical model and how they influence the performance of the IT-department in a SaaS-environment. Moreover, they will be asked how the resources and capabilities would ideally be exploited when migrating to SaaS. The results of these interviews will form the building blocks for the development of an integrated framework that can be used for improving the performance of a SaaS-based IT-department.

## 4.4 Case Study Propositions

Yin (2009) argues that a case study should start with formulating theoretical propositions, which make the case study easier to implement compared to having no propositions. Propositions direct attention to important matters that should be explored within the boundaries of the research. Without propositions, it is more likely that one starts to examine the wrong topics or does unnecessary work. By forcing to formulate propositions, the research will move in the right direction. Additionally, they help reflect on important theoretical issues and indicate where to look for relevant evidence (Yin, 2009). In section 3.5, the following propositions have been formulated. Each resource and its relationship with the IT-department in a SaaS-environment is explored by conducting literature research, which resulted in one or more propositions per resource. In Figure 11, it is shown to which resources each of the propositions are related and how the propositions are related to the performance of the IT-department.

- **P1**: The IT department will require extra financial assets when migrating to a SaaS-environment, due to re-organization.
- **P2**: The operational costs of the IT-department will decrease over time when migrating to a SaaS-environment.
- **P3**: The size of the IT-department will decrease when migrating to a SaaS-environment.
- **P4**: The IT-department requires highly skilled employees that are able to handle new roles and responsibilities when migrating to a SaaS-environment.

- **P5**: Management systems of the IT-department require re-design when migrating to a SaaS-environment, due to new objectives and goals.
- **P6**: IT-employees require a new set of 'soft' skills when migrating to a SaaS-environment.
- **P7**: IT-employees require other knowledge when migrating to a SaaS-environment.
- **P8**: IT-employees require training to acquire new skills and knowledge when migrating to a SaaS-environment.
- **P9**: The IT-department requires a different organizational culture when migrating to a SaaS-environment, to cope with the decrease in job satisfaction.
- **P10**: The IT-department requires contractual governance when migrating to a SaaS-environment, to safeguard good collaboration with the vendor.
- **P11**: The IT-department requires relational governance when migrating to a SaaS-environment, to maintain a good relationship with the Cloud-vendor.

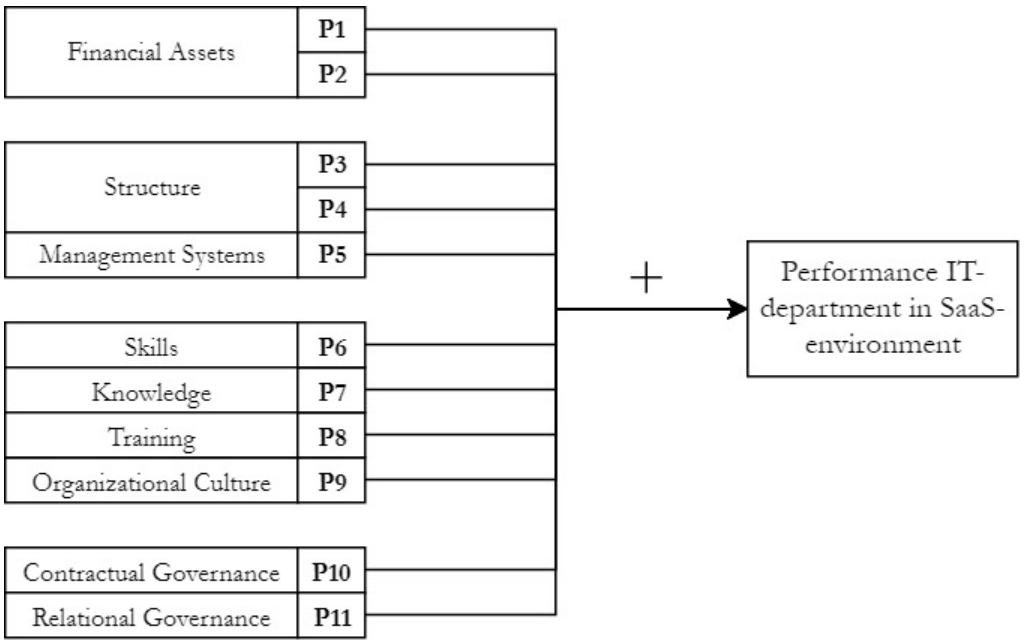


*Figure 11. Framework of Propositions*

# 4.5 Unit of Analysis

According to Yin (2009), a unit of analysis is necessary to define exactly what the case study examines. The unit of analysis can be defined as the entity that frames the factors to be analyzed. In general, the way the research questions have been defined relates to the definition of the unit of analysis and therefore the case. In this case study, the IT-department in a SaaS-environment is the unit of analysis. The performance of the IT-department will be investigated by exploring the most important resources, and looking for the relationship between these resources and performance in a SaaS-environment. Moreover, (Yin, 2009) argues that it is important to define which people are included within the unit of analysis and to define time boundaries to specify the beginning and the end of the case. Consequently, this determines the limits of the data collection and analysis. Hence, the people that are included within the unit of analysis are all the employees in the IT-department or those who have a role within the IT-operation. Further, there are no specific time boundaries, since this case study will be conducted in a relatively short time span. However, it is of importance for the validity of this case study that the analyzed IT-departments have to be migrated to a SaaS-environment in the last 2 years.

## 4.6 Selection of Case Studies

For this case study, three different cases will be used to collect empirical data, which makes it a multiple-case study. Multiple-case studies allow the collection of data from multiple cases, which can provide greater confidence in the study's findings (Yin, 2009). Moreover, this research can be seen as a holistic case study, since only one unit of analysis will be used: the IT-department in a SaaS-environment (Figure 12).

To enhance the generalizability of this research, the organizations in the cases operate in three different sectors: the chemical sector, the food production sector, and the financial sector. By selecting the cases cross-industry (*contrasting*), the findings of this research will not be sector specific and can be generalized. Moreover, the organizations in the cases each have migrated to different types of SaaS-applications, which will also contribute to the generalizability of the case study. As mentioned in the previous section, it is important that the organizations in the cases must be migrated to a SaaS-environment in the last 2 years. This way, the collected data is not outdated and the interviewees have a good memory of the SaaS-migration. Moreover, the implemented SaaS-applications should differ per case, to enhance the generalizability. Per case, multiple employees of the IT-department that have experienced the migration to a SaaS-environment will be interviewed to collect the data (IT-managers, service delivery managers, solution architects, etc.) The selection of interviewees was based on the network at Accenture, my personal network, and recommendations by other interviewees. Moreover, the conducted interviews will be in-depth, open-ended interviews. In the following section, a further elaboration on this will be given.

The following selection criteria for the cases have been defined:

- The organizations must operate in different sectors.
- The organizations must have implemented SaaS-applications in the last 2 years.
- The organization must have implemented different types of SaaS-applications.
- The organizations must be large (+1000 employees).
- The interviewees must have experienced the SaaS-migration.
- The interviewees within each case must have different functions within IT-department.

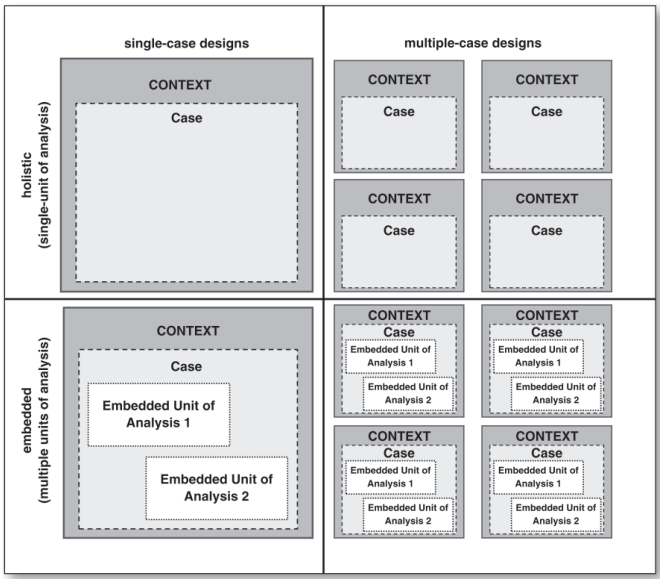


*Figure 12 . Basic types of designs for case studies (Yin, 2009)*

## 4.7 Collection of Data

According to Yin (2009), the collection of data should meet three criteria to enhance the quality and usefulness of the empirical data. First of all, case studies should have *multiple sources of evidence*. (Yin, 2009) argues that six main sources of evidence exist: direct observations, interviews, archival records, documents, participant observation and physical artefacts. In this research, interviews and company documents are used as sources of evidence. The case interviews will be open-ended, in depth interviews. This way, the interviewee will have the opportunity to openly discuss their observations and opinions in an unbiased way. However, the interviews do follow an interview protocol to guide the conversation in the right direction. Moreover, for conducting the interviews, the *inductive* approach will be followed, which allows the interviewee to give his opinion on what he thinks are the most important resources and he can give unbiased answers. Furthermore, by interviewing employees with different roles within the IT-department in each case, the data can be triangulated. *Triangulation* refers to establishing converging lines of evidence and can increase the credibility and validity of the results (Yin, 2009). A second criterion for the correct collection of data in case studies is that the investigator should use a case study database to store the results of the interviews (Yin, 2009). Therefore, the conducted interviews will be recorded and transcribed. Afterwards, the interviews will be manually coded and categorized. Although Yin advises using computer-aided coding tools, manual coding will be used since only 8 interviews will be analyzed. Then, the results of the interviews will be stored in a database. For coding of the interviews, the following steps will be followed:

1. The interview will be transcribed.
2. The parts of the interview that can contribute to the identification of important resources will be highlighted.
3. The highlighted parts will be labeled to which resource they are related.
4. All parts that are related to the same type of resource, will be categorized as such.
5. Within the different categories, observations and recommendations by the interviewee will be distinguished.
6. The results will be stored in a structured table per case.

Finally, Yin (2009) argues that a *chain of evidence* should be maintained, which means that the steps from the research questions to the final conclusions should be able to be traced (Figure 13). Therefore, no evidence should be lost, due to carelessness or bias. Meeting these three criteria will increase the quality of the data substantially.


*Figure 13. Chain of Evidence (based on Yin (2009))*

## 4.8 Data Analysis Strategy and Technique

In CSR, four major data analysis strategies exist (Yin, 2009):

- Relying on theoretical propositions.
- Working the data from the ground up.
- Developing a case description.
- Examining plausible rival explanations.

For this case study, the chosen data analysis strategy will be to rely on theoretical propositions. This will help to organize the complete analysis and identify relevant contextual conditions and explanations to be examined. Questions will be asked during the interviews to collect the data related to each of the propositions formulated in section 3.5. A cross-case analysis will be performed to compare the results of the three cases and draw conclusions from this. Moreover, using a data analysis technique called *pattern matching*, the findings from the empirical data will be compared with the predicted propositions based on theory and literature. This strengthens the validity of the results of the case study if similarities are identified between the predicted and the empirical outcome.

## 4.9 Quality of the Case Study

To establish the quality of a case study, the research should meet four criteria: construct validity, internal validity, external validity and reliability (Yin, 2009). In order to meet these criteria, several *case study tactics* can be applied. *Construct validity* refers to using the correct measures for data being collected and analyzed. Therefore, multiple sources of evidence will be collected by interviewing IT-employees with different backgrounds and functions. Moreover, the chain of evidence will be carefully maintained. More importantly, the final case study report will be reviewed by a Cloud-experts of Accenture to comment on the results and give feedback. *External validity* refers to defining the domain to which the case study's results can be generalized. This can be achieved by using replication logic; where multiple cases serve as replications of each other. By using 3 cases, external validity of the case study can be established. Finally, *reliability* of the case study should be ensured, which means that the case study should lead to the same results when repeated under the same circumstances. This can be achieved by using two tactics: using a case study protocol and developing a case study database. The interview protocol in Appendix B serves as the case study protocol. Also, as mentioned before, the data retrieved from the interviews will be stored and coded by hand. By using the tactics mentioned above, the quality of this case study will be assured.

## 4.10 Chapter Conclusion

In this chapter, the design for the case study has been developed. The choice for a case study is made due to the explanatory nature of this study. Moreover, because this research studies contemporary events and no control is required over behavioral events, a case study seems the most suitable type of research for the collection of data. For the design of the case study, the principles for designing a case study by Yin (2009) were followed. The propositions formulated in Chapter 3 will be used for guiding the case study in the right direction. Further, the unit of analysis for this case study has been determined: the IT-department in a SaaS-environment. The cases for the case study will be selected based on the following criteria: large organizations that have migrated to a SaaS-environment in the last two years. Moreover, the organizations operate in different sectors and have migrated to different SaaS-applications, in order to increase the generalizability of the case study. Also, it has been decided that, per case, the interviews will be conducted with three

employees of the IT-department with different functions and backgrounds, to increase the validity of the findings. Finally, the quality of the case study will be assured by using multiple sources of evidence, making a case study database, using an interview protocol and reviewing the final result by conducting evaluation interviews with Cloud-experts from Accenture. Based on this design, the case studies will be conducted in the next chapter.

# 5 Case Studies on Organizational Change

## 5.1 Chapter Introduction

In this research, three case studies have been conducted. In each case, a different organization is studied that has recently implemented a new SaaS-application. By conducting several interviews with different employees of the IT-department, the changes (of resources and capabilities) within the IT-department of the specific cases can be identified. Moreover, the interviewees will be asked how resources and capabilities should be exploited in the ideal situation. Table 6 shows an overview of the three cases, the sector in which they operate, the key characteristics of the organizations, the number of interviews conducted, and the sources of evidence used for data collection of each case. In the following sections, a short introduction will be given on each case, the SaaS-application that is implemented and the functions of the interviewees. Moreover, the findings of the interviews will be discussed for each resource and capability. The findings of the case study can be distinguished into two types: observations and recommendations. Observations refer to the experiences of the interviewees and recommendations refer to the advice that is given by the interviewees to increase the performance of the IT-department when migrating to SaaS. Finally, a comparison will be made between the three cases to identify differences and similarities of the findings in Section 5.5.

*Table 6. Case Descriptions*

| Case | Sector | Key characteristics | Interviews | Sources |
|---|---|---|---|---|
| **Case 1** | Chemical | • Produces chemicals, salt, chloroalkali products and more.<br>• HQ located in Arnhem<br>• Revenue (2018): €5 billion<br>• 10.000 employees<br>• Recently implemented SaaS-applications:<br>  ○ SuccessFactors (HR)<br>  ○ Mir3 (Remote Collaboration)<br>  ○ Navex (Compliance Automation)<br>• Small applications<br>• Reason for SaaS-migration: modernization of applications | 3 | Company documents and interviews |
| **Case 2** | Food | • Produces beverages, such as coffee, tea, hot chocolate and cola.<br>• HQ located in Amsterdam<br>• Revenue (2018): €5,9 billion<br>• Profit (2018): €727 million<br>• 2.100 employees<br>• Recently implemented SaaS-applications:<br>  ○ Salesforce (CRM)<br>• Large application<br>• Reason for SaaS-migration: increase efficiency and integration of CRM-processes | 3 | Company documents and interviews |

| | | | | |
|---|---|---|---|---|
| **Case 3** | Financial | • A banking and financial service company.<br>• HQ in Utrecht<br>• Profit (2018): €3 billion<br>• 27.000 in the Netherlands<br>• Recently implemented SaaS-applications:<br>  o Workday (HR)<br>• Large application<br>• Reason for SaaS-migration: increase efficiency and integration of HR-processes | 2 | Company documents and interviews |

## 5.2 Chemical Sector

The concerned organization of the first case is a large multinational that is specialized in manufacturing chemicals that can be used for the production of products like paper, plastics, building materials, and personal care items. The chemicals that they produce include industrial chemicals, polymer chemicals, performance chemicals, and surface chemicals. Since 2018, the organization has been an independent organization, whereas the company used to be part of a larger multinational. Although this company employs over 10.000 people worldwide, this case study focuses only on the IT-department of the office in Arnhem.

In 2018, three SaaS-applications were successfully implemented in this organization. One of those applications is *Mir3*, a remote collaboration application that allows employees to initiate messages safely and reliably with complete notification and emergency management tools. Another application that has been acquired is *Navex*, a unified platform for the automation of ethics and compliance management. This includes policy & procedure management, compliance training, incident management, third-party risk management, and analytics & reporting. The last application that has been implemented is *SuccessFactors*, a well-known HR Management system provided as SaaS — using this application, all HR activities, such as automating payrolls until employee engagement can be managed in the Cloud.

To identify how the organization of the IT-department has changed after this migration and how the resources and capabilities should ideally be exploited, three interviews are conducted with employees of the IT-department (a Delivery Manager Hosting, an IT-manager Operations and a Functional Domain Lead). As mentioned in Section 4.9, the interviewees have different functions and backgrounds, which can contribute to the construct validity of this research. Moreover, the interviewees have experienced the migration, which should give them enough knowledge for the interview.

In the following sections, the observations of the case study and the recommendations by the interviewees will be discussed for each resource and capability.

*Table 7. Interviewees Case A*

| Interview | Function | Years of experience | Date interview |
|---|---|---|---|
| A1 | Delivery Manager Hosting | 19 | 10-06-2019 |
| A2 | IT-Manager Operations | 6 | 21-06-2019 |
| A3 | Application Domain Lead | 8 | 24-06-2019 |

### 5.2.1 Physical Resources

#### Financial assets

When migrating to the SaaS-applications mentioned in the previous paragraphs, the total costs of the IT-department increased due to double licensing costs that had to be paid. The IT-manager argued that, due to technical restrictions, it was not possible to start paying for the new applications when all data and users have been transferred to the new system. At the start of the migrations, the license for the SaaS-applications had to be bought, otherwise it was not possible to migrate. Hence, the 'on premise'-license and the SaaS-license had to be paid during the migration.

Moreover, in the interview it came forward that the use of the SaaS-applications had a positive effect on the costs of the IT-operation. "Yes, the costs of the IT-operation are decreasing. There are fewer operational costs, fewer support costs and the capacity planning is outsourced. The biggest difference is that the operational part is done by the vendor, this is not our problem anymore." Hence, after the migration to these three SaaS-applications, the operational costs of the IT-department decreased.

A last advice from the Delivery Hosting Manager to keep the costs low in a SaaS-environment, is to choose a SaaS-provider that offers the lowest price. However, it should be kept in mind that the quality of the service is more important than a good price because the dependency on the service increases. Also, he advised appointing an employee in the IT-department to keep track of the costs of all SaaS-applications and give an overview of what the costs exactly are, because "cost transparency is important". This way, all IT-employees can get a better picture of the costs of SaaS-applications.

| Observations | Recommendations |
|---|---|
| • Costs increased due to double licensing costs<br>• Due to technical restrictions, it was not possible to avoid double licensing<br>• Operation costs and support costs decreased after migration<br>• Costs decreased because capacity planning was outsourced | • To keep costs low, choose the cheapest vendor<br>• Quality is more important than price |

### 5.2.2 Organizational Resources

#### Structure

All interviewees in this case argued that the structure of the IT-department did change. First of all, the IT-employees experienced a shift of responsibilities. The responsibilities of 'on premise' software maintenance used to be for the IT-employees. Now, in a SaaS-environment, these tasks are for the provider. However, the IT-Manager Operations argues that maintenance and operations management remains in the IT-department, but becomes more 'functional' rather than 'technical'.

Moreover, technical IT-functions such as developing applications and maintaining the IT-landscape have disappeared. On the other hand, integration of applications became more important, because the new applications should be able to cooperate in the IT-landscape. Therefore, the IT-employees that used to focus on development and maintenance, should be assigned with integration tasks, because these functions have a large overlap.

Besides integration, there is an increased need for procurement managing in the IT-department. The Application Domain Lead argued: "IT-employees will be more involved in procurement, how

to select the best services and applications. In general, the focus will go from developing and design, to integration and procurement of applications."

Although there is a large shift of roles and responsibilities within the IT-department, the Delivery Manager Hosting did not believe that the size of the IT-department decreased. "Depending on the size of the application, the size of the IT-department will decrease. Large applications have a larger impact." However, the applications that were implemented in 2018, did not have an impact on the size of the IT-department.

Due to the change of functions and responsibilities, the workload of certain functions can fluctuate. The Delivery Manager Hosting recommends organizing a yearly 'clean-up': if a particular employee does not have enough tasks, his function will become unnecessary. So, new tasks should be assigned to this employee.

| Observations | Recommendations |
|---|---|
| • Operations and maintenance management became more 'functional' than 'technical'<br>• Developing and maintenance functions have disappeared<br>• The focus of IT will go from developing and design, to integration and procurement<br>• Size of the IT-department did not decrease | • IT-employees that focused on developing and maintenance should focus on integration<br>• Have a yearly 'clean-up', to assign new tasks to employees |

### Management Systems

In the interviews, no significant changes in management systems were noted during and after the migration in this case. In the SaaS-environment, the same management systems were used as before. However, the IT-Manager Operations does mention that it is desired to work with DevOps (a definition of DevOps is given in Section 5.3.2) when migrating to a SaaS-environment, because the application should be gradually deployed.

| Observations | Recommendations |
|---|---|
| • The same management systems were used in the IT-department as before | • Work with DevOps when migrating to a SaaS-environment, to gradually deploy the application |

## 5.2.3 Human Resources

### Skills

In this case, the Application Domain Lead mentioned that, after the SaaS-migration, IT-employees did no longer require technical application- and design skills. On the other hand, delivery management skills became increasingly important.

The IT-Manager Operations argues that procurement and coordination skills become the most important types of skills in the IT-department when migrating to SaaS-applications. "During migration, the IT-department works with a lot of different external partners, so IT-employees require good coordination skills. In case there is a problem, the IT-employees should be able to quickly find the right solution for this problem and bring the right people/vendors together to come to a suitable solution." He argues that the required skills in the IT-department after a SaaS-migration shift from Design, Build and Operate, to Procure and Monitor. Specifically, procurement skills are needed to ensure to get the best deals for the SaaS-solutions.

Moreover, the integration of the application with the rest of the IT-landscape is essential, so IT-employees should have excellent integration skills. Although technical skills related to the design of applications are not necessary anymore in a SaaS-environment, it is crucial to have enough technically skilled employees in the IT-department. The Delivery Manager Hosting experienced that the IT-department has too little technically skilled employees, which caused problems when IT-related issues arose.

| Observations | Recommendations |
|---|---|
| • After the migration, technical application and design skills are not required<br>• Delivery management skills became increasingly important<br>• Skills shifted from Design, Build and Operate to Procure and Monitor<br>• There were too little technically skilled IT-employees | • IT-employees should have good coordination skills to work with several external partners<br>• IT-employees should have procurement skills, to ensure the best deals for the SaaS-solutions<br>• IT-employees should have good integration skills, for integration of the application with the rest of the IT-landscape<br>• It is important to have enough technically skilled employees in the IT-department |

## Knowledge

"IT-employees need to have a broader knowledge of the application, to know what impact the migration has on other applications", was mentioned by the Delivery Manager Hosting. This refers to the fact that applications should be integrated into the IT-landscape and thus can have an impact on the functionality of other applications. Hence, it is important to know how new applications impact the IT-landscape.

Also, it is crucial that IT-employees have enough knowledge of applications in general, to be able to know what a provider offers. This way, IT-employees are able to choose the best offered SaaS-solutions.

Another type of knowledge that was argued important in a SaaS-environment, was knowledge concerning troubleshooting IT-related issues. "This is done in a different way than before", argued the IT-Manager Operations.

| Observations | Recommendations |
|---|---|
| • Troubleshooting is done in a different way than before | • IT-employees should have a broader knowledge of the application<br>• IT-employees should know how the new application impacts the rest of the IT-landscape<br>• IT-employees should know what a provider offers, to be able to choose the best SaaS-solution |

## Training

Since the migration to SaaS, this firm has introduced a new function: The Productivity Support Officer (PSO). The firm has several offices distributed across the Netherlands, and every office and one or more PSO's. These PSO's are responsible for IT-training of employees related to the use of the SaaS-application. Moreover, the company provides online material for training of key-users. "Key-users have a deeper understanding of the new applications and are responsible to train end-users of the application", was argued by the Application Domain Lead. Further, he argues that IT-employees should be trained how to functionally maintain the new SaaS-system.

Moreover, it came forward in the interviews that leadership training of IT-employees could be useful in a SaaS-environment. During these trainings, IT-employees learn how to manage working with a service-provider. Also, after the migration, the IT-employees of this firm were offered basic training about how SaaS works.

Finally, the IT-Manager Operations mentions that the SaaS-provider often has a knowledge base with documents about the application. Eventually, the IT-department is responsible that employees have easy access to these knowledge bases. "The organization should make this knowledge base easily accessible and structured for the IT-employees, in case they have questions related to the application. They should not drown in the amount of information."

| Observations | Recommendations |
|---|---|
| • After migration, a new function was introduced to provide training related to SaaS-applications<br>• Online material was provided for training of key-users<br>• Basic training was given on how SaaS works<br>• SaaS-providers offered knowledge bases with documents about the application | • Leadership training should be given to teach IT-employees how to manage SaaS-providers<br>• The knowledge base provided by the vendor should be made easily accessible and structured<br>• IT-employees should be trained to functionally maintain the new application |

## Culture

The Delivery Manager Hosting argues that culture does not change on short term. However, he does mention that after the migration, the motivation of some IT-employees decreased. IT-employees that used to develop and design applications, are no longer asked to solve technical issues. A migration to a SaaS-environment takes these tasks away. "To avoid demotivation, you should keep these IT-employees busy with other technical issues."

Moreover, it is mentioned that the IT-department will have fewer technical skilled IT-employees, because it is not necessary to know in detail how the application works. Consequently, this can be frustrating for the technical skilled IT-employees, because in general, they are interested in how the application is built. Hence, this can negatively impact motivation. However, letting the vendor provide a demo for these IT-employees on how the application exactly works, can avoid demotivation.

| Observations | Recommendations |
|---|---|
| • Culture does not change on short term<br>• Motivation decreased due to outsourcing of technical tasks<br>• There are fewer technical skilled employees in the IT-department | • Demotivation can be avoided by keeping IT-employees busy with other technical issues<br>• Demotivation can be avoided by letting the provide give a demo on how the application is built |

### 5.2.4 Capabilities

#### Contractual Governance

The results of the interviews showed that managing contracts is a very important issue in a SaaS-environment, because every SaaS-application in use should have a contract. To make the right agreements about the service, SLA's were made with the vendor. "In these SLA's, Non-Disclosure Agreements (NDA) were included, to ensure that our data and information is safe with the SaaS-vendor", was argued by the Application Domain Lead in one of the interviews. In this case, one employee within the IT-department became responsible for contracting of SaaS-applications, while this used to be extra tasks of several IT-employees. Moreover, the IT-Manager Operations argues the following: "It is important to make the right agreements, which can be difficult for SaaS-applications. You have to be clear when drawing up SLA's." So, clear agreements should be made during contracting, to avoid miscommunication.

All interviewees in this case recommend to re-value the contract with the vendor every year to "get the best deal and don't waste money and resources. Are the agreements that we made still fair?"

| Observations | Recommendations |
|---|---|
| • Every SaaS-application that was used needs a contract<br>• NDA's were included in the contract to ensure security of data<br>• One IT-employee became responsible for contracting of SaaS-applications | • Re-value the contract every year to get the best deal<br>• Make clear agreements during contracting, to avoid miscommunication |

#### Relational Governance

"When using large SaaS-applications that have a big role in the operation, the relation with the vendor should definitely be managed and maintained", was concluded by the Delivery Manager Hosting. However, the SaaS-applications that were recently implemented are not significantly large. Also, he argues that the IT-department needs a contract manager that takes care of maintaining a good relationship with the vendor. It is important to stay in close contact with the vendor, in order to know when certain functionalities of the applications change and how the IT-department should respond to these changes. Furthermore, the vendor often provides training and workshops to maintain the relation with the user, which should be used regularly.

| Observations | Recommendations |
|---|---|
| • The small applications that were recently implemented did not need relational governance | • Large applications need relational governance<br>• The IT-department needs a contract manager that is responsible for maintaining the relationship with SaaS-vendors<br>• Make use of the trainings and workshops offered by the vendor, to maintain the relationship<br>• It is important to have close contact with the vendor, in order to know when certain functionalities change |

## 5.3 Food production sector

The second organization is a large Dutch coffee producer, founded in 2012 after the merger of two large coffee-producing companies. Besides their main product coffee, the company is specialized in manufacturing tea, hot chocolate, and other beverages, which are made at their production site in the Netherlands. Moreover, the company owns several beverage producing brands from all around the world. Although production is done from the north of the Netherlands, the headquarters is located in Amsterdam. Throughout the country, the organization has 2.100 employees that are located in Amsterdam, Joure and Utrecht.

In the beginning of 2019, the SaaS-application *Salesforce* was implemented in the organization, one of the first applications that were provided using the SaaS-model. Salesforce offers Customer Relationship Management (CRM) services in the Cloud. Several applications that used to be 'on premise', were integrated with Salesforce and centrally managed. For example, an application that tracked the number of coffees consumed by customers and automatically made up an invoice, an application that sends customer specific prices to a portal, and an application that kept record of customer discounts were integrated into Salesforce. Since, January 2019, the Salesforce application has been in operation.

Three employees of the IT-department of the office in Utrecht were interviewed for data collection of this case; a Delivery Manager, a Solution Architect and an IT-manager. In the following sections, the observations of the case study and the recommendations by the interviewees will be discussed for each resource and capability.

*Table 8. Interviewees Case B*

| Interview | Function | Years of experience | Date interview |
|---|---|---|---|
| B1 | Delivery Manager | 8 | 07-06-2019 |
| B2 | Solution Architect | 4 | 12-06-2019 |
| B3 | IT-Manager | 18 | 20-06-2019 |

### 5.3.1 Physical Resources

#### Financial assets

Each of the interviewees pointed out that during the migration to Salesforce, costs significantly increased due to additional resources and double licensing. Additional resources, such as hiring external partners to facilitate the migration, were required to migrate. Because the migration project took more time than was expected, the costs for the migration kept growing and were significantly higher than was budgeted. Additionally, the organization had to pay for the licenses of the old applications and the Salesforce license simultaneously, to keep the operation running during the migration.

Further, shortly after the migration the operational costs were higher than usual, due to minor technical implications with the Salesforce application. Therefore, some functions were performed manually for a short amount of time, and this needed to be solved. Workarounds in the IT-operation were required because the system did not function as desired. This had a negative effect on the efficiency of the IT-employees, not only due to the malfunctions of the system, but also because the daily tasks of the IT-employees were different than before. The inefficiency of IT-employees was costly for the IT-department.

However, after some time, these issues were solved, and the operational costs of the IT-department were back at the same level as before the migration. One of the interviewees mentioned that the goal of the migration to Salesforce was not cost-saving of the IT-operation, but to develop one central state-of the-art CRM platform. Hence, the operational costs of the IT-department did not decrease after migration to Salesforce.

To reduce the costs during and after the migration, one interviewee advised keeping the costs of the SaaS-application and the involved migration transparent for the IT-employees. This way, the IT-department is aware of the direction in which the migration is going and what benefits these costs eventually will bring. Also, planning, reporting, and communicating of deadlines for the migration is essential to avoid unexpected expenses. Lastly, SaaS-migrations often involve off-shoring the IT-helpdesk to foreign countries, where labor costs are lower. This can reduce costs and increase the efficiency of the IT-helpdesk.

| Observations | Recommendations |
|---|---|
| • During migration, costs increased due to double licensing and additional resources<br>• Shortly after migration, operational costs were higher, due to technical implications and workarounds<br>• On long term, operational costs did not change compared to on-premise | • Keep costs transparent for IT-employees<br>• Deadlines during migration should be clearly communicated<br>• Make a structured planning upfront and report afterwards<br>• Offshore the IT-helpdesk |

### 5.3.2 Organizational Resources

#### Structure

The interviewees mentioned that, in general, the use of SaaS-applications takes away developing and technical maintenance tasks, because these tasks shift towards the SaaS-provider. However, in this organization, many technical IT-tasks such as developing and technical maintenance of applications were already outsourced to external partners before the migration to Salesforce. Thus, although the system is modernized, no significant changes occurred in the size of the IT-department. On the other hand, one of the interviewees argued that on the long term, the possibility

exists that IT-employees could leave the IT-department, due to the lack of developing and technical maintenance tasks.

Furthermore, it was mentioned that the roles of the IT-department required changes during and after the migration, because a new of working was introduced: DevOps. (Mueller, 2010) defines DevOps as "*the practice of operations and development engineers participating together in the entire service lifecycle, from design through the development process to production support*". DevOps sprang from applying the 'Agile way of working' to IT-operations work, which refers to delivering software in a flexible, timeboxed, iterative approach. The transition to the DevOps model during the migration, allowed the IT-employees to work with changes quickly, in an Agile way. On the other hand, the roles and responsibilities of the IT-employees were different than before, due to the DevOps processes. So, a change approval was arranged upfront by the management to design the Agile and DevOps processes. The employees needed some time to get used to this new way of working. Still, the interviewees recommended using DevOps during and after migration to a SaaS-environment. But, it is vital to communicate clearly to the IT-employees what is going to change in the way of working.

A last point that one of the interviewees mentioned, was that infrastructure managers are always needed in an IT-department, although a large part of the infrastructure is moved to the Cloud when migrating to SaaS. In large organizations, there is always an infrastructure which needs to be managed. Thus, the interviewee recommends to never get rid of infrastructure managers.

| Observations | Recommendations |
|---|---|
| • The size of the IT-department did not decrease after migration<br>• DevOps was applied during and after migration<br>• Using the DevOps approach caused changes in roles and responsibilities<br>• IT-employees needed time to get used to these changes | • Roles and responsibilities should be transformed to work with the DevOps approach, to be able to work with changes quickly in an Agile way<br>• A change approval should be arranged upfront to design the Agile and DevOps processes<br>• Keep infrastructure managers in the IT-department<br>• Clearly communicate to the IT-employees what is going to change in their way of working |

## Management Systems

As mentioned in the previous section, the organization of the IT-department is transformed into a DevOps organization. Hence, DevOps processes can be seen as a new management system of the IT-department, which increases the flexibility of the operation by doing iterations and setting specific deadlines. Two of the interviewees argued that DevOps is mainly used for operations and maintenance tooling. So, the maintenance and operations processes change due to parts of the process that are done using DevOps. The interviewees did not mention any other significant changes in management processes due to the migration to Salesforce.

| Observations | Recommendations |
|---|---|
| • Operations and maintenance processes changed due to the DevOps approach. | • Make use of DevOps for operations and maintenance tooling. |

### 5.3.3 Human Resources

#### Skills

The first aspect related to skills that came forward was that IT-employees require new skills to be able to work with DevOps processes. Before the migration, IT-employees were used to work using another approach, called 'Waterfall'. This approach is less iterative and flexible compared to working with DevOps. To work with such a dynamic process, IT-employees should be able to cope with change. If not, they will tend to quickly fall back into their old way of working.

It was mentioned in the interviews that IT-employees should be able to work with the new application. The implementation of Salesforce causes a change in the functioning of the complete system. So, the IT-employees require new skills to work with the new application, because working with the old platform is not necessary anymore.

Furthermore, it was argued that communication skills become increasingly important when migrating to SaaS. First of all, the communication between business employees and IT-employees should be improved, because they do not speak the same language. IT-employees have a technical perspective while the business has a more economic view. This can result in issues with collaboration, because both parties have different expectations of the outcome of the migration. Therefore, IT-employees and business employees should work together in teams and often meet face-to-face to get to know each other, consequently improving the communication between the departments. A second reason that communication skills become more important, is that the demands and expectations of the applications should clearly be communicated to the SaaS-provider, because the firm is dependent on the performance of the Salesforce-application. Also, due to the dynamic nature of DevOps, it is difficult to make clear agreements in the SLA. Therefore, IT-employees should be able to clearly communicate what should be in the contract. Lastly, the interviews pointed out that communication skills are important to realize change in the organization and consequently successfully migrate to a SaaS-environment.

| Observations | Recommendations |
|---|---|
| • IT-employees used to work with Waterfall<br>• If IT-employees are not able to cope with change, they quickly fall back into their old way of working<br>• Communication between IT-employees and business employees was difficult<br>• The dynamic nature of DevOps made drawing up SLA's difficult. | • IT-employees should be able to work with DevOps processes<br>• IT-employees should be able to cope with change<br>• IT-employees should be able to work with the new application<br>• IT-employees require better communication skills<br>• IT-employees and business employees should work together in teams to improve communication |

#### Knowledge

The main argument of each interviewee was that knowledge of the new application is the most important type of knowledge in a SaaS-environment. All roles within the IT-department should know up to a high level how the new platform is built and how it works. This means that for every integrated application, IT-employees should have knowledge of the functioning of the application, to adapt their regular daily tasks. Of course, the level of knowledge of the application differs per role, but every IT-employees should know the functioning of the application up to a certain degree.

Moreover, IT-architectures should learn the architecture of the new platform, including the integration with the rest of the IT-landscape.

Further, one of the interviewees mentioned that in a SaaS-environment, the division between infrastructure and application becomes a grey area. Overlap between these IT-layers arises, as many infrastructure tasks and application tasks are outsourced. Due to this overlap, infrastructure managers should have more knowledge of the application.

| Observations | Recommendations |
|---|---|
| • The line between the infrastructure-layer and the application-layer fades in a SaaS-environment | • All roles within the IT-department should have enough knowledge of the build and the functioning of the SaaS-application<br>• IT-architectures should learn the architecture of the new platform and the integration with the rest of the landscape<br>• Infrastructure managers should have more knowledge of the application |

## Training

In all interviews, training came forward as an essential resource when migrating to a SaaS-environment. As was mentioned in the previous two sections, new skills and knowledge should be acquired by IT-employees to migrate and work with the new application. According to the interviewees, the IT-employees initially did not know how the new system worked, which caused a lot of problems related to efficiency. It is important that IT-employees should be trained to have sufficient know-how and abilities to work with the new application. Therefore, the provider Salesforce, offered an awareness training for all employees, including the employees of the IT-department, to demonstrate how the new platform worked. After that, more specific training was given for the IT-employees to learn how to maintain the infrastructure environment in the new IT-landscape.

Moreover, key-users were designated by the organization. These key-users were trained by the SaaS-provider to get a deeper understanding of the functionality of the new platform. In case the other IT-employees experienced any issues with the new system that they are not able to solve by themselves, they could be supported by the key-user.

Finally, one of the interviewees recommended that classroom training for the IT-employees should be given to learn how to work with DevOps processes.

| Observations | Recommendations |
|---|---|
| • IT-employees initially did not know how the new platform worked<br>• Awareness training was offered by the provider<br>• Key-users were designated by the firm, to help others | • IT-employees should be trained to have sufficient know-how of the new application<br>• An awareness training should be given to demonstrate how the platform works<br>• Key-users should be appointed and trained to help IT-employees in case of problems related to the new application<br>• Classroom training should be given to teach how to work with DevOps |

## Culture

"On short term, organizational culture does not change", was the conclusion of all three the interviewees after they were asked whether they experienced any changes in culture after the migration to Salesforce. Culture is can be seen as the foundation of the organization, and will therefore not fundamentally change. However, they all argued that the migration to a SaaS-environment did ask for a different mindset of IT-employees. First of all, IT-employees should be open-minded and open to change, because this can make the migration easier and more efficient. When IT-employees are open to change, they will learn to work with the application quicker. Moreover, as mentioned before by the interviewees, working with DevOps asks for a more dynamic way of working. This requires a proactive mindset of the IT-employees.

Furthermore, it was noticed that during, and shortly after the migration, the motivation of many IT-employees decreased. This was mostly because the migration project was under high pressure due to deadlines that were not met, but also because the IT-employees did not like the changes that were caused by this migration. However, the decrease in motivation among IT-employees did not last. After some time, the motivation in the IT-department returned, for different reasons. One of those reasons was that the IT-employees realized and experienced the benefits of the migration to Salesforce. In general, employees like to work with modern applications and, at the moment that the interview was conducted, nobody was unhappy with working with Salesforce. What used to be numerous smaller applications that had to be managed, is now one central application. This was a positive change for the IT-employees. Another reason that the motivation improved, was that the IT-employees received a financial bonus from the firm if they had proven to successfully work with the new application. This led to an enormous energy boost amongst IT-employees.

One of the interviewees advised to keep IT-employees happy when migrating to a SaaS-environment, ensure them that they have a future in the department in this new set-up. Moreover, clearly communicate what is going to change in the way of working and the tasks that should be executed. This way, the IT-employees will stay motivated and will keep performing.

| Observations | Recommendations |
|---|---|
| • The organizational culture of the IT-department did not change due to the migration<br>• The migration asked for a different mind-set of IT-employees<br>• Working with DevOps asked for a different mindset<br>• The motivation of IT-employees decreased during and shortly after migration.<br>• Due to bonusses and the realization of the benefits of the application, the motivation returned. | • IT-employees should be open-minded<br>• IT-employees should have a proactive mindset to work with DevOps<br>• Reward IT-employees with a bonus if they prove to be successfully working with the new system<br>• Ensure the IT-employees of a certain future in the new environment<br>• Clearly communicate the changes that will occur |

### 5.3.4 Capabilities

#### Contractual Governance

When asked what important aspects of contractual governance in the IT-department in a SaaS-environment, the IT-manager responded that, before the migration, it is important to understand what the SaaS-provider can deliver and decide whether the service to be provided can reach the desired level. Therefore, contractual governance starts even before drawing up the SLA. He also argues that contractual governance is an important capability of the IT-department in a SaaS-environment, as performance agreements of the applications used to be made internally with infrastructure and network teams. Now, these arrangements need to be made with SaaS-provider. Therefore, it is important to lead contracting and drawing up the SLA's in the right direction.

According to the interviewees, to start the process of contracting and drawing up an SLA, IT-employees should clearly communicate to the vendor about the expected level of the service and what the involved costs are going to be. Eventually, an IT-procurement team should be appointed to draw up the SLA together with the vendor. Good communication between this team and the vendor is necessary for a smooth contracting process. Finally, the interviewees recommended organizing meetings with the vendor on a regular basis, to discuss and revalue the SLA.

| Observations | Recommendations |
|---|---|
| • Performance agreements are now made with the vendor, instead of the infrastructure and network team<br>• Contractual governance started before drawing up the SLA | • Before migration, it is important to understand what the SaaS-provider can deliver<br>• IT-employees should clearly communicate their expectations of the application to the vendor<br>• An IT-procurement team should draw up the SLA<br>• Good communication between IT-procurement team and the vendor is necessary<br>• Meetings with the vendor should be organized on regular basis to discuss and revalue the SLA |

#### Relational Governance

One of the interviewees pointed out that maintaining the relationship with the vendor is often done very informal. One person in the IT-department is designated to keep in contact with the vendor in case issues occur that should be solved. He also pointed out that for maintaining a good relationship with the vendor, good communication is crucial. Making clear agreements and planning with the vendor up front enhances the relationship. Another interviewee recommended having a yearly meeting with the vendor to discuss the performance of the application and what can be improved.

| Observations | Recommendations |
|---|---|
| • Maintaining the relationship with the vendor was often done very informal<br>• Good communication is necessary for a good relationship with the vendor | • Designate one or more employees to be the contact person of the vendor<br>• Make clear agreements and a planning with the vendor upfront<br>• Have a yearly meeting with the vendor to discuss the performance of the application |

## 5.4 Financial Sector

The organization that is studied in the third and last case is a large Dutch multinational banking and financial service company, which headquarters is located in Utrecht. Although it is a Dutch firm, the company has numerous bank branches and offices located on every continent. The firm is one of the largest financial companies of the Netherlands, as globally 61.000 people are employed in 30 different countries. Within the Netherlands, 27.000 people work for this firm.

The SaaS-application that this form has recently implemented is *Workday*, a well-known SaaS-application for HR-related issues. Before the migration to Workday, all HR units, such as performance management and payroll processing, were operated using separate systems. In total, the HR department had over 100 systems in use to cover all HR processes. Therefore, the bank decided to migrate to a Workday-environment to cover all these different units in a modular way, by integrating all these applications in one system. Since February 2019, the Workday system is up and running.

Due to time constraints and the lack of available interviewees in this case, two instead of three employees of the IT-department are interviewed for data collection. Still, the information that was provided by the interviewees was sufficient for analyzing this specific case. One of the interviewees was a Senior Delivery Manager and the other interviewee was the Program Director Workday. In the following sections, the observations of the case study and the recommendations by the interviewees will be discussed for each resource and capability.

*Table 9. Interviewees Case C*

| Interview | Function | Years of experience | Date interview |
|---|---|---|---|
| C1 | Senior Delivery Manager | 8 | 14-06-2019 |
| C2 | Program Director Workday | 4 | 17-06-2019 |

### 5.4.1 Physical Resources

#### Financial assets

The most important change in financial assets identified by both interviewees in this case, was that double licensing costs were paid as soon as the migration kicked off. This caused a significant increase in the total costs. Although the Workday application was not even fully in use, the firm still paid the full price for the service. At the moment that the new system was running, the costs decreased, because the old system and applications were cut off.

"An important issue related to the costs of the IT-department in a SaaS-environment is how to deal with unnecessary datacenters", argues one of the interviewees. Years ago, the firm bought several new, state-of-the-art data centers. Now, due to the outsourcing of the infrastructure, a large part of these datacenters became unnecessary. It is crucial to find a way to be able to cover the costs related to the infrastructure and get rid of unnecessary hardware.

In the interviews, it came forward that the costs of the IT-operation did not necessarily decrease after the migration to Workday. The biggest win was that the whole HR-department became more efficient in their work, and not specifically for the IT-department.

| Observations | Recommendations |
|---|---|
| • Total costs increased due to double licensing costs<br>• Total costs decreased after migration due to cut-off of old system and applications<br>• Large part of the datacenters became unnecessary, due to outsourcing of infrastructure<br>• The biggest win in costs was the higher efficiency of the HR-department | • The costs related to unnecessary infrastructure should be covered<br>• Get rid of unnecessary hardware |

### 5.4.2 Organizational Resources

#### Structure

In the interviews, it came forward that the structure of the IT-department did significantly change after the migration to Workday. First of all, the interviewees mentioned that the IT-department requires fewer infrastructure managers, because most of the infrastructure and the tasks of the infrastructure managers are outsourced and taken over by the SaaS-provider. Second, tasks such as the development of application are no longer the responsibility of the IT-department, because these tasks shift towards Workday. Third, there is a need for more functional specialists in the IT-department. Functional specialists refer to IT-employees that not only understand how the application works, but also have knowledge of the HR-processes that the application covers. Hence, the IT-employees should be taught how HR-processes work. According to one interviewee, it is important to do this in a modular way. So, IT-employees should have knowledge of the specific HR-process that the application covers for which they are responsible.

In general, technical maintenance of the application became unnecessary, because this type of maintenance is the responsibility of the SaaS-provider. Consequently, there is a large shift towards functional maintenance instead of technical maintenance. Moreover, there is a need for contract management and vendor management employees specialized in IT-procurement.

| Observations | Recommendations |
|---|---|
| • Fewer infrastructure managers were required<br>• Tasks of infrastructure managers were outsourced<br>• Technical development tasks were outsourced<br>• There was a need for functional specialists in the IT-department<br>• There was a shift from technical maintenance to functional maintenance | • Educate IT-employees on how the business processes covered by the application work, in a modular way<br>• Hire contract- and vendor management employees specialized in IT-procurement |

### Management Systems

In the interviews, no significant changes in the use of management systems were noted by the interviewees. However, one of the interviewees did mention that, since the migration, the IT-department is working towards an Agile environment, to increase flexibility and efficiency.

| Observations | Recommendations |
|---|---|
| • The IT-department is working towards an Agile environment. | |

## 5.4.3 Human Resources

### Skills

According to the Delivery Manager, three aspects related to skills became increasingly important in a SaaS-environment. First of all, data analytics and data processing skills became more important, because it is necessary to know how data enters the new system and how data can be used for other purposes. Second, integration skills are required when migrating to SaaS, because the application needs to be cooperating with the complete IT-landscape and other applications. Third, business analytical skills become more important in the IT-department in a SaaS-environment, because IT-employees should be able to work with new business processes in a SaaS-context.

Furthermore, the other interviewee points out that IT-employees should be able to communicate clearly with the vendor, to report issues or demands. He argues that they serve as a bridge between the SaaS-provider and the IT-department. Therefore, IT-employees should have excellent communication skills.

Finally, although technical skills are not as necessary as they were before the migration to Workday, architectural skills should remain in the IT-department. "There is always an architecture and that should be well-understood by the IT-department", was concluded by the Program Director Workday.

| Observations | Recommendations |
|---|---|
| • Data analytics and data processing skills became more important<br>• Integration skills were required during the migration<br>• Business analytical skills became more important<br>• IT-employees served as a bridge between Workday and the IT-department | • IT-employees should be able to work with new business processes involved with the new application<br>• IT-employees should have good communication skills<br>• Architectural skills should remain in the IT-department |

## Knowledge

When asked what knowledge is required in the IT-department in a SaaS-environment, the Program Director Workday answered: "IT-employees need to have a better understanding of how data usage in a SaaS-environment works". This refers to the increased importance of data analytics and data processing skills, mentioned in the previous paragraph. The other interviewee argued that IT-employees should know how to work with Workday and how the application is built. IT-employees that used to be solution architects of the 'on-premise' HR-applications, should now be specialized in Workday.

| Observations | Recommendations |
|---|---|
| • Solution architects were transformed into Workday specialists | • IT-employees need to have a better understanding of how data works<br>• IT-employees should know how to work with the application and how it is built |

## Training

In the interviews, it came forward that this firm does use specific training to teach IT-employees new skills and knowledge to work in a SaaS-environment. In the IT-department, coaches were appointed that are specialized in teaching soft skills such as vendor management and contract management. If IT-employees have any questions or issues related to these soft skills, the coaches are present to support them. Moreover, the Program Director Workday argued that it is important to give communication training to the IT-employees, to improve the communication skills for the contact with the vendor. Also, the Delivery Manager argued that for training for IT-employees related to working in a SaaS-environment, external consultancy companies were hired to facilitate training. This way, IT-employees can learn how SaaS-applications can be of support for the company.

| Observations | Recommendations |
|---|---|
| • Coaches were trained to support IT-employees with soft skills, such as vendor and contract management<br>• External consultancy companies were hired to teach IT-employees the benefits of SaaS-applications | • Communication training should be given to IT-employees |

## Culture

In the interviews it came forward that, in general, there was not a significant change in the culture of the IT-department. However, working with Workday does involve contact with people from all around the world, because this firm's offices are globally distributed and they all make use of the Workday application. Therefore, IT-employees often communicate with people with different cultural backgrounds, which means more diversity. This can lead to potential challenges to overcome, because people from different countries have another way of thinking and communicating. However, this does not specifically change the culture of the IT-department itself.

Initially, the Delivery Manager expected that the employees of the IT-department would be demotivated when the firm decided to migrate to Workday, because it would change their way of working. However, the opposite happened: "Eventually, they all thought the migration was very interesting, despite that they had worked with a different system for many years. They were eager to learn the new system. So, motivation did definitely not decrease." Hence, it can be concluded

that the migration to Workday did not have a negative impact on the motivation of employees in the IT-department.

Still, the interviewee argued that, after the migration, IT-employees did not immediately know what was expected from them in the new setting, and how they could be of added value for the firm. So, his advice was to give these people enough time to discover their role in the new environment. Moreover, clearly communicate to the IT-employees what is expected from them in the SaaS-environment.

| Observations | Recommendations |
|---|---|
| • No significant changes in culture of the IT-department after the migration<br>• IT-employees communicate with people in different countries, which means more diversity and potential challenges to overcome<br>• IT-employees were eager to learn the new system and motivation did not decrease<br>• IT-employees did not immediately know what their role was and how they could be of added value in the new environment | • Give IT-employees time to discover their new roles<br>• Clearly communicate what is expected from the IT-employees in the SaaS-environment |

### 5.4.4 Capabilities

#### Contractual Governance

In the interview with the Program Director Workday, it was argued that the way of contracting became different than it used to be with the old 'on premise' applications. Since many tasks and responsibilities are outsourced and shifted towards the SaaS-vendor, the firm is significantly more dependent on the provider than before. So, it is important to make clear and strict agreements with the provider about what is expected of the service. In this case, these agreements were defined in SLA's. In these SLA's, a large part of the agreements was related to the operation of the application and the level of service that was expected. "Contracts for other non-SaaS applications are more focused on costs", mentioned the Delivery Manager. When asked who is responsible for drawing up these contracts and negotiating with the vendor, both interviewees responded that this is the responsibility of vendor managers that are specialized in IT-procurement.

| Observations | Recommendations |
|---|---|
| • A large part of the SLA is related to the operation and the service level of the application | • It is important to make clear and strict agreements with the vendor about what is expected of the service<br>• For contracting, vendor managers specialized in IT-procurement should be appointed |

#### Relational Governance

"There is much more contact between us and the provider than there used to be when we used 'on premise' applications. When on premise, there is not much contact between the provider and the user.", answered one of the interviewees when asked to what extent relational governance is important in the IT-department in a SaaS-environment. Every month, some employees from the IT-department meet with Workday to discuss the performance of the application.

Also, it was argued that good SaaS-providers give much attention to their users. For example, every year Workday organizes a large event with presentations and case studies to show new

developments and new features within the application. A mix of employees, including IT-employees, is sent to these conferences to learn as much as possible. "There is significantly more contact between the user and the provider, but also between users". According to the Program Director Workday, the SaaS-vendor organizes several user working groups and community groups, to connect clients with each other. This way, users can discuss and learn from each other's experiences with Workday. Moreover, a visit to the headquarters of Workday in San Francisco has been done to learn the newest features and developments.

| Observations | Recommendations |
|---|---|
| • There is much more contact between user and provider compared to 'on premise' applications<br>• Workday organized working groups and community groups, to connect users<br>• The headquarters of Workday was visited | • Meet with the vendor every month to discuss performance of the application<br>• Make use of the of the events that are organized by the vendor |

## 5.5 Case Comparison

In Table 10, the main findings of the case studies for every resource and capability are shown in a simplified manner. In Appendix C, a more detailed table of all the outcomes of the case studies is given. Based on this table, it can be concluded that differences exist between the observations and recommendations of each case study. The contrast of these results can be due to the fact that the three cases all have significantly different characteristics. Therefore, it is important to explain what the different characteristics of these cases are and how these differences possibly had an influence on the results of the case studies. An overview of these characteristics is shown in Table 6. In the next paragraphs, the size of the companies, the sector in which they operate and the type and size of the SaaS-application(s) of each case will be discussed and how they differ from each other.

### 5.5.1 Size of the company

First of all, the size of the companies in each of the cases greatly differ. The coffee producing company in the second case employs 13.000 people worldwide, of which 2.100 employees work in the Netherlands. This is a large difference with the number of employees that the financial company in the last case has; which is an amount of 27.000 employees working in the Netherlands. The company in the first case employs 10.000 people worldwide and 6.000 people in the Netherlands. So, it can be concluded that there is a significantly large difference between the size of the companies that are studied in the case studies. Consequently, these variations in size can have an effect on how IT-employees have experienced the migration to a SaaS-environment. If an organization is larger, the direct impact on the IT-employees could be different, compared to smaller organizations.

### 5.5.2 Sector of the company

Second, the different industrial sectors of the cases should be discussed. The companies in the three cases operate in the chemical sector, the food production sector and the financial sector respectively. Of course, companies that operate in different industrial sectors have different business models. For example, production companies focus on manufacturing a product as quickly as possible for the lowest price. On the other hand, companies in the financial factor aim to provide financial services of the highest quality and make profitable investments. Consequently, the goals and objectives of the IT-department are aligned with the business model of the organization. Therefore, the goals and objective of each case's IT-department differ as well. So, the difference in observations and recommendations of each case could be caused by the difference in business models used.

### 5.5.3 Type and size of application

Last, the characteristics of the SaaS-applications used in the cases should be elaborated on. Each company in the case study implemented a different type of SaaS-application. As was mentioned in Section 2.3, several types of SaaS-applications exist. The companies in the second and the third case migrated to a CRM application and an HR application, respectively. CRM applications cover processes related to managing the relationship with consumers, while HR-applications are used for human resource management processes. Because these applications cover different business processes of the organization, the effect on the IT-department could therefore be different as well. Moreover, the size of the application could also cause a significant difference on the impact of the migration on the IT-department, because large applications that integrate several 'on premise' applications require more resources than smaller SaaS-applications that cover one business process. This might have a different impact on the organization of the IT-department. Therefore, the

different outcomes of the cases could also have been caused by the different sizes of the implemented SaaS-applications.

## 5.6 Chapter Conclusion

The differences between the cases that were mentioned in the previous paragraphs, give interesting insight into how resources and capabilities of the IT-department in a SaaS-environment should be exploited. Table 10 summarizes the findings of each of the case studies. The observations of the cases and the recommendations made by the interviewees differ, which can be caused by the different characteristics of each case. In the next chapter, conclusions will be drawn from these results by doing a cross-case analysis and the overarching findings will be compared with the propositions made in Chapter 3.

*Table 10. Main findings of the case studies*

| | Chemical Sector (Small applications) | | Food Production Sector (large CRM application) | | Financial Sector (large HR application) | |
|---|---|---|---|---|---|---|
| | **Observations** | **Recommendations** | **Observations** | **Recommendations** | **Observations** | **Recommendations** |
| **Financial Assets** | During migration costs increased, after migration costs decreased. | Choose the cheapest vendor and choose quality over price. | During and shortly after migration costs increased, on long term no changes. | Clear planning, reporting and communication of costs and keep costs transparent. Offshore IT-helpdesk. | During migration costs increased, after migration costs decreased. Unnecessary datacenters. | Cover infrastructure costs and avoid unnecessary hardware. |
| **Structure** | Fewer technical functions, more towards integration and procurement. No difference in size | Integration functions for technical employees. Organize yearly 'clean-up'. | DevOps changed roles and responsibilities. No difference in size. | Change structure to work with DevOps and communicate what is changing. Keep infra-managers in department. | Shift from technical roles to functional roles. | Teach IT-employees business processes that the application covers. Hire IT contract and vendor managers. |
| **Management Systems** | Same management systems are used. | Work with DevOps. | Processes changed due to DevOps. | Work with DevOps. | IT-department is becoming Agile. | |
| **Skills** | Less technical skills, more soft skills. | IT-employees should have coordination, procurement and integration skills. | Coping with change was difficult. Communication was difficult. | IT-employees should be able to work with DevOps, the application, and change. Communication skills are required. | Data analytics, integration and business analytical skills became important. | IT-employees should have good communication skills and work with business processes. |
| **Knowledge** | Troubleshooting is done different. | IT-employees should have broader knowledge of the application. | Line between infrastructure and application layer fades. | IT-employees should have knowledge of how the application is built. | IT-architects were transformed in Workday specialists. | IT-employees should have better knowledge of data and the application |
| **Training** | Training and documents were provided on how SaaS and the application works. | IT-employees should be trained to work with the application and the vendor. | Awareness training was given, and key-users were designated. | Training should be given to work with the application and DevOps. Key-users should be appointed. | Coaches for teaching soft skills. External companies for teaching on SaaS. | Communication training should be given to IT-employees. |
| **Culture** | Culture did not change. Motivation decreased. | Avoid demotivation by keeping IT-employees busy and teach how application is built. | Culture did not change. Migration asked for a different mindset. | IT-employees should be open-minded and proactive. | Culture did not change. More diversity due to globalization. Motivation did not decrease. | Clearly communicate what is going to change and give IT-employees time to get used to new roles |
| **Contractual Governance** | One IT-employee for contracting. Every application needed a contract with NDA's. | Be clear when drawing up contract and re-value the contract every year. | Performance agreements were now made with the vendor. | Understand what the provider can offer and clearly communicate expectations. IT-procurement team should be made. Re-value contract. | Big part of the contract was related to the operation of the application. | Make clear and strict agreements in the SLA. Vendor managers specialized in IT-procurement should be appointed. |
| **Relational Governance** | The applications implemented did not need relational governance. | Large applications need relational governance. Appoint vendor manager that maintains close relationship with vendor. | Maintaining relationship with the vendor was done informal. | Designate one employee for contact with the vendor, clearly communicate expectations upfront and have yearly meeting. | More contact between user and provider and also between users. | Meet with vendor every month and make use of the events organized by the vendor. |

# 6 Findings on Propositions

## 6.1 Chapter Introduction

In the previous chapter, observations were made during the case studies regarding the changes that occurred within the IT-department when migrating to SaaS. Moreover, the case studies resulted in recommendations made by IT-employees on how to exploit the resources and capabilities of the IT-department when migrating to a SaaS-environment. In this chapter, a cross-case analysis will be performed on the findings of the case studies, and the findings on each type of resource will be compared with the propositions that were formulated in Chapter 3. The results of the cross-case analysis will form the input for the maturity model that will be developed in the next chapter.

## 6.2 Physical Resources

The main physical resource that was examined in this case study research was *financial assets*, which was identified as an important resource in the IT-department when migrating to a SaaS-environment. Besides financial assets, other physical resources came forward in the interviews that could be beneficial for the performance of the IT-department when migrating to a SaaS-environment. Namely, *technological tools* that can be used to improve working with SaaS-applications.

### 6.2.1 Financial assets

The first proposition related to financial assets that will be compared with the findings of the case studies is the following:

***P1: The IT department will require extra financial assets when migrating to a SaaS-environment, due to re-organization.***

In all cases, it came forward that during the migration to the SaaS-application the total costs for the IT-department increased. Mainly, this was due to double licensing costs, which refer to the costs that are made for using the old 'on premise' application and the new SaaS-application that is being implemented. Due to technical limitations, it is not possible to directly switch to the new SaaS-application and cut off the 'on premise' application. So, the licenses for both applications need to be paid during migration. Furthermore, it was argued in the second case that additional resources such as external SaaS-migration consultants and extra IT-capacity were needed to facilitate the migration. To keep these costs during the migration as low as possible, the time required to migrate should be minimized. Therefore, it is important to clearly **communicate deadlines** regarding the migration within the IT-department to avoid miscommunication. Also, a **structured planning** should be made upfront with the SaaS-provider and progression should be **reported** to avoid unplanned costs.

#### Conclusion on P1

So, it can be concluded that during the migration to a SaaS-environment, the total costs for the IT-department will indeed increase and extra financial assets are required. However, in contrast to what is stated in proposition P1, the need for extra financial assets are not due to the re-organization of the IT-department, but is caused by double licensing costs and costs related to additional resources. Although it did not came forward that these higher costs were caused by re-organization, it can be assumed that re-organization does contribute to this. The case studies indicated that the IT-department does require some re-organization on several aspects such as training employees, providing financial incentives and hiring new staff, which comes at a price.

The second proposition related to financial assets that will be compared with the findings from the case study, is the following:

***P2: The operational costs of the IT-department will decrease over time when migrating to a SaaS-environment.***

In the first case, it came forward that the operational costs of the IT-department after the migration decreased, because the capacity planning was outsourced, and costs of the IT-operation and support costs were lower. However, in the other two cases, the conclusion was made that the costs of the IT-operation did not specifically decrease. Even more, the operational costs of the IT-department in the second case were higher than before, due to **technical implications and workarounds** that were necessary to keep the operation running. Afterwards, the costs decreased but were not lower compared to before the migration. The reason for this was that the goal of the SaaS-migration was not to reduce the costs of the IT-operation, but to improve the efficiency of the CRM processes. The third case had a similar reason for the SaaS-migration; to increase the efficiency of HR-processes.

Moreover, due to the outsourcing of the IT-infrastructure when migrating to SaaS, a large part of the data centers in the third case became unnecessary. These data centers need to be maintained and take up extra space, which involves extra costs. So, these additional costs should be covered and **unnecessary hardware** should be avoided.

### Conclusion on P2

Hence, the findings of the case study disprove proposition P2; the use of SaaS does not lead to lower operational costs of the IT-department. Although one case experienced a decrease in operational costs, in the other two cases no significant changes were noticed. In literature it is stated that the operational costs of the IT-department can decrease when using SaaS-applications, due to less direct costs (Chou & Chou, 2008; Janssen & Joha, 2011). The reason that this study does not show that costs decrease, can be that the cases studied migrated to a SaaS-environment on short time ago. Therefore, it can be argued that operational costs are not decreasing on short term, when migrating to a SaaS-environment. This occurs after a longer period of time. It should also be mentioned that cost reduction was not the reason for migrating to SaaS within these cases. So, the impact of the use of SaaS-applications on operational costs is largely dependent on the reason for using SaaS.

### Additional findings

Besides the findings on the propositions mentioned above, other interesting factors related to financial assets have been found in the case study that can positively affect the performance of the IT-operation in a SaaS-environment. First of all, the costs of the migration and the use of the SaaS-application should be **transparent** for the IT-employees. This way, all employees of IT-department are aware of the extra costs that are involved with a SaaS-migration and thus be able to guide the expenses of the migration in a good direction. Moreover, to reduce the costs of the IT-department, the IT-helpdesk can be **offshored** to a location where labor costs are lower. Because SaaS-applications do not need physical maintenance, there is no longer need for a physical help-desk. Further, the SaaS-provider with the **lowest operational costs** could be chosen to keep the costs as low as possible. Nevertheless, it should be emphasized that the **quality** of the application is more important than the costs.

### 6.2.2 Technological tools

In the third case, it came forward that some tools could be introduced to improve the performance of working with SaaS-applications. First of all, it was mentioned that **smart alerts** should be installed in the new system, that can proactively give a sign when an issue related to the SaaS-application occurs. This way, IT-employees can efficiently react and solve the issue or, if necessary, contact the vendor. Second, it was recommended when using large SaaS-applications to create a **central dashboard** that monitors all the applications in the new system simultaneously. This way, the IT-department has a clear and structured overview of the applications and how they function.

## 6.3 Organizational Resources

According to the case study, some significant changes in the use of organizational resources occurred within the IT-department when migrating to a SaaS-environment. In the following paragraphs, the exploitation of the organizational resources *structure* and *management systems* in a SaaS-environment will be discussed. Moreover, these findings will be compared with the propositions formulated related to these two types of resources.

### 6.3.1 Structure

The first proposition that will be compared with the findings of the case study is related to the size of the IT-department:

***P3: The size of the IT-department will decrease when migrating to a SaaS-environment.***

None of the interviewees in the case study experienced a reduction of the size of the IT-department after the migration to SaaS. Although it was argued that in all cases that certain functions became unnecessary, the IT-department did not shrink. Due to **outsourcing of the infrastructure and development** of applications, most tasks for infrastructure managers and developers shifted towards the SaaS-provider. But still, these employees kept their position in the IT-department, albeit in another role. Nevertheless, in two cases it was argued that, on the long term, the possibility employees leaving the IT-department existed. In the first case, a yearly **'clean-up'** is organized to assign new tasks to employees that have insufficient workload. Though, if no tasks exist for these employees, they should leave the IT-department or even the organization. However, at the moment that the case study was conducted, no 'clean-up' moment had been performed since the SaaS-migration.

**Conclusion on P3**

Hence, it can be concluded that on short term, the size of the IT-department does not decrease after migration to a SaaS-environment. It can be argued that for large organization, the However, on long term, some employees within the IT-department may become obsolete, due to the lack of available functions.

The second proposition related to organizational structure that will be compared with the findings of the case study, is the following:

***P4: The IT-department requires highly skilled employees that are able to handle new roles and responsibilities when migrating to a SaaS-environment.***

The findings of all cases showed that there was a large shift in the roles and responsibilities of IT-employees when migrating to a SaaS-environment. A significant change that was mentioned in all the cases, was the shift from 'technical' operations and maintenance tasks to '**functional' tasks**. Maintenance of the technical layer of the applications is unnecessary in a SaaS-environment, because these tasks are the responsibility of the SaaS-provider. Therefore, IT-employees will focus more on functionality of the application, which refers to how the application performs as a business solution. Another transition that came forward in the cases, was that tasks related to the development and design of applications disappear in a SaaS-based IT-department. On the other hand, roles related to the **integration** of SaaS-applications with the rest of the IT-landscape and **procurement** become more important in the IT-department. Since the skills needed for development and design are similar to those needed for integration, it is recommended to assign integration tasks to those IT-employees who used to focus on development and technical maintenance. Moreover, in the second case, the results indicated that the roles and responsibilities of the IT-department should be transformed to work with the **DevOps** approach, and be able to work with changes quickly in an **Agile** way. It was noticed that, during the migration and after the migration, working in a DevOps setting significantly changed the roles and responsibilities of the IT-employees.

### Conclusion on P4

Altogether, it can be concluded that the IT-department does indeed require highly skilled employees that are able to handle new roles and responsibilities after a SaaS-migration. Even more, during migration new roles and responsibilities are introduced as well, in order to be able to work with DevOps. Also, development, maintenance and design tasks make place for integration and procurement tasks.

### Additional findings

Some important additional findings related to the organizational structure were made besides the findings discussed above. As was mentioned in the previous paragraphs, due to the outsourcing of the infrastructure when migrating to SaaS, the tasks for the infrastructure manager are also outsourced. However, it is important to keep **infrastructure managers** in the IT-department. Although some part of the infrastructure is outsourced, in large organizations there is always an IT-infrastructure that needs to be maintained. Further, because DevOps and the use of SaaS has a large impact on the roles, responsibilities, and way of working of the IT-department, it is important to **clearly communicate** to the IT-employees what is going to change and give them **time** to get used to these changes.

### 6.3.2 Management Systems

To assess the change in management systems, the following proposition will be compared with the findings of the case study:

***P5: Management systems of the IT-department require re-design when migrating to a SaaS-environment, due to new objectives and goals.***

In all cases, it came forward that the use of **Agile** and **DevOps** can contribute to the performance of the IT-department during and after SaaS-migration, because this allows to quickly adapt to changes and **improves communication**, **collaboration,** and **integration**. Moreover, by using DevOps, the SaaS-application can be gradually deployed in an iterative way and therefore allows for a smooth transition. Although the organization in the third case did not use DevOps, it was mentioned that the IT-department did shift towards an Agile way of working.

**Conclusion on P5**

Besides working with DevOps, no other findings were made related to the use of new management systems. So, the conclusion can be drawn that the management systems of the IT-department do not necessarily require re-design of management systems due to new goals and objectives. Still, it is advised to use DevOps, for a smooth transition to a SaaS-environment.

## 6.4 Human Resources

The case study pointed out that the way human resources of the IT-department in a SaaS-environment are exploited has changed. The propositions related to *skills*, *knowledge*, *training* and *culture* that were formulated in Section 3 will be compared with the empirical findings of the case study.

### 6.4.1 Skills

The proposition related to skills that will be compared to the findings of the case study goes as follows:

***P6: IT-employees require a new set of 'soft' skills when migrating to a SaaS-environment.***

In the three cases, the interviewees argued that technical skills for maintaining and design of applications are not required in the IT-department after the SaaS-migration. Tasks related to technical maintenance and design of applications are outsourced to the SaaS-provider, which means that skills to perform these tasks are not required in the IT-department. Hence, the IT-department in a SaaS-environment requires **less technical skills** than before the migration. However, this does not mean that no technically skilled employees in the IT-department are required. In the second case, it was argued that it is important to have enough technically skilled employees in the IT-department, because **integration skills** were significantly important during the migration. As mentioned before, the SaaS-application should be integrated such that it cooperates with the rest of the IT-landscape.

Besides the fact that technical skills become less important, it came forward in the case study that IT-employees require several new skills to optimally perform in a SaaS-environment. In this paragraph, the most important skills will be discussed that are necessary when migrating to SaaS. First of all, although very straightforward, IT-employees should be able to **work with the new application**. If they are not able to work with the application, this could seriously hinder the

performance of the IT-department. Second, **coordination** and **communication** skills become increasingly important in the IT-department. IT-employees will have to collaborate with the (possibly multiple) SaaS-providers and serve as a bridge between the provider and the IT-department. Therefore, it is crucial that these employees can clearly communicate and coordinate the collaboration with the provider in a correct way. Also, **procurement** skills are required to ensure that the IT-department gets the best deal for the SaaS-application. Additionally, skills related to **delivery management** become increasingly important, as SLA's have to be met.

### Conclusion on P6

The case study pointed out that the skills required in the IT-department when migrating to SaaS shift from technical skills related to design, development, and maintenance of applications towards procurement and monitoring skills. Although technical skills will remain necessary, communication-, coordination and delivery management skills become increasingly important. Hence, it can be concluded that IT-employees require a new set of 'soft skills' during and after migration to a SaaS-environment.

### Additional findings

Next to the 'soft skills' mentioned in the previous paragraphs, other skills were identified as essential as well by the interviewees in the case study. First of all, IT-employees should be able to **work with DevOps**, because using this approach can increase the efficiency of migrating to SaaS and working in a SaaS-environment. Moreover, in the second case it was argued that **data analytical skills** becoming more important in a SaaS-environment. IT-employees should be able to work with the data that is involved with using the SaaS-applications. Furthermore, **business analytical skills** play a large role in the IT-department, because IT-employees should know how to work with the business processes that the new SaaS-application covers.

## 6.4.2 Knowledge

The following proposition related to knowledge will be compared with the findings of the case study:

***P7: IT-employees require other knowledge when migrating to a SaaS-environment.***

The main finding related to knowledge that came forward in the case study, was that IT-employees require a **broad knowledge** of the implemented SaaS-application, as the line between the infrastructure layer and the application layer fades in a SaaS-environment. It was emphasized that IT-employees should have enough knowledge of the **functioning of the application**, how the application is **built up** and how the **integration** of the application impacts the rest of the IT-landscape. By having a broader knowledge of the application, IT-employees understand what the provider offers, which allows them to choose the best SaaS-solution. Moreover, in the third case it was argued that the IT-employees should have a better understanding of how **data** can be used in a SaaS-environment, for improving the performance of the IT-operation.

### Conclusion on P7

Hence, when comparing the findings of the case study with proposition P7, it can be concluded that the empirical findings prove the proposition right. IT-employees do require new knowledge after migration to a SaaS-environment, especially knowledge related to the functioning, build and integration of the implemented application.

### 6.4.3 Training

To assess the importance of training in the IT-department in a SaaS-environment, the following proposition will be compared with the empirical findings of the case study:

***P8: IT-employees require training to acquire new skills and knowledge when migrating to a SaaS-environment.***

In two of the three cases, **awareness training** was given to teach IT-employees what the new application exactly entails and what the benefits are of the migration. This can help IT-employees understand why the organization decided to migrate to the new system and what the benefits are. In the second case, the IT-employees did initially not understand how the new system worked, which consequently had a negative effect on the performance of the IT-department. Therefore, training was provided to teach IT-employees **how to work** with the new SaaS-application. Furthermore, specific IT-employees were appointed and trained as **key-user**, to provide support related to the functionality of the application. These key-users have a deeper understanding of the application than other employees and are able to support others in case of issues related to the new application. Moreover, it was recommended in two cases to provide **communication training** and teach IT-employees how to manage the **collaboration** with the SaaS-provider in terms of contract management and vendor management. Finally, if **DevOps** is used in the IT-department, training should be provided to teach IT-employees how to work with DevOps.

#### Conclusion on P8

Based on the findings of the case study, it can be concluded that IT-employees require training when migrating to a SaaS-environment. The most important trainings that should be provided are related to awareness, working with the application, working with DevOps, training key-users and communicating with the vendor.

#### Additional findings

Besides training, other useful forms of educating came forward in the case study as well. When migrating to SaaS-application, usually the vendor provides a **knowledge base** containing documents about the application that can be accessed by users in case of issues. It is the responsibility of the organization to make this knowledge base easily accessible and structured, so that IT-employees will not get lost in the amount of available information.

### 6.4.4 Culture

The following proposition will be compared with the empirical findings of the case study related to organizational culture of the IT-department:

***P9: The IT-department requires a different organizational culture when migrating to a SaaS-environment, to cope with the decrease in job satisfaction.***

All the interviewees in the case study shared the same view regarding the influence of the use of SaaS on the culture within the IT-department: "Culture does not change on short term". In none of the cases a change in organizational culture was noticed when migrating to a SaaS-environment. However, the interviewees did notice that the **motivation** of the IT-employees could decrease due to the migration to SaaS. In the first and the second case, during the migration and after the migration the IT-employees lost some of the **satisfaction** in doing their jobs. A large part of the tasks of the IT-employees required technical abilities and was related to technical maintenance,

design, and development of applications. Due to the outsourcing of these tasks, the motivation of the IT-employees decreased. Additionally, the migration to SaaS changed their regular way of working, due to the transition to DevOps and working with a completely new system. So, to keep the IT-employees motivated when migrating to a SaaS-environment, the changes that will occur in their way of working should be **clearly communicated**. Moreover, it is important to ensure the IT-employees that they have a **certain future** in the new setting of the IT-department and that they are still needed. Another way of keeping the motivation high is to give the IT-employees an incentive to work with the new application, by offering a **financial bonus** to those employees that have proven to work successfully with the new application. On the other hand, working in a SaaS-environment asks for a **different mindset** of the IT-employees. To stay motivated when migrating to SaaS, IT-employees should have an **open-minded** and **proactive** mindset. Especially when working with DevOps, because of its dynamic nature. In contrast to the first two cases, the interviewees in the third case did not experience lower motivation among the IT-employees. Instead, the IT-employees were eager to learn and work with the new system. According to the interviewees, this happened because the changes and expectations were clearly communicated upfront, which strengthens the point that changes regarding the way of working should be clearly communicated to the IT-employees. However, in this case the IT-employees did not immediately know what their role was and how they could be of added value in this new environment. Therefore, it is essential to give IT-employees enough **time to discover** their new roles.

**Conclusion on P9**

From the case study, it came forward that to cope with motivation issues due to migration to SaaS, a different mindset of the IT-employees required. So, a different organizational culture is not the solution, as was suggested in the proposition. Moreover, to keep IT-employees motivated in SaaS-environment, it is important to clearly communicate changes and expectations, ensure them of a certain future and provide them with incentives to work with the application.

## 6.5 Capabilities

The findings of the case study pointed out that ensuring good collaboration between the vendor and the IT-department by means of contractual and relational governance, are important capabilities when migrating to SaaS. In the following sections, the propositions related to *contractual governance* and *relational governance* will be compared with the empirical findings of the case study.

### 6.5.1 Contractual Governance

The following proposition related to contractual governance in a SaaS-environment is compared with the findings of the case study:

***P10: The IT-department requires contractual governance when migrating to a SaaS-environment, to safeguard good collaboration with the vendor.***

In all the cases, it came forward that some form of contractual governance was used in the IT-department when migrating to a SaaS-environment. Because the transaction between the provider and the IT-department should be safeguarded, **contracts** in the form of **SLA's** were used. In the second case, it was argued that contractual governance was required even before drawing up the SLA. It is important for the IT-department to understand what the SaaS-provider can **deliver** and decide whether this service is in line with what is **expected** of the SaaS-application. Moreover, contractual governance became increasingly important, because performance agreements regarding applications used to be made internally with the infrastructure and network managers. Now, in a SaaS-environment, the performance agreements are made with the provider. Besides, when

working with **DevOps**, drawing up contracts is difficult due to the dynamic nature of DevOps processes. Therefore, it was emphasized in all cases to have these performance agreements and expectations of the application clearly defined in an SLA with the SaaS-provider, to avoid miscommunication and avoid problems related to the expected level of service. To guide the contracting process in the good direction, an **IT-procurement specialist** or, depending on the size of the application, an IT-procurement team should be appointed. These IT-procurement specialists should draw up the SLA's and make **strict and clear agreements** with the SaaS-provider. Moreover, in the first case, it came forward that **Non-Disclosure Agreements** (NDA) should be included in the SLA. In these NDA's, strict agreements regarding the confidentiality of the exchange of information between user and provider are made. This can **enhance trust** between the SaaS-provider and the user. Moreover, it was argued in two of the three cases that a meeting with the IT-department, IT-procurement team and the vendor should be organized on a regular basis, to discuss the performance of the SaaS-application and **re-value** the contract.

**Conclusion on P10**

Hence, it can be concluded that contractual governance is required to safeguard good collaboration with the SaaS-provider. It is important to know upfront what a provider can deliver and what the IT-department expects from the application. Moreover, IT-procurement specialists should be appointed to draw up the contract and make clear and strict agreements with the vendor. Afterwards, meetings should be held with the vendor on a regular basis to re-value the contract.

### 6.5.2 Relational Governance

To assess the importance of relational governance, the following proposition will be compared with the results of the case study:

***P11: The IT-department requires relational governance when migrating to a SaaS-environment, to maintain a good relationship with the Cloud-vendor.***

In the first case, it came forward that relational governance is especially important when making use of **large SaaS-applications**, that have a big impact on the IT-operation and the rest of the business. Since in this case, the SaaS-migration concerned small applications, no significant form of relational governance was applied. This view on the importance of relational governance is in line with results of the other two cases, that implemented large SaaS-applications that covered many business processes. In both these cases, it was argued that relational governance played a big role in the IT-department to safeguard the relationship with the vendor. Maintaining the relationship with the vendor was done by means of **(informal) meetings** on a regular basis to discuss the performance of the SaaS-application. In the second case, this meeting was held every year, while the IT-department in the third case organized such a meeting on a monthly basis. A **vendor manager** should be appointed that stays in close contact with the vendor to know when **functionalities** of the application will change, and communicate these changes to the rest of the IT-department. Further, in all the cases it was argued, to maintain a good relationship with the vendor, **communication** is key. Miscommunication can hamper the collaboration between the parties and therefore clear agreements regarding the collaboration should be made **upfront**.

**Conclusion on P11**

The conclusion can be drawn that relational governance is an important capability for maintaining a good relationship with the Cloud-vendor when migrating to a SaaS-environment. Especially, when migrating to a large application that covers many business processes, relational governance

is essential in the IT-department. A vendor manager should be appointed and meetings with the vendor should be organized to discuss performance. Overall, good communication is the most important aspect when it comes to maintaining the relationship with the Cloud-vendor.

**Additional findings**

Besides the forms of relational governance mentioned above, some other findings related to relational governance were made during the case study. Also from the SaaS-provider's side, initiatives are taken to enhance the relationship with the user. In all the cases, the provider organized events such as **workshops**, **working groups,** and **working communities**, to connect users with each other. This way, organizations that have migrated to the same SaaS-applications could discuss each other's experiences and learn from this. In general, it is useful to make use of the initiatives that are organized by the vendor.

## 6.6 Chapter Conclusion

Using the findings of the cross-case analysis and pattern matching, it came forward that the use of all the proposed resources and capabilities significantly change in the IT-department due to migration to a SaaS-environment. Moreover, ways how to exploit and reach the ideal state of these resources and capabilities were identified and discussed. These observations and recommendations can be used to develop an integrated framework that can support organizations to improve the performance of their IT-department when migrating to a SaaS-environment. In the next chapter, the development of this framework will be discussed.

# 7 Design of Maturity Model

## 7.1 Chapter Introduction

In this chapter, the framework that can support organizations' IT-departments when migrating to a SaaS-environment will be developed. The 'Design & Development' step of Peffers' DSR framework will be executed in this chapter. Based on the findings of the cross-case analysis of the case study, a maturity model will be developed.

The choice for maturity model and the purpose of the maturity model will be explained in Section 7.2. Then, the design of the maturity model will be explained in Section 7.3 according to the maturity model development framework by de Bruin, Freeze, Kulkarni, & Rosemann (2005). The maturity model will be developed following these design steps. Finally, this chapter will end with the last step of the DSR framework: 'Demonstration'. This step is executed by conducting two evaluation interviews with Cloud-experts from Accenture regarding the usability and applicability of the developed maturity model (Section 7.6)

## 7.2 Purpose of the Maturity Model

The integrated framework that can be used by organizations for optimizing the performance of the IT-department when migrating to SaaS, will be developed in the form of a maturity model. In general, maturity models are used to assess the current state of specific situations in organizations, to identify where improvements can be made and to control the process of making these improvements (Pöppelbuß & Röglinger, 2011). For many organizational domains, such as business management, process management, project management and IT-management, maturity models can be helpful to assess the as-is situation and identify and prioritize improvements to be made (de Bruin et al., 2005). Maturity models define the development or maturity of a particular process or situation using different levels. In general, these levels range from underdeveloped or immature, to developed or optimized. In literature, many studies have successfully developed maturity models to help organizations improve internal processes (de Bruin et al., 2005; Pöppelbuß & Röglinger, 2011). In current literature, no scientific based design does yet exist that can guide large organizations through the process of migrating to a SaaS-environment on an organizational level. Hence, this model contributes to the existing knowledge base regarding in the impact of SaaS-migration on the IT-department. In this section, a maturity model will be developed that can help organizations identify which resources and capabilities of the IT-department should be exploited for optimal performance of the IT-department in a SaaS-environment. The model can be of use for IT-managers or other employees that are concerned with or responsible for the strategy of the IT-department in a SaaS-environment.

## 7.3 Design Principles

The development of maturity models falls under the domain of Design Science Research (Pöppelbuß & Röglinger, 2011). Therefore, a clear structure should be followed to design this artifact. De Bruin et al. (2005) have developed a framework to guide the process of design and structurally build a maturity model. In this framework, six different phases can be distinguished: *Scope, Design, Populate, Test, Deploy* and *Maintain*. The first four phases refer to the design of the maturity model. On the other hand, the last two phases are related to the actual usage and the continuous improvement of the model. However, as this study only results in the design and validation/verification of the maturity model, the *Deploy* and *Maintain* phases are left out of the scope of this research and the first four phases will only be included (Figure 14). Still, the usability of the designed maturity model and how it can be deployed will be shortly discussed. In the following sections, the first four phases of the design will be discussed.

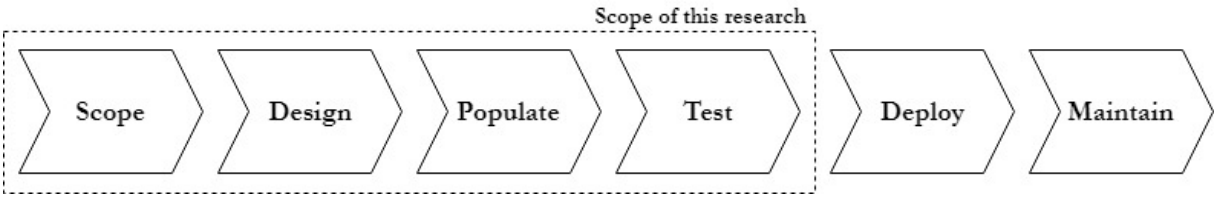


*Figure 14. Model Development Phases (Bruin et al., 2005)*

### 7.3.1 Scope

Determining the scope of the desired model is the first step of the development of a maturity model. By scoping, boundaries will be set for further application and use of the model (de Bruin et al., 2005). The two most important decisions to be made in this phase are which stakeholders to involve and what the focus of the model is.

The focus of the model refers to the domain in which the model could be used and applied. According to the framework of de Bruin et al. (2005), the focus of the model can be either domain specific or general. This study aims to develop a maturity model that could help organizations that are going to migrate or have been migrated to a SaaS-environment to identify which resources of the IT-department should be exploited for an optimal performance. Hence, this maturity model will focus on a specific domain, namely SaaS-based IT-departments of large organizations.

The second decision to be made in this step is which 'development stakeholders' to use for the design of the model. Development stakeholders are people that assist in the development of the model and helped to identify the most important resources for the model. This decision was made when defining the theoretical background (Section 3.5) and during the case study research (Section 4). Cloud-experts from Accenture contributed by checking the relevance of the resources and capabilities found in literature and several employees of the IT-department of the organizations studied in the case study assisted by identifying the most important resources and capabilities. Hence, it can be concluded that Accenture's Cloud-experts and IT-employees of the cases are the 'development stakeholders' that assisted in the development of the maturity model.

### 7.3.2 Design

The second step of de Bruin's framework, *Design*, refers to determining the architecture of the model that forms the foundation for the rest of the development and application of the model. Maturity models exist out of two core components: *dimensions* on the x-axis and *levels* on the y-axis.

Maturity models can be one-dimensional or multi-dimensional, which refers to the number of layers that the maturity model has (de Bruin et al., 2005; Pöppelbuß & Röglinger, 2011). Multi-dimensional models are divided into multiple components and sub-components that account for the complexity of the domain of the research. In this research, the maturity model will be layered by means of four different components: physical resources, organizational resources, human resources and capabilities (as identified by performing literature research and expert-questionnaires). Then, these components are further decomposed into the multiple resources and capabilities that should be exploited to optimize the performance of the IT-department in a SaaS-environment (identified during the case study). According to de Bruin et al. (2005), using a multi-layered approach helps organizations get a better insight into their relative strengths and weaknesses.

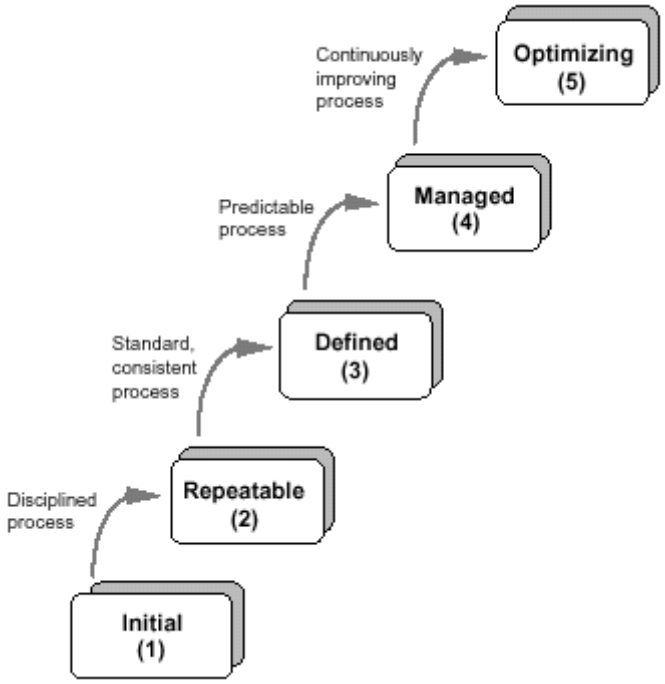


*Figure 15. Capability Maturity Model Levels*

Then, on the x-axis of the maturity model, the levels should be chosen. The levels of the model refer to the different stages of maturity of each sub-component. Hence, in this case the levels refer to the stages of maturity of the resources and capabilities in the IT-department in a SaaS-environment. In other words, the levels indicate how well the resources and capabilities are exploited for the best performance of the IT-department when migrating to SaaS. So, the assumption that the maturity of a SaaS-migration can be divided in different phases in is in line with the statements made in Section 3.6: that transition due to organizational changes goes in phases (Bridges, 1986). Therefore, a maturity model would be suitable for assessing the maturity of organizational change in the IT-department when migrating to SaaS. According to de Bruin et al. (2005), levels should be distinct and well-defined and therefore should be labeled with short a definition of the intent of the level. In literature, most maturity models exist out of four or five maturity levels. A well-known maturity model is the Capability Maturity Model (CMM), which can be used to improve software development processes but can be applied to other processes as well. The CMM exists out of five different levels, each serving as the foundation for the next level:

Initial, Repeatable, Defined, Managed and Optimizing (Paulk, Curtis, Chrissis, & Weber, 1993). Each of these levels are shown in Figure 15. These levels are used as an example of how the levels of the maturity model should look like and how they should serve as a foundation for the next level.

However, due to the intangible nature of the empirical data of this study, such as skills and knowledge, the maturity levels are difficult to provide with a clear measurement. Therefore, it is chosen to use three levels in this maturity model instead of five. Based on the levels from the CMM, the following levels are defined for the maturity model:

*Table 11. Maturity levels*

| Level | Definition |
|---|---|
| **Level 0: Unaware and Underdeveloped** | The most immature level of exploitation of a resource in a SaaS-environment. Decision makers within the IT-department are unaware of the importance of the resource and no attempt has been made for improvement. The resource is not being exploited, which can hamper the success of the SaaS-migration and can lower the performance of the IT-department. |
| **Level 1: Aware and Initiating** | Decision makers are aware that the resource should be exploited in a SaaS-environment and initiate improving the use of the resource, which can smoothen the SaaS-migration and use of SaaS. However, the performance of the IT-department will not necessarily increase. |
| **Level 2: Optimizing** | Decision makers of the IT-department actively improved the resource, which can optimize the performance of the IT-department. This level indicates the ideal level of each of the resources, as indicated during the case studies. Under these circumstances, the migration to SaaS and the use of SaaS is optimized. |

### 7.3.3 Populate

After the scope and the design of the maturity model have been determined, the model should be populated. In other words, the content of the model should be defined. This is an important step, because the identification of *what* should be measured and *how* it should be measured takes place during this step (de Bruin et al., 2005). The collected data from the case study interviews and expert-questionnaires will form the content of the model. During the data collection in this study, enough data related to the exploitation of each of the resources and capabilities were provided to populate the model. The interviewees were asked how the exploitation of the resources and capabilities changed in a SaaS-environment and what their idea of the ideal state of the resource would be. Using this information, the optimal level in the maturity model can be populated. Based on this ideal level, the other levels can be populated as well. In the maturity model, each of the resources are divided in sub-components, in order to improve the clarity of the model. Below, the sub-components of the maturity model are identified and explained why and how they are included in the maturity model, based on the results of the case studies.

| Resource | Sub-component | Explanation for inclusion in maturity model |
|---|---|---|
| | | ***Physical Resources*** |
| ***Financial Assets*** | Transparency of costs | Cost transparency allows IT-employees to be aware of the costs of migration and operation of SaaS, and allows them to guide expenses in the right direction. |
| | IT-helpdesk | Offshoring of the IT-helpdesk can lead to lower operational costs. |
| | Planning & reporting | A structured planning, strict deadlines and clear reporting can avoid unplanned costs. |
| | Unnecessary hardware | Getting rid of unnecessary hardware can decrease maintenance and operational costs. |
| ***Technological Tools*** | Smart alerts | The use of smart alerts allows IT-employees to efficiently react to technological issues regarding the new applications. |
| | Monitoring dashboards | A central monitoring dashboard allows the IT-department to have a clear overview of the functioning of the new applications. |
| | | ***Organizational Resources*** |
| ***Structure*** | Roles & responsibilities | Aligning roles and responsibilities with DevOps processes can improve the capability of the IT-department to work with changes quickly. |
| | Integration & procurement tasks | Procurement and integration tasks should be fulfilled by highly skilled employees for a good integration of the SaaS-applications and selecting the most suitable SaaS-applications. |
| | Function awareness | Due to the impact of SaaS on roles, responsibilities and tasks, changes should be clearly communicated to the IT-employees and should be given time to get used to these changes. |
| ***Management Systems*** | DevOps | The use of DevOps for the SaaS-migration and the operation of the IT-department, can improve communication, collaboration and integration processes. |
| | | ***Human Resources*** |
| ***Skills*** | Skills for working with the application | IT-employees should be able to work with the SaaS-applications, in order to execute their tasks in an efficient way. |
| | Communication & coordination skills | Excellent communication and coordination skills can improve the collaboration with the SaaS-vendor. |
| | Procurement & delivery management skills | IT-employees with good procurement and delivery management skills can ensure the best deals with the vendor and draw up proper SLAs. |
| | Data analytical & business analytical skills | Data analytical and business analytical skills can contribute to understanding the functioning of the SaaS-applications and the business processes they cover. |
| | Technical skills | Although less technical skills are required in a SaaS-environment, technical skills remain necessary among IT-employees to perform integration tasks and maintenance tasks of the remaining IT-landscape. |
| | DevOps skills | IT-employees should be able to work with DevOps, to increase efficiency of migrating to SaaS and working in a SaaS-environment. |
| ***Knowledge*** | Knowledge of application | Having a broad knowledge of the application, allows IT-employees to better understand what the provider offers and how the application works. |
| | Knowledge of business processes | Understanding the business processes that the SaaS-application covers, can improve the efficiency of the IT-employees when working with the application. |
| ***Training*** | Training | Awareness training, DevOps training, key-user training, communication training and training related to working with the new SaaS-application can contribute to the migration process. |
| | Knowledge base | A structured, easily-accessible knowledge base can support IT-employees finding information regarding the SaaS-application. |
| ***Culture*** | Mindset | An open-minded and proactive mindset of IT-employees can increase the motivation and ability to cope with change. |
| | Motivation | High motivation amongst IT-employees can improve the process of SaaS-migration and the performance of the IT-department. |
| | Future reassurement | When IT-employees are aware of their new role and are certain about their future in the new situation, they will stay motivated. |
| | Incentives | Providing financial incentives to work with the new application can improve motivation. |
| | | ***Capabilities*** |
| ***Contractual Governance*** | SLA | Clear SLAs and NDAs can safeguard good collaboration with the SaaS-vendor. |
| | Procurement | Assigning highly skilled IT-procurement specialists can improve the SaaS selection process and negotiations, ensuring the best deals. |
| | Contract re-valuation | Regular meetings with the vendor to re-valuate the contract can avoid unfair or outdated arrangements |
| ***Relational Governance*** | Vendor relationship | A good relationship with the vendor enhances trust and collaboration. |
| | Vendor management | Assigning a vendor manager to manage the relationship with the vendor and organize meetings with the vendor can contribute to a better relationship. |
| | Vendor offerings | Making use of workshops, working groups and community groups offered by the vendor, can enhance the relationship with the vendor and can be helpful for getting in contact with other users. |

## 7.4 Assessment of the Model

In this section, an elaboration will be given on how the maturity model can be assessed by the respondent. For each dimension in the model, the respondent is asked to indicate which maturity level best represents the current state of the concerned resource. Consequently, the respondent chooses a level from the model for each resource, that best describes the stage of exploitation of the resource at the moment of the assessment. Hence, at the end of the assessment for every resource in the model a level is chosen. This allows for a discussion where improvements should be made and what resources are already optimally exploited.

This maturity model can be of value for IT-departments in a SaaS-environment in three different ways. First of all, it could occur that the respondent of the maturity model is unaware of the importance of specific resources. This model allows organizations to identify what resources and capabilities should be exploited for optimizing the performance of their IT-department in a SaaS-environment. Furthermore, the model can identify which resources and capabilities are well exploited and which are not, which allows the improvements to be prioritized. Last, the model can guide organizations in the right direction *how* to improve the resources and capabilities of the IT-department in a SaaS-environment.

## 7.5 Evaluation of the Model

After population, the model should be tested for relevance and rigor (de Bruin et al., 2005). In other words, the validity of the model should be verified. The validity of the model can be divided in *face validity* and *content validity* (de Bruin et al., 2005). Face validity refers to the completeness and accurateness of the scope of the model, and can be achieved by using methods such as focus groups and interviews during the population of the model. Also, using complementary methods can contribute to achieve face validity. Hence, in this research, face validity was achieved during the case studies by conducting interviews with IT-employees of the case organizations and by conducting expert-questionnaires with Cloud experts from Accenture. The use of these two methods combined, contributed to the accurateness and completeness of defining the scope of the model.

Content validity refers to the completeness of the domain that is represented in the maturity model. To test the content validity of the developed model, two evaluation interviews have been conducted with Cloud-experts from Accenture. Both Cloud-experts are part of the Intelligent Cloud & Infrastructure department of Accenture and have done several projects related to the migration to SaaS-environments. Therefore, they are familiar with the changes that occur within the IT-department when migrating to SaaS and can assess the importance and the relevance of the content and usability of this model.

In the expert interviews, all the different resources and their involved maturity levels were scrutinized by the Cloud-experts. It came forward that the resources included in the model are all relevant for the IT-department when migrating to SaaS, and the Cloud-experts found the model useful for organizations in case they decided to migrate to a SaaS-environment. However, some mistakes were found in the descriptions of the maturity model, which made them more difficult to understand for the respondent. Based on the feedback of the Cloud-experts, some changes were made in the model related to the descriptions of the maturity level of the resources. The final maturity model is shown in Table 12. Below, the changes that were made after the evaluation interviews are shown:

- Initially, the maturity model contained four different levels. During the interviews, it came forward that the descriptions of the levels for some resources were not specific enough. Therefore, on advice of both the Cloud-experts the number of levels in the maturity model was reduced from four to three.
- The initial maturity model existed out of 10 dimensions, one for each resource. For every resource, the maturity level of several aspects was described in one paragraph. According to the Cloud-experts, the descriptions of the levels were too extensive. Therefore, the 10 dimensions were divided into sub-components and shorter descriptions of the levels were given, to enhance the clarity of the model.

## 7.6 Usability and Applicability

During the evaluation interviews with the Cloud-experts, the usability and applicability of the maturity model was discussed. Both Cloud-experts, that have been involved in several SaaS-migrations, find that organizations should be aware of how the organization of the IT-department will change when migrating to SaaS and should know how to improve the performance of the IT-department in a SaaS-environment. From the interviews, it came forward that this maturity model could be useful for two parties: for the organization that is migrating or has decided to migrate to SaaS, as well as for Accenture. It is argued that the model can be used by the management and IT-managers of the organization that is migrating to SaaS, to identify the weaknesses in the organization of the IT-department that could hinder working with SaaS. Moreover, this model can facilitate as a tool in the discussion within the IT-department regarding the use of resources in a SaaS-environment. On the other hand, one of the Cloud-experts argued that the maturity model can be used by consultants of Accenture, that are facilitating a SaaS-migration for a client. This way, the consultants of Accenture could discuss the current state of the IT-department with the management and IT-managers of the client before migration. Consequently, this can help to identify where improvements should be made, and Accenture could inform the client how the organization of the IT-department will change and how resources and capabilities should be exploited. Then, after the migration has taken place, Accenture and the client could meet again and assess which resources have been improved and which resources are still lacking behind. Thus, these evaluative interviews do indeed confirm that this model can support organizations when migrating to SaaS.

However, in one of the interviews it was mentioned that this model is predominantly useful for the IT-managers and other management employees, because all resources are related to the organization of the IT-department. This model is developed for decision makers that operate on strategic level and are responsible for the organization of the IT-department. Therefore, this model cannot be used by IT-employees to identify weaknesses on operational level. He argues that changes on operational level due to SaaS-migration are significant as well, and should therefore be taken into account. However, the operational level of the IT-department is left out of the scope of this model. The Cloud-expert argues that a maturity model that can be assessed by IT-employees concerning the impact of SaaS on operational level could be a valuable artifact. The importance of including the operational level should be acknowledged as it can contribute to improving the performance of the IT-department in a SaaS-environment. Therefore, in Section 8.3.5 this point will be taken further into consideration.

## 7.7 Chapter Conclusion

In this chapter, the 'Design & Development' phase was initiated. The framework that can support organizations for optimizing the performance of the IT-department when migrating to SaaS, was developed in the form of a maturity model (Table 12). This maturity model can be used to assess the state of each of the resources and capabilities of the IT-department identified in the previous sub-question. On the y-axis of the model, each of the 9 resources identified in Chapter 3 is shown. Moreover, one additional physical resource that came forward as important during the case study was added: *technological tools*. The x-axis represents three maturity levels that indicate the state of exploitation of each resource: *unaware and underdeveloped*, *aware and initiating* and *optimizing*. The findings of the case study were used as the input for this maturity model. During the case study, the interviewees gave their idea of the ideal state of each resource would be when migrating to a SaaS-environment. These recommendations, together with the rest of the findings were used to describe the different maturity levels of each resource. After the development of the maturity model, two evaluation interviews were conducted with SaaS-migration-experts, to validate the content of the model and make improvements. This can be seen as the 'Demonstration' phase of Peffers' DSR framework. From these interviews, it came forward that the maturity model could be of use for the migrating organization as well as for consultants of Accenture.

*Table 12. Maturity Model*

| Resources | | Level 0: Unaware and Underdeveloped | Level 1: Aware and Initiating | Level 2: Optimizing |
|---|---|---|---|---|
| *Physical Resources* | | | | |
| *Financial Assets* | **Transparency of costs** | IT-employees are unaware of migration costs and operation costs of the application. | IT-employees have a basic idea of migration and operation costs of the application. | IT-employees have an excellent insight into the migration and operation costs of the application. |
| | **IT-helpdesk** | IT-helpdesk is operated internally. | Part of the IT-helpdesk is off-shored, part is operated internally. | The complete IT-helpdesk is offshored |
| | **Planning & reporting** | Planning of the migration is unclear and no deadlines are set by the IT-department and the vendor. No form of reporting is done. | A basic planning of the migration is made, but no deadlines are set. | Strict deadlines and structured planning are agreed upon with the vendor. |
| | **Unnecessary hardware** | Significant amount of unnecessary hardware. | Some unnecessary hardware present. | No unnecesary hardware present. |
| *Technological Tools* | **Smart alerts** | No tools present for noticing failures in the system. | Basic tools installed that indicate failures in the new system | Smart alerts are installed that proactively indicate technological issues related to the SaaS-application. |
| | **Monitoring dashboards** | No monitoring dashboards are present. | Some applications are monitored on separate dashboards. | Dashboard is present for centrally monitoring application(s). |
| *Organizational Resources* | | | | |
| *Structure* | **Roles & responsibilities** | Roles and responsibilities are not aligned with DevOps processes. | The use of DevOps is initiated, but roles and responsibilities are the same as when 'on premise'. | Roles and responsibilities are transformed in alignment with DevOps processes. |
| | **Integration & procurement tasks** | Unclear who performs integration and procurement tasks. | Some employees in the IT-department are doing integration and procurement tasks, but have weak skills. | The IT-department has highly skilled employees that are excellent in performing integration and procurement tasks. |
| | **Function awareness** | IT-employees are unaware of their new roles. | IT-employees are exploring their new roles. | IT-employees are fully aware of what their new role will be. |
| *Management Systems* | **DevOps** | DevOps processes are not in use. Old management systems are used for the migration, operation and integration of the SaaS-application. | DevOps processes are used for the migration and integration of applications. Operations is still done the old way. | IT-department applies DevOps for migration, operation and integration of the SaaS-application. |

| *Human Resources* | | | | |
|---|---|---|---|---|
| *Skills* | **Skills for working with the application** | IT-employees are not able to work with the new application. | IT-employees are learning to work with the new application. | IT-employees are fully able to work with the new application. |
| | **Communication & coordination skills** | Managing the SaaS-vendor is difficult, due to weak communication and coordination skills of IT-employees. | IT-employees possess moderate communication and coordination skills. | IT-employees have excellent communication and coordination skills to manage the SaaS-provider. |
| | **Procurement & delivery management skills** | No employees with procurement- and delivery management skills in the IT-department. | Some employees are present in the IT-department with moderate procurement- and delivery management skills. | IT-employees with excellent procurement and delivery management skills are present in the IT-department. |
| | **Data analytical & business analytical skills** | IT-employees have no data analytical- and business analytical skills. | IT-employees have some data analytical- and business analytical skills. | IT-employees have good data analytical skills and business analytical skills. |
| | **Technical skills** | IT-department has no technically skilled employees for integration tasks. | IT-department has some technically skilled employees for integration tasks, but not enough. | IT-department has enough technically skilled employees for integration tasks. |
| | **DevOps skills** | IT-employees are not able to work with DevOps processes. | IT-employees are learning to work with DevOps processes. | IT-employees are able to work with DevOps processes. |
| *Knowledge* | **Knowledge of application** | IT-employees are unaware of how the SaaS-application works, how it is built or how it impacts the IT-landscape. | IT-employees are learning how the SaaS-application works, how it is built and how it impacts the IT-landscape. | IT-employees have a broad knowledge of the application and know how the application works, how it is built and how it impacts the IT-landscape. |
| | **Knowledge of business processes** | IT-employees have no knowledge of the business processes that the SaaS-application covers. | IT-employees know what business processes are covered by the application, but do not have a deep understanding of these processes. | IT-employees have excellent knowledge of the business processes that the SaaS-application covers. |
| *Training* | **Training** | No specific training related to the application, communication or DevOps in place. | Awareness training is given related to the functionality of the SaaS-application. Basic training is available on how to work with the SaaS-application. | Awareness training, communication and DevOps training is given to IT-employees. Intensive, advanced training is available for IT-employees to learn how to work with SaaS-application. |
| | **Knowledge base** | Knowledge base regarding the SaaS-application is not present | Knowledge base for the application is available, but is unstructured. | Structured and clear knowledge base regarding the SaaS-application is available. |
| *Culture* | **Mindset** | IT-employees have a narrow-minded, improvident mindset and are not open for change. | IT-employees are interested in the works of the SaaS-application, but are not eager to work in a different way. | IT-employees have an open-minded, proactive mindset and should be open for change. |

| | | | | |
|---|---|---|---|---|
| | **Motivation** | Motivation is low, and IT-employees are not willing to work with the new system. | Motivation among IT-employees is medium. | Motivation is high, and IT-employees are eager to learn to work with the new system. |
| | **Future reassurement** | IT-employees are uncertain about their future in the new environment and are unaware of the changes that the migration will cause. | IT-employees are aware of the changes that the migration will cause, but are uncertain about their future. | IT-employees feel that they have a future in the new environment and are fully aware of the changes. |
| | **Incentives** | No incentives are offered to increase motivation. | Some incentives are provided to stimulate working with the new application. | Financial incentives are provided to stimulate IT-employees. |
| ***Capabilities*** | | | | |
| ***Contractual Governance*** | **SLA** | SLA is made between user and SaaS-provider. However, no NDA is included in the SLA and agreements are unclear. | SLA (without NDA) between user and SaaS-provider is agreed upon and agreements are clear. | Collaboration with the SaaS-provider is safeguarded by means of an SLA, including NDA and strict agreements related to expectations of the service. |
| | **Procurement** | There is no specific employee in the IT-department that is responsible for procurement. | Procurement tasks are performed by IT-employee(s) at random. | IT-procurement specialists are present for procurement tasks. |
| | **Contract re-valuation** | No meetings are planned for re-valuing the contract. | Re-valuation meetings with the vendor are initiated. | Structural meetings are planned with the vendor to re-value the contract. |
| ***Relational Governance*** | **Vendor relationship** | The relation between the IT-department and the SaaS-provider is poor. | The relationship between IT-department and SaaS-provider is moderate. | The relationship between the IT-department and the SaaS-provider is excellent. |
| | **Vendor management** | It is unclear who is responsible for managing the relationship with the vendor. The vendor is unaware of the expectations and demands of the IT-department. | IT-employee with some vendor management skills is responsible for managing the relationship with the vendor. The vendor has a basic idea of the expectations of the IT-department. | A vendor manager is present in the IT-department and structurally a meeting is organized to discuss the performance of the SaaS-application. Expectations or issues are clearly communicated to the vendor. |
| | **Vendor offerings** | Incentives from the vendor to connect with other users are ignored. | IT-employees make use of some of the incentives organized by the vendor to connect with other users. | IT-employees often make use of workshops, working groups and community groups organized by the vendor. |

# 8 Conclusion and Discussion

## 8.1 Chapter Introduction

Now that the maturity model is developed, the research will be finalized in this chapter by means of a conclusion and a discussion. In Section 8.2, a conclusion will be drawn by giving answer to the four research questions formulated in the first chapter. Then, the results of this research and the developed maturity model will be discussed and reflected upon in Section 8.3, by describing its limitations. Based on these limitations, directions will be provided for future research. Finally, this chapter will be closed with a personal reflection and the provision of further recommendations.

## 8.2 Conclusion

In Chapter 1, the main research goal of this research was defined as follows:

***To develop a framework that can help organizations improve the performance of the IT-department when migrating to a SaaS-environment***

To achieve this research goal, design science research was performed in which four different sub-questions were defined. By answering these sub-questions, it is possible to achieve the main goal of this research. In order to do so, an answer will be given to each of the sub-questions in the next paragraphs.

1. **What are the differences between a situation with and without the use of SaaS?**

In Chapter 2, information was gathered to answer this research question by doing an extensive literature research. From this literature research, it came forward that significant differences exist between a situation with and without SaaS. First, the origination of Cloud Computing and the existing service- and deployment models were defined to give a clear image of how SaaS originated. Then, an in-depth definition of SaaS was provided to identify the differences between a situation with and without SaaS. The most important differences that came forward from the literature research was that IT-equipment and IT-tasks are outsourced when using SaaS, while in an 'on premise' environment these issues are the responsibility of the IT-department. The physical IT-infrastructure such as servers and databases are unnecessary when using SaaS, and the complete application is managed by the SaaS-provider. Moreover, SaaS-applications have a different business model than 'on premise' software, because SaaS is 'paid-per-use'. Further, the literature research showed that the use of SaaS allows for several benefits such as cost transparency, scalability, reduction of up-front costs and global accessibility, but does also involve several risks compared to the use of 'on premise' software. Namely, the use of SaaS increases dependency on the provider and the internet, involves security and privacy risks, and can cause interoperability issues. But above all, the use of SaaS asks for a different organization of the IT-department, due to outsourcing of responsibilities of the IT-department and outsourcing a part of the IT-operation. A conventional IT-department has three main functions: systems developing, operations governance and technical support. Whereas these functions are predominantly related to technical tasks, literature shows that the use of SaaS makes several technical functions unnecessary. Overall, the use of SaaS asks for a different set of skills for IT-employees and a different organization of the IT-department. How the organization of the IT-department exactly changes in a SaaS-environment is not yet defined in

literature and no scientifically based design exists that can help organizations change the organization of their IT-department when migrating to SaaS.

2. **How do organizations' IT-departments change from an organizational perspective when migrating to a SaaS-environment?**

In order to answer this research question, a theoretical framework was developed in Chapter 3 that can help identifying what changes occur within the organization of the IT-department when migrating to a SaaS-environment. After conducting literature research, the Resource Based View of the Firm was used as the underlying theory for the development of this framework. According to the RBV, the firm can be seen as a bundle of resources that should be exploited to gain competitive advantage and the exploitation of these internal resources explain the success and the value of the firm. In this research, the RBV perspective was used to identify which resources should be exploited within the IT-department to perform when migrating to a SaaS-environment. However, the RBV perspective takes the resources of the complete firm into account, while in this research the scope of the RBV narrowed down and focuses on the resources of the IT-department. Four types of resources exist within the firm: physical resources, organizational resources, human resources and capabilities (Barney, 1991). By conducting an extensive literature, the most important resources of the IT-department were identified that could possibly change due to migrating to a SaaS-environment and that should be exploited for a good performance of the IT-department. Moreover, Cloud-experts from Accenture answered a questionnaire regarding the importance of these resources to validate the results of the literature research and mentioned other important aspects that were not found in literature. The literature research and the expert questionnaires resulted in the identification of the following important resources: *financial assets, organizational structure, management systems, skills, knowledge, training, culture, contractual governance,* and *relational governance*. For every resource, a proposition was formulated regarding its relation to the migration to SaaS.

In Chapter 4 & 5, case study research was performed to find out how the use of each resource in the IT-department changed when migrating to SaaS and how resources should be exploited for an optimal performance of the IT-department. Interviews were conducted with employees that have a role in the IT-department at three case organizations that have recently migrated to a SaaS-environment. For each resource, one or more propositions were formulated related to the perceived impact of the SaaS-migration on this resource. In Chapter 6, the empirical findings of the case study were discussed and compared with the formulated propositions. From the case study it came forward that the use of SaaS does not necessarily lead to cost reduction of the IT-operation, this is highly dependent on the type of application and the underlying reason for migrating to SaaS. On the other hand, the costs of the IT-department will increase during migration due to the need for additional resources and double licensing costs. Further, it came forward that, on short term, the use of SaaS does not lead to shrinkage of the IT-department, even though many tasks are outsourced. Although the size of the IT-department does not decrease, there is a need for highly skilled IT-employees that are able to perform integration and procurement tasks. In general, it can be concluded that the use of SaaS causes a shift from 'technical' tasks to 'functional' tasks within the IT-department. Moreover, the use of DevOps processes is recommended in the IT-department to improve communication, collaboration, and integration when migrating to SaaS. One of the most significant changes within the IT-department is related to skills and knowledge. Due to the outsourcing of technical tasks, technical skills become less necessary. On the other hand, soft skills such as coordination skills, communication skills, procurement skills, delivery management skills become increasingly important in the IT-department. Also, IT-employees require a broader

knowledge of the SaaS-application, compared to 'on premise' applications. To acquire these new skills and knowledge, training is required in a SaaS-environment. It is essential to give awareness training, key-user training, communication training and training related to working with the new application and DevOps. Further, it is important to have IT-employees with a proactive and open-minded mindset, that are open to change. To keep IT-employees motivated and stimulated when migrating to SaaS, it is crucial to clearly communicate the changes within IT-department, ensure employees of their future in the department and reward them with a financial bonus if they successfully work with the new application. Finally, contractual and relational governance become important capabilities when migrating to SaaS; strict SLAs should be made, meetings with the vendor should be held on regular basis and the communication should be clear, for a successful collaboration with the vendor. These findings and other additional findings that came forward from the case study formed the basis of the development of the framework that will be discussed in the next section.

3. **What would a framework look like that can support organizations' IT-departments when migrating to a SaaS-environment?**

In Chapter 7, the framework that can support organizations for optimizing the performance of the IT-department when migrating to SaaS, is developed in the form of a maturity model. This maturity model can be used to assess the state of each of the resources and capabilities of the IT-department identified in the previous sub-question. On the y-axis of the model, each of the 9 resources identified in Chapter 3 is shown. Moreover, one additional physical resource that came forward as important during the case study was added: *technological tools*. The x-axis represents three maturity levels that indicate the state of exploitation of each resource: *unaware and underdeveloped*, *aware and initiating* and *optimizing*. The findings of the case study are used as the input for this maturity model. During the case study, the interviewees gave their idea of what the ideal state of each resource would be when migrating to a SaaS-environment. These recommendations together with the rest of the findings were used to describe the different maturity levels of each resource. After the development of the maturity model, two evaluation interviews were conducted with SaaS-migration-experts, to validate the content of the model and make improvements. The final maturity model is shown in Table 12.

4. **What are the benefits from the use of this framework?**

The aim of the maturity model is to support organizations to optimize the performance of the IT-department when migrating to a SaaS-environment. The use of this model can bring several benefits. First of all, the management and IT-managers of organizations that are migrating to SaaS or have decided to migrate to SaaS, can use this model to become aware of the importance of specific resources and consequently identify which resources in the IT-department are underdeveloped. It allows them to identify weaknesses that could hinder working with SaaS and to identify the improvements that should be made. Moreover, the identification of maturity levels gives them the opportunity to prioritize the improvements to be made. Another benefit of using the maturity model is that it can guide organizations in the right direction how to improve the IT-departments resources. The model can facilitate as a tool for discussion within the IT-department on how to exploit resources during a SaaS-migration. On the other hand, the maturity model can be useful for consultants of Accenture that will facilitate a SaaS-migration for a client. Using this model, Accenture can inform their clients of the possible changes that will occur within the IT-department. Consequently, the client and consultants can discuss the current state of the resources of the IT-department and where improvements should be made.

By answering these sub-questions, the main research goal of this study has been achieved: *To develop a framework that can support organization's IT-departments when migrating to a SaaS-environment.*

# 8.3 Discussion

In the following sections, the results of this research will be discussed and reflected on. First, the empirical results will be discussed (Section 8.3.1), followed by the scientific contribution (Section 8.3.2) and societal contribution (Section 8.3.3) of this research. The limitations of this study will be elaborated on in Section 8.3.4 and based on the limitations of this study, recommendations for future research will be made (Section 8.3.5). Then, a reflection will be given on the choices that were made during this research in Section 8.3.6. This study will be finalized with further recommendations regarding the developed maturity model and the relation to the COSEM Master Program.

## 8.3.1 Discussion of the Empirical Results

From the case study, it came forward that IT-employees did not experience lower operational costs in the SaaS-environment, while Chou & Chou (2008) and Janssen & Joha (2011) have argued that the use of SaaS can lead to lower direct costs for the IT-operation. This difference might be caused for two reasons. First, this study focused on short term, not long term. On long term, the costs might decrease. Second, it was indicated that cost transparency is important for IT-employees to know what the SaaS-migration can bring for benefits in terms of costs. A lack of cost transparency could have caused the IT-employees to think that there was no reduction in costs, while the costs did actually decrease. This strengthens the statement that cost transparency is an important aspect. The use of SaaS allows for better transparency of costs (Janssen & Joha, 2011), but is important that the costs will be clearly communicated towards everyone in the IT-department in order to create overall transparency of costs, and not only for decision-makers. In the case studies, the size of the IT-department did not decrease, while this was expected (Willcocks et al., 2013). This can be caused by the short term perspective of this study. Moreover, it was argued by one of the interviewees, that on long term the size of the IT-department would probably decrease. Hence, this study indicates that shrinkage of the IT-department does not occur on short term. Additionally, the IT-departments of large organizations will not decrease as quickly compared to small or medium-sized organizations, because a lot of IT-tasks will remain besides those related to the SaaS-applications.

It is interesting to see that in literature no statements have been made regarding the use of smart alerts and central monitoring dashboards, which can be beneficial to avoid workarounds. Also, the use of DevOps did not come forward from the literature research as a useful type of management system for SaaS-migrations and the use of SaaS. This can be due to the fact that the concept of DevOps is a relatively new way of working and not research has been done on the effect of DevOps on SaaS-migrations. However, this study does provide a good foundation for further research regarding the application of DevOps in SaaS-environments. From the literature research, it was argued that the IT-department would require a different organizational culture when migrating to a SaaS-environment (Kanter, 1983). In contrast, the majority of the interviewees indicated that organizational culture does not change on short term, so culture did not play a role during the migration. This is an interesting insight, because it did come forward from the interviews that a pro-active and open-minded mindset is asked when migrating to SaaS. It can be argued that organizational culture and the mindset of employees are somewhat related, because a way of thinking within the organization can define the culture of an organization. Hence, the culture of the IT-department does indeed require some changes.

It can be argued that this study indicates that the use of SaaS asks for a significant number of different skills in the IT-department, compared to on premise IT-departments. However, this does not mean that every IT-employee should have all of these skills within his skillset; this would be an energy-consuming and difficult task. Nevertheless, it is important that these skills are present within the IT-department, albeit divided over several employees that require those skills for their tasks.

Moreover, the case studies indicated that relational and contractual governance become increasingly important when migrating to a SaaS-environment. However, relational governance and contractual governance in the IT-department were significantly less important for organizations that migrate to small SaaS-applications, compared to organizations that migrated to large applications that cover many business processes. This can be caused by the fact that firms are more dependent on the vendor when many business processes are covered, so the relationship with the vendor is more important compared to the use of small SaaS-applications.

From the case studies, it can be concluded that IT-employees undergo a transition when migrating to a SaaS-environment, which is in line with Bridges Transition model (Bridges, 1986). It is important to guide these IT-employees through the process of organizational change. From the third case, it came forward that good communication and clear goals enhance the motivation IT-employees when migrating to SaaS. The consequence of clear communication is that the transition from the first phase to the third phase from Bridges' Transition model goes quicker. This indicates that communication is key in the IT-department when migrating to a SaaS-environment.

### 8.3.2 Scientific Contribution

This research contributes to the limited amount of literature regarding the organizational changes within IT-departments when migrating to a SaaS-environment. This research provides new insights in how the IT-department is impacted by SaaS on an organizational level. Moreover, a broad range of aspects that change is given, which can extend the current knowledge regarding the changes within the IT-department. Whereas current literature focused mainly on CC in general, this research dives deeper into the concept of CC by differentiating between service models (SaaS).

The maturity model that is developed in this study contributes to the current body of knowledge on scientific based tools that can guide organizations when migrating to a SaaS-environment. In literature, tools exist that are related to technical changes within the IT-department, but not on an organizational level. Therefore, this maturity model is a relatively new concept in literature.

### 8.3.3 Societal Contribution

The maturity model designed in this research is developed to support decision makers of large organizations to adapt the organization of the IT-department when migrating to SaaS. No such tool exists yet and, according to Accenture, many organizations that migrate to SaaS have questions related to changes within their IT-department. This maturity model can serve as a tool for decision makers and people involved in SaaS-migrations, to discuss where improvements should be made within the IT-department. Such a tool is relatively new and can be helpful for many large organizations.

### 8.3.4 Limitations

Although the research goal has been achieved and the desired supporting framework has been developed, this study does have some limitations. First of all, only three cases were studied during the case study research due to time restrictions, which could be a reason for questioning the generalizability of this research. It was observed during the case study research, that some differences in the results existed between the three cases. By including more cases with different characteristics, the generalizability of this research could have increased. Also, in the case study it came forward that the way of exploiting some resources depends on the size of the SaaS-applications that were used. It appeared that the exploitation of some resources and capabilities was more important for organizations that migrated to large applications compared to organizations that migrated to small applications. For example, when using large SaaS-applications, contractual and relational governance is more important compared using small SaaS-applications. Therefore, the generalizability of this model can be questioned when taking the size of the implemented SaaS-applications into consideration. Considering the choices made in the design of the maturity model, it can be argued that the model is especially useful when migrating to large applications. Differentiating between types and size of SaaS-applications can be suggested for future research. Moreover, as this research studied only the effects of SaaS on large organizations, the results and the use of the model are limited and the possibility exists that it could not be useful for small or medium sized companies.

Further, the developed maturity model exists out of three levels, which is less compared with maturity models found in literature and could make assessing the maturity level for each of the resources difficult for the organization or Accenture. A suggestion for future research would be to build further on this maturity model and aim for extension of the maturity levels. Still, the maturity model was validated by two Cloud-experts from Accenture to check for the usability and applicability. However, as the maturity model serves as a tool for the management and IT-managers of organizations, the validation of the model could have been stronger when validated by the management of the organizations or IT-managers as well. Also, due to time constraints, a pilot assessment of the model has not been performed. This could have contributed to the validity of the model but leaves space for future research.

Moreover, by doing literature research and conducting questionnaires on resources and capabilities, a structure for assessing the changes in the organization was formed. However, by focusing only on these resources during the case study, other important changes in the IT-department might have been missed. Still, by conducting open-ended and unstructured interviews, the possibility of biases was attempted to be reduced.

Furthermore, approximately three people per case were interviewed. The possibility exists that the interviewees did not have the right knowledge or experience to give trustworthy answers. By doing more interviews per case, the reliability of the results of the case study could have been increased. Even more, the results of this study could have been different, because some interviewees might have been biased. However, by using unstructured interviews, triangulation of evidence, and using propositions, the possibility of biased results is reduced as much as possible. Moreover, although rich information can be extracted from a case study, the opinion of a small part of the IT-department regarding the impact of SaaS is included. Including the opinions of more people with different functions and backgrounds by using another method, such as a survey, could have led to different results.

Last, in the case study, organizations were observed that have recently migrated to a SaaS-environment. The observations made in the study were based on short term experiences of IT-employees. During the interviews, it came forward that some of the resources could have been affected differently by a SaaS-migration on long term. Therefore, the possibility exists that the results could be different when looking at the effects of SaaS on long term.

### 8.3.5 Future Research

Based on the limitations mentioned in the previous paragraph, some interesting insights can be noticed and recommendations can be made for future research. First of all, during the case study it came forward that IT-departments do not shrink in size on short term when migrating to SaaS. Also, it was mentioned that the culture of the IT-department does not change on short term. So, it would be interesting to find out how the use of SaaS impacts the size, culture and other aspects of the IT-department on long term. Further, as was mentioned before, the use of resources of the IT-department is dependent on the type and size of the application that is used. For the sake of the generalizability, each selected case made use of different SaaS-applications, in order to develop a general model. However, in future research the differentiation can be made between the types and size of SaaS-applications, and study the impact of these separate applications on the organization of the IT-department. It would be interesting to see what the differences would be compared to the results of this study. Also, in Chapter 1 it was discussed that in literature no differentiation has been made between service models (IaaS, PaaS and SaaS) when assessing the impact of Cloud Computing on the organization of the IT-department. For this reason, this study focused on the impact of SaaS on the IT-department. Additionally, studying the impact of both IaaS and PaaS could give interesting insights for analyzing the differences between service models and their impact on the organization. Also, this study focused on the use of Public Clouds and did not take other deployment models into consideration. Studying the effects of both Private Clouds and Hybrid Clouds on the IT-department could contribute to the existing literature on the effects of CC on the IT-department.

In this study, the use of DevOps processes was highly recommended for migration to SaaS, integration of SaaS-applications in the current IT-landscape and operation of the IT-department in a SaaS-environment. However, in this research it does not come forward *how* to apply DevOps processes in the IT-department when migrating to SaaS. Therefore, further research is necessary to make recommendations on the use of DevOps when migrating to SaaS. Further, as mentioned in the previous section, further research is necessary to build upon the maturity model developed in this research; consequently extending the maturity levels and possibly include more important resources in the model. This can contribute to the usability of the applicability of the maturity model. Moreover, according to literature, the use of SaaS often leads to lower costs of the IT-operation. However, the case study showed that the costs of the IT-operation do not necessarily decrease when migrating to a SaaS-environment. Reduction of costs is dependent on the type of application and the reason for migrating. Further research is needed to discover under which circumstances the use of SaaS does lead to cost reduction of the IT-operation.

Another recommendation that can be made for future research is related to the development of the maturity model. According to de Bruin's framework for developing maturity models, the final step in the model's development is *Maintain*. This refers to the continuous improvement of the model that is necessary to maintain the model's growth and usability. However, in the research this step is left out of the scope due to time constraints of this research. Therefore, future research is necessary to ensure the continuous relevance of the model by maintaining the model over time.

Further, the maturity model can be useful for IT-department when migrating to SaaS from a strategic perspective. This means that the model can be of purpose for IT-managers or other employees are responsible for the strategy of the IT-department. However, during the evaluation interviews it came forward that a similar model focused on the operational level of the IT-department could be very useful for the IT-employees involved in the operation when migrating to SaaS. Future research is required to establish such a model.

Finally, in this research the importance of the resources of the IT-department were qualitatively assessed. It could be helpful to repeat this study in a more quantitative approach to assess the relative importance of resources. This could especially be beneficial for improving skills and knowledge, since a significant amount of different new skills and knowledge are required in a SaaS-environment. Quantitative research could assess the relative importance of these skills and knowledge and prioritize the need for training. Moreover, a quantitative approach could give insight into the relation between the use of resources and can contribute to improving the organization of the IT-department when migrating to SaaS.

### 8.3.6 Personal Reflection

In the early stages of this research, it took significant time to correctly scope this research and find out in what way a framework related to improving the performance of the IT-department when migrating to SaaS could contribute to science and society. Moreover, finding the right theory to develop the theoretical model was seen by the researcher as the most difficult part of this research. Nevertheless, the choice for the RBV perspective turned out to be a suitable theory for developing the theoretical framework, despite the time that it took to come to this decision. However, it should be mentioned that the Dynamic Capabilities perspective could have been a valuable theory as well, since this theory aims to improve resources and capabilities in a rapidly changing market. As was discussed in Chapter 2, the concept of SaaS is constantly developing and the related technologies are continuously being improved. Therefore, the Dynamic Capabilities perspective could give an interesting view on the use of resources in the IT-department in a SaaS-environment. However, the use of this perspective could have given a different result compared to the outcome of this study.

Moreover, the collection of data requires some reflection. For the case study, interviews and company documents were necessary for gathering information. Finding IT-employees that were willing to share their experience was a relatively easy task. However, the search for companies that have recently migrated to a SaaS-environment, was challenging. Luckily, consultants at Accenture were available for support with finding the right cases. In hindsight, the researcher would have started with the search for cases in an earlier phase, due to the lack of suitable cases. Moreover, the collection of company documents was a difficult process, because some interviewees were not willing to share (possible) sensitive data. Eventually, the company documents that could be collected were only used for getting a better image of the organization of the IT-department of each case and were not used for the further development of the model. So, the use of only interviews would have been sufficient for getting a good result of this study.

In hindsight, conducting the interviews could have been done more strictly. During some of the interviews, the interviewee diffused from the targeted subjects and the researcher should have intervened in earlier stages of the interview, to get the right results out of the interview. Because of the unstructured nature of the interviews, this was a challenging issue, which made the interpretation of results in the transcripts more difficult. However, conducting the interviews was

the part of the study that the researcher found most interesting, as it was very informative to talk directly to the enthusiastic IT-employees about the transition to SaaS.

### 8.3.7 Recommendations

Based on the results of this study, some recommendations can be made for two parties in particular: organizations that are migrating to a SaaS-environment and Accenture.

Regarding the first, when assessing the maturity model, IT-managers and other decision makers responsible for the IT-department should take into consideration that the model does not identify the relative importance of improving resources and capabilities. Although the model can support to identify which resources are underdeveloped and should be exploited, it does not give what the priority is for improving resources. Therefore, decision makers should have profound discussions on which resources have priority for improvement when assessing the model. Nevertheless, this model can be used for the facilitation of such a discussion. Moreover, although the model is developed for SaaS-applications is general, the respondents of the model should take into consideration what the characteristics of the SaaS-application to be implemented are and take this into account when deciding on improvements to be made in the IT-department. For very small applications that do not influence the rest of the IT-operation, the possibility exists that this model is not suitable.

For Accenture, the following recommendations can be made. During this study, it came forward that the developed model can be useful for Accenture's consultants when facilitating a migration to a SaaS-environment for a client. Together with the client, a discussion based on the model could be held about where improvements should be made in the client's IT-department when migrating to SaaS. Accenture should take into consideration that this model is developed based on the experiences of IT-employees in large companies and that the model might not be useful for clients which are significantly smaller. However, most clients of Accenture are generally large enterprises, and therefore the model could be of the use for consultants facilitating SaaS-migrations. Further, Accenture should be aware of the fact that the concept of SaaS is continuously developing and therefore the maturity model might not be applicable on the long term. It is highly recommended, regarding the rich amount of knowledge and expertise that Accenture has related to SaaS, to keep improving the model in line with the new developments and features of SaaS and therefore maintaining the usability of the model.

### 8.3.8 Relation to COSEM

During this research, a significant amount of methods and theories from the COSEM Masters Program were used by the researcher to perform this study. *Complex Systems Engineering (SEN112)* and *Managing Multi-actor Decision Making (SEN114)* were helpful for one of the most important issues within this research: defining the problem definition and making objectives for the solution. By following these courses, the researcher has developed skills to successfully tackle complex problems in socio-technical environments and make use of Design Science Research. This research has an obvious socio-technical nature; the concept of SaaS (technical) and organizational changes (social). *I&C Architecture Design (SEN161), I&C Service Design (SEN162)* and *Integrated Design of I&C Architectures (SEN164)* provided the researcher of a good knowledge base regarding the complex nature of socio-technical ICT systems. Thanks to the knowledge gained during these courses, the researcher was able to understand the concepts of CC and SaaS better and more quickly. Finally, the *Design Project (SEN116)* and *CoSEM Research Challenges (SEN131)* prepared the researcher to successfully and properly conduct a literature research and large projects such as this thesis.

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# Appendices

## Appendix A. Expert Questionnaire

# Expert Questionnaire

### Introduction

Dear respondent,

For my thesis, I am studying how the organization of the IT-department of large companies is affected by the migration to a SaaS-environment. I would like to find out what the most important changes are that occur due to the migration, and how the IT-department would ideally look like after migration to SaaS.

According to literature, companies exist out of four major types of resources: Physical resources, organizational resources, human resources and capabilities. By doing a literature review, I have found the most important resources and capabilities of the IT-department, and that are most likely to change due to SaaS-migration.

In the following questionnaire, I will ask your opinion regarding the importance of the chosen resources and capabilities in the IT-department and how they will change due to SaaS-migration. Moreover, I will ask what other resources or capabilities that I have not mentioned could play an important role in the IT-department after SaaS-migration.

Thank you for your collaboration.

Kind regards,

Justus Rijnveld

### Physical Resources

Physical resources can be seen as tangible resources such as IT, financial assets, raw materials etc. For this research, only financial assets are chosen as an important physical resource in the IT-department after SaaS-migration.

1. To what extent are financial assets important in the IT-department after SaaS-migration?
   Not important 1 2 3 4 5 Important
2. Does the total cost of the IT-operation change? If yes, how?
3. What other physical resources could be of importance or could change, and why? (For example IT, equipment, raw materials, etc.)

## Organizational Resources

For this research, management systems and organizational structure are chosen as the most important organizational resources in the IT-department after SaaS-migration.

Management systems refer to all processes, policies and procedures that are used to achieve the department's objectives.

Organizational structure refers to the roles, competencies and responsibilities of the IT-department.

1. To what extent are management systems important in the IT-department after SaaS-migration?
   Not important 1 2 3 4 5 Important
2. Are different policies, processes or procedures used to achieve the goals of the IT-department?
3. To what extent is organizational structure important in the IT-department after SaaS-migration?
   Not important 1 2 3 4 5 Important
4. Do roles, responsibilities and competencies change? If yes, how?
5. Does the IT-department's size change?
6. What other organizational resources could be of importance or could change, and why? (For example planning systems, control systems, etc.)

## Human Resources

For this research, skills, knowledge, training and organizational culture are chosen as the most important human resources in the IT-department after SaaS-migration.

1. To what extent are skills important in the IT-department after SaaS-migration?
   Not important 1 2 3 4 5 Important
2. Do IT-employees require new skills? If yes, what kind of skills?
3. To what extent is knowledge important in the IT-department after SaaS-migration?
   Not important 1 2 3 4 5 Important
4. Do IT-employees need to acquire new knowledge? If yes, what kind of knowledge?
5. To what extent is training important in the IT-department after SaaS-migration?
   Not important 1 2 3 4 5 Important
6. Do IT-employees need training after SaaS-migration? If yes, what kind of training?
7. To what extent is organizational culture important in the IT-department after SaaS-migration?
   Not important 1 2 3 4 5 Important
8. Do norms and values change or need to change after SaaS-migration? If yes, how?
9. What other human resources could be of importance or could change, and why? (experiences, insights, etc.)

## Capabilities

Capabilities can be described as the ability to transform a firms resources into results. For this research, contractual governance and relational governance are chosen as the most important capabilities for the IT-department after SaaS-migration.

Contractual governance refers to safeguarding the cooperation between user and vendor through formal contracts.

Relational governance refers to safeguarding the relationship with the vendor through social processes and norms.

1. To what extent is contractual governance important for the IT-department after SaaS-migration?
2. Not important 1 2 3 4 5 Important
3. Do IT-employees focus more on contracting?
4. To what extent is relational governance important for the IT-department after SaaS-migration?
5. Not important 1 2 3 4 5 Important
6. Do IT-employees focus more on maintaining a good relationship with the vendor?
7. What other capabilities could be of importance or could change, and why? (other types of governance)

---------- **Other** ----------

1. What other resources that have not been mentioned before, could be of importance or could change in the IT-department after SaaS-migration?

# Appendix B. Case Interviews

# Case Interview

| | | | |
|---|---|---|---|
| Organization: | | Years in Function: | |
| Interviewer: | | Date: | |
| Interviewee: | | Function: | |

---------- **Intro** ----------

- Preparation
  - Do you mind if I record this conversation?

- Introduction
  - Introduction about myself
  - Introduction about thesis subject
  - Purpose of the interview

- General
  - What is your function?
  - What is your background?
  - What SaaS-applications are used within your company?
  - How long have these SaaS-applications been in use?
  - Did you experience the SaaS-migration?

---------- **Physical Resources** ----------

- Financial
  - Did the total costs of the IT-department change **during** the SaaS-migration?
  - If yes, what are these costs?
  - Did the total costs of the IT-department change when the SaaS-application(s) was **in use**?
  - If yes, what are these costs?
  - Are there other important expenses?
  - How can these costs be kept low?

---------- **Organizational Resources** ----------

- Organizational structure
  - Did the structure of the IT-department change after the SaaS-migration?
  - Did new functions or responsibilities arise/ Did certain functions become unnecessary?
  - How important are these?
  - Did the size of the IT-department change?
  - What does the structure of the IT-department look like in the ideal situation after SaaS-migration?

- Management Systems
    - Does the IT-department make use of different management systems since the SaaS-migration?
    - Did certain management systems become unnecessary
    - Did changes occur within the (management) processes of the IT-department?
    - What kind of management systems are ideally used in the IT-department in a SaaS-environment?

---------- **Human Resources** ----------

- Skills
    - Do employees of the IT-department need to acquire new skills after SaaS-migration? If yes, what kind of skills?
    - What skills became unnecessary?
    - To what extent are 'soft skills' more important than 'hard skills'?
    - What skills do IT-employees ideally have in a SaaS-environment?

- Knowledge
    - Do IT-employees need new knowledge after SaaS-migration? If yes, what kind of knowledge?
    - What knowledge became unnecessary?
    - What kind of knowledge do IT-employees ideally have in a SaaS-environment?

- Training
    - To what extent is training of IT-employees important after migration to a SaaS-environment?
    - What kind of training related to the SaaS-migration do IT-employees get at your current employer?
    - What kind of training do IT-employees ideally get in a SaaS-environment?

- Culture
    - Does the organizational culture of the IT-department change after migration to a SaaS-environment? (norms and values, diversity, job satisfaction)? If yes, what are these differences?
    - What does the organizational culture look like in the ideal situation?

---------- **Capabilities** ----------

- Contractual Governance
    - To what extent is drawing up and maintaining contracts with the Cloud-vendor important within the IT-department?
    - Is this the responsibility of the IT-department?
    - Are certain processes or procedures used to do so?
    - What does this look like in the ideal situation?

- Relational Governance
    - To what extent is maintaining a good relationship with the Cloud-vendor important within the IT-department?
    - Is this the responsibility of the IT-department?
    - Are certain process or procedures in use to do so?
    - What does the relationship with the Cloud-vendor look like in the ideal situation?

---------- **Conlusion** ----------

- Ex Post
    - Next to the discussed points, are there other important changes within the IT-department after a SaaS-migration?
    - Which of the discussed resources did you find most important?

- Closing
    - Thank the interviewee

# Appendix C. Findings of Case Studies

| | Chemical Sector (Small applications) | | Food Production Sector (large CRM application) | | Financial Sector (large HR application) | |
|---|---|---|---|---|---|---|
| | Observations | Recommendations | Observations | Recommendations | Observations | Recommendations |
| Financial Resources | • Costs increased due to double licensing costs<br>• Due to technical restrictions it was not possible to avoid double licensing<br>• Operation costs and support costs decreased after migration<br>• Costs decreased because capacity planning was outsourced | • To keep costs low, choose the cheapest vendor<br>• Quality is more important than price | • During migration, costs increased due to double licensing and additional resources<br>• Shortly after migration, operational costs were higher, due to technical implications and workarounds<br>• On long term, operational costs did not change compared to on-premise | • Keep costs transparent for IT-employees<br>• Deadlines during migration should be clearly communicated<br>• Make a structured planning upfront and report afterwards<br>• Offshore the IT-helpdesk | • Total costs increased due to double licensing costs<br>• Total costs decreased after migration due to cut-off of old system and applications<br>• Large part of the datacenters became unnecessary, due to outsourcing of infrastructure<br>• The biggest win in costs was the higher efficiency of the HR-department | • The costs related to unnecessary infrastructure should be covered<br>• Get rid of unnecessary hardware |
| Structure | • Operations and maintenance management became more 'functional' than 'technical'<br>• Developing and maintenance functions have disappeared<br>• The focus of IT will go from developing and design, to integration and procurement<br>• Size of the IT-department did not decrease | • IT-employees that focused on developing and maintenance, should focus on integration<br>• Have a yearly 'clean-up', to assign new tasks to employees | • The size of the IT-department did not decrease after migration<br>• DevOps was applied during and after migration<br>• Using the DevOps approach caused changes in roles and responsibilities<br>• IT-employees needed time to get used to these changes | • Roles and responsibilities should be transformed to work with the DevOps approach, to be able to work with changes quickly in an Agile way<br>• A change approval should be arranged upfront to design the Agile and DevOps processes<br>• Keep infrastructure managers in the IT-department<br>• Clearly communicate to the IT-employees what is going to change in their way of working | • Fewer infrastructure managers were required<br>• Tasks of infrastructure managers were outsourced<br>• Technical development tasks were outsourced<br>• There was a need for functional specialists in the IT-department<br>• There was a shift from technical maintenance to functional maintenance | • Educate IT-employees on how the business processes covered by the application work, in a modular way<br>• Hire contract- and vendor management employees specialized in IT-procurement |
| Management Systems | • The same management systems were used in the IT-department as before | • Work with DevOps when migrating to a SaaS-environment, to gradually deploy the application | • Operations and maintenance processes changed due to the DevOps approach. | • Make use of DevOps for operations and maintenance tooling. | • The IT-department is working towards an Agile environment. | |
| Skills | • After the migration, technical application and design skills are not required<br>• Delivery management skills became increasingly important<br>• Skills shifted from Design, Build and Operate to Procure and Monitor<br>• There were too little technically skilled IT-employees | • IT-employees should have good coordination skills to work with several external partners<br>• IT-employees should have procurement skills, to ensure the best deals for the SaaS-solutions<br>• IT-employees should have good integration skills, for integration of the application with the rest of the IT-landscape<br>• It is important to have enough technically skilled employees in the IT-department | • IT-employees used to work with Waterfall<br>• If IT-employees are not able to cope with change, they quickly fall back into their old way of working<br>• Communication between IT-employees and business employees was difficult<br>• The dynamic nature of DevOps made drawing up SLA's difficult. | • IT-employees should be able to work with DevOps processes<br>• IT-employees should be able to cope with change<br>• IT-employees should be able to work with the new application<br>• IT-employees require better communication skills<br>• IT-employees and business employees should work together in teams to improve communication | • Data analytics and data processing skills became more important<br>• Integration skills were required during the migration<br>• Business analytical skills became more important<br>• IT-employees served as a bridge between Workday and the IT-department | • IT-employees should be able to work with new business processes involved with the new application<br>• IT-employees should have good communication skills<br>• Architectural skills should remain in the IT-department |
| Knowledge | • Troubleshooting is done in a different way than before | • IT-employees should have a broader knowledge of the application<br>• IT-employees should know how the new application impacts the rest of the IT-landscape<br>• IT-employees should know what a provider offers, to be able to choose the best SaaS-solution | • The line between the infrastructure-layer and the application-layer fades in a SaaS-environment | • All roles within the IT-department should have enough knowledge of the build and the functioning of the SaaS-application<br>• IT-architectures should learn the architecture of the new platform and the integration with the rest of the landscape | • Solution architects were transformed into Workday specialists | • IT-employees need to have a better understanding of how data works<br>• IT-employees should know how to work with the application and how it is built |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | • Infrastructure managers should have more knowledge of the application | | |
| Training | • After migration, a new function was introduced to provide training related to SaaS-applications<br>• Online material was provided for training of key-users<br>• Basic training was given on how SaaS works<br>• SaaS-providers offered knowledge bases with documents about the application | • Leadership training should be given to teach IT-employees how to manage SaaS-providers<br>• The knowledge base provided by the vendor should be made easily accessible and structured<br>• IT-employees should be trained to functionally maintain the new application | • IT-employees initially did not know how the new platform worked<br>• Awareness training was offered by the provider<br>• Key-users were designated by the firm, to help others | • IT-employees should be trained to have sufficient know-how of the new application<br>• An awareness training should be given to demonstrate how the platform works<br>• Key-users should be appointed and trained to help IT-employees in case of problems related to the new application<br>• Classroom training should be given to teach how to work with DevOps | • Coaches were trained to support IT-employees with soft skills, such as vendor and contract management<br>• External consultancy companies were hired to teach IT-employees the benefits of SaaS-applications | • Communication training should be given to IT-employees |
| Culture | • Culture does not change on short term<br>• Motivation decreased due to outsourcing of technical tasks<br>• There are fewer technical skilled employees in the IT-department | • Demotivation can be avoided by keeping IT-employees busy with other technical issues<br>• Demotivation can be avoided by letting the provide give a demo on how the application is built | • The organizational culture of the IT-department did not change due to the migration<br>• The migration asked for a different mind-set of IT-employees<br>• Working with DevOps asked for a different mindset<br>• The motivation of IT-employees decreased during and shortly after migration.<br>• Due to bonusses and the realization of the benefits of the application, the motivation returned. | • IT-employees should be open-minded<br>• IT-employees should have a proactive mindset to work with DevOps<br>• Reward IT-employees with a bonus if they prove to be successfully working with the new system<br>• Ensure the IT-employees of a certain future in the new environment<br>• Clearly communicate the changes that will occur | • No significant changes in culture of the IT-department after the migration<br>• IT-employees communicate with people in different countries, which means more diversity and potential challenges to overcome<br>• IT-employees were eager to learn the new system and motivation did not decrease<br>• IT-employees did not immediately know what their role was and how they could be of added value in the new environment | • Give IT-employees time to discover their new roles<br>• Clearly communicate what is expected from the IT-employees in the SaaS-environment |
| Contractual Governance | • Every SaaS-application that was used needs a contract<br>• NDA's were included in the contract to ensure security of data<br>• One IT-employee became responsible for contracting of SaaS-applications | • Re-value the contract every year to get the best deal<br>• Make clear agreements during contracting, to avoid miscommunication | • Performance agreements are now made with the vendor, instead of the infrastructure and network team<br>• Contractual governance started before drawing up the SLA | • Before migration, it is important to understand what the SaaS-provider can deliver<br>• IT-employees should clearly communicate their expectations of the application to the vendor<br>• An IT-procurement team should draw up the SLA<br>• Good communication between IT-procurement team and the vendor is necessary<br>• Meetings with the vendor should be organized on regular basis to discuss and revalue the SLA | • A large part of the SLA is related to the operation and the service level of the application | • It is important to make clear and strict agreements with the vendor about what is expected of the service<br>• For contracting, vendor managers specialized in IT-procurement should be appointed |
| Relational Governance | • The small applications that were recently implemented did not need relational governance | • Large applications need relational governance<br>• The IT-department needs a vendor manager that is responsible for maintaining the relationship with SaaS-vendors<br>• Make use of the trainings and workshops offered by the vendor<br>• It is important to have close contact with the vendor, in order to know when certain functionalities change | • Maintaining the relationship with the vendor was often done very informal | • Designate one or more employees to be the contact person of the vendor<br>• Make clear agreements and a planning with the vendor upfront<br>• Have a yearly meeting with the vendor to discuss the performance of the application<br>• Good communication is necessary for a good relationship with the vendor | • There is much more contact between user and provider compared to 'on premise' applications<br>• Workday organized working groups and community groups, to connect users<br>• The headquarters of Workday was visited | • Meet with the vendor every month to discuss performance of the application<br>• Make use of the of the events that are organized by the vendor |

# Appendix D. Types of DSR Artefacts

*Table 13. Types of DSR artefacts (Offermann et al., 2010)*

| Artifact Type | Use | Structure |
|---|---|---|
| System Design | Description | Structure or behavior-related description of a system, commonly using some formalism (e.g. UML) and possibly text |
| Method | Support | Definition of activities to create or interact with a system |
| Language/Notation | Support | A (generally formalized) system to formulate statements that represents parts of reality |
| Algorithm | Description | Executable description of system behavior |
| Guideline | Support | Suggestion regarding behavior in a particular situation |
| Requirements | Description | Statement about System (e.g. a system of type X should have some property Y, because of Z) |
| Pattern | Support | Definition of reusable elements of design with its benefits and application context |
| Metric | Support | A mathematical model that is able to measure aspects of systems or methods |

# Appendix E. Academic Paper