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AUTOMATION OF FINANCIAL MANAGEMENT PROCESSES BY UTILIZING ROBOTIC PROCESS AUTOMATION – A FINNISH BANKING CASE

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TIIVISTELMÄ

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Tämä Pro gradu -tutkielma tutkii ohjelmistorobotiikan (RPA) hyödyntämismahdollisuuksia taloushallintoon liittyvissä liiketoimintaprosesseissa. Tapaustutkimuksena toteutettu tutkimus tarkastelee suomalaista keskisuurta yritystä pankki- ja rahoitusalalla. Lisäksi kohdeyritystä verrataan suomalaiseen yritykseen vakuutusalalla. Tutkimuksen kohteena on kaksi ohjelmistorobotiikan pilottiprosessia kohdeyrityksessä sekä yksi taloushallinnon prosessi vertailuyrityksessä. Prosesseja tarkastellaan kohdeyrityksen tämänhetkisen RPA-automaatiotilanteen selvittämiseksi. Selvitys tehdään ohjelmistorobotiikan hyödyntämisen toiminta-asteesta kohdeyrityksessä. Selvityksen päätteeksi kohdeyrityksille on laadittu suosituksia tulevia prosesseja silmällä pitäen.

Aiheesta kirjoitettu akateeminen tutkimus osoittaa, että ohjelmistorobotiikkaa voidaan hyödyntää tehokkaasti monien erilaisten liiketoimintaprosessien tarpeisiin. Tällaisia automaatiokohteita ovat prosessit, joiden volyymi on korkea, ovat luonteeltaan manuaalisia, perustuvat selkeisiin säännönmukaisuuksiin sekä sijaitsevat vakaissa ohjelmisto- tai tietokantaympäristöissä. Prosessinäkökulmasta tarkasteltuna edellisissä tutkimuksissa korostuivat suositukset pitkän aikavälin strategian ja vision luomisesta ohjelmistorobotiikan tueksi sekä ohjelmistorobotiikkaa hallinnoivan ja kehittävien tiimien perustamiseksi. Huomiota tutkimuksissa kiinnitettiin myös henkilöstön automaatio-odotusten ja viestinnän hallintaan tiimi- ja yritystasolla.

Yhteenvetona todettakoon, että ensimmäinen ohjelmistorobotiikan pilottiprojekti kohdeyrityksessä tuotti arviolta 0,0 – 1,0 täysiaikaisen työntekijän työpanosta vastaavan automaatiovaikutuksen. Toinen pilotti tuotti arviolta 0,07 – 0,12 työntekijän työpanosta vastaavan vaikutuksen. Työntekijöiden mitattu tyytyväisyys oli korkea ensimmäisessä projektissa ja kohtuullisen korkea toisessa projektissa.

ABSTRACT

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This thesis discusses the utilization of Robotic Process Automation (RPA) in financial management. The thesis incorporates a qualitative case study methodology to examine a Finnish SME Ltd. in banking industry. The case company is also compared to another, larger Finnish enterprise in the field of insurance. This thesis aims to examine two RPA pilot processes within a case company and one process within a reference company. The processes are examined in order to understand the current situation of RPA implementation within the main case company and to analyze feedback from the pilot processes. Some emphasis is also put on to gain insight on the future possibilities of the case company in their financial management related operations. This includes a list of concrete recommendations for the main case company to improve their further RPA pursuits based on the collected data and existing academic literature.

The existing literature suggested that RPA can be used to effectively automate various business operations that are high in volume, manual, repetitive, based on a certain set of clear rules and are in a stable IT environment. As for the processes, various traits such as the need for a long-term RPA business vision and strategy, setting up an RPA governance board and a center of excellence as well as ensuring proper employee expectation management and communication procedures were mentioned.

In conclusion, the first RPA pilot created approximately 0.0 to 1.0 FTEs reduction in the amount of workload faced by the employees and the second pilot from 0.07 to 0.12 FTEs. The employee satisfaction on the automation solutions was high with the first process and moderately high with the second automation solution.

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List of abbreviations

AI Artificial Intelligence

BPA Business Process Automation

BPM Business Process Management

BPO Business Process Outsourcing

CA Cognitive Automation

COE Center of Excellence

CRM Customer Relationship Management

EAI Enterprise Application Integration

ERP Enterprise Resource Planning

ESB Enterprise Service Bus

ESOA Enterprise Service-oriented Architecture

FTE Full-time equivalent

GUI General User Interface

IEEE the Institute of Electrical and Electronics Engineers Standards Association

IA Intelligent Automation

IFRS International Financial Reporting Standards

IRPA Institute for Robotic Process Automation

IT Information Technology

ITPA Information Technology Process Automation

KPI(s) Key Performance Indicator(s)

ML Machine Learning

OCR Optical Character Recognition

PDD Process definition document

PRH the Finnish Patent and Registration Office (Patentti- ja rekisterihallitus in Finnish)

RaaS Robotics as a Service

RBA Run Book Automation

RDA Robotic Desktop Automation

RPA Robotic Process Automation

SaaS Software as a Service

SOA Service Oriented Architecture

TCA Thematic Content Analysis

UI User Interface

VBA Visual Basic

YTJ The Business Information System BIS (Yritys- ja yhteisötietojärjestelmä in Finnish)

1. INTRODUCTION

Foundational questions of business and Information systems engineering authors and readers are: “What should be automated?” and reversely: “What should be done by humans?” (van der Aalst, Bichler & Heinzl 2018, 269). Developments in data science, machine learning and artificial intelligence force us to revisit this question over and over again. Technological changes began with digitalization and mobile technologies followed by other disruptive technologies such as automation, big data, data analytics, mobile technologies, smart devices, cloud technologies, robotics, Internet of Things (IoT) and many other technological improvements (Kaya, Turkyilmaz & Birol 2019, 236). Stople, Steinsund, Iden and Bygstad (2017) see that this development is getting faster and faster since companies are digitalizing at an accelerating rate. Lightweight IT solutions including smartphones, tablets, virtual robots, Artificial Intelligence (AI), advanced analytics, sensors as well as IoT are being used by different companies more than ever before. Humans working side by side with software robots is no more science fiction, but already reality in numerous different organizations worldwide (Anagnoste 2018, 307).

According to the Institute for Robotic Process Automation (IRPA 2015, 5) many technologies including AI, expert systems and other methods of process automation have been the predecessors leading up to Robotic Process Automation (later referred shortly to as RPA). RPA has gained popularity quickly since it has been seen to offer unique capabilities and advantages over the previous technologies (IRPA 2015, 5). RPA is currently in a new state of maturity where it has moved past the days of screen scraping and scripting to an overall solution that can work alongside existing technologies such as Business Process Management (BPM) and Enterprise Application Integration (EAI) to automate different complex processes and activities (Barnett 2015, 2). Other terms used for similar approaches have also been referred to as Information Technology Process Automation (ITPA) and Run Book Automation. (Fung 2014, 1; Nizri 2012, 4; Riedl & Beetz 2019, 3-4) RPA can also occasionally be referred to as smart automation or intelligent automation (Gartner 2019a, 3; Laurent, Chollet, Herzberg 2015). The term RPA has gained the most interest according to Google trends, relative interest of the term Robotic Process automation has been much higher than of ITPA or Run Book Automation. Also, the term used in the current literature has been RPA, apart from Fung (2014).

According to IRPA founder Frank Casale (IRPA 2015, 3-4), we cannot deny automation and RPA is the today’s outsourcing. According to Casale, the development will be unstoppable. Organizations that do not make the pivot towards automation will suffer the same loss as the companies that did not prepare for the outsourcing economy two decades ago. Yurcan (2017) claims in the American

Banker that the robotics technology may find its way to nearly all aspects of running the bank including, but not limited to financial reports such as HR, administrative functions, financial management and financial advisory. According to Papageorgiou (2018, 27), over the next four years (2019-2022), the RPA market is expected to grow to a roughly 200-billion-dollar industry, with the vast majority of Fortune 1000 companies adopting to it. Authors such as Galusha (2018, 44-45) state that for enterprise innovators, it is not only critical to understand how RPA solutions are defined and distinguished from one another, but how the utilization of RPA can steer your organization on a long-term path of continued automation and learning.

Baranauskas (2018, 251) claims the scientific Robotic Process Automation and Robotic Desktop Automation (RDA) research and related combinations with other Business Process Management (BPM) methods as well as Lean or Agile process development have not been widely discussed yet. Since RPA is a relatively new technology, there is relatively limited amount of academic research available on the topic. According to one of worlds' largest RPA vendors, UiPath, the emergence of the term "robotic process automation" came around in the early 2000 (UiPath 2016). Still, the proper utilization of RPA has gained popularity within different enterprises after 2010. For instance, an U.K. telecommunications company Telefónica O2 was one of the first case companies that started their RPA experimentation back in 2010 (Lacity & Willcocks 2016, 25). The Telefónica O2 case is elaborated also more in the third chapter. In part, this thesis seeks to fulfil this research gap by offering another case-based research on the topic.

1.1 Research objectives

The focus of the research is in a cross-section of financial management and Information Technology (IT). The presented solutions are based on IT and robotics, but the different target processes are management and business oriented. In itself, "financial management" is the umbrella term used to describe the presented processes. According to the London School of Business and Finance (2018) "Financial management refers to the strategic planning, organizing, directing and controlling of financial undertakings in an organization or an institute. It also includes applying management principles to the financial assets of an organisation, while also playing an important part in fiscal management". Financial management consists of financial planning, control and decision-making. This includes different business functions, financial management or administration processes. Similar to other management disciplines, financial management is not isolated from other management operations. It can be seen as an integral part of the general management of any organization (McMenamin 1999,

8). This thesis follows similar philosophy; the investigation of specific financial management processes is not in the scope of this thesis. The purpose of the research is to consider the implementation of Robotic Process Automation (RPA) technology on the different processes relating to financial management. In the larger context, RPA is a technology that can be complemented with technologies such as Artificial Intelligence (AI), contextual learning and advanced cognitive capabilities (IRPA 2015, 8; Moffitt, Rozario & Vazarhelyi 2018, 9). Also, many RPA providers have already added additional tools with their RPA software such as machine learning (ML) or optical character recognition (OCR) (Tornbohm & Dunie 2017, 5)

This thesis is partly based on an empirical case study conducted in co-operation with a case company. It examines two previous processes, which the case company has already automated with RPA technology. The main case company has done four complete RPA implementation processes. Two of which are presented later in the case study chapter of the thesis. The reason that the remaining two processes are not being presented is due to the lack of information available on these projects for this thesis, as well as due to their technically straightforward nature. The two processes of interest are analyzed including feedback from the case company employees. This feedback is gathered from two employees and 9 survey respondents who work in the case company. The analysis includes the calculation of the automation potential in terms of FTEs. The FTEs are calculated before and after the RPA automation. The two processes are also qualitatively compared to the academic literature. This is done to find out what traits affect the perceived success of RPA processes. The perceived success is assessed by decomposing and analyzing the responses of the employees from interview and survey data.

The analysis includes a third interview on a financial management team employee. The responses are used to assess the future possibilities of RPA utilization in the company's financial management functions. The case company is currently seeking to expand their RPA technology-based solutions into their financial management processes as well. The financial management team of the case company has not yet implemented RPA into its processes; the previous two processes were conducted in the back-office and customer advisory teams. Therefore, an RPA-suitability analysis for the third respondents' suggestions for financial management processes is made. This suitability analysis is based on the academic literature. After the analysis, a concise six-step guideline is formed on how to improve their future RPA implementations in the case company.

It is also important to note that the case company is not seeking to implement the RPA into any accounting activity, since this function has been outsourced. For this reason, the dimensions of financial management related to accounting are not examined in this thesis. The financial management team of the case company has a wide variety of administrator tasks. These tasks include reconciliations of the accounting functions, interpretation of accounting standards such as IFRS and other authorities as well as internal and external reporting. Other tasks include the administration of capital outstanding, compiling of the profit & loss statements, managing of the banks' contracts and other minor Ad-Hoc tasks.

Another research target includes another company on a similar industry to the case company, which is referred later on to as the "reference company". The reference company has conducted 10-15 RPA implementations in total. One RPA process is presented in terms of feedback from a reference company employee. An interview with an automation expert gives further insight on RPA processes in this company. This information is then compared to the case company information. By comparing these two companies, we can create a more thorough view as well as find the best practices within the companies' processes. This includes their management, communication and leadership dimensions. Since the reference company's RPA-maturity is higher, the reference company and service provider interview respondents' experiences with different RPA projects and solutions may be beneficial to the main case company.

Also, one qualitative interview was conducted with a solutions consultant of the service provider to the reference company. This company is later on referenced to as the "service provider". These companies were included in order to gain more data on the RPA processes, since the actual case company has just begun their experimentation with RPA solutions. The service provider interview is analyzed to provide information on how the providers see the processes, price them, form the solutions with the client, as well as how they communicate with the client. All of the case companies examined are Finnish companies in the private sector, therefore the focus of this thesis will be in the private sector as well.

On a more broader scale, RPA is a newly developed and expanding technology, which can be seen to offer organizations different ways to automate their processes as well as to cut down their cost-structure (Bruno 2017, 55; Slaby 2012, 1, 14; Willcocks, Lacity, Craig 2015a, 3-6). As previously stated, the growth in demand for the technology has been growing rapidly with no sign of deceleration (Gartner 2018, 2019b; Papageorgiou 2018, 27). However, apart from different thesis made on the topic, there is a very limited amount of research available on the use of RPA in Finnish SMEs.

This is true especially within the banking and insurance industry. In part, this thesis attempts to fulfil this clear research gap by providing additional information for the case company. The inspiration for this thesis comes from a direct need of the case company to further investigate the possibilities associated with RPA. Currently, the case company lacks this proper research of opportunities. Therefore, this thesis directly attempts to provide information on RPA, as requested by the case company.

1.2 Research questions

This thesis seeks to answer questions asked by the case company. These questions included topics such as "how did the two projects succeed in the employer's opinion?". Besides the case company, similar questions are being asked in the IT and automation research academia as well. The academical topics of interest include different areas of interest such as: "what other type of financial management related processes RPA might be best suited to?" and "how much benefit can be gained from a successful implementation to a suitable target?". After the examination of all the possible questions, the amount of questions was narrowed down to three main research questions. There are also two sub-questions related to the main questions 1 and 3. The first main question is:

1. *"How can the main case company improve their future RPA implementations based on their previous projects"*

This is the most significant research question of this thesis. The answer to this question is based on the interviewed employees and survey respondents as well as the academia. The question itself will mainly focus on the case company, but the data from the non-case company interviews are also utilized in order to provide more insight. This question allows the use of the existing literature to capture the "best practices" presented in the academia. This is mostly being examined in the analysis chapter 5 and answered in the concluding chapter 6. Another sub-question is similar to the first one, but instead of asking "how" it focuses on the "what":

1 a) "What kind of processes should the financial management team of the main case company pursue to automate with RPA"

Since the case company has not laid out any precise processes they seek to automate, the answer to this sub-question is mainly based on the literature. However, some insight to the preliminary plans were given by respondent 5. This interview is compared to the existing academic literature in chapter 5.3. As mentioned in the previous chapter, two case company's RPA processes are being presented later on in the chapter 4. The second research question focuses these RPA processes:

2. *"How do the employees of the case and reference companies describe their experiences working with RPA"*

This qualitative question aims to answer the question: "what can we learn from the previous RPA projects that may be utilized in the future?". The question itself is based on the conducted interviews as well as the survey responses. The survey respondents being the users of the RPA software license (or "robot") in the case company. These users include the client advisory and back-office teams of the case company. The next research question is broader and focuses on the overall traits that make a good candidate process into a successful RPA implementation:

3. *"What factors affecting the success of RPA processes are found in the literature as well as the employee experiences"*

Even though the term "success" is difficult to assess unbiased, the academia on RPA has multiple different suggestions and general advice for organizations seeking to implement RPA. Many of these suggestions are based on the prior RPA automation business cases presented in the literature. This question also links to the last sub-question of this thesis. The sub-question aims to capture one important, measurable aspect that is inherently linked to the success of an RPA solution. The sub-question is:

3 a) "How much benefit in full-time equivalent units have been attained using the RPA technology in the case company"

A full-time equivalent (FTE) is defined for example by Eurostat (2019) as "a unit to measure employed persons or students in a way that makes them comparable although they may work or study a different number of hours per week." The unit is obtained by comparing an employee's average number of hours worked to the average number of hours of a full-time worker. In this thesis, one FTE is considered to be 37.5 hours per week (or 7.5 hours a day). This is considered to be a standard

work week in most Finnish organizations. This is also the full work week in the case company. With FTEs, we are able to measure the automation potential and amount of work automated with RPA. In chapter 4.7, the amounts of workload per task before and after the implemented RPA solutions are measured using FTEs.

All the research questions are assessed in order to further investigate the domain of RPA automation in financial management framework. The pursuit of this thesis is to combine the aforementioned questions into a complete view on the possibilities of RPA. By investigating different processes and approaches, it is possible to qualitatively map out the best ways to organize and conduct RPA automation processes. Ultimately this thesis seeks to answer the underlying question of *how RPA should be utilized in the domain of financial management processes in the most efficient manner possible*.

1.3 Research methodology

The nature of this thesis is qualitative. Qualitative research relies on the process of describing, interpreting, and explaining phenomena of interest (Maxwell 1992, 279). This thesis aims to answer questions that are “why” and “how”, rather than “what” or “how should” -types of problems. This is an indicator of research problem that drive towards a case-based research (Carson, Gilmore, Perry & Gronhaug 2011, 3-4). Gibbert, Ruigrok & Wicki (2008, 2) state that while case studies may also use quantifiable data, the main difference is that case studies seek to study phenomena in their own contexts, rather than independent of context. In this study, the context is the main case company with occasional references to the reference company and the service provider. Suter (2014, 4) claims that qualitative research is “guided by the philosophical assumptions of qualitative inquiry”. In order to understand complex phenomenon, multiple realities experienced by the participants must be considered. This is conducted in the analysis section, where the given answers by the different respondents are being compared to the existing literature. The research questions also include a lot of qualitative description in order to be answered as they incorporate employee experience and process descriptions. These questions are partly answered through interview transcriptions.

As mentioned earlier, the data will mainly consist of six qualitative interviews. Two surveys were also sent to users of RPA software licenses in the main case company. These surveys were answered by a total of nine employees. Also, a thorough examination on the current literature was conducted with the focus on the academia including case examples. Quantitative researchers’ value large sample size, manipulation of treatments and conditions and true experiments or quasi experiments.

Qualitative researchers value case studies (Suter 2014, 5). Quantitative methods would require data from numerous different companies and similar observations. Thus, it is not a viable option in this case due to limited amount of data from the case company. Therefore, the focus is on the case company with occasional comparisons to the reference and service provider companies. In order to answer these qualitative research questions, the interviews must be in-depth and well transcribed and documented afterwards. As the interviews were mostly conducted in order to find data and information on the processes and RPA, a denaturalistic approach was applied in the transcription process. However, when assessing the personal opinions of the respondents, the recordings were transcribed in part with a more naturalistic approach. (Oliver, Serovich & Mason 2005, 1273-1274)

Most of the literature scrutinized for this thesis was found using the LUT university library Finna. Finna is a collection of search services which contain international, scientific and electronic library material (LUT Finna 2019). Other extensively used source of information was Google Scholar as well as other science portals such as ScienceDirect and ProQuest. This research takes on a structured approach on the review of material for this thesis. As this thesis is in a crossing point between information technology and financial management, an interdisciplinary review-approach is used to cover the existing literature (Klein and Newell 1998, 393-394).

The first step of the complete literature review process was to search the previously presented LUT Finna portal to scan the science behind the topic. The initial search string was: “Robotic Process Automation” AND “Financial Management” which granted 24 peer reviewed full-text articles. These were mainly short journal articles on governmental and public administration; therefore, they did not provide a lot of interesting insights to the topic. A keyword “Robotic Process Automation” produced 183 articles. A total of 207 articles were scanned by their title and description based on their relevance to this study. The broader “Robotic Process Automation” keyword produced more relevant articles. It also produced less relevant articles such as news articles that merely mention RPA among automation trends (such as AI and Blockchain articles). Articles that were completely from different field (such as surgery or healthcare) as financial management were mostly left out as well. A few of the articles were found to be completely inaccessible or in other language and were left out. This second search step provided a total of 30 relevant studies that were then examined more in detail. All these studies are also cited in this study.

During the examination, another effort was made to capture major contributions not found by the search strings, or not accessible from LUT Finna. Some of these sources included also the commercial vendors and research agencies such as Forrester Research, Gartner, HfS Research, KPMG,

PwC and UiPath. These were found from the sources or from the additional searches to find information. This was done to search information on specific issues risen from previous searches with keywords such as “RPA AND Machine Learning” or “Industry 4.0” et. cetera. Also, citations considering the research methodology such as case study and semi-structured interviews were added. A total of 71 citations were added in this third and final step of research. After the literature selection process, a total of 101 sources is thus presented in this final version. Since RPA research is a relatively new field and the scientific information on the subject is somewhat scarce, these “commercial” sources were used to complement the strictly scientific literature. This is the main reason that the information on the research agencies and vendors’ reports are being provided. This thesis also non-peer reviewed articles from news articles such as Harvard Business Review and American Banker, that are generally seen as quality news outlets.

The most common citated researchers in this thesis are the London School of Economics and Political Science professors Mary Lacity and Leslie Willcocks. Many of their work was also contributed by Andrew Craig. They have collectively written several journal papers on RPA related research including case studies. Other widely used citations include authors Anagnoste, Boulton Asatiani & Penttinen, Rutaganda, Bergstrom, Jayashekar and Jayasinghe, Slaby and Fung. Since RPA is a fairly new technology altogether, all the research has been conducted frequently. Therefore, most citations are published within the last ten years.

1.4 Structure of the thesis

This thesis consists of introduction, theoretical background and literature, case examples from the literature and an empirical study. This is followed by an analysis of the empiric data and the literature. Lastly, this thesis concludes to a summary of the findings in the form of discussion and conclusions. The theoretical background section consists of two main chapters, which are the chapters 2 and 3. The second chapter discusses RPA and automation solutions and financial management in a more general manner. This chapter focuses on RPA on the business perspective without going too much into detail in financial management in itself. There are three reasons why this thesis does not address the theoretical background of financial management thoroughly, nor does it address certain financial management processes. The first reason is that the domain of financial management is naturally very broad and loosely defined, i.e. it can include a wide variety of different processes depending on the company. The second reason is the case company has not yet agreed upon any new processes they are going to automate with RPA. The case company is in an exploratory phase of RPA utilization as mentioned earlier in the research objectives. The third reason is the case company’s request to

receive this thesis as an RPA guidebook. Therefore, this thesis will include an introduction to RPA, experiences from the two previous processes and how to improve the future RPA processes. Also, since the chosen perspective is business-oriented rather than IT-oriented, the technical aspects of RPA are not examined in great detail. Besides the RPA in business processes, chapter two also covers the benefits, challenges and alternatives to RPA.

The third chapter focuses on the process view of RPA and the existing business case examples. The case examples help to provide insight into real-life applications of RPA and will present the processes associated with RPA projects in different enterprises. The third chapter is also concluded with some of the general traits of successful RPA implementation.

The fourth chapter presents the empirical study. The data of this section is gathered via six interviews and two online surveys as presented in the chapter 4.2. The data includes employees of the case company as well as the reference company and its RPA service provider. The interviewees are experts in either business administration or in IT and automation solutions. The empirical section covers information from different projects of the case and reference companies. In addition to this, one service provider interview provided information from the perspective of an RPA supplier. As mentioned in the research questions, the survey respondents include the main case company employees that have used the RPA software licenses. The section presents first the evidence from reference company in chapter 4.3, the service provider in chapter 4.4 and lastly for the main case company in chapter 4.5.

The fifth analysis chapter will combine the previous theoretical framework and existing literature. This chapter seeks to answer the research questions with the presented literature including the key empirical findings. The subchapters 5.1 to 5.3 reference to the literature and data to make recommendations for the future processes. Finally, chapter 6 will summarize the findings of the study. This chapter also includes the critique and limitations of the study. Lastly, chapters 6.3 and 6.3.1 include the discussion on the future research opportunities and possible future direction of RPA automation.

2. BACKGROUND AND LITERATURE OF FINANCIAL MANAGEMENT AUTOMATION

Webster and Watson (2002, 13) claim the review of prior and relevant literature is an essential feature of any academic project. An effective review is the foundation for advancing knowledge since it facilitates the development of the theory, closes the area where excessive research exists as well as uncovers area where further research is needed. Levy & Ellis (2006, 182) claim in order to create an effective literature review, one must methodologically analyze, evaluate and synthesize quality literature. This way it is made possible to provide a firm foundation on a research topic as well as the selection of research methodology. The conducted research must also provide something new to the existing domain knowledge. Webster & Watson (2002, 13) also see an effective literature review as one that creates a "firm foundation on advancing knowledge". The chapters 2-3 of this thesis seek to fulfil these requirements.

As previously mentioned in the introduction, financial management is the umbrella term used to describe the presented processes. It was also the case company's request to keep the subject of RPA within financial management on a general level. Ergo, there is also no specific financial management processes or issues, that this thesis seeks to address. This chapter views RPA as a tool to automate certain business processes without proceeding to go profoundly into specific technological aspects. This overview is therefore business- rather than technology-oriented. The focus is on the processes and how to improve them with RPA-based automation. The meaning of the word "process" is used in this thesis similar to the Institute of Electrical and Electronic Engineers Standards Association's (IEEE 2017,10) definition. The definition is: "a sequence or flow of activities in an organization with the objective of carrying out work, which may include a set of activities, events, tasks, and decisions in a sequenced flow that adhere to finite execution semantics". The process flows are understood as "the defined representations of the overall progression of how a process is meant to be performed, including all exceptions." (IEEE 2017, 10)

The following chapters describes the traits of Robotic Process Automation (RPA) within the financial administration and management environments. The questions include "what is RPA", "how does RPA differ from different automation approaches" and "how it can be utilized in processes of financial management". The first chapter will cover a surface-level view on the automation methods available in financial management. This presentation includes some of the different possibilities available to-

day. The second chapter focuses on defining and explaining RPA more in detail. This chapter includes different RPA approaches and techniques, as well as the possible benefits and challenges of utilizing RPA automation. The last chapter will compare the alternatives of RPA-based automation.

2.1 Automation and financial management

This thesis revolves around the themes of software robotics, artificial intelligence (AI), and intelligent automation (IA). The IEEE (2017, 11) defines automation as an "independent machine-managed choreography of the operation of one or more digital systems". Intelligent automation may be described as the combination of AI and automation (Laurent, Chollet & Herzberg 2015), yet it can also be used as an equivalent to RPA in some instances. Namely, it is also used as an umbrella term for "advanced software systems that can be programmed to perform a series of tasks that previously required human intervention" (Gartner 2019a, 3).

According to Kaizer, Ponce and Steinhoff (2018, 14) IA may be divided into three different categories from the strategic perspective. These categories are RPA, enhanced process automation and cognitive automation (CA). Each of these classes have specific capabilities and each of them address a specific automation type. RPA will be defined in the following chapter. Enhanced process automation involves the ability to work with unstructured data and pattern recognition. CA includes artificial intelligence; processing of super-data sets and predictive analysis (KPMG 2017, 4). CA is also capable of mimicking human-like activities such as perceiving, inferring, information gathering, hypothesizing and reasoning (Kaizer et al. 2018, 14). Davenport & Kirby (2016, 21-22) identify four levels of intelligence associated with smart machines as the general trend is moving towards greater autonomy in decision-making. The smart machines are on a trajectory developing from machines that require highly structured data and decision context, eventually leading to smart machines capable of working with complex datasets and contexts. The four levels are support for humans, repetitive task automation, context awareness (CA) & learning as well as self-awareness. Support for humans means that the cognitive technologies act as a decision support in a sense that the machine can offer a recommendation, but a human will make the final decision. (Davenport & Kirby 2016, 21-22)

Contextual awareness and learning are the most top-tier technologies of today already in the practice. Based on these technologies, the machines are capable of categorizing, extracting and interpreting relevant data in real time. These machines are also able to improve and learn from their performances based on collected datasets. The claimed fourth step of self-awareness is yet to be

reached. This means it may be possible in the future, that machines are able to work beyond the levels of human intelligence across multiple contexts. (Davenport & Kirby 2016, 21-22) According to Bruno, Johnson & Hesley (2017, 60) as organizations become more comfortable with their robotics capabilities, more advanced robotics such as handwriting recognition, natural language processing (NLP), pattern-detection through ML and cognitive processing become more widely utilized.

One of the automation trends which has currently received a lot of attention is Industry 4.0. According to Ustundag and Cevikcan (2018, V) the term Industry 4.0 is currently one of the most popular topics among industry and academia. It has been claimed to be the new industrial revolution. Industry 4.0 utilizes and combines the opportunities in multiple physical and digital technologies such as AI, cloud computing, adaptive robotics, augmented reality and IoT. It has been on growing on interest due to its unforeseen capabilities associated with technological advancements of the entire production line. The main aspiration is to increase the resource efficiency and productivity. (Onar & Ustundag 2018, 25) Another one of the rising trends within robotics is the Robotics as a Service (RaaS) model. In RaaS, the customer can remotely monitor its robotic systems. RaaS can be defined as a virtual or a business model which is the combines AI solutions, cloud computing and shared services (Haidegger, Galambos & Rudas 2019). The shared services model can be defined as a "collaborative strategy in which a subset of existing business functions are concentrated into a new, semi-autonomous business unit that has a management structure designed to promote efficiency, value generation, cost savings, and improved service for the internal customers of the parent corporation, like a business competing in the open market." (Bergeron 2003, 3) Leading cloud technologies like OpenStack and Docker empower many known large service providers such as Google, Microsoft and IBM. (Haidegger et al. 2019; Sefraoui, Aissaoui & Eleuldj 2012; Anderson 2015)

Nowadays, there are different automation related cloud services that are based on cloud computing and cloudsourcing. The NIST (U.S. National Institute of Standards and Technology 2011, 3) definition for 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." Cloudsourcing is defined by Haidegger et al. (2019) as a software architecture strategy which utilizes a model of control distribution by delegating the execution of certain tasks into computing resources. These resources can be either external or otherwise virtualized.

The model of cloud computing includes five essential characteristics, three service models, as well as four deployment models. (Mell & Grance 2011, 2-3) The five essential characteristics of cloud

model is on-demand self-service, broad network access, resource pooling, rapid elasticity and measure service. On-demand self-service means that a consumer may unilaterally provision computing capabilities (for example server time and network storage) needed without human interaction with the service provider. Broad network access means that the capabilities are available over the network and can be accessed with standard methods. Resource pooling is the characteristic the provider's computing resources are pooled to serve multiple consumers where different resources are dynamically assigned and reassigned according to consumer demand. (Mell & Grance 2011, 2-3)

Bygstad (2015, 1) suggests all different automation solutions can be divided into two main categories. These categories are lightweight and heavyweight IT. Heavyweight IT means the traditional IT systems including databases which are becoming more and more expensive through advanced integrations. Examples of lightweight IT include smart phone applications, sensors, IoT as well as RPA and other forms of software robotics (Bygstad 2015, 1; Bygstad 2017, 180-181; Stople et al. 2017) The aspect that distinguishes lightweight IT is that the deployment can be done cheaply and fairly quickly, and without any help from IT departments. (Bygstad 2015, 1; Bygstad 2017, 182) According to Stople et al. (2017) lightweight IT as a trend is challenging the role of the traditional IT function since lightweight IT is often being acquired and implemented by local business units.

Lightweight IT can be seen also as a complementary to heavyweight IT. Lightweight IT is well-suited for the tasks the heavyweight does not perform very well at i.e. the simple and immediate needs of a user. As heavyweight IT is developed through systematic and quality-oriented approach; as opposed to lightweight IT which can be more experimental and innovation oriented. They are therefore mutually dependent of each other. Namely, heavyweight IT can work as a platform for innovative lightweight IT. Reversely lightweight IT offers an arena for more agile innovation possibilities, which are not in the scope of heavyweight IT. (Bygstad 2015, 3-5)

Innovation is arguably best served by different organizations developing heavyweight and lightweight IT. It can be argued that in most of the today's organizations, heavyweight IT is overloaded due to rising costs, long backlogs and increasing complexity. (Bygstad 2017, 190-191; Sommerville et al. 2012, 1) That being said, besides the smart phone's "app revolution", RPA is currently one of the most prominent lightweight solutions (Bygstad 2017, 182). This chapter presented the general approaches to automation of the 2010s. In the next chapter, the main introduction to RPA is being presented.

2.2 Robotic Process Automation

Although the term Robotic Process Automation (RPA) suggests it is physical robots performing human tasks, it is in fact a software-based solution (Willcocks, Lacity & Craig 2015b, 5). In RPA lingo, one "robot" is equal to one software license (Lacity & Willcocks 2016, 21). The IEEE (2017, 11) defines RPA as "a preconfigured software instance that uses business rules and predefined activity choreography to complete the autonomous execution of a combination of processes, activities, transactions, and tasks in one or more unrelated software systems to deliver a result or service with human exception management". The market definition of RPA software by Thornbohm & Dunie (2017, 2) is that "Robotic process automation (RPA) tools perform 'if, then, else' statements on structured data, typically using a combination of user interface (UI) interactions, or by connecting to APIs to drive client servers, mainframes or HTML code. An RPA tool operates by mapping a process in the RPA tool language for the software 'robot' to follow, with runtime allocated to execute the script by a control dashboard".

In many of the definitions, the trait of similarity to human action has been pointed out in more than one manner. For example, van der Aalst et al. (2018, 269) and Gartner (2019a, 3) define Robotic RPA as an umbrella term for advanced technologies that perform a series of tasks on the user interface of other computer systems. Forrester Research (2014, 1) also defines RPA as "a style of automation where a computer mimics a human's action in completing a task – effectively a computer drives application software in the same way that a user does". In addition, Willcocks et. al. (2015b, 5) claim: "For business processes, the term RPA most commonly refers to configuring the software 'robot' to do the work previously done by people". Bruno et al. (2017, 55) also brought up the similarity to human action, "RPA is a software-based protocol that operates across technology platforms at the user interface level to mimic human actions". As stated in chapter 2.1, Gartner also provide this view on RPA being "an umbrella term for advanced technologies that can be programmed to perform a series of tasks that previously required human intervention" (Gartner 2019a, 3).

In van der Aalst et al. (2018, 269) the similarity to human action is due to the fact the software robot tool uses IT systems in the same manner to human since they operate on the user interface (UI). Moffitt, et al. (2018, 2) claim RPA's unique feature that sets it apart from other automation paradigms such as BPM, business process re-engineering, or Business Process Management systems is the RPA's ability to conduct actions through the software presentation layer. It accesses other systems through the UI with a logon ID and password. This way, the underlying business logic is not modified in at all. (van der Aalst et al. 2018, 269-271; Willcocks et al. 2016, 22-23)

The RPA interfaces can be operated by users with drag & drop actions, and by linking different icons that usually represent process steps. As users create these processes by dragging and dropping different process steps, the code is being generated automatically. Many of the RPA tools by software providers, such as Blue Prism, Automation Anywhere, Ipsoft and UiPath, are easy enough to use even without prior knowledge of programming. (Lacity and Willcocks 2016, 21-23) As mentioned also in the introduction, the market for RPA solution has grown rapidly. Le Clair (2018) and Thornbohm & Dunie (2017) mention RPA providers including AutomationEdge, Automation Anywhere, Blue Prism, Kryon Systems Softomotive and UiPath as companies that provide exclusively RPA solutions. Other firms such as Pegasystems and Cognizant provide a variety of solutions with RPA including BPM, customer relationship management (CRM) and business intelligence (BI).

Forrester Research counted 32 RPA vendors in the market as of 2018. In their 2018 study, they evaluated and selected 15 RPA vendors (Le Clair 2018, 5-7). The vendors were selected based on product orientation, broad range of use cases, at least two-regional markets, at least 5 million dollars in RPA-derived revenue, significant market share or innovative developing of new capabilities as well as customer interest. The vendors were evaluated based on their current offering, market presence and company's strategy in terms of execution, partnerships, innovation, differentiation etc. The three companies that performed best in the research were UiPath, Automation Anywhere and Blue Prism. UiPath was the leader with shared services and bot design. Automation Anywhere delivers "an enterprise-grade digital workforce platform". The third strongest provider, Blue Prism offers "secure, scalable and central control". The greatest competition to the top companies, apart from each other, were vendors such as WorkFusion, Pegasystems, Kryon and NICE. Emerging challengers were companies such as Another Monday, AntWorks and Redwood Software. (Le Clair 2018, 4-9)

2.2.1 Technical aspects of RPA

Davenport & Kirby (2016, 23) share the idea of RPA as utilizing workflow and business rules technology to interface with multiple information systems. PwC (2017, 30) also claims that RPA is virtual robots which are integrated with existing software as well as configurations that automate these tasks. The purpose of RPA technology is to replace people by automating in an "outside-in" manner. This approach is different to the "inside-out" approach. (van der Aalst et al. 2018, 269) The difference of RPA compared to the traditional software solution is that in the traditional approach, the communication with other IT systems takes place via the back end. (Asatiani and Penttinen 2016, 68-69) A typical RPA architecture is of a following form:

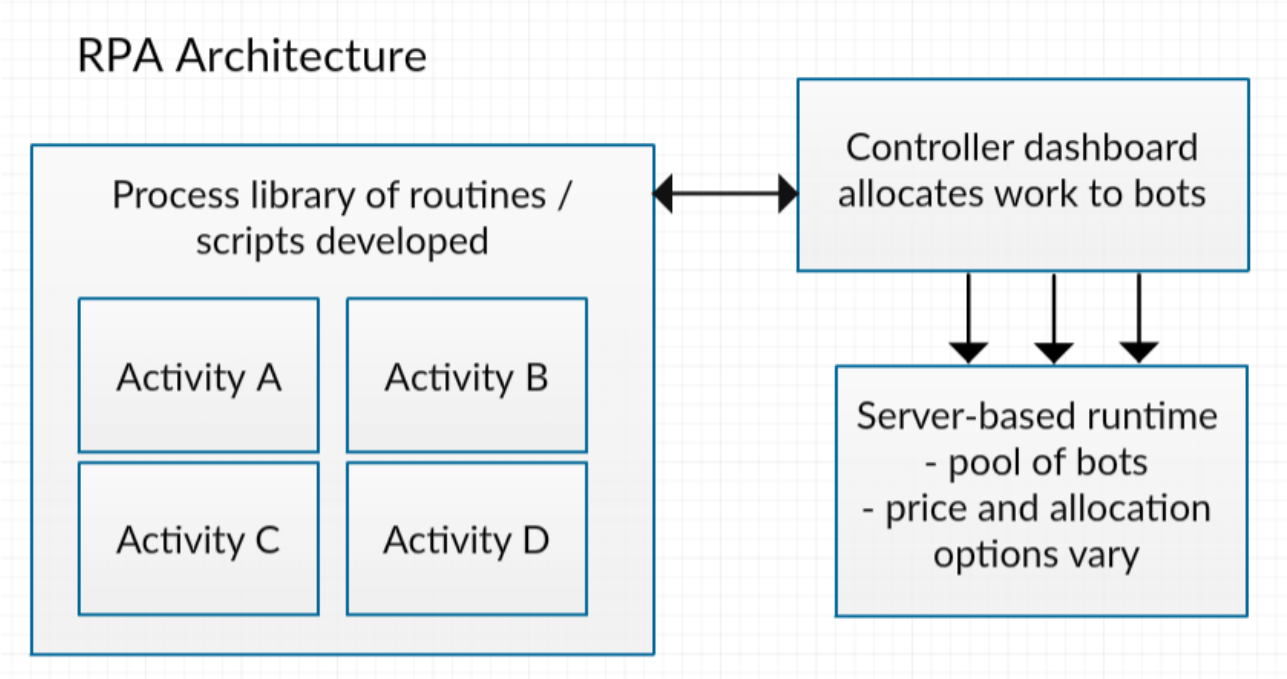

Figure 1. Typical RPA architecture (Adapted from Tornbohm & Dunie 2017, 3)

As we can see from the figure, the process library containing different activities is linked to the controller dashboard, which allocates work to the bots. The dashboard is then allocating work to the server-based runtime. The idea behind RPA is that the process is mapped in the RPA tool language for the robot to follow. (Tornbohm & Dunie 2017, 2-3) Unlike different AI and ML solutions, it is also important the target tasks are clearly defined and structured using different inputs and outputs. RPA requires that it can be conducted without human-like judgement. (Vishnu, Agochiya & Palkar 2017, 69) RPA solutions require familiarity; the process needs to depend on recurring patterns and low amount of variability. Even though AI has come a long way in a short period of time, the general principle is the same; can the process be written down clearly including all the possible exceptions. (Asatiani and Penttinen 2016, 69) Thus, the processes automated with RPA must be driven by simple rules and business logic (PwC 2017, 30).

According to KPMG (2017, 5) RPA tools leverage workflow, rules engine and automated event data collection (screen scraping) to automate the existing processes. Brain (2016) characterizes screen scraping as a way of capturing bitmap data from the screen and cross-checking it against stored information to decipher it. This is not the fastest or the most accurate method, but the plus side is it provides the flexibility to capture almost any application. The screen-based navigation works with all the elements not accessible through code and UI frameworks. Also, text digitalization provides the access to the image-based and structured documents. This is achieved through optical character recognition (OCR). This kind of software can structure data when reading structured documents. For

example, this kind of software can read invoices and proceeds to categorize them into different sections. Screen scraping allows the user to recognize the screen pixel by pixel as the application icon. Afterwards, it can be assigned to an RPA software. One clear downside of this technology is that it is inevitably slower than direct, code-based approach. Most of the screen scrapers are built in a manner which enhances accuracy over speed. (Brain 2016)

2.2.2 Target process selection and suitability

Despite the strict need for structure in the target processes, RPA is a cutting-edge technology in business process automation. RPA is the imitation of a human worker, with the goal being tackling structured tasks in a fast and cost-efficient manner (Asatiani & Penttinen 2016, 67; Slaby 2012, 4-7; Fung 2014, 1). According to Anagnoste (2018, 307) RPA has proven a solid and affordable solution for organizations to tackle repetitive, low value work. This reportedly helps to raise the moral in the organization due to further opportunities for the organization. One of the most widely referred uses for RPA is for manual tasks that are high in volume, time consuming, repetitive and based on a clear set of rules. (Anagnoste 2018, 307; Asatiani & Penttinen 2016, 68-69; Fung 2014, 9; Galusha 2018, 45; Gex & Minor 2019, 18; Hallikainen, Bekkhus & Pan 2018, 41-42; Lacity & Willcocks 2016, 21; Slaby 2014; 5-7, Willcocks, Lacity & Craig 2015a, 9-12; 2015b, 3-4; 2017, 18-22; Zarkadakis et al. 2016) RPA software is ideally suited for so-called “swivel chair” processes, which means a process wherein a human take in work from many different electronic inputs such as emails and spreadsheets, and then processes the information. The information is usually being complemented with another information and then transferred into other information systems such as ERP or CRM systems. (Willcocks et. al 2015b, 5; Lacity & Willcocks 2016, 22; Zarkadakis et al. 2016)

For example, UiPath (2019) and Bruno et al. (2017, 58) claim RPA is capable of mimicking many human actions. RPA is capable of logging into different applications, connect to system APIs, move, read, write, copy & paste different datasets, filling in forms, extract and process information from different documents, open emails, scrape data, follow if-then -based rules and calculate information. KPMG (2016, 3-4) points out the following examples in invoice processing and business case analysis: RPA can be used to extract information from invoices, enter the data into an ERP system, process it through a workflow and assign it to the correct approvers of the invoice. In business case analysis, RPA may assist by extracting data from different system, which is then used by humans to analyze the cases. RPA may also be utilized combined with other cognitive technologies such as NLP, ML, data analysis and probabilistic reasoning. According to KPMG (2016, 4), the market is eventually headed towards this type of cognitive automation.

Although there are many opportunities in the domain of different RPA solutions, the typical RPA projects have a certain position in the business development area. Figure 2 (adapted from van der Aalst et al. 2018, 270) exhibits the “long tail of work”. In the y-axis, we can see the frequency of the cases. This indicates the similarities in a certain process; i.e. how often does a certain case emerge, or how rarely is it dealt with. In the x-axis, we can see the different types of cases. This means the similarities in a certain process; i.e. how repetitive a certain task is. The figure is now drawn in a manner where around 80 percent of the cases can be explained by 20 percent of the different case types. (van der Aalst et al. 2018, 270) The figure 2 illustrates this below:

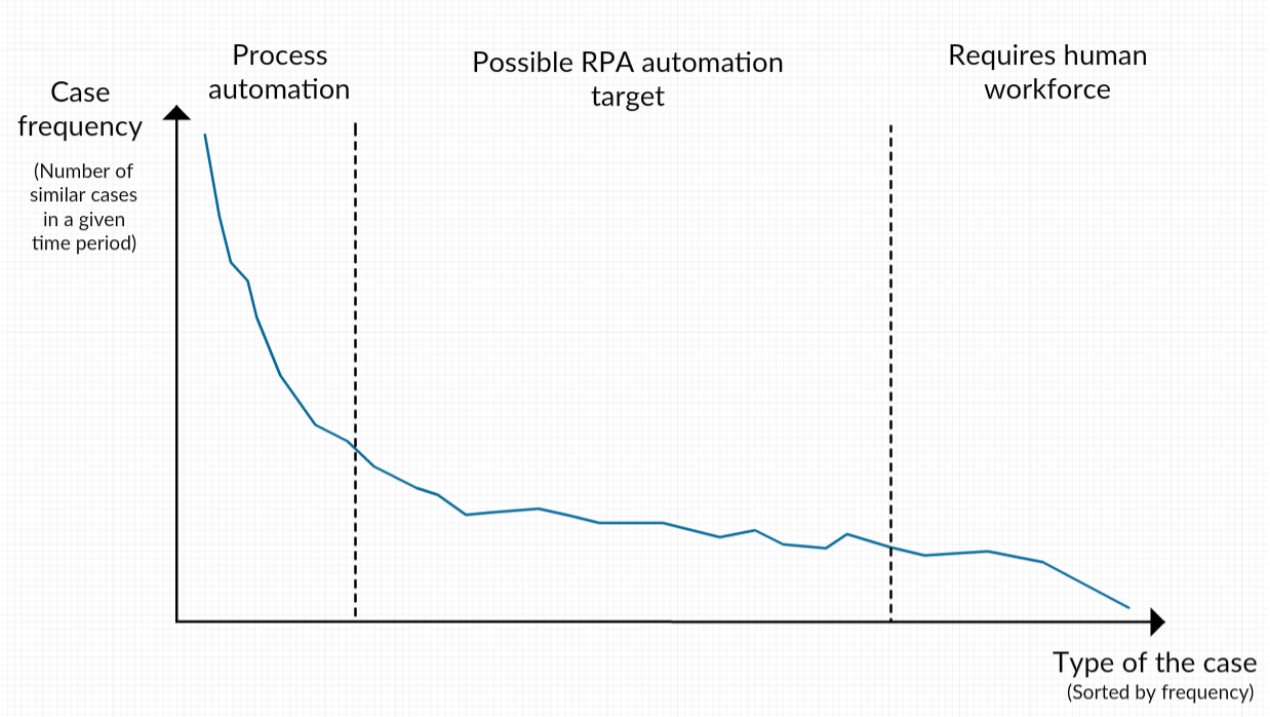

Figure 2. Positioning RPA solutions (Adapted from van der Aalst et al. 2018)

Many of the different tasks are rather rare. Traditional automation is usually considered for a few different types of tasks that incorporate a very high case frequency. Since traditional automation usually requires long and costly IT-integration projects, less frequent cases are rarely considered as viable targets for automation. The remaining 20 percent of the cases, which covers for 80 percent of the different case types are usually dealt by humans due to their complexity, decision-making or rarity traits. On the right side of the figure there are the cases that are rare and different from all other cases. These tasks are commonly dealt with using human workforce. As we can see, RPA solutions are viable for the middle ground case types which are moderately common and indifferent from each other. (van der Aalst et al. 2018, 270)

To conclude this chapter, the figure 3 below presents the suitable tasks for RPA. The possible targets do not have to incorporate all these traits. The more of these traits a certain process has, the likelihood to a more beneficial business case increase. (Slaby 2012, 7) The figure 3 exhibits these common traits:

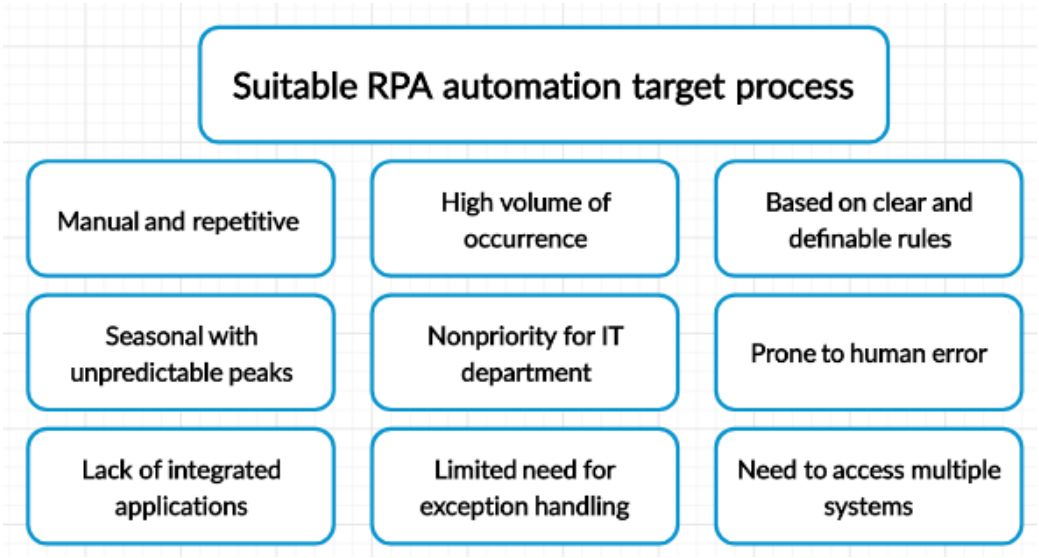

Figure 3. The traits of suitable target processes for RPA automation

The figure 3 above is adapted from Anagnoste (2018, 307), Asatiani & Penttinen (2016, 68-69), Fung (2014, 9), Galusha (2018, 44-45), Gex & Minor (2019, 18), Hallikainen et al. (2018, 41-42), Lacity & Willcocks (2016, 21-22), Slaby (2014 5-7), Willcocks et al. (2015a, 9-12; 2015b, 3-4; 2017, 18-19) and Zarkadakis et al. (2016). As we can see, a lot of the existing literature share similar ideas on the potential target processes for RPA. However, identifying these traits from certain processes or tasks may be simple, but the deeper understanding of how an organization can leverage RPA in the whole enterprise as well as create a platform of organizational transformation is quite a challenge (Bruno et al. 2017, 56). The benefits of RPA are presented in the next chapter. If an RPA automation process has been successful, these are the benefits that can be gained.

2.3 Benefits of RPA

One of the most straightforward benefits of RPA (and automation in general) is the possibility to cut costs of given process. Bruno et al. (2017, 55) state that the cost reduction opportunities associated with RPA are one of the most self-evident and enticing opportunities, yet they can also affect the implementing organization in other ways. This cost savings come mainly from the difference between

the average annual RPA license costs per robot compared to the average annual employee compensation. Robots can work fast, efficiently and around the clock. (Bruno et al. 2017, 55-59; Del Rowe 2017) One robot can typically replace the work of 1.7 humans (Slaby 2012, 11).

van der Aalst et al. (2018, 269) claim most firms are always looking for ways to reduce their cost structure and link legacy applications together. This is one of the reasons firms implementing RPA wish to quickly achieve high return on investment (ROI). Boulton (2017, 1) similarly cited a principal of Deloitte Consulting; “Enterprises are looking to RPA to automate legacy business processes”. This is mainly due to restricted talent, technology and limited time resources. Boulton (2017, 1) claims that more Chief Information Officers (CIOs) are turning to RPA in order to streamline enterprise operations as well as reduce the company’s cost structure. As according to Galusha (2018, 44) by leveraging the automation power of a robot, the organizations not only make their processes more efficient, the organization also enables business groups of the organizations to learn where further improvements can be made. KPMG (2017, 5) claims organizations may receive incremental benefits with every subsequent process or subprocess automated. The benefits are visible in the best-cases in a matter of weeks, but regularly in a couple of months. At best, this leads companies to look further for automation targets. The deeper the RPA is imbedded into the organization, the more touch points it may add value to (Willcocks et al. 2015b, 36).

Other benefits of RPA include the fast implementation time. Asatiani and Penttinen (2016, 68) claim that RPA processes may be implemented in a very short timeframe, which was estimated to be “two to four weeks”. Also, Lacity and Willcocks (2016, 21) claim that business operation staff can be trained “within a few weeks” to automate certain processes. Slaby (2012, 11) claim that business units can implement a proof of concept process in a few months. After an organization has learned to properly utilize RPA, it can be done in a matter of weeks. RPA is also offering easy-to-use software platforms in which organizations may utilize robotics. The benefit to RPA is that it only requires a basic programing and process knowledge. (Bruno et al. 2017, 59; Del Rowe 2017) Willcocks et al. (2015b, 6-7) also claim that developers need no programming skills for RPA, since with for example Blue Prism and Automation Anywhere software is possible to create solutions with the aforementioned drag and drop -icons. The code is then generated automatically. As a lightweight IT solution performing on the GUI, it does not disturb these underlying software systems and can run on virtually any platform, client, server or cloud system (Lacity & Willcocks 2016, 23-24).

Del Rowe (2017) also listed more benefits such as increased security of handling information which could be compromised by humans, greater regulatory compliance, reduced need to upgrade legacy

systems, and greater employee satisfaction. Fung (2014, 6-7) listed the benefits to be better support of contracting, reducing sales cycles, increasing the amount of working capital and improved customer satisfaction. By incorporating RPA, it is also possible to stand out in the business competition through innovation. Rutaganda, Bergstrom, Jayashekhar, Jayasinghe & Ahmed (2017, 106) listed the benefits of RPA-based solutions. Their key insights are presented in the figure 4 below:

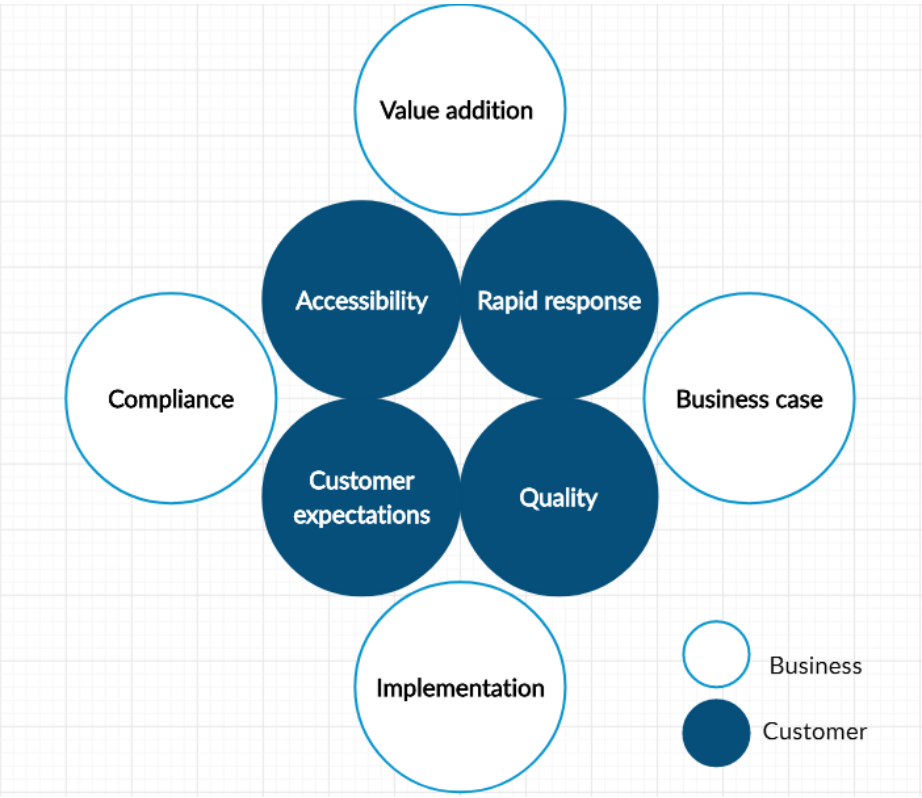

Figure 4. Benefits of RPA (Adapted from Rutaganda et al. 2017, 106)

As we can see from the figure 4, the white circles indicate benefits of RPA usage for the business and the blue circles indicate benefits to the customer. The business benefits are higher value addition, which implies the human workforce may focus on more productive and more valuable activities. (Rutaganda et al. 2017, 106)

Compliance is the improved internal transparency of operations in the form of detailed process documents and logs. Implementation refers to faster improvement of existing processes. With RPA, the company may find fast solutions without changing their existing IT infrastructure. The term business case refers that RPA (if implemented successfully) simplifies those existing operations and reduces their costs in the long run. (Rutaganda et al. 2017, 106) With RPA, it is also possible to achieve

improved accuracy through the precision inherent in software robotics. The tasks can also be monitored and recorded in detail, and it can enhance the production of quality data as a byproduct. (Bruno et al. 2017, 58)

Furthermore, Bruno et al. (2017, 58) claim that with RPA, the employees are freed for more valuable and fulfilling work. This is also the meaning behind the words “value adding” in the figure 4 (Rutaganda et al. 2017, 106). Slaby (2012, 10) also sees as employees become free to work on the work that is higher in value and more engaging. This includes different cognitive functions, problem solving, analysis and exception handling. Many of the rule-driven and repetitive operations associated the company’s revenue cycles offer prime opportunities for RPA. This was also presented earlier by many other studies.

As for the customer expectations, RPA offers accessibility. With RPA, organizations may provide certain processes available to the customers 24/7. A rapid response time can be achieved in common customer cases that are high in volume. The word quality in the figure 4 refers that with RPA it is possible to achieve high customer satisfaction. This is made possible through consistent quality services. (Bruno et al. 2017, 58; Slaby 2012, 11; Rutaganda et al. 2017, 106) RPA may also address peaks in workload by assigning more robots to the task. These common processes can be standardized and automated with RPA to achieve reduced response time to customers’ needs. (Bruno et al. 2017, 58; Yurcan 2017, 1)

2.4 Challenges of RPA

As presented in the chapters 2.2 and 2.3, with RPA it is possible to automate tasks that are high-volumes, manual and based on a clear set of rules. This links to the most obvious shortcoming of RPA; it is unsuitable for processes incorporating a lot of variation or high complexity (Zarkadakis et al. 2016). Asatiani & Penttinen (2016, 69) point out that highly cognitive tasks requiring creative thinking and non-routine tasks with little recurring patterns are not suited for RPA. Even though RPA solutions brings flexibility and speed to the process automated, it is still quite inefficient compared to back-end solutions with machine-to-machine communication. (Asatiani and Penttinen 2016, 68) Another claim is that RPA is not optimal for the biggest transaction volumes and is more suited to be used as a temporary solution in between system development and manually processing on legacy systems (Asatiani and Penttinen 2016, 68). Hence, if the internal IT infrastructure is unsuited to the implementation of RPA, it may cause issues in the launching phase (Lacity & Willcocks 2016, 32).

Described for example in Bannister (2001, 66-67) a combination of large, diverse, unintegrated and old IT systems is a major challenge facing (public) management. These problems arising from legacy systems are referred to as silo or “stovepipe” problems. The dismantling of these silo problems and converting them into integrated systems can be very lengthy and time-consuming process. This is caused mainly by increasing complexity of IT systems and the difficulty of changing them. Moreover, as IT solutions become more integrated, another problem of higher risk of unexpected error increases (Bygstad 2015, 3). These highly integrated and interconnected systems are also called “coalition of systems”. Coalition of systems are collection of systems that work together, and this also makes software system’s engineering more challenging. (Sommerville, Cliff, Calinescu, Keen, Kelly, Kwiatkowska, McDermid & Paige 2012, 72) RPA in part attempts to hinder these issues, though it might be a challenging environment for RPA if there are multiple coalitions of systems.

Another criticism pointed towards RPA is the negative effect on the employer base. Lacity & Willcocks (2016, 32) claim that even though RPA feedback has shown no significant job loss, employees might still see RPA as a competition to human labor. There are also claims such as in Del Rowe (2017) that these accusations are “baseless”. Many of the enterprises also benefit from the new opportunities in RPA, and new technologies in itself can create more jobs. Either way, due to automation evidently changing the existing structures and operating models of companies, it has also been shown to create tension between the company management and the employees. (Asatiani and Penttinen 2016, 68; Lacity and Willcocks 2016, 32) However, this fear of losing a job to automation may sometimes be reality to those performing only manual, low value work. If the employees on the low end are not re-trained into performing different tasks, then the chance of being laid off is high. It is the company’s responsibility to properly investigate these re-training opportunities for the personnel. Referring to Willcocks & Lacity’s studies with Telefónica O2 telecom company, Hodson (2015) reports that the company replaced 150 workers with RPA software. Evidently, the company had not been preparing for this large automation impact beforehand.

As we can see, both the positive and negative media hype revolving around RPA does not help the organizations to set realistic expectations towards the technology. (Rutaganda et al. 2017, 109) According to Gartner (2018) as of 2018, RPA tools resided at the peak of inflated expectations in the Gartner Hype Cycle for Artificial Intelligence. Therefore, the occurrence of inflated expectations may still be extraordinarily high.

In addition to the previously presented traits, more common themes for failed RPA processes were found in Rutaganda et al. (2017, 109-111). The figure 5 below sheds a light on these challenges:

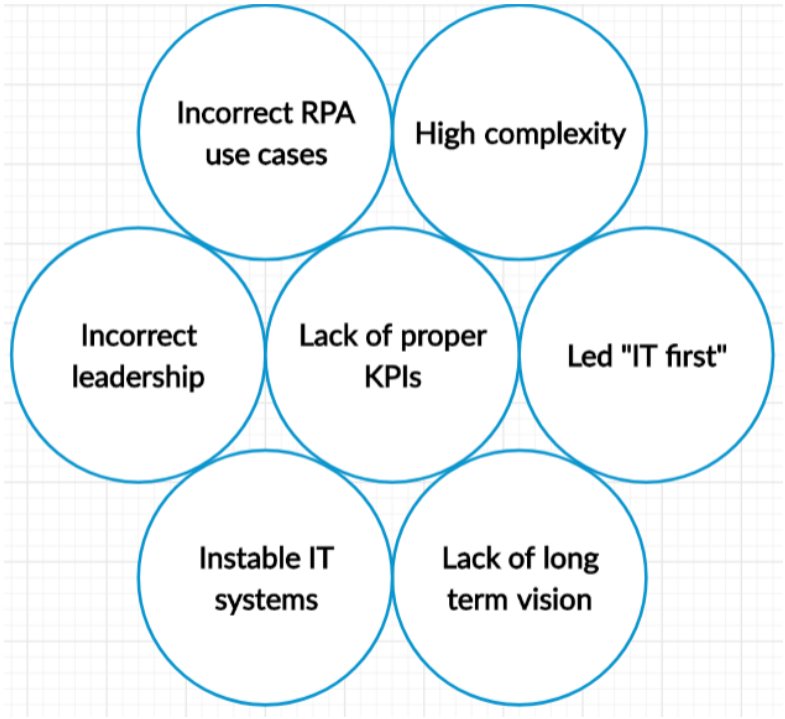

Figure 5. The challenges of RPA (Adapted from Asatiani & Penttinen 2016, 69; Bannister 2001, 66-67; Boulton 2017, 2; Rutaganda et al. 2017, 109-111; Zarkadakis et al. 2016)

First presented issue is incorrect RPA leadership at the top level. According to research, the most significant factor is that the project has not come business first but rather IT first. Meaning that the key objective is the usage of new technology, that necessarily does not transfer into value in its business operations. In Boulton (2017, 2) the claim is that many implementations fail due to poor management. If the development is done on a tight schedule, the communication of the process may be overlooked, and this may create a lot of havoc. Problems related to corporate compliance may also appear.

The second “pitfall” in Rutaganda et al. (2017, 109-110) is selecting incorrect RPA use cases and the lack of clear key performance indicators (KPIs). If the RPA projects proof of concept is not precisely and clearly defined, or the measurement technique through KPIs is not clear enough, the RPA Proof of Concept (PoC) might come out as more important than the actual long-term value creation. In the best-case scenario, the business and technology stakeholders work together by identifying the real business drivers in the organization and define concrete uses for RPA with straightforward KPIs from these drivers. (Rutaganda et al. 2017, 110)

The third theme listed by Rutaganda et al. (2017, 110) is the lack of long-term RPA vision. As most organizations are quite new to RPA, they do not commonly dare to set a longer-term goal to their RPA pursuits. The organizations that have successfully implemented RPA have often set up an RPA Center of Excellence (CoE) with support from strong governance. Fourth pitfall listed is the attempt to implement RPA in a rapidly changing environment. Especially in organizations where the business processes, workforce and IT-structure are changing. Since RPA is operated directly from the GUI, it is not well-suited for processes that are not mature or under continuous development. The last theme is dated project delivery approaches for RPA cases, meaning that the delivery dates for solutions are being postponed far to the future. The similar approach as in large IT projects is not seen beneficial in RPA projects. This is due to the fact it conflicts one of the key benefits of RPA, which is the promise of rapid development and launch of the RPA solution. (Rutaganda et al. 2017, 109-111)

2.5 Alternatives to RPA

As previously stated, RPA is suitable for certain manual and repetitive, swivel chair processes. One of the most obvious alternatives to RPA is therefore human workforce. The problem with the human workforce used for manual and repetitive labor is that it is costly for the companies and unrewarding for the employees. Most large enterprises in the past have partly solved this issue with outsourcing. Advocates for RPA usually see the technology replacing outsourcing (Asatiani & Penttinen 2016, 68). Also, Slaby (2012, 1) claims that due to RPA being cheap and easy to develop, it will eventually replace the traditional outsourcing. Fung (2014, 1-2) and Asatiani & Penttinen (2016, 67-68) claim that RPA (ITPA) has been already been adopted by a growing number of outsourcing service providers. Slaby (2012, 14) and IRPA (2015, 9-10) also claim that the cost of RPA software-based approach is around half of that outsourced FTE and Willcocks et al. (2015a, 9) around 33 % of an offshore FTE.

According to Seasongood (2016, 32) individuals performing finance and accounting duties spend significant amounts of time on repetitive, low-value duties. In repetitive task automation, the machines already make decisions that rely on a fixed set of rules or algorithms. RPA and robotic desktop automation (RDA) are one way of solving this issue. Robotic desktop automation is according to the IEEE (2017, 11) “a computer application that makes available to a human operator a suite of predefined activity choreography to complete the execution of processes, activities, transactions, and tasks in one or more unrelated software systems to deliver a result or service in the course of human-initiated or -managed workflow”. As we can see, RPA is closely related to RDA. Its key feature is

that it performs locally and is dependent on its operator; it only functions when given a permission to function (Baranauskas 2018, 254; IRPA 2015, 8).

Seasongood (2016, 32) claims that RPA as well as RDA both are used for tasks such as processing sales, financial transactions, managing data, communicating between different systems, access management and monitoring & reporting. These tasks may include determining credit decisions, loan and insurance underwriting, insurance claim adjudication, payment processing, customer service delivery, accounting data entry and procurements and so on. In Bruno et al. (2017, 56) examples include RPA for front office tasks such as sales order management, competitor price monitoring or customer engagement automation. For middle office, the opportunities are, for example, within trend tracking and report generation and in back-office in data reconciliation and app integration. The differences between these two technologies is that with RDA, it is possible to complete more complex, integral and different type and number or processes. Since a human control the whole process, it is possible to stop the process if an error occurs and immediately make the switch to manual processing. (Baranauskas 2018, 255)

Slaby (2012, 5) and Lacity & Willcocks (2016, 22-25) also discuss the differences between RPA and 'traditional' IT development, which in this case means Service-Oriented Architecture (SOA) and Business Process Management (BPM). BPM is "a discipline combining business and IT perspectives with the ultimate goal of improving an organization's business operations." The goal of BPM is to increase the effectiveness and efficiency of an organization. (vom Brocke, Mathiassen & Rosemann 2014, 189) BPM also includes the "methods, techniques and tools to support the design, enactment, management, and analysis of operational business processes" (van der Aalst 2013, 1). SOA focuses on a three main concepts. The first one of which are the services offered over the web and within the enterprise using XML-based (Extensible Markup Language) standards. The services are used both for the specification of on-demand services and for the messaging involved with those services. It also includes the implementation of services using component-based software architecture as well as a service mindset including architectural, procedural, and organizational dimensions. (McGovern, Sims, Jain & Little 2006, 3). SOAs architectural style with the potential of impacting the IT systems is the Enterprise Service-Oriented Architecture (ESOA). This term indicates an architectural style which enables an interoperability layer reducing the costs of integration, creating technical and functional links between applications and supporting the rationalization of different IT applications. (Herzum 2006, XVII)

What distinguishes RPA from SOA and BPM is that the development skills required to address new business unit requirements are quite modest. As discussed in the chapter 2.2, also Slaby (2012, 5) claim that RPA may be executed by analysts or modelers with a few months of training into the RPA tools. The traditional development requires software architects and engineers with years of expertise of relevant programming knowledge as well as BPM tools and enterprise application suites. Also, the development can be considered lightweight as opposed to traditional IT development. Whereas the traditional IT development requires complex application layer integration or data layer integration, RPA's benefit is the use of GUI and the underlying logic and security beneath the RPA solution. (Slaby 2012, 5) There are also many other differences between the technologies, these are presented in the table 1 below:

Table 1. Differences between RPA, SOA and BPM (adapted from Forrester Research 2014, 3; Lacity & Willcocks 2016, 23-24; Slaby 2012, 5)

Attribute	**RPA**	**BPM / SOA**
Business goal	Automate existing processes	Re-engineer processes
Technical goal	Use existing application	Create a new application
Process conception	Automation of repetitive, high-volume tasks	Comprehensive process models manage work items through entire business
Development methodology	Lightweight IT	Heavyweight IT
Integration method	Access the GUI of existing applications	Access business logic layer, application layer integration
Developers	Business operations	Software developers
Testing requirements	Output verification	System testing
Accessibility	Self-served by business analysts and administrators	Needs configuration of complex development UI

As we can see, RPA, SOA and BPM incorporate many key differences. Mainly RPA is a lighter and more straightforward solution on the GUI. BPM/SOA processes can be used for the most comprehensive, heavyweight IT projects. One of the key findings in the Forrester Research (2014, 1) report was that RPA complements BPM efforts. The claim based on in-depth interviews with a dozen of organizations in seven countries to evaluate the best practices and shortcomings when founding

their organizational Center of Excellences (CoEs). One of their research hypotheses was that over time, RPA becomes “another tool” in the domain of change management and is best suited in automation of repetitive processes. One of the findings was that in order to become agile and efficient, you need both BPM and RPA. By combining RPA with human workforce and BPM in an efficient way, enterprises may claim a broad range of advantages. (Forrester Research 2014, 1; 11)

Penttinen, Henje & Asatiani (2018, 4) also mention other lightweight approaches such as macros and scripting. One of the most widely used and known tools is the Microsoft’s Visual Basic (VBA). Visual Basic can be used to build type-safe and object-oriented .NET apps (Microsoft 2019a) .NET is an open source developer platform by Microsoft which can be used for building different applications. These apps can be written with programming languages C#, F# and Visual Basic. This code can be run on any compatible operating system (OS). (Microsoft 2019b) In Moffitt et al. (2018, 2) one of the claims is that RPA robots can be compared to recorded macros in Excel that automate specific tasks, with the exception that RPA “macros” may be used to automate almost any desktop or server software.

Zarkadakis et al. (2016) also mention cognitive automation as an alternative to RPA. Cognitive automation includes the use of machine learning, deep net technology and hybrid AI. As opposed to RPA, CA can be used to tackle processes with high complexity or re-engineer their existing business processes. According to Tornbohm & Dunie (2017, 5-6) the market for RPA is headed towards the direction where RPA providers are seeking to integrate ML and AI technology to deliver more types of automation solutions. For example, according to Bruno et al. (2017, 61) ML can be used for improvised management of variances in payment transactions. These technologies can also be combined with RPA. According to KPMG (2016, 4) RPA can be combined with advanced cognitive technologies such as natural language processing (NLP) and ML to tackle complex tasks that have previously required human intelligence and situational analysis.

Similar benefits of automated FTEs and cost savings can also be gained using these alternative automation solutions. An example of successful automation of financial management processes without RPA is described in the Dunlap & Lacity (2017) teaching case. The Blue Cross Blue Shield North Carolina (BCBSNC), a non-profit health insurance company created their own automation solution for healthcare claims adjudication. Adjudication is the type of insurance claim process, that results in paying a claim or denying a claim, after it has been compared to its corresponding benefit or coverage requirements. The solution was conducted using Pega Technology, .NET and Java programming. In three years, their claim automation engine was able to perform the equivalent

amount of work of 300 claims examiners. This project generated savings of 11 million dollars from 2008 to 2010, as well as a reduction of claims processing staff by 125 people (FTEs). (Dunlap & Lacity 2017, 29-33) Therefore in the next chapter, two case examples utilizing RPA are being presented more in detail. This is done in order to give insight on how much benefit can RPA facilitate in terms of automated FTEs, reduced costs and return on investment.

3. ROBOTIC PROCESS AUTOMATION CASE EXAMPLES FROM THE LITERATURE

This chapter will cover different RPA solutions within financial management. First, the case examples 3.1 and 3.2 will go through what kind of examples of automation with RPA there has been presented previously in the academia. These two studies were extracted with the methodology discussed in the chapter 1.3. The studies were chosen according to their comprehensive and descriptive step-by-step approach of the RPA processes, which is similar to the assessment of the empirical data later on. The case examples are given by researchers Lacity, Willcocks (2016) and Willcocks et al. (2015ab, 2017). This chapter will give insight into what sort of RPA case processes exists in the academia. Chapter 3.3 will generally cover the different RPA success factors in the financial management area. This examination is being conducted since this thesis is to answer questions which are inherently linked to the RPA utilization in financial management. This includes a strong emphasis on the processes conducted. Therefore, one of the key aspects is to figure out what aspects make an RPA implementation successful. Lastly, the case examples and success factors of the two companies are being compared. These cases as well as the success factors are eventually compared to the empirical data in chapters 4-6.

3.1 Case Telefónica O2

Lacity & Willcocks (2016) has researched the Telefónica O2 telecommunication enterprise that was mentioned also in the first and the second chapters. The case company's journey can be used as an example of a successful RPA implementation. Telefónica O2 (later referred to as just O2) is a large, U.K. based telecommunications company which adopted RPA early on in their processes. Like many other telecommunications companies, the company has a large customer base. The company had 24 million customers in 2015. In 2013, the company had 6.69 billion euros of revenue and 21,580 employees in the U.K. This results the company handling various large-scale back-office operations. O2's original business goal behind the considerations of RPA was to keep the business growing whilst attempting to keep the cost structure low. This would ensure the continuity in the highly competitive telecommunications market. (Lacity & Willcocks 2016, 25)

This journey began from the company having outsourced low-value tasks to India. This was conducted via a business process outsourcing (BPO) partner. In 2009, there were 375 FTEs worth of back-office work done in India and 50 FTEs in the U.K. The initial incentive to think of alternatives

was mainly due to the rising wages in India and the BPO partner having no incentive to innovate, largely due to a payment system having an hourly wages'-based approach. By the year 2010, the volume had grown into over a million monthly transactions, with the costs associated followed to increase as well. There were 60 core back-office processes with around 400 sub-processes. (Lacity & Willcocks 2016, 26)

O2 began their cost-reduction project by first eliminating non-value adding processes and simultaneously optimizing and simplifying the processes that were not eliminated. Some of the processes were also brought back from India to the U.K. These processes were further examined in terms of efficiency. This project resulted with a two-year reduction in the back-office employee base of roughly 10 %. During the two-year period the possibility of RPA was first discussed. These discussions resulted in the decision to conduct two pilots to examine the possibility with a PoC. The company chose to utilize Blue Prism as their service provider. (Lacity & Willcocks 2016, 26-27)

After the pilot, it was clear RPA worked with the O2's IT systems. These two pilots were even compared to BPM-technology based pilots on identical processes. Based on the financial cases, RPA turned out to be "a clear winner". The greatest difference was in the amount of costs associated with the IT labor used for the development. The prediction at the time was that RPA would reach payback in 10 months whereas BPM could take up to three years. To start of the RPA preparations, two back-office employees attended a one-week training program at Blue Prism and after that, they worked with Blue Prism consultants for a month. After the month, this was reduced to once a week. Within 12 weeks, the employees were almost fully independent to develop with Blue Prism's RPA software. (Lacity & Willcocks 2016, 27-28)

O2 began the full implementation with 20 software licenses and afterwards it was increased to 75. Also, a third employee was trained in a similar manner as the previous two. With these resources, a total of 15 core processes were automated. After the automation, the estimate of the saved FTEs was in the hundreds. Other benefits included the increase in customer satisfaction due to reduced turnaround times and phone calls. Finally, in the year 2015 the amount of automation had reached up to 400,000 – 500,000 transactions each month. (Lacity & Willcocks 2016, 28-29) As we can see, as an early adopter of RPA, the benefits were massive. The amount of processes automated was 35 % from the overall amount of the said back-office processes. The financial benefit was also outstanding; the three-year ROI was estimated to be a 650 – 800 percent. (Willcocks et al. 2015b, 18) Next, another example of an RPA automation process is being presented to further gain insight on a different RPA process approach.

3.2 Case Xchanging

Willcocks, Lacity and Craig (2015ab; 2017) examined the usage of RPA in a company called Xchanging Limited. Xchanging is a technology-enabled business processing, technology and procurement service firm (Willcocks et al. 2015a, 5; 2017, 20; Xchanging 2019). As of 2015, it operated in 15 countries and had over 7,400 employees with a net revenue in 2014 of 406,8 million pounds. Founded in 1998, it first operated in BPO market. By the year 2015 it had gradually specialized in bringing technology-enablement to business processing. Xchanging has the overall approach to combine innovative technology with the best process methodologies available to customer needs. (Willcocks et al. 2015a, 5-6; 2017, 20)

Willcocks et al. (2015ab, 2017) case studies discusses the adaptation of RPA into Xchanging's insurance business. Xchanging had its insuring services in co-operation with Lloyd's of London ad IUA (the international underwriting association). In 2012, it secured a five-year contract in order to run the centralized Insurers' Market Repository. This contract contained market's claims, premiums, policies and related documentation, as well as the back-office policy and administrator processing for London Insurance Market Repository and the Lloyd's of London. (Willcocks et al. 2015a, 5-6; 2017 20-21) The Insurer's Market Repository is an "infrastructure owned and funded by London market insurers, both Lloyd's and companies, which provides a common repository for documentation to support accounting and settlement claims processes" (Loan Market Association 2016, 9).

Xchanging's strategy already involved the idea of "technology at our core", which meant that technological development was a large part of the company's strategy. The company also claimed in the strategy section of their annual report that technology is "at the core of everything we do at Xchanging". In 2014 they wrote: "Constantly innovating, Xchanging uses its market insight and understanding of its customers to help them to maintain a competitive edge in the face of rapid industry and technology developments. We are investing significantly in our capabilities to bring technology to the market either directly, for example in the form of software licenses, or through technology-enablement of business processing services that we provide." (Xchanging 2015, 1-5) Moreover, in the 2012 annual report (Xchanging 2013, 2), chairman Geoff Unwin wrote: "technology-enablement and constant innovation, not just cost effectiveness, are vital if we are to win business and ensure that customer satisfaction remains high."

As we can see, Xchanging was strategically invested in technological development. Thus, the possibility of RPA implementation was a strategically accepted approach for the company. Xchanging had a huge amount of manual back-office and processing tasks as well as repetitive data collection duties. The data was scattered around many different information systems which also made the information gathering challenging and time consuming. After gathering the information, it was then put into different non-integrated systems to generate different reports. In order to improve these processes, Blue Prism's RPA products were considered in the year 2013. The first phase involved identifying ten processes suitable for RPA automation. (Willcocks et al. 2015a, 8-9) The criteria used for identifying the possible RPA processes were the degree of process standardization and the volume of transactions. It was also assessed how rule-based and mature the processes were. (Willcocks et al. 2017, 20-22) Figure 6 below illustrates the complete RPA journey Xchanging took during the years 2013-2015:

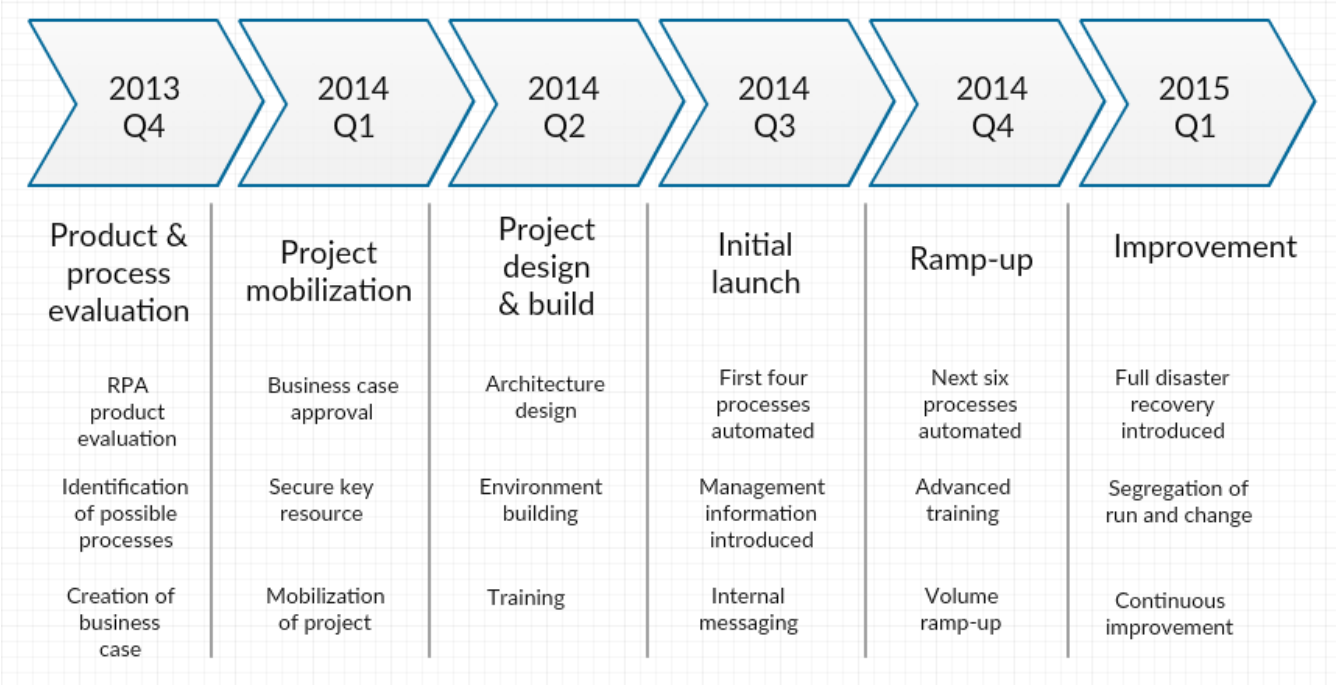

Figure 6. Xchanging's RPA journey (adapted from Willcocks et al. 2015a, 2017; copyright Xchanging plc, 2015)

As we can see from figure 6, the complete process took around one and a half years to complete. The project had around 20 people involved in it during the complete process. There were 10 employees from the insurance field and 10 from a "Group technology" team. In the Group technology team, there was a project lead, a systems' manager and two members responsible for servers, architecture and technology policies. From the service provider's team at Blue Prism, there were four people to conduct the training of the software and system. In addition, there were two business

operations specialists and an engagement manager who led the whole process. (Willcocks et al. 2017, 23)

The RPA project design & build phase took around three months, including the building of the software architecture, server and software support. The employees were also trained during this phase. During the fourth month of design & build, the company was ready to launch ten software robots. One of the initial ten solutions was the London Premium Advice Notes (LPAN's) robot. The LPAN robot was used to submit premiums by insurance brokers for Xchanging to process. Before the automation, the customer sent a raw data file to Xchanging. Xchanging's role was then to validate the file, collect additional data, create the LPAN by hand and upload it to the repository. The robot was then designed to either complete the task or to register it as an exception. The exceptions were then checked by humans. Use of the RPA solution had a great impact; where initially 500 LPAN processes took days to complete, the software could complete the same number of tasks in around 30 minutes. (Willcocks et al. 2015a, 7-12; 2017, 24)

After the initial ten projects, additional six processes were automated in four months. Xchanging also improved the existing processes via upping the volume and advanced training of the RPA software. (Willcocks et al. 2015a, 12-13) The manager of these processes, Paul Donaldson stated that they got more benefits from the processes and continuous improvement than they planned in the beginning. As Xchanging went through the 'industrialization' phase, they could use hundreds of robots in a short amount of time since they already had the corresponding technical and business architecture structure to support the implementation. By the May of 2015, the process has improved up to the point where the amount of first-time exceptions was around seven percent. Reversely, this gives a success rate of 93 percent. This was much higher compared an initial target of 20 percent in 2013. The volume of all the processes at the time was around 70,000 per month. These improvements were achieved due to rigorous improvement of the processes. (Willcocks et al. 2015a, 12-13, 19; 2017, 23-25) The monetary benefit was also very significant; around 11-30 percent cost savings depending on the process being automated. (Willcocks et al. 2015a, 14-19; 2017, 24-25)

3.3 Successful RPA implementation

In this chapter, an outlook on the RPA process implementation is taken based on the previous literature. There are multiple different traits that may be used to categorize different successful RPA implementations. There are also quite a few recurring themes in the literature that rise above the

others. These traits include process related matters such as the requirement for RPA long-term vision, planning the communication, forming an RPA governance board and Center of Excellence, early involvement of IT team, considering the business case impact and so on. To start off, it is beneficial for the case company to consider the suitability of its business- and organizational structures. Willcocks et al. (2015a, 15-16) mention the beneficial impact of business innovation and technology corporate culture to accelerate the adoption of RPA. Ideally, the business culture is such that technology is not only accepted but embraced in the strategy and practice. As examined in the chapter 3.2, this was one of the beneficial traits in the Xchanging company. Furthermore, Rutagada et al. (2017, 110) note that even though organizations are willing to explore the benefits of RPA, many of them lack the proper rigor to set up a long-term vision. Also, Gex & Minor (2019, 19) claim that planning and operationalizing an IT strategy is of "paramount importance" when considering RPA.

As for the employees, both the forming of an RPA Center of Excellence and RPA governance board is suggested. Anagnoste's (2018, 307) recommendation is that the most efficient way of handling RPA within an organization is that a CoE handles and monitors the robots. Simultaneously the CoE should always look for new automation targets. Rutagnada et al. (2017, 110) claims that organizations with successful RPA initiatives have strong relation to the strategic vision accompanied with the forming of an RPA CoE. These companies also tend to have a strong governance structure. An RPA governance board is also suggested by Gex & Minor (2019, 20) and Willcocks et al. (2015b, 31). This applies to other automation solutions as well; according to Anagnoste (2018, 307) a BPM CoE is widely adopted by organizations targeting for a consistent and centralized deploying BPM initiatives. According to Jesus, Macieira, Karrer & Rosemann (2009, 1) a CoE is widely adopted by enterprises aiming to institutionalize BPM initiatives and expand its benefits throughout the entire organization in a more centralized manner. A CoE team is recommended to have at least a CoE Manager, RPA Team Lead, -Developer, -Process Analyst, and Controller, Solution Architect as well as CoE Trainer (Anagnoste 2018, 311-312).

Moreover, Willcocks et al. (2015a, 15) suggest that successful RPA projects require a senior sponsor who initiates the idea, underwrites resources and protects the business adoption process. Also, a project champion is recommended. This is a person who puts between 40 to 80 percent of their time into RPA processing and development: communicating the vision, upholding the motivation of the personnel and maintaining stakeholder relations including the senior management. According to Gex & Minor, (2019, 20) a critical strategy component in having success with RPA is to have a dedicated IT systems administrator. Without one, RPA developers and analysts will be spending a majority of

their time addressing different infrastructure requirements, rather than focusing on building automations. IT systems administrator may also help to manage the changes related to IT security as well as troubleshoot unexpected IT problems. Setting up clear duties and lanes of accountability within the available workforce is also recommended. (Gex & Minor 2019, 20-21)

Studies such as Willcocks et al. (2015a, 20-21) suggested that a clear and open communication of the processes are of the utmost importance. Anagnoste (2018, 312-318) also suggests that members of the RPA CoE must have strong organizational and stakeholder communications skills to guide the organization's RPA actions. Furthermore, Seasongood (2016, 39) suggests that companies may avoid communicational issues with the RPA-affected employees by creating a communication strategy. Ideally, this strategy ensures all the robot users are tied to the success of the program. This ties to the previous points since development of a thorough change management plan will allow organizations to redeploy the personnel and human resources efficiently.

As for the technology and processes, Gex & Minor (2019, 22) claim that keys to successful RPA implementation are designing a flexible operating model and institutionalizing a well-understood automation development methodology. This entails that the methodology on RPA development should be so that it allows for the customers and directors of the projects to identify and track the progress of the development. According to Willcocks et al. (2015a, 17) RPA must act in accordance with the technology's governance and architecture. It is suggested to review the technology infrastructure as early on as possible. The automatable process should also be standardized and stabilized before the automation. This can be done for example with process re-engineering and continuous improvement. (Willcocks et al. 2015a, 17; 2017, 20)

Riedl & Beetz (2019) created a three-step evaluation model for the companies to tackle the process selection issues. The three-step model is divided into pre-selection, suitability prioritization and financial analysis. In the pre-selection phase, the companies select processes that do not need standardization or optimization prior automation. The suitability prioritization is based on analyzing the processes in more detail. They are ranked based on technical feasibility, business potential and organizational aspects. Within this step, there is 14 different measures, including many of the same criteria (such as rule-based and limited human intervention) as presented in the chapter 2.2 and 2.2.1. The business potential is then assessed with two criteria: risk-proneness and process standardization. In this phase, other than technical aspects are being considered. In the third step, a financial analysis is made with for example net present value or discounted value-added methodologies. (Riedl & Beetz 2019, 1; 5-8)

To further summarize the success traits, Boulton (2017, 2-4) referenced to a CIO.com case study, in which they interviewed technologists and consultants on how IT leaders may use RPA effectively in their organization. The nine tips are as follows:

1. *Set and manage expectations*
2. *Consider business impact*
3. *Involve IT early and often*
4. *Poor design and change management can create havoc*
5. *Do not fall down the "data rabbit hole"*
6. *Project governance is paramount*
7. *Control maintains compliance*
8. *Do not forget the impact on people*
9. *Put RPA into your whole development lifecycle*

As we can see, a lot the similar traits have been presented in the aforementioned studies. To clarify few of the traits, the fourth trait implies that many implementations fail because design and change are poorly managed. In speedy deployment projects, some companies overlook the communication between different bots. Before implementation, some attention should be paid to planning the operating models' design. The fifth trait means that if for example a bank deploys a solution that requires thousands of bots to automate data, it will create a huge amount of it as a byproduct. This can lure business leaders to leverage the data with for example machine learning applications. Then it may be that an initial RPA project may suddenly become an ML project, but it has not been designed as an ML project. It is beneficial to think more on the long-term effects and to not get overwhelmed by the increasingly complex opportunities without proper planning and implementation. The sixth trait refers to the governance challenges that may arise from implementing different bot technologies. One example was that one client spent several meetings trying to determine the gender of their robot. This also required the examination of human resources, ethics and compliance to resolve this issue. Therefore, sufficient command and control of these processes is required to tackle these issues. This is one of the reasons why forming of an RPA governance board is also recommended. (Boulton 2017, 2-4)

In 2018, KPMG (2018, 2) conducted a series of discussions in Australia in order to discuss relevant shared service topics such as outsourcing. The discussions were attended by executives from multiple corporate functions including industries such as financial services, telecommunication, fast

food, healthcare, energy et cetera. According the KPMG (2018, 3) report, all executives from industries that attended the discussions claimed they were contemplating the use of robotics, if they had not already started. The number one reason for this was the possibility of cost savings. Some companies were saving up to 25 percent with RPA in opposed to human workforce. In order to make this happen, it requires replicating exact human processes, a shift in thinking the processes, implementing different governance and control as well as pre-empting potential organizational culture and challenges of employee engagement. (KPMG 2018, 7)

Also, PwC (2017) surveyed managers of the 18 largest Danish enterprises on RPA. 45 percent of the enterprises had implemented RPA, 45 percent were in the PoC or pilot stage and 10 percent were in the preliminary examination and research phase. The main findings were that in the majority of the enterprises RPA was not implemented as quickly as the organizations would have hoped. Also, the PoC projects were not conducted as fast as expected. Although based on the previously presented literature and the PwC surveys, it is a beneficial trait that the organizations reportedly spent time on integration of the RPA unit, setting up a CoE and in the structuring of the employees and organizations. One of the lessons learnt were that choosing of complex processes as a PoC creates delays in the process. (PwC 2017, 3-7)

As for the governance and structure, the companies agreed that the establishment of the right structure and foundation in the beginning allowed faster and precise scaling in the future. PwC recommends that RPA is best incorporated in accordance to the company's size and enterprise culture. RPA should be integrated in the business with close co-operation with the IT function. As for the strategy, many of the respondents claimed the definition and clarification of the RPA strategy are "the most important factors for a successful implementation of RPA". Also, the deployment standards and process documentation should be defined as early as possible. (PwC 2017, 9-13)

To summarize the chapter, table 2 below concludes the Telefonica O2 and Xchanging cases as well as their success factors found from the studies:

Table 2. A summary of case examples and success traits in the literature (Lacity & Willcocks 2016, 24-34; Willcocks et al. 2015a, 4-21, 2015b 18; 28)

Case	**Telefónica O2**	**Xchanging**
Target of automation	SIM card swaps Pre-calculated credit Order processing Unlocking porting ID generation Customer data updates, reassignments and dispute resolutions	Processes related to the validation and creation of LPANs.
Processes automated	15	14
Implementation time	Pilot process: around three months.	1.5 years for all the implementations.
Number of transactions per month	400,000 – 500,000 (more than 160 software licenses).	120,000
Saved FTEs	“Hundreds”	Processes focused more on continuous improvement.
Payback period	12 months	N/A
Profitability and cost savings	ROI 650 - 800 % in three years.	Typical cost savings: 30 % per process.
Success traits	Conducted a pilot. Compared to alternatives such as BPM. A heuristic of more than three FTEs’ worth of automation potential to target selection. Optimization of the underlying IT infrastructure. Managing the expectation: a promise of no layoffs to the employees.	Strong support from IT later on in the process. Continuous improvement. High-volume, rule-based and repetitive tasks targeted. Actively managing the expectations of employees. Processes standardized and stabilized before automation. RPA incorporated as a part of broader innovation strategy.

As can be seen from the table 2, the success traits were similar for both of the companies, with only few differences in their emphasis towards the technology. For example, the both of the companies had problems with the IT department of the case company due to their initial doubts on RPA as a technology. However, these problems were tackled later with a pilot project which showed the clear potential of RPA. (Lacity & Willcocks 2016, 31-32; Willcocks et al. 2015a, 9-10) Especially for O2, the doubts were conquered by learning and experimenting with the technology (Lacity & Willcocks 2016, 31-32). As for Xchanging, the first four processes were automated in around 9 months if examined from the initial product process and evaluation (Willcocks et al. 2015a, 10). For O2, the pilot was done in about 3 months into the RPA project (Lacity & Willcocks 2016, 28).

Both of the companies also incorporated their own criteria for the target process selection. In Xchanging, they initially encountered problems on choosing the correct processes and several of them had to be rejected before the most suitable processes could be found. The company also streamlined and optimized these processes before automation. (Willcocks et al. 2015a, 17) In the O2 company, a similar optimization for the core back-office tasks as done on a two-year project. This already reduced the need for back-office personnel by 10 percent. After the optimization, they searched the processes which incorporated at least 3 FTEs worth of automation potential within them. (Lacity & Willcocks 2016, 26, 31)

Moreover, one of the success factors for both Xchanging and O2 was the fact they communicated positively about the technology to their employees. In the O2, the company had promised no layoffs (Lacity & Willcocks 2016, 32). In Xchanging, the company held special roadshows where they communicated proactively that with RPA the employees may get to do more fulfilling work (Willcocks et al. 2015a, 12-13; 2017, 24). As we can see, the expectation management in both of the companies seem to have succeeded.

Overall, both of the case companies reaped great benefits from the projects. These high figures were enabled by the very high volume of manual, high-volume labor. O2 had especially high benefits from the automation with hundreds of FTEs saved accompanied with a ROI of 650-800 % (Lacity & Willcocks 2016, 25). As for Xchanging, they reaped benefits from continuous improvement up until the point where the cost savings were 11-30 % per process automated (Willcocks et al. 2015, 4, 12-15) The summary of these cases as well as their success traits are later on compared to the figures and success traits of the case company in the fifth chapter. First, in the next chapter the case and reference companies' processes and the solution provider's RPA principles are presented.

4. CASE STUDY: RPA WITHIN THE CASE COMPANIES

This chapter focuses on the empirical part of this research. First, the case companies are shortly introduced in chapter 4.1. The methodology and data are being introduced in chapter 4.2 including the information on the respondents of the interviews and questionnaires. The following chapter 4.3 will discuss the RPA solutions conducted in the reference company. Chapter 4.4 presents the service providers' RPA procedures including their communication and RPA product pricing principals. Chapter 4.5 will present the main empirical data on case company's processes. After the presentation, chapter 4.6 will analyze the received feedback from the respondents. Lastly, chapter 4.7 presents the results of the workload automated in the case company.

4.1 The case companies

The main case company is a Finnish SME-sized limited company in the banking industry. Upon request from the company, it will remain anonymous due to the nature of the process related subjects being presented in this chapter. This chapter contains detailed information about the case company's previous projects as well as its preliminary plans for the future. This chapter also contains information that may be linked to the competitive advantages of the case company. This study focuses especially in the back-office, administration as well as customer service teams within the case company. Also, one interview covers the IT development of the case company from the perspective of a development director.

The reference company is larger, Finnish enterprise in the insurance field. This company works in a slightly different financial sector than the actual case company. However, it has a wide variety of similar processes to the main case company. This thesis contains two qualitative interviews from the reference company. The said interviews act as a reference material to reflect upon the experiences of the main case company. Also, one interview was conducted with a representative of the service provider for the reference company. This interview covers mostly the personal opinions of the respondents, but also some of the procedures and policies of the companies. The service provider is an international intelligent process automation company that specializes in RPA and intelligent automation. These companies are also addressed anonymously due to similar reasons as for the main case company. In the next chapter, we will discuss the methodology used in the gathering of the empirical data.

4.2 Methodology and data

To summarize, the empirical section of this thesis comes from conducting three different interviews from different employees of the main case company as well as three interviews from outside of the main case company. The interviews were semi-structured theme interviews with predesigned themes and questions for each person individually about the topic of interest. According to researchers such as Longhurst (2010, 103) a semi-structured interview is a verbal interchange where the interviewer attempts to elicit information from the respondent by asking questions. The interviewer prepares a list of predetermined questions, but the interviews are still conversational; this allows for the participants to dig into the subjects they feel are important. The aim was to allow the respondents to freely express their ideas on the topics and matters at hand.

All the interviews were voice recorded and a thematic content analysis (TCA) was conducted for the data. According to Anderson (2007, 1) thematic content analysis is "a descriptive presentation of qualitative data", in which qualitative data takes the form of interview transcripts collected from respondents that reflect experientially on the topic of the study. Thus, correctly implemented TCA depicts the thematic content of interview transcripts by identifying the common themes in the interviews for the analysis. Since TCA does not suffice as a complete analysis of research findings, the data is interpreted and compared to the theoretical literature in the chapter 5. (Anderson 2007, 1-2) The figure 7 below illustrates the steps made to collect and transform the data into research findings:

Figure 7. The process of gathering and analyzing the empirical interview data.

After the transcription of the interview data, the interview themes were first organized in following manner: reference company's responses on their RPA processes and solutions, case company's processes and solutions, and lastly the service provider's point of view. After this, a second division into themes was made. The main themes of all the interviews involved the process steps and step-by-step the process timelines, respondent opinions on RPA, matters related to the collaboration and communication, future possibilities, and mapping of the time before and after automation. Lastly, the

transcriptions were interpreted and analyzed to summarize which parts of the themes were interconnected in a meaningful manner, or otherwise significant towards the research questions.

The purpose of case company interviews was to trace the case company's current processes, RPA projects conducted previously as well as the process and user experiences from them. Three interviews from outside of the case company were made. This was done in to gain more knowledge on the technical possibilities and challenges of automation and RPA in general, as well as the information on the reference company's processes and procedures. Two of the respondents had the technical knowledge of the RPA processes and automation solutions that benefit this study. The second interview of the reference company provided interesting data due to the respondents real-life RPA process experience in the field of financial management and accounting. The six qualitative interviews used in this empirical section include:

1. A system manager of the reference company, working in the automation and robotics team of the reference company

The scope of this interview was to provide an alternative viewpoint on the developmental side of RPA and automation technologies. The interviewee has a PhD. & MBA as well as over ten years' worth of experience working with information technology automation. Specifically, the expert has experience especially designing and building robotics, AI and data-analytics -based platforms as well as innovating, implementing and planning automation business cases. He also has experience in automation project management and process ownership. The current role of interviewee involves around the technical solutions in intelligent process automation. The respondent's position in the robotics team includes assisting different teams to find the most suited automation solutions for their needs. The respondent also comments on the teams' ideas for automation targets as well as making sure the already finished solutions are functioning properly. The questions for this interview are in the Appendix 1.

2. An expert of the administration team of the case company, currently working as a payment product specialist

The scope of this interview was to find out, what kind of processes the team has already automated, how good has the user experience been, and what can we learn from it. This interview aims to look into the things that may be beneficial to do similarly in the financial management team. The expert

has a professional background of around two years in the case company, mostly focusing on customer service, anti-money laundering functions and payment product services. Their team has already implemented RPA solutions by automating an information update process. The project was initialized in September of 2018 and was implemented to everyday use in the early 2019. The emphasis of this interview was on tracking the complete RPA process and to collect the respondents' feedback after the implementation. The questions for this interview are in the Appendix 2.

3. An expert of the financial management team of the reference company, currently working as a system manager / accounting specialist

This particular interview was conducted in attempt to gain more reference to the main interviews for the case company. The reference company already had some insight into RPA automation, especially in financial management as the reference company attempted to automate a certain process in their payroll system. The expert has a professional background of around six years in financial management, mostly in accountings. Due to more informal nature of the interview, there are no specific interview questions in the Appendix.

4. A director of the information technology team of the main case company, currently working as a development director.

The scope of this interview was to understand the directory role in the case company's RPA processes. This seeks to answer the questions: what kind of things there are to consider when implementing an RPA technology, what software is being used and what tools could ultimately be used for these kinds of processes. The respondent has been working in the current role of development director for 2.5 years in the case company. Before the case company, the respondent worked in the case company's automation service provider for five to six years. The respondent made a career of 15 years in different banks starting from a cashier to a manager of a small bank. The interviewee has taken a directory role in two RPA projects in the case company, and other projects in automation as well. The interview questions for this interview can be found in the Appendix number 3.

5. An expert of the financial management team of the case company, currently working as a business controller

The scope of this interview was to find out what kind of processes the team has and what processes could possibly be automated with RPA technology. The interview will cover the preliminary ideas: what processes the case company may want to automate with RPA in the future. The respondent is responsible for the initialization phase of RPA in the financial management team of the company. The team consists of four controllers, two back-office employees and two treasurers. The respondent has around 5.5 years' worth of background in accounting and financial management. However, the respondent has no previous experience with RPA processes. The interview questions for this interview can be found in the Appendix 4.

6. An expert in the development of RPA processes, currently working as a solutions consultant for the service provider

The scope of this interview was to deepen the understanding from the perspective of a service provider offering specifically RPA solutions. The respondent is currently working as a solution consultant and is an accredited Blue Prism professional developer. The respondent has one year and nine months' worth of previous experience working with RPA and intelligent process automation. This interview provided a valuable insight to the developer and service provider perspective on the RPA processes. The respondent also gave intriguing examples of the pricing model of RPA solutions and the general communication principles with their clients. The interview questions for this interview can be found in the Appendix 5. A total summary of respondents' background information can be found in the table 3 below:

Table 3. Respondent information of the interviews

Respondent	**Respondent's affiliation**	**Role of the respondent**	**Experience in automation and RPA**	**Educational background**
Respondent 1	Outside of the case company	System manager	Over 10 years in automation and RPA	PhD. (tech.), MBA
Respondent 2	In the case company	Payment product specialist	Expert role in one RPA project	M.Sc. (Econ. & Bus. Adm.)
Respondent 3	Outside of the case company	System manager / accounting specialist	Expert role in one RPA project	M.Sc. (Econ. & Bus. Adm.)
Respondent 4	In the case company	Development director	7-9 years in Information Technology	B.Sc. (Econ. & Bus. Adm.)

Respondent 5	In the case company	Business controller	No previous experience in automation or RPA	M.Sc. (Econ. & Bus. Adm.)
Respondent 6	Outside of the case company	Solutions consultant	Almost two years, solutions provider & development role in 9-10 RPA projects	BBA (Int. Bus. Adm.)

In addition to interviews seen on table 3, two more formal questionnaires were conducted. These questionnaires were conducted and collected using an online survey tool. The data is anonymous and was examined using the previously stated TCA methodology.

The first questionnaire was aimed at a client advisor team of the company. The team's main purpose is to serve the customers both personally and in the company's website through an Internet-chat. In this team, the case company conducted an RPA project which was designed to process certain student loan application cases, examined more detail in this section's chapter 4.5.1. The role of the team members was to start the RPA robot application, supervise whether the RPA robot was functioning correctly and to manually process the exception cases. There was a total of six respondents, with the average number of years spent working for the case company being 2.87.

The second questionnaire was aimed for a back-office team that is using an RPA robot which was processing customer death record information further examined in the section 4.5.2. The role of the team was similar to the client advisor team's role: starting, supervision and exception handling. There were two respondents for this questionnaire with the time spent working in the case company being 37 and 43 years. As we can see, the back-office team consisted of much older personnel than the client advisory team. This provided a good chance to compare the respondents' views on RPA to see if they differed in terms of general attitudes towards automation. Before this, the views on the reference company are being introduced.

4.3 The reference company processes and solutions

The automation and robotics solutions in the reference company is administrated by a "virtual team". The virtual team has one director of operations and one system manager (respondent 1). In addition,

the virtual team has a one part-time coordinator, which also has other responsibilities within the company as well as one to two other part-time business operation representatives. This can also be considered a small-scale automation Center of Excellence, as discussed in chapter 2.4 and 3.3. According to respondent 1, the reference company uses BPM as well as Enterprise Service Bus (ESB), chatbot solutions as well as RPA to automate its processes. The two service providers for BPM and ESB are both large international enterprises, one of them is one of the largest in the world. As for the chatbots, they are smaller startup companies.

In addition to their RPA possibilities, the reference company utilizes four to six different automation platforms. Most of the core business processes are automated within the software. Mainly they are developed with Java. Therefore, most of the automation is done in through core integrations. The second most utilized automation approach in the case company is the integration platform -approach also known as cloud-based integrations. In these solutions, they are partly using SOA. Thirdly, the case company utilizes different types of RPA and ESB solutions. There is roughly equal amount of integration platform -based automation solutions as there are RPA and BPM -based solutions. According to respondent 1, BPM is best suited where a human intervention is required at least in one part of the automation process. The automation within one application is usually integrated into the system in the reference company. Therefore, the total number of BPM or SOA automation solutions is very difficult to assess. As for the integration platform solutions, the number is in the several tens of more robust automations. In addition to these, there are 10-15 RPA solutions. Currently, the automation resources are mainly put in developing the AI and chatbot -technologies. At the moment, these solutions are not very far developed, but have a good amount of future potential for the reference company.

The reference company also takes advantage of the screen capturing technologies discussed in chapter 2.2.1. However, the company does not use the record and playback (or record and replay) functions of screen scraping. The idea behind the record and playback function of screen scraping is that the human actions on the UI are being recorded in a machine-operable format. This technology is by no means new, but the current service provider does not have the said functionality in its RPA platform. This means in any case, the discussion about whether the depicted process flowchart is in line with the actual process must be held.

The respondent 1 also noted that if the record and playback functionalities were integrated into the RPA software the service provider uses, in the best-case scenario it could create a ready flowchart to the RPA developer. Respondent 1 also noted that a technology capable of utilizing several record

and playback recordings would also be useful. Possible expansions to this technology would be if these several recordings could be transformed into a generic, parameterized and machine-driven process automatically. The only problem is that this form of high-level technology has not been properly implemented by any RPA provider. As asked how useful they would feel if this form of technology would be for the reference company, the respondent answered:

"*If somebody would invent such a way to fully utilize this technology, it would be somewhat of a breakthrough. Technically speaking, this would be very hard to create since it requires a combination of RPA and process mining into a complete package, which also needs to be easy to use. There are already attempts amongst providers to create such a solution. Still, there is no such a solution that would capture the recording directly into a complete process flowchart. I believe, though, that this will be possible in the future, and this will immensely ease and improve RPA processes.*"

Currently, the only screen capturing done in the company is the standard screen capturing technology, which scrapes the bitmap data from the screen, as described in Brain (2016). Any higher degree of usage is not yet a viable option in the reference company, due to the aforementioned reasons.

As for the processes, there is a certain automation pathway for creating the solutions. The first step is understanding the target of the automation process. The owner of the process maps out the process and turns it into a rudimentary flowchart. Respondent 1 claims that the development phase is the fastest phase of the whole process. This means the process step in which the process flowchart is complete and then translated into "automated language". These ideas for automation targets usually come from the representatives in the particular team or segment of the company. After this phase, the flowchart is delivered either to respondent 1 or the service provider for preliminary assessment. In its preliminary state, the workload as well as juridical and information security aspects of the project are first considered.

After the first phase, the complete project proposal is made a part of the company's balanced scorecard (BSC) system. At this point, the proposal is made into a full business case. The business case is then either accepted or rejected by a process owner, whom is typically the executive of the particular organizational unit. This executive base their decisions on the available budget and the overall benefit of the project. After the approval, the service provider is in control of the launching of the RPA/automation solution. This includes the solution maintaining and providing IT-support if any problems occur. The responsibility of the target team is to supervise the robot as well as reporting of the

possible problems and dysfunctions that may occur. The receiving team also supervises that the automated tasks get completed and to inform the service provider in an event of dysfunction.

The respondent 1 claimed that the typical RPA project from initial planning to launching takes roughly one to three months to conduct. His message was that the whole service promise of RPA is that it provides fast solutions to customer needs. Naturally, this varies a lot depending on the case. The one to three-month timeframe includes the mapping, development, testing and launching of the automation solution. The respondent 1 also noted that if the IT-processes are outsourced, the complete process is slower. This is mainly due to gathering of the necessary licenses, accounts and passwords to access certain software and information. Also, the process is sometimes delayed by matters related to the communication between the stakeholders.

In the mapping phase, the time spent in this part of the process naturally varies a lot depending on the case complexity. In the reference company, the mapping of the process is being conduct by persons who usually have knowledge only on the target process. According to respondent 1, this slows down the process. This is due to the fact that these people have no previous experience in consultancy or business process analysis. Previous automation experience would help to recognize different phases of the complete process. This is where the process would need improving, according to respondent 1.

The respondent 1 claimed that in the reference company for every future RPA solution made in the reference company there is an exit strategy on how to automate the process with more sustainable solution. Examples include a new system version, or a complete and direct integration. Therefore, especially in the future, RPA solutions are only seen as a temporary solution in the reference company. Next, a real example of a reference company process is given by respondent 3.

4.3.1 The purchase ledger supplier information automation project

Respondent 3 of the reference company depicted the process which involved the use of RPA technology in order to automate the purchase ledger / accounts payable supplier information. This project involved data transference from a Finnish business information system (“YTJ”, in Finnish) to the electronic purchase ledger system. YTJ is a service maintained by the Finnish Patent and Registration Office (PRH) and the Finnish Tax Administration. It is used by companies to file the official information to these authorities. Then they are also forwarded to the Trade Register and Register of

Foundations, which are maintained by the PRH. They are also forwarded to the VAT register, Prepayment Register and Employer Register, which are maintained by the Finnish Tax Administration. (YTJ 2019)

After the needed information is transferred from YTJ, the RPA software chooses the appropriate recipient to the given purchase invoice and then forwards it to the ledger. The RPA software proceeds to process the payment to the correct automatically founded suppliers. This solution was used in the basic case of a simple invoice; the more unordinary cases are still dealt with by an employee of the financial management team. According to the respondent 3, their RPA project involving the aforementioned purchase ledger supplier information and invoice automation took approximately eight months to complete. Respondent 3 claims that the initial estimate by the service provider for the length of the project's design & build phase was ten days. However, in total the amount of work spent in this phase was three to four times higher than the initial estimate according to the respondent 3.

There were technical, business and liability reasons for this delay. Most problems were associated with the technical side; the solution could not get a connection to the YTJ and other applications. There were also issues with the computer's firewalls on which the software operated. Some problems were associated with the personnel: some of the employees changed during the process and there was not enough clear and open communication between the stakeholders. The issue with communication was especially about whether the error messages are being sent to the service provider or the financial management team. The parties could not decide which problems should have been taken care of manually, and which would need service provider's consultation. Another difficulty in the project was in proper testing of the RPA solution. The service provider was unsure in the beginning on how to properly execute the testing phase. Therefore, this phase took a lot longer than what was agreed upon in the beginning.

As an accounting specialist, the main feedback the respondent 3 had to their team leader and the management of the company considered the cost accounting and investment analysis. Besides the multiple problems, one of the main concerns of respondent 3 was that the payback method calculation of the project was not done thoroughly. Respondent 3 also expressed their concern that only the robotics team made these for their use, and a more in-depth analysis was not done for the company's mid- and upper management.

Other, more general feedback concerned the role of the robotics team of the company. The respondent 3 felt that the robotics team as a separate unit is destined to increase the amount of unideal use of robotics in the reference company. The respondent saw that the company could be more efficient if the automation would be an inherent part of every unit of the reference company. Meaning that every team should have a person that has at least some knowledge on automation and robotics. The respondent 3 also said that other options such as lean management or lean manufacturing should always be considered before automation.

All in all, the respondent 3 did not feel this project was very fruitful. To summarize, the respondent 3 claimed that this process could have been improved with a more realistic time frame and more clear communication between the parties. Also, despite RPA being lightweight IT, the respondent claimed that Blue Prism RPA software is too "heavy" for this process. According to respondent 3, the solution should have been more agile. The respondent claimed that it should have been conducted in a way that the financial management team "*could better modify and control*".

4.4 RPA projects in the service provider company

Respondent 6 from the service provider company estimated that the normal RPA project could take anywhere from six to eight weeks to conduct, if things go by the best-case scenario. In the worst-case scenario, projects can take from five to six months. Some rare, even more complex cases can also take more than six months. This estimate considers the time period from the process definition phase up to the final production phase. In the final phase the project is being handed over to the service providers' maintenance and support -team.

The process in the service provider company has a certain delivery model that the solution consultants of the company follow. The delivery model begins with the mapping of the RPA-automation potential. This mapping is done in cooperation with the customer and is done by examining the existing processes and assessing their suitability for RPA automation. The key indicators are the volume, the number of working hours used for the process in a certain timeframe, costs accrued from manually completing the process, and the benefit from the automation of the process. The benefit is measured in terms of cost-savings as well as the number of FTEs automated. In other words, a business case assessment is done in the mapping phase of the project.

The service provider does not recommend automating processes that are unclear to the client internally. These cases may for example include those processes that can be done in multiple different ways by multiple different workers. If there is no specific set of procedures to the process itself, then there is no right way for the RPA solution to deal with the process either. According to the respondent 6, this is always communicated to the potential customer as a key prerequisite for automation. Other clear signal for the non-suitability is too high technical complexity within the process. One example is the target process flow involving five to six different IT systems. These systems include for example different data storages and ERP systems. Another negative aspect towards automation is the instability of the systems. This includes instances where the system is unstable, a beta version, or is otherwise under constant updates.

A certain automation target which is difficult to automate with RPA is the processing of different PDF-documents. Especially if these documents are scanned from paper and includes different formats or handwriting. It can be automated with RPA, but the process is still quite prone to multiple errors. All in all, the internally unclear processes, five or more different systems as well as IT system instability greatly affects the suitability of RPA automation. Respondent 6 also claims an automation solution that could reliably read PDF and scanned, hand-written documents is currently in very high demand. The service provider is seeking to answer the demand with a new, machine learning -based technology. The service provider has also gathered an AI-team that seeks new solutions to these issues. The solution that they are currently working on is an invoice and file claiming software which can scan through an invoice or file of any format. The machine learning -based software has been trained with thousands of different files. To simplify, the software is basically programmed based on the fact that every sort of invoice must have an account number, a reference number, an invoice number, a due date, code of product/service et. cetera. The goal of the team is to achieve as high success rate as possible. According to respondent 6, the success rate is already “quite high” but they are still attempting to improve it through constant training of the solution.

After the process is agreed to be suitable for RPA, the mutual goal of the companies is to validate whether the case is suitable and financially beneficial to conduct or not. The assessment is based on the RPA suitability criteria examined above and on the preliminary budget. If the project is decided to be worthwhile, the next step is to have a project kick-off meeting with all the stakeholders from both of the companies. Usually these kick-off meetings include the IT-personnel and project managers from both of the companies, a process owner or other persons who know the complete target process, and an RPA developer. There can also be other managers and staff members from the receiving company, depending on the projects’ size and importance. Smaller RPA projects can only

include the RPA software developer/consultant, one process owner (or expert), and one project manager (or owner) from the client company. Larger RPA projects may also include consultants working for the client, as well as managers of both the client and the service provider. In the kick-off meeting, the process roles and responsibilities of each stakeholder are being discussed and defined. Other important matters about the input of each team member and the common practices and guidelines in the project are being decided upon as well. These matters may include things such as the amount and frequency of the future meetings, communication related aspects and the monitoring of the progress.

After the kick-off meeting, the next step is the mapping of the targeted process. According to the respondent 6, in some of the cases the customer wishes to continue to create the process definition document (PDD) themselves. However, the respondent 6 claims it is not encouraged by the service provider. This is due to the fact that if the document is done carelessly or unclearly, the process definition phase will be much more time-consuming and difficult. This will most likely cause a lot of unclear situations for the RPA developer, which will inevitably lead to slower development. The developer has to contact the client and more communication or meetings is then required. Mainly for these reasons, the creation of the PDD is one the most crucial phases in the complete process, according to respondent 6. The PDD has a large effect on the overall length of the process and amount of communication required in the definition phase. Ideally, the PDD contains all the information required in the development phase of the project. The respondent 6 claims:

"The PDD is the 'bible' of the process. The PDD contains the thorough and detailed view on the complete process. It contains all the possible variations, rules, exceptions, time-related demands and everything linked to these, and what is needed to teach the robot."

After the PDD is being prepared, the goal is to "freeze" the document. Freezing means that no modifications or alterations can be done in between the completed PDD and the first version of the RPA solution. According to respondent 6, what usually happens when the development has already been started is the client notices a flaw or a missing aspect in the current PDD. After noticing, more communication or meetings are required in order to address the issue(s), and the PDD has to be modified accordingly. Shortly put, this is also why the service provider strongly recommends creating the PDD in co-operation with the client. The idea behind the freezing of the document is to create the RPA solution as it is described in the PDD. However, minor questions and fixes almost always come up in this phase. After the solution is done, all the additions and modifications can be done afterwards.

Respondent 6 claims structuring the process this way is much more efficient and less time consuming than without the freezing of the PDD.

The development and testing phase can range anywhere from few weeks to a few months, depending on the complexity of the information systems and processes being automated. After the development, the testing is done in co-operation with the client. The client commonly has prepared test data for this occasion in advance. The goal is that the client has provided enough test data to cover for every possible variant of the process which has been automated. This includes all the exceptions which can occur. At first, the testing is usually conducted in the testing environment with the test data. After all the detected shortcomings have been fixed, the team may take the project into the actual production environment to be tested under careful supervision with the actual data. According to respondent 6, the amount of testing can range roughly from three two-hour sessions to around five to ten five-hour sessions with the client. The testing continues until the provider and the client are certain that all the cases have been successfully automated.

After the testing, the first two to four weeks is a so-called “hyper care” -phase. This means enhanced surveillance from both the customer’s and service providers’ side. The goal is to supervise that all the cases are processed by the RPA solution accordingly. If there are any errors or exceptions which are not being dealt with, the teams can intervene right away and start fixing the error as soon as possible. After a few weeks of successful hyper care -phase, the service provider may transfer the solution to the maintenance team. The project is carried on to maintenance team, once both the testing team and the customer are convinced that all the cases are being handled by the software.

The maintenance team intervenes to the process only if something unexpected occurs. These events may include server related issues or outside problems affecting the process. The maintenance team’s responsibility is to investigate the issue, communicate it to the client, and to solve it. In the event of system or GUI updates, the customer ideally gives a notice beforehand to the service provider. After that, the updated version can be taken to the test environment and tested beforehand. Ideally, the customer informs all the things that are going to be updated, and the maintenance team can start the updating the RPA solution immediately. In the larger update processes, the testing is dealt with in co-operation with the client.

4.4.1 Service provider's pricing model of RPA

Respondent 6 also described the pricing model of the service provider company. The service provider has a three-part pricing model including RaaS, run management and development & consulting services. The RaaS price component includes the technical environment; the cloud services, testing and development environment and a varying number of production environments. The number of production environments is based on the number of RPA processes. The RaaS price component also includes the user license fees of every RPA-robot.

The second price component is the run management, referring to the administration and maintenance of the solution. After the process has been transferred to the aforementioned maintenance team, the team takes care of the solutions' run management. This maintenance has a certain fixed cost per month. If there are any special cases, e.g. a large update to the existing GUI, the price of these larger updates is agreed upon case by case. The cost of the larger operations is time and material based, and mainly depending on the working hours of the consultants and developers.

The third price component is the development and consultation, which is also based on the time and materials used. This component is also assessed mainly by the expected hours used from the consultants or the developers. After being handed over to the maintenance team, the number hours worked is then re-assed and charged from the customer by the factual number of hours.

4.4.2 Collaboration and communication with the client

As presented earlier, the practical matters are agreed upon in the kick-off meeting. The pursuit of the service provider is to communicate directly by the solutions consultant to the client without any extra steps. This is also dependent on the size and significance of the client. In the service provider company, this direct communication model has been accepted as the most efficient way of communication.

The most problems in collaboration according to the respondent 6 arise from the technical and IT-solutions as well as IT-maturity of the case company. If the client has multiple different IT-partners, providers or IT-systems, then the communication tends to get progressively challenging. When the

actual client does not have a clear administration over the systems being automated, the RPA service provider does not have a clear connection to the IT-systems' administration. This is where the most problems with communication stem from according to respondent 6. The RPA service provider usually requires additional information, licenses, or support from the customers' IT functions.

If the IT-provider has not been to the kick-off meeting or the IT-provider has not been fully informed and partaken into the RPA project, then the co-operation between the providers may turn out to be slow, unclear or otherwise challenging. Another possible issue is that the jurisdiction of certain IT-systems or processes are unclear to the RPA provider, or even to the client themselves. In these cases, the jurisdiction issues may halt the decision-making process completely or make it significantly more complex. Unclear or scarce communication of these issues may lead to further problems and this creates frustration towards the collaboration altogether.

According to the respondent 6, the service provider has learned about these common issues from experience. They currently know how to manage the clients' expectations to a certain degree. The target organization has certain expectations for RPA and automation in general. These expectations can vary greatly from the actual possibilities of the technology. If the representatives of the client are not aware of the actual possibilities, this can easily lead to disappointments. The service provider does its best in communicating clearly enough what RPA is capable of doing, and what it is not. According to respondent 6, the service provider attempts to be "as proactive as possible" in their expectation management and also in advising and teaching the client. These aspects are further discussed in the chapter 5, which attempts to link together the presented processes with the academical literature.

4.5 Empirical findings from the case company automation processes

As mentioned earlier in the introduction, the main case company has previously had a total of four RPA projects. Two of them are presented in this chapter. The reason that the remaining two processes are not being presented is the lack of information available as well as due to their technically simple nature. In short, the first RPA project involved a target process, in which the approval of a standard-form student loan application was automated. The second RPA project included updating customer data in a CRM system in instances where the customer of the company has died. After the passing of a client, there are certain procedures to be done. These include closing the credit/debit cards, different customer's accounts as well as removing the possible linkages to other customers.

Also, another form of automation was being implemented on a data transfer process. In this process, customers with address record data in foreign countries were updated into the company's CRM system. According to respondent 2, this was a very simple process in which the information is simply updated from a data set into the CRM system of the company. However, the respondent 2 did not know which kind of automation solution it required. This was originally intended to be automated with RPA, but the IT team found a more straightforward integration approach to the issue, according to respondent 4. In the next chapters, the RPA processes of the main case company are being presented, starting off with the company's initial RPA experimentation with the student loan automation.

4.5.1 Student loan application handling RPA project

As mentioned in the previous chapter, the case company had an RPA project in which they automated the accepting and processing of student loan applications. This process is done for the whole company all at once in the morning shift of the back-office employees. The RPA software is run through the employees' user account.

The student loan system in Finland has certain special aspects that differentiate the loan application from standard loan applying processes. First, the student loan system requires the recipiency of adult education allowance or a study grant. If an individual receives the allowance, they may get a student loan guarantee from Kela (Kela 2019a). Kela (Social Insurance Institution of Finland) is a government agency that provides basic economic security for everyone living in Finland. Kela's customers comprise of everyone who is covered under the Finnish social security system, including employer organizations that handle certain of their employees' Kela-related matters. (Kela 2019b) The student loan is a government guaranteed loan. If Kela gives an individual a loan guarantee, one can apply for a loan at a bank of your choice. There is no need for any personal security to put up as a collateral for the loan. Another condition is that the individual must live outside of their parents' house if they are under the age of 17 years. Also, if an individual is under 17 and not living with their parents, the parents' combined income must be less than 64,400 euros per year. Lastly, if they have previous student loan debt which is being collected by Kela, they cannot get a loan guarantee without successfully appealing to exceptional circumstances. (Kela 2019c)

The RPA software for the loan application system can process the admittance of a basic student loan application. As they are guaranteed by Kela, the admittance fully depends on whether the aforementioned conditions are being met. The amount of student loan applications is very cyclical throughout the year. The number of applications experience two peaks per year; first one being before the fall semester in August to September, and the second one being before the spring semester in December to January. According to respondent 4, during the peak seasons they can receive dozens of applications per day for roughly two to four months per year. One of the back-office employees claimed that during the season, the number of applications received can be over 60 per day, and the manual processing of the applications takes several hours per day from the team. Rest of the respondents also claimed it took several hours per day during this season. Outside of the peak seasons, there are occasional applications. The amount is then only a couple of applications per week. According to the respondent 4, during the peak periods it takes a client advisor roughly from three to four hours per working day, and during the non-peak season roughly fifteen minutes. According to the client advisors, it took anywhere from 10-15 minutes to one hour during the non-peak seasons.

According to respondent 4, the RPA solution halted in the cases that the applicant was not eligible for a student loan. These cases include the special conditions discussed above about the guarantee, or if the applier has their credit rating downgraded by the district court or the Finnish enforcement officer (Suomen asiakastieto 2019). In the event of a student loan application process declined, the software robot notes and highlights the application in an Excel log. It also makes a note on the customer's information page as well as into a virtual desktop about the procedures the robot has conducted. The client also receives an automatic message into their online service site in the event of a declined loan due to downgraded credit rating.

After the implementation of the robot, the service company started using the solution whenever there were applications to process. The first observation was that the robot was not perfect since there have been issues with the solution. According to a one client advisor, there have been many different kinds of technical difficulties associated with the solution. The good thing has been that the solutions to these issues have been found "within a reasonable timeframe", according to the survey respondent. Another client advisor claimed that the repairing or updating of the software in their user account has usually taken 1-3 weeks. A third respondent claimed the frequency of issues experienced with the software has been "every few months". According to the respondents, sometimes the software has not started at all, yet sometimes it has left around half of the applications unprocessed. The

problems reported was also that sometimes the solution has not written the information of the procedures in the CRM system, and sometimes it has not fetched the collateral from Kela. One client advisor reported that if there is an information on an ex-employee as the person in charge of the particular account in the CRM system, the solution starts the information gathering from the beginning and does not continue from that point onwards.

Despite the issues presented above, the general feedback on the project was quite positive. The most general response was that it is positive if you do not take all the problems into account. In the event of a problem, the exception handling may be slower than the actual manual processing of the applications. All in all, the overall grade (where 1 = not useful at all and 10 = extremely useful) the average grade the team gave the solution was 8. The mode and median were both 9. Also, in the teams' opinion, the communication related in the initiation phase was sufficient. According to the respondents, there was a good image by image manual for starting the software, accompanied with enough training and guidance from outside and inside of the team. Respondent 4 was also pleased about the overall amount of documentation that the solution created in the log files as well as in the CRM system. More on the feedback and analysis on the process is presented in the chapter 5. Next, the second case company RPA project is presented.

4.5.2 Updating the death record information RPA project

Most of the information on this process was gained from interviews with respondents 2 and 4. Respondent 2 was invited into the RPA process as an expert of the targeted process, which is one of the back-office tasks. The respondent 2 is currently in the administration team but was asked to participate in the process due to the respondent's previous background in the back-office team. The back-office team currently has around 10 employees.

Respondent 2 was informed about their expert role in September 2018. From October to November, the process was first defined into a process flowchart and weekly meetings were held about the process. The testing phase was conducted from December 2018 to January 2019. The project team consisted from two to three people, one of which was working in the back-office functions and the respondent 4, whom had the development director role in the automation process. The service provider had one project manager and one developer working for this case as well. The project manager of the service provider was responsible for the documentation and supervision of the budget agreed

by the companies. The budgeting contracts were also negotiated by the respondent 4. The respondent 4 was also the person who initiated the project as well as took care of the service producer, relations and schedules for the project. The target of the automation was to update the received death record dataset automatically into the CRM system. The robot fetched the data which was originally imported from the Finnish Local Register Office. The robot automatically imported the records from the larger company's system into the office's system.

Respondent 4 claimed the definition phase took around one month. Respondent 2 estimated the planning and process estimation phase took around two months and the testing phase was done roughly in the same timeframe. The testing phase took longer than anticipated; there was unexpected specification of the robotic actions which needed to be taken care of in order to continue the process. The co-operation with the service provider lasted for two months, in which the planning from the co-operative perspective and process flowchart specification was done. Meetings between the teams took place once a week. A functional version of the robot could handle most of the cases was created in total of 3-4 months. In addition, the improvement of the RPA process took one to two months before the software robot was able to function without major disruptions. Thus, the complete RPA process took approximately five to six months.

According to respondent 2, this process was longer than expected due to some unpredicted incidents. In the process, there was 5-10 details which needed to be specified during the initial testing of the software robot. According to the respondent 4, the complete project had many different types of cases within the process itself. This is why the consideration of all the possible exceptions for the flowchart took longer than expected. After the launch, the robot still did not perform perfectly. The reason for this was that some of the customers which had died had much more different kinds services and products from the case company than others. The initial estimation was the definition of the project should take around two weeks to complete. According to respondent 4, this timeframe doubled in the making; eventually it took around four weeks to complete.

One of the main observations was the RPA robot does not take some small details automatically into account when completing the tasks. Examples of these situations include when there are two contracts on the desktop screen, the order of these which one is first up on the screen varies occasionally. The RPA solution was programmed to click on the first one up on the screen, some trials of the solution ended in an error since the option windows were in a different order than intended. The production of the death record project also took a lot of time in the production phase, in which the function errors of the robot were common.

Respondent 2 estimated that the previous manual completion of the task took approximately five hours per week for one person. However, usually the task was conducted by two persons simultaneously. Therefore, the respondent 2 claimed it is somewhat difficult to assess the weekly workload before the automation. After the PRA project was conducted, the weekly workload dropped down to a maximum of half an hour worth of exception processing per week. The workload saved via automation was therefore around 4.5 to 5 hours per working week, accruing up to approximately 230 to 260 working hours saved within a full year.

In retrospect, respondent 2 did not feel this implementation process was a great success. Respondent 2 claims the initial error was made in the first phase; the upper level management had the inclination to utilize RPA and automation solutions just for the sake of automation. Respondent 4 as the development director, saw the complete process in a bit different light than respondent 2. Respondent 4 claimed it was already a known fact in the beginning of the process that it will not save a large number of hours worked. They knew in the beginning the amount of applications was not that high, therefore the idea behind the process was to learn as much as possible from use of RPA. The idea behind the process was to free some of the working hours of the respondents into something more productive, as well as learn in the process. Therefore, it was considered to be more as proof of concept or pilot. Respondent 4 noted that sometimes the removal of user accounts and links to another (alive) customers can sometimes be very time consuming in the more complex cases. However, respondent 2 did feel that overall RPA is useful to implement into this process. In the respondents' opinion, RPA is useful if the tasks are simple, require handling large amounts of data or a lot of hours to complete. The respondent 2 concluded the question about the benefits and downsides of the project:

"The downside of this (project) was, if we implement the wrong processes at the wrong time, as in my opinion happened in this our (death record information) process. You have to carefully consider the situation, is it the right time and process. I don't see any other downsides (to RPA). I see that it is a reliable way of doing things, and it serves the other procedures well."

Even though the respondent 2 had critiqued the process target, they also felt it is always better to free the time of human workforce into something more productive. The respondent 2 felt no change resistance. The problem with the death record process in the respondent's opinion was the lack of sufficient communication. Mainly it was the administration team manager who could not communicate the upcoming change properly. According to respondent 2, this caused confusion and negative

emotions within the team. Respondent 4 was also a bit concerned about the change resistance of the back-office employees, since they were older and "always done things in the same manner". The respondent supposed this is due to the employees' fear over losing their jobs. Respondent 4 also claimed the client advisory team saw their student loan application project in a totally different light, mostly due to their much younger average age.

To summarize, respondent 2 felt that more thorough and early-on communication could have prevented a lot of these negative emotions from emerging. The part that the respondent 2 feels needs always to be considered is the expectation management within the team. Thus, the clarification of causalities within the procedures as well as openness about the process is key to success. One of the things that could have improved the process according to respondent 2 is to have a preparational meeting for the target team. This meeting could include matters such as what RPA is, what are the next steps in the process, and how to prepare for the whole upcoming process. These suggestions are further analyzed in the chapter 5. Next, a view on a service provider's perspective is presented.

4.6 Employee feedback from the projects

In the student loan application process, the respondent 4 described the process with phrases such as "*clearly useful*". The client advisory team claimed it has "*eased the processing of the applications immensely*". The problems the client advisory team faced were mainly focused around the dysfunctions of the robot. For example, one of the client advisors claimed: "*from time to time the robot has not started at all, and sometimes it has left half of the applications unprocessed*".

In the death record information updating project, the back-office employees expressed a more critical stance and concerns related to the automation. Other one of them from the back-office for example claimed: "*New functionalities have brought someone 'a couple grey hairs', when the new (technologies) are being resisted, even little bit dreaded also. The fear has been that the new robot is going to take away our jobs.*" Boulton (2017, 2) claims the first step towards effective RPA was to set and manage the expectations. The claim was that many RPA problems stem from "poor expectations management from the outset". Lacity & Willcocks (2016, 32) reported in the Telefónica O2 case study this fear was removed in the case company by promising their employees the automation would not result in anyone being laid off. A similar promise could have been effective in order to hinder the fears also in the case company. Also, Kaizer et al. (2018, 17) argue communication and transparency are key for intelligent automation and deployment. It is also expected some employees

being very critical and resistant to automation, usually being the ones whom the automation is directly involving. Some of these people even have no relevant skill set or inclination to chance with the automation. In KPMG (2018, 5) it was recommended the organizations to recognize the need to invest in people as well as support the training of their personnel. The goal is to give the workforce a positive future outlook on the technology. Change and expectation management can work as a way to hinder this resistance towards the new technologies. Respondent 6 from the service provider also raised the similar idea, as they also actively know how to manage the client's expectations. The respondent 6 claimed:

"If someone who is a little more unaware (about RPA) is involved in the project, the expectations might be totally different. And if there is a situation where we deem the robot cannot do something, then this might lead to disappointments, when the demand for the technology is more than actually can be done. In many of the things, the communication and customer teaching and guidance is the key. We strive to be as proactive as possible, since the customers are usually not experts in these matters, therefore it is our responsibility to steer this situation."

Associated with the using of the RPA solution and the change, another survey respondent claimed:

"The feedback has been negative because the robot cannot take care of everything. Another reason is that the robot works in a computer on a background and makes working a little bit more difficult. It also does not allow exiting the computer, or it shuts down automatically, in which cases the robot has to be paused."

These issues are quite common for RPA software, since they communicate through the GUI. Correspondingly, respondent 2 and the back-office team described it as "*the robot has a lot of room for improvement" and "I deem the project not very successful".* Yet, respondent 4 claimed that it was known already in the beginning of the process that the process was not intended to automate as much workload as possible. *"It was a thing we already knew, that did not come as a surprise to us in any way. Of course, we know how many cases there were (to automate)"*. As mentioned in the chapter 4.5.2, this might have been partly misunderstood, since the two experts had very different approaches to the project. This could have to do with the way the project was communicated to the target team and respondent 2. Namely, it implies a communicational error in the process. As the comments are all very vital in assessing the overall success of the projects, all the key insights from the respondent feedback are presented in the table 4 below:

Table 4. Respondent feedback about the processes and solutions.

Solution	Respondent(s)	Positive feedback	Negative feedback
Student loan solution	Client advisory team	Benefit of automation when the solution functions correctly. Amount of workload eased significantly, especially during the season. Deployment was straightforward, good manual including images. Sufficient guidance and communication.	Need for fixing the solutions' mistakes. Launching of the solution fails occasionally. Technical difficulties in functioning of the solution. No proper back-up from the service provider's end. Might take several days to solve issues on the service provider end.
Student loan solution	Respondent 4	A well-made PDD document right from the beginning. Relieves the workload during season significantly.	Occasional crashes and malfunctions.
Updating of death record information	Back-office team	The problems have become fewer after each update. Amount of education and information for usage was sufficient.	Lot of updates in the beginning of the implementation. Manual processing still required monitoring. If desktop locks up or closes, the RPA solution pauses.
Updating of death record information	Respondent 4	Learning experience from the process. A few hours of work automated.	Longer definition of process than anticipated. Planned budget was not sufficient for the complete process.
Updating of death record information	Respondent 2	Benefit in terms of saved FTEs.	Process was not for a business need, but for the sake of automation itself. Small volume.

		Communication between parties was direct and effective.	Testing of the solution took longer than anticipated. Certain details not included initially in the PDD. Lack of education and communication of RPA for the back-office team.
Purchase ledger supplier information (reference company)	Respondent 3	Learning of robotics from the process.	Problems related to IT. Process took 3-4 more work input than anticipated. Unclear responsibilities between parties. Lack of proper cost/benefit analysis.

As previously stated, as the average grade by the client advisory team was 8 and median 9 for the student loan solution, the positives seem to outweigh the deficiencies. The most positive responses seem to target the benefits of the solution during the peak season from August to September and from December to January. The back-office team was more critical towards the solution in the commentary section. As for the numerical assessment, both respondents gave the average and median grade of 7 for the solution. The back-office team made it clear that the solution did not perform as they expected, and the solution cannot perform all the tasks the team hoped the robot would. Positive feedback was mainly addressing that some of these issues have been gradually fixed via updates.

This is in line with, for example Willcocks et al. (2015a, 12) argument that continuous improvement beyond deployment maximizes the received benefits. Another positive feature being there was sufficient amount of training and information about the solution. All in all, these two projects can be deemed at least mostly successful in the terms of respondent feedback, the student loan project being the more successful one based on the comments and average and median grades presented. As for the purchase ledger project in the reference company, respondent 3 did not feel the project was a great success. The timeframe was much longer than expected and with a lot of issues. The positive note was that after the project, the team learned to seek out better alternatives for RPA automation.

Interview respondents 1, 2, 4 and 6 were also asked to describe the pros and cons of RPA in order to gain some perspective into their ideas and attitudes towards the technology. The summary of these answers is visible in the table 5 below:

Table 5. The respondent's views about the pros and cons of RPA

Respondent	**Pros**	**Cons**
Respondent 1 (system manager)	Relatively easy to implement integrations with RPA. Easy to implement and conduct a business case. Relatively cheap.	GUI is not natural habitat for a robot to function. The automation is not as stable as in SOA / BPM integrations. RPA implementation may reduce the willingness to do "actual improvements". RPA hype and publicity may reduce the tendency to consider the alternatives or may increase the willingness to implement RPA in unsuitable processes.
Respondent 2 (payment product specialist)	Reduced need for human workforce in tasks that are simple, high volume or time-consuming. Reliability.	Incorrect timing or incorrectly chosen target process can cause a lot of distress in the workforce.
Respondent 4 (development director)	Easy to re-program and try different approaches with. Able to deploy solutions multiple times per years.	Robot functions using the employee's account in the desktop (in the case company). Not well suited for financial management's cognition requiring processes.
Respondent 6 (solutions consultant)	When implemented correctly to a correct target can create massive benefits. Fast to design and implement.	Improper risk management and planning may cause unrealistic expectations. If conducted just for the sake of robotics, may lead to disappointments and multiple other issues.

As we can see, the most positive attention gathered was due to its relatively simplicity, fast solutions, flexibility and easy implementations. Most negative responses involved the incorrect target process,

improper planning or using robotics just for the sake of robotics. Respondent 1, who has worked with automation solutions the longest, pointed out the lightweight attributes of the solution. That is with RPA, companies have the option to create implementations fast, easy and cheap. Correspondingly, the respondent 3 said other options such as lean management or lean manufacturing should be considered before automation, and especially before RPA solutions. A similar idea is presented in for example Alberth & Mattern (2017, 57) who claim the Lean Six Sigma programs may benefit from RPA since process repeatability produces a lot of data. This data may be used in six sigma procedures. The negative aspects were that GUI is not natural for a robot to function in, and this makes it more instable. Another issue is that RPA utilization may hinder the willingness to do "actual improvements" due to its low cost-structure and easy implementation. *"It should always be a temporary solution",* said the respondent 1.

Respondent 4 noted that in the future, RPA could be a viable option to automate the manual labor of the account managers and salespersons. The solutions would take place mostly in the customer interface of the systems. *"It would make everyone's work more meaningful, if there is no need to go all the manual labor yourself."* As previously stated, respondent 2, claimed it is *"always good if we can free up human workforce into something better"*. The respondent 2 also saw it is important to carefully consider the processes it should be implemented on. Respondent 2 also pointed out the importance of communication, training and change management towards the team(s) or workers which the process impacts. The negative feedback of respondent 4 considered mostly the function of the front-end robotics. As these robots do not have their own licenses, it functions on the employees' license. This can sometimes cause issues such as locking up of the desktop cause the robot to freeze, as noted by the back-office employees. Respondent 2 focused on the occasions where the robot is incorporated to incorrect targets with incorrect timing *"as what happened in my opinion with the our (death record) process*".

As we can see, there were a lot of different viewpoints to consider, and there is no specific way to take all the different aspects into account. The next chapter attempts to quantify the results to create a view on the capabilities of the solutions. These FTE measures are utilized to answer the question on how much benefit was gained from the two RPA projects as well as how much can the case company expect to gain in the future.

4.7 Results on automation impact

As for the workload automated by the case and the reference companies, the amount was not particularly high. The table 6 below describes the information source, initial workload before RPA, the time used to handle the exceptions, as well as the final amount of workload automated:

Table 6. The effect of the RPA solutions on the workload

Solution	**Respondent(s)**	**Initial workload (per work week)**	**Workload after RPA (per work week)**	**Workload automated**
Student loan application	Respondent 4	Season: 25 hours. Non-season: 75 minutes.	-	Season: 0.40 FTEs (15 hours).
Student loan application	Customer service team	Season: 25-37.5 hours. Non-season: 75 minutes – 7.5 hours.	Season: 5 minutes - 5 hours. Non-season: 25 - 75 minutes.	Season: 0.53 – 1.00 FTEs (20-37.33 hours). Non-season: 0.00 – 0.19 FTEs (0 – 7.08 hours).
Updating of death record information	Respondent 2	5 hours.	Maximum of 2.5 hours.	0.07 FTEs (“at least” 2.5 hours).
Updating of death record information	Respondent 4	-	-	0.12 FTEs (4.5 hours).
Updating of death record information	Back-office team	5 hours	2 hours	0.08 FTEs (3 hours).

In the table 6 above, the reported number of hours or minutes are assessed per one employee. As we can see, the amount of workload automated in the terms of FTEs ranged quite precisely between 0.00 to 1.00 FTEs. As mentioned previously, in the student loan solution the workload heavily depends on the season/non-season -division. In the most active season from August to September, the total benefit from the solution can reach 1.00 FTE. On the other hand, during the non-season the

benefit can also be around zero. This marks the amount of low volume during the non-season times, as also pointed out by respondent 4 and the survey respondents. Respondent 4 claimed that the process only took during the non-season 15 minutes, and the survey respondents estimated it took from 10-15 minutes up to one hour. As we can see, this volume was very low compared to for example the Xchanging's volumes of tens of thousands of cases per process.

However, in for example Lhuer (2016, 2) Willcocks also claims that in every one of their cases, the employees welcomed the technology since they hated the tasks which were automated. It also relieved the ever-rising pressure of work. This similar phenomenon was also highlighted in the comments made about the benefits of the solution, especially during the seasons with the massive amounts of applications.

The FTEs saved are not particularly high, but it is worth noting the budgets for these particular projects were not high either. Respondent 4 claimed the budged range for these sorts of processes is somewhere between 10,000 to 35,000 euros. For example, if we assess that an employee receives 2,600 euros of gross salary, this can cost an employee roughly 3,164 euros per month in Finland. This measure thus considers the employee pension insurance 18.45 %, employer's obligatory health insurance at 0.77 %, other obligatory insurances 2 %, and unemployment insurance at 0.5 %. (Suomen yrittäjät, 2019) With a 10,000-euro budget this would mean 3.16 working months per employee and with 35,000-euro budget 11 months. This also does not consider the cost of the license or updates, which the respondent 6 also separated from the budget in the service provider company.

In the student loan application automation process, this would mean that at best, the payback period for the investment can be less than a year, and with a larger budget it would still mean less than 4 years. As for the death record automation project, with the best estimate take little over 2 years and in the worst-case scenario over 13 years, using the example gross salary. Unfortunately, there were no precise figures available on the workforce or the FTEs automated. However, this gives some reference about the range of the payback period, which is presumably not particularly high.

Moreover, according to PwC (2017, 8) it is recommended to start the RPA experimentation with a Proof of Concept or a pilot. By PwC's definition, a PoC is a minor project which proves the technology's practical applicability in a particular company. Fung (2014, 8) also recommends starting with less complex projects since they incorporate less risks, lower cost, experience gaining and serve immediate results. In Rutaganda et al. (2017, 110) they also note this can be difficult. The problem

is that the PoC might be put under a lot of skepticism, rather than being treated as an opportunity to learn. Now, if we look into the comments made by respondent 4, a PoC is exactly what the main case company has done. It also makes it more apparent, why the reduce in FTEs was not that significant. If the case company would have chosen a more complex process to automate, then much more difficult problems could have emerged. According to PwC (2017, 8) if a company automates a complex process right in the beginning, this can easily create delays as well as other serious problems. Now, in order to draw the final analysis of the projects conducted, more comparison to literature is presented in the following chapter.

5. COMPARISON TO PREVIOUS CASES AND LITERATURE

In the first chapter 5.1, the empirical section of the study is being compared to the existing academic knowledge presented in chapter 2. Furthermore, the previous case studies of Lacity & Willcocks (2016) as well as Willcocks et al. (2015ab, 2017) are being compared to the processes of the case and the reference companies in the chapter 5.2. Lastly, the future prospects for the main case company are assessed in the chapter 5.3.

5.1 Comparison to literature

In the second chapter, many different traits were presented about the benefits of RPA. In the third chapter, some of the key traits in order to successfully implement RPA into different organizations were examined. Naturally, these traits may vary depending on the organization, IT infrastructure and the target processes. However, there existed a lot of common “success traits” for the processes as well. The figure 8 summarizes the key studies presented including their success traits and process recommendations:

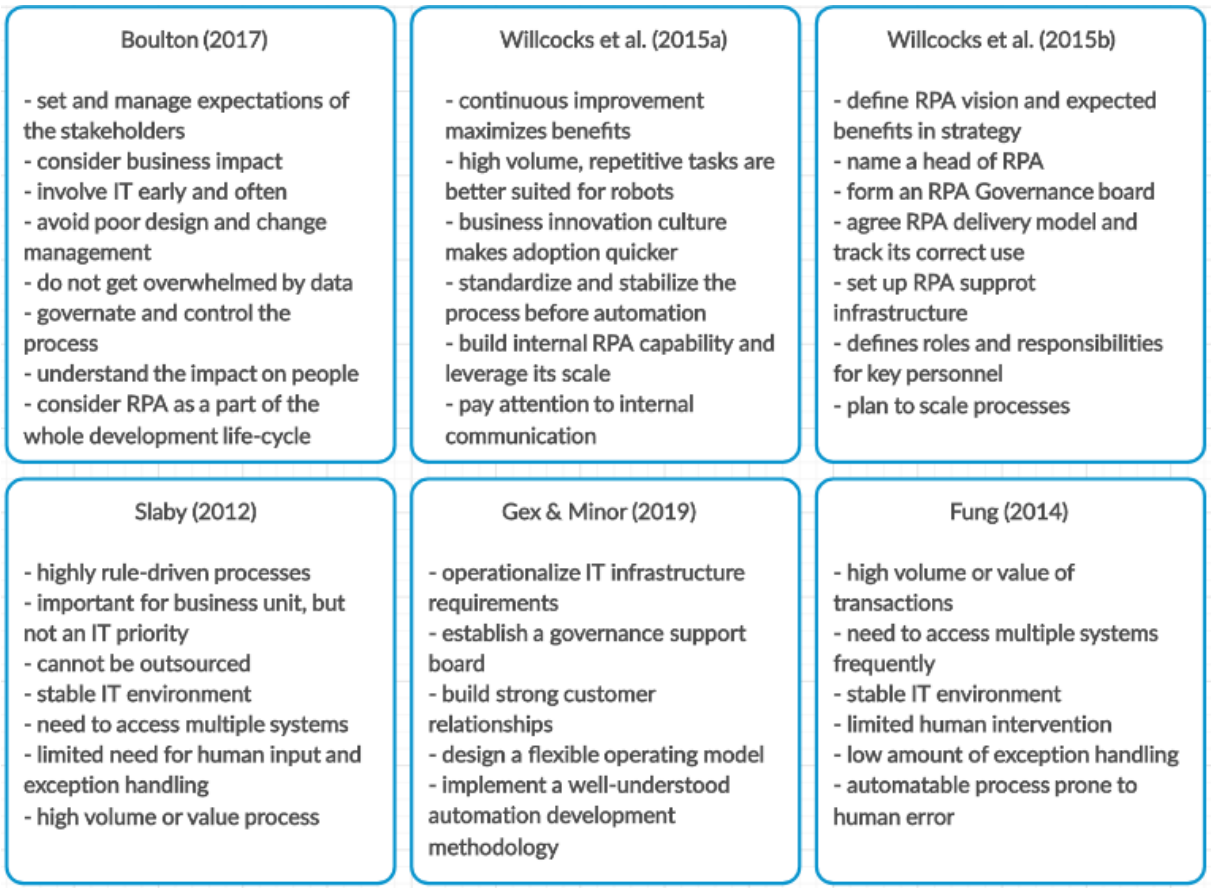

Figure 8. Summary of RPA success traits and process recommendations from literature.

As we can see from the figure, there are multiple different approaches to RPA processes. Some of the traits have a strong connection to the RPA in terms of future strategy, planning and vision. As stated previously, in Boulton (2017, 2) the recommendation is to set and manage these expectations. In Willcocks et al. (2015a, 12) they claim continuous improvement maximizes the automation benefits. In Willcocks et al. (2015b, 30) the claim is that a clear vision helps to create a good "business-RPA alignment". This entails the RPA vision is being defined, and the use of RPA is critically compared to the corporate strategy.

It is also beneficial to assess the limit to what degree RPA is a strategic capability and an asset (Willcocks et al. 2015b, 30). One of the success traits is that robotics is effective for integrating lines of business systems but is not well-suited as a business application in itself. Some organizations have even gone as far as attempting to build complete production environments through robotics. According to Rutaganda et al. (2017, 39) this is not a viable long-term approach. According to the empirical data, there was no statements about the use of RPA in the case company's corporate strategy policies. Therefore, it is highly suggested to plan the long-term vision for the usage of RPA, and then compare it to the existing strategy.

Another common theme was that a successful implementation requires a stable IT environment. Penttinen et al. (2018, 2) claim lightweight solutions require stable IT environments. Optimally, there are very few changes to the design and layout of the UI during the complete system lifecycle, since lightweight IT is highly sensitive to these changes. Gex and Minor (2019, 21) state that automation in production must be continuously monitored and inspected for system updates. Bygstad (2017, 191) claims that lightweight IT should provide for unstable and momentary elements of the heavy IT infrastructures. As stated earlier, lightweight and heavyweight IT are at best complementary to each other; heavyweight IT can work as a solid foundation for lightweight IT. Lightweight IT also offers a chance to more innovative approaches that are outside the scope of heavyweight IT. (Bygstad 2017, 182)

Problems arise when the lightweight and heavyweight do not work complementary to the other regime. Respondent 6 pointed out that one of the red flags in the potential mapping phase is that if there is over 6-7 systems which the target process utilizes. This raises the likelihood of potential risks as well as the instability of the solution. Another red flag the respondent 6 mentioned was that if the systems are instable or they go through frequent updates. As for the case company, the number of applications used were kept to a reasonable amount of 2-4 different systems per project, according to respondents 2 and 4.

According to Willcocks et al. (2015a, 17) RPA must comply with IT's governance and architecture. As a part of the choosing the right automation target, RPA must be considered as a part of the larger, technological infrastructure. It is also beneficial to involve an IT manager to work with the business lead from the start. This is what was done in the case company processes, according to respondent 4. Their responsibility was the IT and the business targets were applicable. Also, the case company used the RPA in tasks where there are multiple different systems involved, such as a CRM system and an application claim information system. This trait of automation between different systems was also mentioned in studies including Asatiani & Penttinen (2016, 69), Fung (2014, 2; 9) and Slaby (2012, 6).

Limited human input was a trait which was raised by Slaby (2012, 6) and Fung (2014, 2). The intention behind this suggestion is that there is as little intervention by the human workers as possible. To give an example, one of the client advisors claimed sometimes the student loan application robot makes and error which leads to time wasted. Also *"eventually the application has to be processed manually anyway"*. As previously suggested, this may possibly be tackled with the aforementioned

continuous improvement. As one of the back-office employees claimed, the death record project has been gradually improving and can be seen as a trait of successful process implementation. (Willcocks et al. 2015a, 12)

The processes were also examined according to their execution timeframe. The student loan project took only one month to get into action according to respondent 4. The solution was then updated for a couple of months after the launch. According to respondents 2 and 4, the updating of the death record information project took more time than the student loan project. This was due to multiple issues with the testing. The process up to the point of receiving a first functioning version of the robot took around 3-4 months. Finishing the complete process was around 5-6 months in total. In the reference company, the purchase ledger process took 3-4 times longer than anticipated due to multiple different issues discussed in the chapter 4.3.1. In the end, the total timeframe was around 8 months for the complete process.

The respondents 1 and 6 assessed RPA on a general level. Respondent 1 claimed that normally the RPA projects take around 1-3 months to complete. From an idea into the production it takes normally around 1-2 months. Sometimes this timeframe might expand if the IT services are outsourced in the target company. As discussed previously in the chapter 4.4, the respondent 6 claimed that in the best-case scenario, an RPA project can be completed in 6-8 weeks. In the more complex or difficult cases, it may take roughly 5-6 months.

As for the literature, in the multiple robot development processes of Xchanging the timeframe reached up to 1.5 years (Willcocks et al. 2015a, 10) For example, Asatiani & Penttinen claimed RPA process can be implemented in 2-4 weeks. Lacity and Willcocks (2016, 21) claimed that RPA can be trained within few weeks. In Slaby (2012, 11) the timeframe went from a few months to in “a matter of weeks”. As we can see, these estimates of the shortest timeframes were not found from the data. There were also many unexpected incidents in the processes. Therefore, the more realistic estimates should be ranging from around 3-8 months. This is based on the examined processes and respondent estimates. It is also to be noted that companies can reduce this timeframe by learning to utilize the technology properly, as stated in Slaby (2012, 11). As stated previously, most of the time the complexity of the process and the amount of unexpected issues determine the length of the process.

5.2 Comparison to previous case examples

This chapter combines and compares previously presented information on the case examples presented in the chapter 3 to the empirical study of chapter 4. Unfortunately, all the information was not available for research; the missing information is labelled as N/A. The table 7 below adds to the table 2 the information on the case and reference company processes:

Table 7. A comparison of case study to previous case examples (Lacity & Willcocks 2016, 24-34; Willcocks et al. 2015a, 4-21, 2015b 18; 28)

Case	**Telefónica O2**	**Xchanging**	**Reference company**	**Case company**
Target of automation	SIM card swaps Pre-calculated credit Order processing Unlocking porting ID generation Customer data updates, reassignments and dispute resolutions	Processes related to the validation and creation of LPANs	Purchase ledger automation	Student loan application automation Updating the death record information of customers
Processes automated	15	14	1 examined (10-15 in total)	2 examined (4 in total)
Implementation time	Pilot process: around three months.	1.5 years for all the implementations.	Complete process: 8 months. Respondent 1: In normal cases 1-3 months.	Student loan: first functioning solution one-month, complete process 3 months. Death record: first functioning 3-4 months, complete process 5-6 months.
Number of cases per month	400,000 – 500,000 (more	120,000	N/A	Student loan: < 50 (non-season),

	than 160 software licenses).			1000 – 3000 (season).
Saved FTEs	“Hundreds”	Processes focused more on continuous improvement.	N/A	Student loan: 0.00 – 1.00 Death record: 0.07 – 0.12
Payback period	12 months	N/A	N/A	General estimate for the case company: 11 months – 4 years.
Profitability and cost savings	ROI 650 - 800 % in three years.	Typical cost savings: 30 % per process.	N/A	N/A
Success traits	Conducted a pilot. Compared to alternatives such as BPM. A heuristic of more than three FTEs’ worth of automation potential to target selection. Optimization of the underlying IT infrastructure. Managing the expectation: a promise of no layoffs for the employees.	Strong support from IT later on. Continuous improvement High-volume, rule-based and repetitive tasks targeted Actively managing the expectations of employees. Processes standardized and stabilized before automation. RPA incorporated as a part of the broader, innovation strategy.	Continuous improvement. Solving of multiple issues related to IT and business functions. Sufficient automation potential.	Student loan: A pilot process with a well-made PDD. Co-operation with the service provider was straightforward and direct. Relatively quick implementation. Sufficient communication towards the target team. Death record: A pilot process. Co-operation with the service provider was straightforward and direct.

As we can see from the table 7, the number of automated processes was much greater for the case examples from the literature, with the amount of 10-15 processes automated. As we can see from the number of cases, they were more than 133-500 times higher even compared to the seasonal case numbers for O2. This reflects to the difference in the number of FTEs, which were more than

100 times as high as in the case company. The payback period was similar to the best-case scenario for the case company, with the estimated payback reached in 11-12 months. This would indicate in that the best-case scenario the processes are equally beneficial if they are being compared by their payback periods. The case and the reference company also implemented these small-scale projects a lot faster than the complete process of 1.5 years in Xchanging. For the case company the time was 1/3 to 1/6 for the complete process and similar to the pilot process in the O2 company. It can be thus argued that if the processes are scaled based on the number of transactions, similar benefits can be gained.

As for the cost savings of the case companies, the amounts were not available. As for the academic literature, for example Asatiani & Penttinen (2016, 68) claim the estimates of RPA cost savings vary greatly. In O2, the annual return on the investment was reported being up to 200 %. This complete process yielded a staggering three-year ROI between 650 % - 800 % (Lacity & Willcocks 2016, 1; 25) In Lhuer (2016, 2), Willcocks commented that data from 16 different case examples showed the ROI varied between 30 to 200 percent during the first year. In Pragnell & Wright (2015, 7) the claim for a typical software robot cost compared to an average employee in the UK was 0,11. In Slaby (2012, 1) the claim was at best, an FTE costing 80,000 dollars per year may be automated with 15,000 or less. (or 18.75 % from the original cost). Slaby (2012, 11) the claim was that one robot (software license) can perform equivalent to 1.7 human workers. In the Xchanging, the cost-savings were around 11-30 percent, depending on the process automated. (Willcocks et al. 2015a, 14-19; 2017; 24-25) As we can see, the cost-savings are prone to being highly dependent on the target process.

Lastly, the success factors were analyzed. There were many success factors for the example cases of O2 and Xchanging. As for the case and the reference company, the cases were conducted with smaller resources and less planning, mostly due to their smaller scale implementations. Also, for the case company the projects can be seen as pilots. A common theme for the success traits was the case examples had also conducted similar pilots for RPA. In the beginning, there were multiple problems with the processes mainly from the technical side for the reference company. According to the respondent 3, in the purchase ledger process the problems were not tackled with a strong support from the IT department in the similar manner as in Xchanging. However, the reference company did not overcome these issues as effectively as in Xchanging. As for the case company, most of the problems were related to the lack of expectation management as in the example cases according to respondent 2 and the back-office team. In the Xchanging and O2 companies, the expectation management was more actively managed with roadshows and promises of no layoffs to the employees.

Xchanging and O2 also had more suitable manual and repetitive target cases with much higher transaction volumes. As for the case company, the death record process did not incorporate high volume and therefore was not the right target for RPA automation as according to respondent 2. In Xchanging and O2, the selection of more suitable processes can be seen to have led into better automation outcomes.

As for the future, the case company should pay close attention to the aforementioned success traits. A strong emphasis should be put on the proper expectation management and correct target process selection. These recommendations for the case company are further put together in the discussion & conclusions chapter 6. Next, more details on the future prospects for the case company in terms of RPA automation potential are being presented.

5.3 Future prospects for the case company

Starting off the assessment, a look into the future prospects for the case company is made. The ideas for the future are mainly driven from respondent 4. Respondent 4 felt the best targets to start off the RPA automation are the ones the financial management team has to check multiple times per day. These tasks include for example checking whether a certain account has enough liquidity or not. Similarly, respondent 5 also claimed the most lucrative processes are manual processes which are done daily or weekly. Repetitiveness is also the trait which arose from numerous articles. These included for example Anagnoste (2018, 307), Bruno et al. (2017, 56), Fung (2014, 2), Willcocks et al. (2015a, 12; 2017, 19) and Slaby (2012, 5). Also, many of the researchers raised the idea that RPA is suited for high volume tasks that are relatively low in complexity. (Anagnoste 2018, 307; Asatiani & Penttinen 2016, 68-69; Bruno et al. 2017, 56; Slaby 2014, 5; Willcocks et al. 2015a, 12; 2015b, 3-4; 2017, 8-19; Zarkadakis et al. 2016)

One of the ideas from respondent 5 was that RPA could possibly create automatic alarms or processes that enable automatic surveillance or input of certain information into Excel files. Respondent 4 claimed there are files respondent 5 has to check every day multiple times. In these cases, automated surveillance could be implemented. For example, Slaby (2012, 12) mentioned RPA robots are also capable to leverage IT frameworks for this sort of security-, risk management- and IT governance related solutions.

According to respondent 5, the communication about the possible automation projects in the financial management team has been an ongoing process for almost a year. These plans are still entirely unofficial and no official planning has been conducted. These tasks and processes include the revision of certain reports as well as sending standardized emails based on these reports. One possibility that has been considered according to respondent 5 so far is a process of reconciliation in between the company's offices. The process involves a standardized PDF-file which gathers information on different transactions. The software could read the PDF-file and flag the transactions that are negative. Then, the solution could verify whether the next report contains a similar positive entry on the same transaction. If there is a missing entry, or a specific entry is somewhat unusual, this requires further communication in between offices. The research has also noted this possibility. According to Wiggins (2019, 1-2), RPA can drastically reduce cycle times auditing expense reports and conducting general ledger account reconciliation. For example, a global financial services provider Allianz built an RPA program that can connect to three cash pooling systems to calculate and reconcile daily cash data (Allianz 2019; Wiggins 2019, 1-2). The result was that reconciliations are now performed much more frequently, and the data is more high-quality. (Wiggins 2019, 1-2) Preliminarily speaking, these processes seem quite possible for RPA to handle in the case company.

Respondent 5 does not believe an upcoming change of the banks' IT systems affects this process, since it requires a certain amount of human intervention. Automation of these processes could take daily a total of 15-30 minutes from their schedules, therefore the benefit from automating these tasks is still going to remain low in the terms of automated FTEs. However, Slaby (2012, 7) also sees another alternative to the FTE reduction requirement. A process does not require high volumes if it is business critical. An example of a business-critical process is a transaction which needs a 24/7 365 availability for the customers. In this case, a further assessment would be recommended to decide upon the importance of this process. As we can see, the time consumed in this task is not a relevant factor due to its short processing time. One benefit which respondent 5 sees by automating these processes is it might lower the bar for future RPA implementations. Respondent felt strongly as the learning takes place in the team, it can open the team's eyes for the search of new automation potential. For example, Galusha (2018, 44) claim that by experimenting, the business groups learn to recognize the targets where further improvements can be made. Also, the three-step criteria as presented in Rield & Beetz (2019) could be implemented to find new automation targets.

According to respondent 5, the first step would be to find out what is the original goal of the process and then proceed to find out the necessary steps needed to reach that goal. This is then followed by documentation and re-planning of the process. The respondent 5 estimated that 50-80 % of the total

utility gained would be from the manual process restructuring and redesign only. Willcocks et al. (2015a, 17) also made a similar claim based on the Xchanging interview with the Xchanging director Paul Donaldson: *"Don't automate a process that's not ready to be automated. Stabilize it first. It's a basic Six Sigma principle. […] In all our processes, we keep a delivery lead in the process world, to standardize and streamline before we automate."* This would be highly recommended for the case company as well.

Respondent 6 from the service provider also commented the issue with certain processes which are unclear or disorderly. Respondent 6 would absolutely not recommend attempting to automate it before the process has been standardized and streamlined. According to respondent 5 the continuation of these processes would require the correct people to take this further, research the possible options for 1-2 months and prioritize the strategically most viable options. One approach for the case company to consider would be the founding of an RPA CoE as discussed in chapters 2.3 and 3.3. Authors such as Anagnoste (2018) and Jesus et al. (2009) claim that CoE is a solid and affordable solution to tackle these issues. Willcocks et al. (2015b, 30-31) suggest forming an RPA governance board and a head of RPA to organize the RPA related matters within the organization. This might also be problematic due to the size of the IT team, which consists of 6-7 employees. Most of them are also working with the upcoming banking system change. The case company still might utilize a similar "virtual team" approach as in the reference company. As mentioned previously, the company has around 2.2 FTEs worth of workforce in the robotics and automation, with changing experts on the particular issues and a part-time team coordinator. A similar approach could be implemented in the case company as well.

The case company's RPA CoE can name head of RPA as well as a part-time coordinator in charge of the administration of the team. The team would also need the help of different business representatives, such as respondent 2 was in the death record information process. One problem is that according to respondent 4, the case company cannot take other service providers to complement its RPA functions. Yet, the co-operation between the case company and service provider could be improved by forming a CoE to search automation targets specifically for RPA. This CoE should have the required knowledge about automation as well as the considered business targets.

To conclude the goal of the case company's future processes, the greatest benefit would arise from future business processes which are customer oriented. These targets should be considered first. The next possible targets should focus on the financial management's operations. Also, these targets could serve the controllers by allowing them to focus less on the operational, manual tasks and

more on the customer-oriented functions. As discussed earlier in the chapter 2.2.2, Lacity & Willcocks (2016, 22), Willcocks et al. (2015b, 5-6) and Zarkadakis et al. (2016) referred these processes as the “swivel chair” processes. These swivel chair processes can be seen as the best targets for RPA implementation. To further assess the possibilities, an exploration to the future possibilities is made in the chapters 6.1 and 6.3.

6. Discussion & conclusions

This chapter presents the conclusions for the thesis based on the previous chapters. This section aims to address the three main research questions as well as the two sub questions presented in the chapter 1.2 of the introduction. In the first chapter, the conclusion based on the previous sections are given. In chapter 6.2, this thesis is assessed in terms of validity and reliability. The study's limitations are also explored in chapter 6.2. Chapter 6.3 takes a look into the future research possibilities and chapter 6.3.1 discusses the possible future development and possibilities of RPA.

6.1 Conclusions

This chapter assesses the research questions presented in chapter 1.2. The connections between the empirical evidence and the literature are being further summarized in this chapter. As previously claimed, several traits for the RPA process improvement and RPA suitability to certain tasks were found from the literature. To address the first main research question, we will look at the sub-questions associated with the first main question. Afterwards, a sum-up from the sub-questions can be utilized to answer the main research questions. The first research question was:

1. *"How can the main case company improve their future RPA implementations based on their previous projects."*

This question is assed below after examining the first sub-question and the second research question. This also heavily links to the third research question and can be answered through its examination applied into the future framework. The first sub-question clarifies the focus:

1 a) "What kind of processes should the financial management team of the main case company pursue to automate with RPA"

The question can be mostly answered with analyzing the literature, since the case company has not laid out any precise plans for future RPA processes. There are merely a couple preliminary ideas from respondent 4 and 5, as discussed previously in the introduction chapters 1.1 and 1.2. This question focuses on the received feedback from the interviews and the surveys conducted. The

success factors that were found in the literature are drawn from studies such as Asatiani & Penttinen (2016), Gex & Minor (2019), Slaby (2012) & Willcocks et al. (2015b) and Boulton (2017). These were presented in the chapter 5.1 and figure 8.

One of the most common aspects that was found from the literature was that the suitable RPA targets would be high in volume, repetitive, based on clear set of rules, limited exception handling, low in complexity and located in at least relatively stable IT environment. (Anagnoste 2018, 307; Asatiani & Penttinen 2016, 68-69; Fung 2014, 9; Galusha 2018, 55; Gex & Minor 2019, 18; Lacity & Willcocks 2016, 210-211, Slaby 2014; 5-7, Willcocks et al. 2015a, 9-12; 2015b, 3-4; 2017, 8-19; Zarkadakis et al. 2016) This can be thought as the basis of an RPA target, however there are some exceptions. For example, Lacity & Willcocks (2016, 23-24) recommended that BPM is more suited on high-value investments such as ERP and CRM systems. On the contrary, Slaby (2012, 7) argued also that high-value processes can also be automated with RPA if the task is business-critical.

The reconciliation process presented in chapter 5.3 can be one alternative to as an automatable process, given that it does not include high inherent complexity. One preliminary problem in this alternative is RPA does not perform well on the very high complexity environment commonly present in ERP and CRM systems. (Willcocks et al. 2015a, 9; 2017, 19). RPA is more suited for example inputting information to these systems (Zarkadakis et al. 2016). Another preliminary suggestion by respondent 5 to incorporate automatic surveillance or an Excel file information input seems a viable alternative for an RPA solution. As for the processes already conducted, the second question sheds a light on conducted processes:

2. *"How do the employees of the case and reference companies describe their experiences working with RPA"*

The tables 4 and 5 in the analysis section were formed to answer this research question. To summarize the previous results, the respondent 4 described the student loan automation process with phrases such as "*clearly useful*" and the client advisory team claimed it has "*eased the processing of the applications immensely*". Correspondingly, in the updating the death record information process the respondent 2 and the back-office team described it as "the robot has a lot of room for improvement" and "*I deem the project not very successful*". The respondent 3 of the reference company made similar comments, for example, they claimed that there were a wide variety of issues, little communication, and the workload put into the project was 3-4 times higher compared to the

original estimate. Respondent 4 claimed that it was known already in the beginning of the process that the process was not intended to automate as much workload as possible. "*It was a thing we already knew, that did not come as a surprise to us in any way. Of course, we know how many cases there were (to automate)".* The respondent 4 saw this more as a pilot project, than respondent 2. This might indicate an existing communication deficiency about the intention of the project. A clearer communication of the project being a pilot would have decreased the negative feedback.

One of the concerns of respondent 4 was the change resistance associated with new technology and automation. However, the only respondents concerned about the change brought by automation and RPA were the back-office survey respondents. Other than that, no change resistance as described in for example Kunze, Boehm & Bruch (2013) was detected. The claim that the older people might be more resistant to change was accurate, at least if the question is contemplated using the scarce survey data. However, mostly all the respondents were rejoicing about the functioning solutions whenever human workforce could be utilized into something more productive. Therefore, almost all the respondents saw that RPA is a welcomed change. On the contrary, some of the respondents noted that it should be carefully considered where is it implemented and when. As previously stated, the grades measuring the overall success of the projects (from 1-10) by the client advisory team was an average of 8 and median of 9. The back-office employees were more critical and gave an average and median of 7. Overall, the feedback was positive towards RPA automation and the teams were ready for the change of culture towards automation in the case company. The next research question focused also on these "where" and "when" issues in the form of success factors in the presented processes:

> *3. "What factors affecting the success of RPA processes are found in the literature as well as the employee experiences"*

The underlying questions being: "what makes an RPA process successful?" and "what sort of enterprise environment is needed in order to succeed in RPA implementations?". This question was combined in the figure 8, table 7 and chapters 3.3, 5.1 and 5.2. The phrase "success factors" may also be understood differently, but the first technique to approach this was the assessment of the literature. Multiple different approaches were found from studies such as Anagnoste (2018), Boulton (2017), Fung (2014), Gex & Minor (2019), KPMG (2018), PwC (2017), Rutaganda et al. (2017), Slaby (2012), Vishnu et al. (2017), Willcocks et al. (2015a, 2015b) were found. The wide variety of methods and recommendations included for example the need for a long-term strategy and planning, defining RPA future vision, setting up a CoE or an RPA team, managing the communication and

employee expectations, process stability and standardizing before RPA implementation, involving all the stakeholders early into the process, and first conducting an RPA pilot or proof of concept project. In order to summarize the third and first research questions, the following guidelines for the case company were formed based on the complete research:

1. *Choose processes that are repetitive, high in volume (or high in value) and rule-driven*
2. *Optimize the process before automation and consider the alternatives to RPA*
3. *Set up a long-term RPA strategy and plan for exit strategies where necessary*
4. *Manage the expectations of the employees*
5. *Plan the team and stakeholder communication beforehand*
6. *Set up an RPA Center of Excellence and name a head of RPA*

When implementing RPA, the first thing to search for is whether there are generally any target processes suitable for RPA automation. As for the RPA-suitable processes, the recurring theme has been presented multiple times. This is that suitable process targets are high in volume, repetitive and based on a clear set of rules (Anagnoste 2018, 307; Asatiani & Penttinen 2016, 68-69; Fung 2014, 9; Galusha 2018, 45; Gex & Minor 2019, 18; Hallikainen et al. 2018, 41-42; Lacity & Willcocks 2016, 21; Slaby 2014; 5-7, Willcocks et al. 2015a, 9-12; 2015b, 3-4; 2017, 18-22; Zarkadakis et al. 2016). This has a very strong base in the research stated above and was answered in the conclusion to the research question 1a). These are the processes that the case company should mainly look to automate.

The second step is to optimize and streamline the automatable processes and consider the alternatives to RPA-automation. The alternatives were discussed in the interviews with the (outside of the case company) experts 1 and 6, that strongly claimed that RPA just for the sake of RPA (or automation/robotics) is never a good starting point. According to respondent 1 this is mainly due to current RPA hype. Willcocks et al. (2015b, 11) also claim one of the key roles and challenges of IT executives is also to navigate through the techno-hype, existing and emerging technologies and choose the alternatives that bring real strategic value to the company. Viable alternatives for RPA should always be considered. According to the literature and respondents 1 and 6, the viable alternatives may include a wide variety of approaches such as heavy-weight integrations, BPM, SOA, RDA, cognitive automation, ML-based methods, Java-based approaches, Python scripts, .NET solutions, Citrix, VBA, outsourcing and more. (Dunlap & Lacity 2017, 19-23; Forrester Research 2014, 2; KPMG

2016, 4; Moffitt et al. 2018, 4; Lacity & Willcocks 2016, 23-25; Penttinen et al. 2018, 4; Seasongood 2016, 32; Slaby 2012, 1-2; Tornbohm & Dunie 2017, 5; Vishnu et al. 2017, 69; Zarkadakis et al 2016) Most of these solutions such as cognitive automation and machine learning could also be used to complement the RPA solution and vice-versa (Boulton 2017, 1; KPMG 2016, 4) If RPA is being chosen over the alternatives, it is still vital to optimize, standardize or lean the process before automating it if it is possible. This was a trait that came up in the interviews with the respondents 3 and 6, the case examples as well as in the literature including Willcocks et al. (2015a, 17; 2015b, 3), Slaby (2012, 8), Galusha (2018, 44-45), Kopeć et al. (2018) and Riedl & Beetz (2019).

One important thing to consider would be the automation life cycle and the long-term effects on the possible company's IT and automation strategy as a whole. This was pointed out in numerous articles such as Asatiani & Penttinen (2016, 69), Lhuer (2016, 3), Rutaganda et al. (2017, 110-111) and Willcocks et al. (2015a, 14; 2015b, 30-34). It is a trait of successful organization to plan and execute a long-term vision. This also links to the sixth recommendation of a CoE. Rutaganda et al. (2017, 110) claim that the strategic vision can be achieved through a proper setup of RPA CoE, accompanied with a strong governance structure. This trait was not brought up in the interviews as much as the other traits, apart from respondent 5 that mentioned the possibility of an outside consultant to evaluate the suggested upcoming RPA automation possibilities. This could include investigation of the strategic elements: where RPA could be utilized, when, and how.

The fourth recommendation was brought up in many of the interviews including respondents 2, 3, 6 as well as the survey respondents. Respondent 6 claimed that the expectation management is vital in RPA processes and respondent 2 emphasized the importance of open communication and training of the staff. Moreover, respondent 3 claimed scarce and closed communication of the service provider directed towards the target team made things much more complicated. The team was not informed thoroughly and properly about the solution and the upcoming changes. Literature also recognizes the need for expectation management, training and open communication towards the personnel. Willcocks et al. (2015a, 20-21) suggest looking closely on the communication. In the Xchanging case, the company made RPA visible to the different operations, created newsletters and roadshows. The case company was also active in informing what is happening, when and also inviting personnel to see the changes for themselves. This benefited the company massively. (Willcocks et al. 2015a, 20-21) Hallikainen et al. (2018, 48) also claim that communicating the positive aspects and success stories about RPA is essential for the dissemination of the technology to an organization. The act of sharing about robotics' related implementation experiences is vital for the organization in terms of learning about the technology. (Hallikainen et al. 2018, 48)

The fifth recommendation revolves around the same themes as the recommendation number four. Kaizer et al. (2018, 17) claim that communication and transparency are the key to success and KPMG (2018, 5) suggested in the training of the personnel to further increase their positive outlook on automation. Therefore, it is highly suggested to plan the training and communication beforehand. As mentioned above, a lot of the negative experiences in both the interviews and survey responses included this trait. Even though there were also positive feedback about the communication, for example from the client advisory team, the communication procedures can always be further improved in the case company.

Before informing the personnel, it is important to take a critical outlook on them, their teams and their capabilities. For example, Willcocks et al. (2015b, 30-31) recommend naming a head of RPA to coordinate the pursuits actions related to RPA. This role might involve things such as communicating the RPA vision to the target team and stakeholders, coordinating the CoE and maintaining the teams' motivation. This is a person that is not only skilled in business, IT and RPA, but also able to define and deliver the robotic operating model. As mentioned previously, the virtual team of the reference company can be perceived as an CoE, but in the case company due to size limitations it might as well be a virtual team with temporary process specialists. In Rutaganda et al. (2017, 109) the recommendation was that RPA programs should be business driven, rather than IT driven. This does not mean to forget about IT, in Willcocks et al. (2015b, 3, 22-23) the recommendation was to involve IT and stakeholders as early and often as possible. In the best-case scenario, the IT complements the business (Willcocks et al. 2015a, 17). Also, in Anagnoste (2018, 307-311), the undisputed benefits of clearly defined responsibilities combined with teamwork were also suggested. Lastly, the final research question attempted to quantify benefits from the past two processes for the case company:

3 a) "How much benefit in full-time equivalent units have been attained using the RPA technology in the case company"

The question 3a) was used to assess the reduced workload by the two RPA projects. The table 6 in the analysis was formed to specifically answer this question. To summarize, the RPA projects reduced workload significantly less than what has been presented in the literature. As discussed in the chapter 3.3 the cost savings can vary greatly; the ROI could even reach up to 800 percent during the first three years (in the O2 Telefónica case) for 15 core processes. (Asatiani & Penttinen 2016, 68; Willcocks et al. 2015b, 18). In Lhuer (2016, 2) the estimate was between 30 to 200 percent within the first year and the estimate in Willcocks et al. (2015a, 14-19; 2017; 24-25) was that the cost-savings were around 11-30 percent depending on the process.

As the table 6 described, the student loan application automation process yielded approximately 0.53 to 1.0 FTEs (20 to 37.5 hours per week) worth of workload automation during the three-month seasons, and from 0.00 to 0.19 (0 to 7 hours per week) during the non-season. Correspondingly, the death record update automation project yielded from 0.07 to 0.12 FTEs (2.5 to 4.5 hours per week). These measures are applied per one employee, which usually conducts these tasks at the time with one exception being the season of the student loan process during the peak seasons. The crude estimate showed the payback period for these projects can be as little as from one year to over two years. Despite the good payback period, the FTEs automated were relatively minor. Therefore, these projects merely affect positively to the employee satisfaction when the processes function. Mainly the only significant improvement was the student loan application process during the seasons. All in all, these projects would not net any significant cost savings in the client advisory or back-office teams.

There are multiple reasons why the case company could not reach the staggering numbers reported in the literature. The difference is due to the fact the case studies, such as Lacity & Willcocks (2015ab, 2016, 2017), were describing a significantly larger, global enterprises. The large enterprises such as Telefónica O2 and Xchanging have a lot more tasks that include a very high volume. Also, the number of personnel working with the tasks was also much higher. One possible reason is the literature can be prone to only investigate the cases where RPA has been tremendously successful, there was little academic literature available on the failed RPA implementation cases. As there was little to no relevant research from financial sector SME companies, the lack of proper comparisons turned out to be a problem. The literature mainly was assessed in order to gain insight on the processes and to inspire what can be achieved with RPA.

The search for the high-volume tasks turned out to be difficult for the case company. This is due to the fact there was limited number of manual tasks with a very high volume. This can naturally be seen as a positive aspect for the case company, since there was a limited amount of manual and repetitive tasks to begin with. According to respondent 4, these case company projects were merely RPA pilots in order to experiment with the new technology and learn in the process. Now, the case company has been able to learn from their experiences with RPA as well as create future value for the company and its personnel.

To summarize the research questions, table 8 below examined the research questions and the key findings:

Table 8. The summary of research questions and key findings

Research question	**Key findings**
1. How can the main case company improve their future RPA implementations based on their previous projects?	The improvement is made through proper following of the six-step guidelines of question 3, finding correct target processes of question 1a). Suitable processes are worthwhile to automate in terms of FTEs (3a) or business critical. It is recommended to take the feedback of question 2 into account in both the planning and execution of future processes.
1 a) What kind of processes should the financial management team of the main case company pursue to automate with RPA?	Ideal target processes: high-volume, repetitive, manual, based on a clear set of rules with limited exception handling and is located in a stable IT environment. Business critical processes such as processes that require 24/7 availability for customers or a process with clear deadlines.
2. How do the employees of the case and reference companies describe their experiences working with RPA?	Respondent 1: Easy implementation and cheap, not as stable as SOA/BPM, may reduce the willingness for actual improvements. Respondent 2: Death record process had a lot of room for improvement, overall not suitable target for RPA. Generally, always beneficial to free employees from manual and mundane labor. Respondent 3: Purchase ledger process had many issues but managed to automate some of the work after the issues had been fixed. Learning by doing. Respondent 4: Loan automation process clearly useful, change resistance for death record process was faced. In general RPA is a great tool to experiment and try different solutions with. Client advisory team: Average grade 8 and median 9 for the solution in usefulness (0-10). Benefit of automation when functions correctly. Occasional malfunctions which might take several days to fix. Back-office team: Average grade and median 7. Problems were reduced after each update, sufficient education and information on the process before usage. Malfunctions in the beginning were common, manual processing still required human monitoring.
3.What factors affecting the success of RPA processes are found in the literature as well as the employee experiences?	Choose processes that are repetitive, high in volume (or value) and rule-driven Optimize the process before automation and consider the alternatives to RPA Set up a long-term RPA strategy and plan for exit strategies where necessary Manage the expectations of the employees

	Plan the team and stakeholder communication beforehand Set up and RPA Center of Excellence and name a head of RPA
3 a) How much benefit in full-time equivalent units have been attained using the RPA technology in the case company?	Student loan application process: 0.00 – 1.00 FTEs. Updating the death record information process: 0.07 – 0.13 FTEs.

As visible on the table 8, the first main research questions were: *"How can the main case company improve their future RPA implementations based on their previous projects."* This is also the most important question regarding the main case company. To summarize, the best way for the case company to improve their future RPA implementations is to combine the provided answers to these research questions. First, RPA must be implemented to correct targets as discussed in the question 1a). These processes are high-volume, repetitive, manual and located in a stable IT environment. The process is also recommended to provide enough automation potential in the terms of FTEs or to be considered as a business critical (3a). Next, the processes have to be constructed in a manner that takes the feedback of the employees critically into account. This is highly important in the planning phase of future processes. This planning includes RPA as a part of the whole company's long-term success strategy as well as communication and expectation management of the stakeholders in the future processes.

Finally, as described in chapter 1.2 all the research questions were assessed in order to answer the larger question of how RPA should be utilized in the domain of financial management processes in the most efficient manner possible. For both the case company and in the general case, the six-step guideline based on the complete study provided suggestions that should be considered before automation. This involves the setting up of a proper RPA strategy, creating a CoE, considering the automation alternatives, seeking out the correct processes, optimizing them before automation, planning the stakeholder communication beforehand and managing the expectations of the employees.

6.2 Critique and limitations

According to Maxwell (1992, 279) qualitative research rely "on a variety of understandings and corresponding types of validity in the process of describing, interpreting, and explaining phenomena of interest." One of the critiques pointed towards of qualitative approaches is they lack the "standard"

means of assuring validity, including quantitative measurement, controls for validity threats, and formal testing of prior hypotheses (Maxwell 1992, 279).

The qualitative interviews were conducted with only three different workers from the case company. This is quite sample on the case company as a whole and might hinder the aforementioned control of validity threats. From the financial management team, one interview was conducted. The respondent 5 also has no previous experience from RPA. This narrows the perspective to the financial management team's possibilities with RPA, since the future prospects for the company are examined based on this particular interview as well as some minor parts from respondent 4. The financial managements team's plans for RPA are very preliminary, therefore there was no concrete suggestions to examine in detail. It was also not possible to receive an interview from the service provider of the case company's solutions. The service provider interview with respondent 6 considered the services of an outside enterprise. It would have created a more coherent view on the main case company, if the service provider interviews had presented the views of the service provider of the case company.

Gibbert et al. (2008, 5) claim transparency of a case study can be enhanced through measures such as careful documentation and clarification of the research procedures. This was attempted throughout the research process, as in the clear documentation on the literature review and interview procedures. One exception was the interview with the respondent 3. These procedures may also be affected by the researcher's personal views and attitudes towards the documentation and procedures. According to Hove and Anda (2005), many phenomena related to software development and engineering are qualitative in nature and are often collected using semi-structured interviews. It would seem relevant in robotics process research, since it crosses similar methods and also involves process engineering and development. Longhurst (2010, 112-113) claim that semi-structured interviews are useful for investigating behaviors, opinions and emotions, as well as for collecting a diversity of experiences. They do not offer researcher the ultimate truth, but they do offer partial insights into what people do and think. Mainly, these interviews relied on the experiences, memory and descriptions of the respondents. Therefore, the interviews may also contain information that is conflicting or opinionated. For example, the work time in order to calculate FTEs was based on the oral and written assessments of the different respondents. The respondents did not track the time it took to conduct these tasks. Therefore, the assessment of the FTEs is more approximate than precise. This could be improved for future research to show more concrete data on the results.

As for the literature, some real-life case examples were presented. However, there was no research found that would have almost identical information about the processes explored from the empirical evidence. With little research available, the comparison to literature examined larger, foreign enterprises. This is not an apt comparison to a nationwide SME. Almost all of the case examples were from other countries', and therefore it is also worth noting the Finnish regulatory environment, enterprise culture, or other similar factors may differentiate on certain aspects.

6.3 Future research opportunities

For further research avenues, it would be intriguing to search the RPA processes in the financial management team of the case company, that are assessed and mapped in the near future. These processes could be compared to these two procedures discussed in this research in an attempt to map out the possible process improvements. In addition, the feedback from the solutions' users could be analyzed and compared. It could be also compelling to conduct a more thorough view on the assessment of future processes in the terms of time-tracked FTEs and then also to assess the cost savings stemming from that automation.

These cost-savings could be compared to the total costs of the RPA projects to receive the return on investment measures (for example ROI) to receive an estimate on the project's profitability. Unlike in this research, due to lack of data available, the exact profitability measures could be formed. After obtaining these measures, it would be possible to address the claims such as in Fung (2014, 1), Penttinen et al. (2018, 1-3), Slaby (2012, 4) and Willcocks et al. (2015b, 16-17) that RPA is very competitive in terms of cost-effectivity compared to other automation solutions.

These future RPA processes could also be compared to other automation alternatives to map the different types of automation possibilities. These alternatives could include options to RPA such as BPM, other forms of heavy-IT solutions including BPM and SOA as well as other lightweight automation tools. Furthermore, the future technologies such as ML and cognitive automation combined with RPA could be studied in the future within the case company. This is given the case company continues to increase their automation maturity and to look for new ways to automate their existing processes.

6.3.1 The future of RPA and automation

Respondent 6 of the service provider company assessed that in the future, many of the systems developed for example to CRM purposes are able to communicate with different other systems such as databases. This could be done in a way that the information transference is fully automated from one system to another. The solutions would also be able to offer wider range of features, and the systems would be more open to integrations than before. This could in part hinder the need for lightweight-IT such as RPA. However, the replacement of core systems is always a very time-consuming processes that require a lot of resources to conduct. Respondent 1 saw that RPA will seek and find its place in the complete enterprise architecture. At the moment, the software robotics has a lot of attention and hype revolving around it, and this phenomenon will most likely balance out. The RPA vendor's valuation is "in the clouds", according to respondent 1. One scenario for the future is the big IT companies acquiring smaller, RPA specific companies. If this does not happen, the larger companies will further develop their co-operation with the RPA vendors. Respondent 1 claims that the future goal for the larger enterprises will be most likely to "cover the complete field of automation".

As for the technology itself, for example Zarkadakis et al. (2016) assess that companies may include more and more cognitive automation into their systems in the future. Cognitive automation could be used to re-engineer business processes completely, to develop new products and services, or to combine analytics with machine learning to receive better analysis and predictions on various entities. Also, respondent 6 gave a similar idea that a machine learning -based automation solution that could read different files intuitively is already in a very high demand. The similar idea is explored also in Tornbohm & Dunie (2017, 5), KPMG (2016, 4) and Boulton (2017, 1) that machine learning could be also incorporated with RPA to create more 'cognitive' and versatile automation solutions.

Kopeć, Skibiński, Tkaczyk, Biele & Jaskulska (2018) claim that one of the most prominent trends within Industry 4.0, a term described in chapter 2.1, is the combination of RPA to the lean approach. Their "human-centered" method proposal involved the design of software robotics accompanied with interactive and collaborative AI solutions including machine learning and neural networks. In this model, repetitive and manual tasks are being turned into high-skilled jobs increasing their meaningfulness as well as lowering the expenditure for example on automatic tests, code deployment and even in customer service. (Kopeć et al. 2018) According to Salkin et al. (2018, 5) Industry 4.0 focuses on the establishment of intelligent and communicative systems, enabling machine-to-machine communication and human-machine interaction. We have learned from the industrial companies' experiences that production, control and monitoring of the smart and interconnected devices have

changed the view on value creation for these companies. This value creation has been enabled mostly by the combination of manufacturing and computer technology. Production, control and monitoring of the smart and connected products will change from human labor into a fully automated approach. (Salkin et al. 2018, 21)

This similar phenomenon does not just involve industrial companies, but also financial and banking industry among many others. In the banking and financial services industry, digitalization and industry 4.0 has forced banks to re-examine their traditional business methods. It is therefore evident that Industry 4.0 has major effect on the future transformation of the financial and banking industry. (Mekinjić 2019, 7, 25) The new technologies will also impact across disciplines and challenge the traditional functions for example human resources in training, staffing and job design. (Alhajjar, Kassim, Raju & Alnachef 2018, 53) Madakam et al. (2019, 2) went as far as to claim that the adoption of RPA has become a necessity in day to day business activities, and if enterprises do not set up RPA in its operations, they may not sustain in the business competition in the near future. Besides RPA improving the quality of business processes in financial management, RPA among many other technologies may improve the quality of life in other fields such as healthcare technology. (Madakam et al. 2019, 2,15)

To conclude this thesis, a quote from Professor Leslie Willcocks in a Digital McKinsey interview captures the zeitgeist of future RPA possibilities perfectly (Lhuer 2016, 4):

"In the longer term, RPA means people will have more interesting work. For 130 years we've been making jobs uninteresting and deskilled. The evidence is that it's not whole jobs that will be lost but parts of jobs, and you can reassemble work into different types of job. It will be disruptive, but organizations should be able to absorb that level of change. The relationship between technology and people has to change in the future for the better, and I think RPA is one of the great tools to enable that change."

If the case company decides to continue with their RPA and automation pursuits, they will eventually receive just the right tools to enable the said change.

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Appendices

Appendix 1 Interview questions for the first interview in Finnish (system manager)

1. Mikä on tämänhetkinen roolinne yrityksessä ja mitkä ovat tärkeimmät työtehtävänne/vastuunne?
   1.1 Minkälainen tausta ja koulutus teillä on RPA:n ja muiden automaatioratkaisuiden parissa?
   1.2 Onko teidän vastuullanne automaation ja RPA:n lisäksi muita automaatioratkaisuja?
   1.3 Oletteko työskennelleet tehtävissä, joissa tarjotaan automaatiopalveluita suoraan asiakkaille?
   1.4 Onko asiakkaille tarjottu konsultatiivista, ongelmalähtöistä palvelua sekä ratkaisumyyntiä?
   1.5 Kuinka standardoituja tuotteet ovat näissä yrityksissä olleet? Kuinka paljon ns. valmiita tuotteita/ratkaisuita on hyödynnetty muilta yrityksiltä? Onko ollut esimerkiksi tapauksia, joissa on kyetty hyödyntämään samaa ratkaisua monilla asiakkailla?
2. Minkälaisia tekoälyn muotoja tässä yrityksessä on käytössä?
   2.1 Kuinka iso tämän yrityksen robotiikkatiimi on?
3. Minkälaisia RPA ohjelmistoja yrityksessä hyödynnetään tällä hetkellä?
   3.1 Ostetaanko palveluita joltain tietyltä tuottajalta, vai tuotetaanko nämä palvelut yrityksen sisällä?
   3.2 Onko sovelluksen välissä toimivia ja yhtä sovellusta käyttäviä robotteja yhtä paljon? Paljonko näitä on suhteessa toisiinsa?
4. Mitä automaatioratkaisuja yrityksessä käytetään ja tuotetaanko nämä yrityksen sisällä?
   4.1 Hyödynnetäänkö tässä yrityksessä Citrix -automaatiota?
5. Mistä yrityksen sisäiset kehitysideat ja -kohteet tulevat?
   5.1 Miten prosesseja yrityksessä lähdetään edistämään idean tasolta eteenpäin? Onko yrityksessä ennalta määrättyä prosessia näiden ideoiden edistämiselle?
   5.2 Osaavatko liiketoimintayksiköiden edustajat tunnistaa ne prosessit, jotka sopivat RPA:n avulla automatisoitaviksi?

6. Minkälaista osaamista/työpanosta RPA:ta sekä automaatioratkaisuja vastaanottavilta tiimeiltä tarvitaan?
7. Hyödynnetäänkö käyttäjän käyttöliittymällä tapahtuvien toimien nauhoittamista (screen scraping) tässä yrityksessä?
   7.1 Johtuuko nauhoittamisen hyödyntämisen puuttuminen kohdeyrityksen vai palveluntarjoajan toimintatavoista?
   7.2 Kuinka hyödylliseksi te kokisitte nauhoittamisen, jos se saataisiin käyttöön?
8. Minkälaisia erilaisia elinkaaria RPA projekteissa on? Kuinka pitkiä prosessit ovat suunnitteluvaiheesta toteutukseen aina käyttöönoton jälkeiseen tukeen?
   8.1 Kuinka kauan aikaa kuluu suunnittelusta toteutukseen?
   8.2 Mikä vaihe RPA prosesseissa kestää ajallisesti kaikkein pisimpään?
9. Mitkä ovat RPA:n hyvät ja huonot puolet?
10. Mitä eri vaihtoehtoja yrityksillä on automatisoida tietojärjestelmiään?
11. Mihin uskotte, että RPA kehittyy tulevaisuudessa, esimerkiksi kymmenen seuraavan vuoden aikana?

Appendix 2 Interview questions for the second interview in Finnish (payment product specialist)

1. Mikä on tämänhetkinen roolinne yrityksessä ja mitkä ovat tärkeimmät työtehtävänne/vastuunne?
   1.1 Minkälainen työtausta ja/tai koulutus teillä on?
   1.2 Kuinka paljon kokemusta teillä on RPA:n ja muiden automaatioratkaisuiden parista?
   1.3 Oletteko kuinka kauan työskennelleet kohdeyrityksessä
   1.4 Mihin yksikköön tai tiimiin kuulutte yrityksessä? Kuinka monta henkilöä siihen kuuluu?
2. Kuvailisitteko niitä kyseisiä prosesseja, joihin ohjelmistorobotteja tai muita automaatioratkaisuja on yrityksessä käytetty?
   1.1 Kuinka tiedonsiirto eri järjestelmien välillä toimi?
   2.2 Kuvailisitteko rahanpesurobotin käyttöönottoprosessia tarkemmin?
3. Mistä kyseinen projekti sai alkunsa?
   3.1 Mikä oli teidän roolinne kyseisessä projektissa, ja milloin osallistuitte siihen?
4. Kuinka kauan RPA:n käyttöönottoprosessiin kului arvioilta aikaa suunnitteluvaiheen alkamisesta ensimmäiseen käyttöönottoon?
5. Mikä palveluntuottaja kyseisellä projektilla oli?
   5.1 Mitä kaikkea palveluntuottajan vastuulle kuuluu?
   5.2 Mikä oli yrityksen ja palveluntuottajan välinen vastuujako? Mitkä toiminnot kuuluivat teille ja mitkä palveluntuottajalle?
   5.3 Miten yhteistyö palveluntarjoajan kanssa sujui teidän mielestänne?
   5.4 Oliko yhteistyössä jotain sellaista, joka aiheutti ongelmakohtia tai ristiriitoja projektin aikana?
6. Miten tarkka oli mielestäsi projektin alkuperäinen kustannusarvio?
   6.1 Kuinka paljon henkilöstölle järjestettiin erilaisia koulutuksia aiheeseen liittyen, ja kuinka monta tuntia niihin kului arviolta?
   6.2 Kuinka monta henkilöä robotin testaukseen osallistui teidän puoleltanne?

7. Kuinka pitkä aika ensimmäisestä käyttöönotosta kului siihen, että henkilöstö osasi käyttää ohjelmaa itsenäisesti päivittäisiin työtehtäviinsä?
8. Kuinka monta työtuntia rahanpesun vastaisiin työtehtäviin tarvittiin tässä yksikössä viikoittain ennen projektia? Entä sen jälkeen?
   8.1 Kuinka paljon ohjelmistorobotin käyttämisen jälkeen jää työpanosta käyttäjälle?
   8.2 Kuinka paljon arvioisitte, että ohjelmistorobotin käyttö helpotti tähän liittyviä viikoittaisia työtehtäviä?
9. Mitä tekniikkaa/ohjelmistoja kuolematietojen päivittämiseen käytettiin?
   9.1 Osaatteko kuvata kyseistä prosessia tarkemmin?
   9.2 Kuinka onnistuneeksi arvioisitte edellisen projektin ja sen tuoman lopputuloksen? Onko RPA:n käyttöönotto sujuvoittanut prosessia?
10. Kuinka onnistuneeksi arvioisitte viestinnän kohdeorganisaatiossa?
11. Mihin seikkoihin mielestäsi organisaatiossa tulisi erityisesti panostaa, jotta seuraavat projektit taloushallinnossa onnistuisivat?
12. Millaista palautetta olette kuulleet RPA:n käytöstä tiimin muilta henkilöiltä?
13. Onko tiedossanne tulevia projekteja, joissa hyödynnetään automaatiota tai robotiikkaa?
14. Mitkä ovat mielestänne RPA:n hyödyntämisen hyvät ja huonot puolet?

Appendix 3 Interview questions for the fourth interview in Finnish (development director)

1. Mikä on tämänhetkinen roolinne yrityksessä ja mitkä ovat tärkeimmät työtehtävänne/vastuunne?
   1.1 Minkälainen työtausta ja/tai koulutus teillä on?
   1.2 Kuinka kauan olette työskennelleet kohdeyrityksessä?
   1.3 Mihin yksikköön/tiimiin kuulutte yrityksessä, ja kuinka iso tämä yksikkö on?
2. Oletteko olleet useammassa RPA projektissa mukana kohdeyrityksessä?
   2.1 Kuvailetteko ne prosessit, joihin automatisaatiota sekä ohjelmistorobotteja on käytetty?
   2.2 Onko teillä käytössä edelleen sama palveluntarjoaja?
   2.3 Oletteko olleet muissa automaatioprojekteissa mukana?
3. Kuvailisitteko nämä RPA prosessit tarkemmin?
   3.1 Kaikissa projekteissa suunniteltuna toimintamalli, jossa robotti jättää toimintahäiriöt tai poikkeustapaukset väliin; kuinka nämä käsitellään?
   3.2 Oletteko tyytyväisiä robotin tuottamaan dokumentaation määrään?
4. Miten kuvailisitte yhteistyösuhdettanne tämän yrityksen ja robotiikan palveluntarjoajan kanssa?
   4.1 Liittyykö ulkopuolisen palveluntarjoajan käytön vaikeus tietoturvallisuuteen, vai johonkin muuhun seikkaan?
   4.2 Palveluntarjoajanne ostaa RPA palvelut toiselta palvelutarjoajalta; kuinka tämä yhteistyö toimii?
   4.3 Mitkä olivat kummankin osapuolen pääasialliset vastuut?
   4.4 Oletteko tyytyväisiä kokonaisuutena yhteistyöhön palveluntarjoajanne kanssa?
   4.5 Mitä parantaisitte yhteistyössänne?
5. Kuinka kauan RPA:n käyttöönottoprosessiin kului arvioilta aikaa suunnitteluvaiheen alkamisesta ensimmäiseen käyttöönottoon?
   5.1 Milloin nämä prosessit toteutettiin?
   5.2 Mitkä olivat teidän pääasialliset vastuunne kyseisissä projekteissa?

5.3 Kuinka iso näiden projektien henkilömäärä oli?

6. Tehtiinkö projekteista minkälaisia investointilaskelmia esimerkiksi taloudellisen takaisinmaksuajan laskelmia?

   6.1 Kuinka isoja budjetteja tämänkaltaisille automaatioprojekteille myönnetään?

7. Mitä tekniikkaa/ohjelmistoja prosesseihin käytetään tällä hetkellä?
8. Miten RPA:n käyttöönottoprosessit etenivät suunnitteluvaiheesta toteutukseen?

   8.1 Kuinka usein tapasitte palveluntarjoajan edustajien kanssa?

9. Kuinka paljon teknisten yksityiskohtien selvittämiseen (esimerkiksi ohjelman muokkaaminen, konfigurointi ja siihen liittyvät toimet, juuri siihen nimenomaiseen ohjelmaympäristön GUI:n päälle) kesti prosesseissa, vai oliko kyseessä valmis ratkaisu?
10. Kuinka paljon ratkaisut vaativat ylläpitoa, päivittämistä ja kehittämistä käyttöönoton jälkeen?
11. Mitä haasteita prosesseihin on mahdollisesti liittynyt?

    11.1 Kauanko poikkeuksien käsittelyissä kuluu aikaa?

    11.2 Eräässä näistä projekteissa oli henkilöstön keskuudessa ollut toisen haastateltavan mukaan muutosvastarintaa. Oletteko kuulleet minkälaista palautetta näistä projekteista jälkeen päin?

12. Jos talousallinnon tiimissä yrityksessänne aloitetaan suunnittelemaan RPA projekteja tulevaisuudessa, mitä asioita mielestänne kannattaisi ottaa huomioon näissä kyseisissä projekteissa?
13. Kokemuksiinne pohjautuen, mitkä ovat mielestänne RPA:n hyödyntämisen hyvät ja huonot puolet?

Appendix 4 Interview questions for the fifth interview in Finnish (business controller)

1. Mikä on roolinne yrityksessä ja mitkä ovat tärkeimmät työtehtävänne/vastuunne?
   1.1 Minkälainen työtausta ja/tai koulutus teillä on?
   1.2 Kuinka kauan olette työskennelleet kohdeyrityksessä?
   1.3 Mihin yksikköön/tiimiin kuulutte yrityksessä, ja kuinka iso tämä yksikkö on?
2. Mitkä ovat taloushallinnon tiimin tärkeimmät tehtävät ja vastuut?
   2.1 Mitkä ovat tärkeimmät sidosryhmänne?
3. Onko teillä alustavia suunnitelmia siitä, mihin prosesseihin ohjelmistorobotteja on suunniteltu käytettävän?
   3.1 Kuvailisitteko mahdollisimman tarkasti, minkälaisia kyseiset prosessit ovat?
4. Kuinka paljon uskotte, että peruspankkijärjestelmän uusiminen mahdollisesti poistaa näitä automatisoitavia kohteita?
   4.1 Onko jo tiedossa sellaisia manuaalisia prosesseja, joita peruspankkijärjestelmän uusiminen mahdollisesti poistaisi?
   4.2 Kuinka uskotte, että automaatiokohteiden tunnistusta lähdetään mahdollisesti toteuttamaan?
5. Kuinka paljon näiden prosessien suorittamiseen kuluu päivittäin/viikoittain aikaa?
6. Kuinka monta henkilöä tällä hetkellä työskentelee näiden prosessien parissa yrityksessänne?
   6.1 Mitä tekniikkaa/ohjelmistoja/järjestelmiä prosesseihin käytetään tällä hetkellä?
7. Miten uskotte käyttöönottoprosessin etenevän suunnitteluvaiheesta eteenpäin?
8. Onko teidän IT-osastonne mukana näissä projekteissa? Minkälaisessa roolissa?
   8.1 Uskotteko, että yhteistyö palveluntarjoajan kanssa tulee olemaan samankaltaista kuin edellisissäkin RPA-projekteissa?
9. Mitä mahdollisia ongelmia uskotte ilmenevän, mikäli ohjelmistorobotti otetaan käyttöön näissä prosesseissa?

10. Kuinka paljon uskotte konttorien rahansiirtotilin prosessien tuplavarmistuksiin kuluvan aikaa esimerkiksi viikoittain?
11. Minkälaista palautetta olette kuulleet jo toteutetuista RPA projekteista?

    11.1 Kuinka hyödyllisiksi kohdeyritykselle arvioisitte nämä projektit?

Appendix 5 Interview questions for the sixth interview in Finnish (Solutions consultant)

1. Mikä on roolinne yrityksessä ja mitkä ovat tärkeimmät työtehtävänne/vastuunne?
    1.1 Minkälainen työtausta ja/tai koulutus teillä on?
    1.2 Kuinka kauan olette työskennelleet kohdeyrityksessä?
    1.3 Mihin yksikköön/tiimiin kuulutte yrityksessä, ja kuinka iso tämä yksikkö on?
    1.4 Kuinka monessa RPA projektissa olette olleet mukana?
    1.5 Onko teillä aikaisempaa kokemusta RPA:sta tai automaatioratkaisuista?
    1.6 Teettekö muuta kuin RPA automaatiota?
2. Minkälainen palvelutarjoama yrityksellänne on?
3. Mitä tekniikkaa/ohjelmistoja/järjestelmiä prosesseihin käytetään tällä hetkellä yrityksessänne?
    3.1 Kuinka teette projektikohtaiset päätökset näiden teknologioiden väliltä?
    3.2 Mitkä ovat Blue Prism -ohjelmointiympäristön edut verrattuna muihin ympäristöihin?
    3.3 Kuinka kilpailtu toimiala RPA ratkaisujen palvelutuotanto ja -konsultointi on tällä hetkellä suomessa?
    3.4 Miten yrityksessänne hoidetaan asiakashankinta?
4. Onko olemassa RPA-projekti tai prosessityyppejä, jotka ovat yleisimpiä yrityksessänne?
    4.1 Mitä kaikkea asiakkaat haluavat yleisimmin automatisoitavan?
    4.2 Onko teillä tiettyä prosessirunkoa tai sisäistä strategiaa, jonka mukaan lähdette projekteja toteuttamaan?
    4.3 Kuvailisitteko tämän sovitun prosessin kulun tarkemmin?
    4.4 Kuinka tunnistatte, ovatko jotkin prosessit sopivia RPA-automaatiolle vai ei?
    4.5 Miten toimitte siinä tapauksessa, jos jokin prosessi soveltuu huonosti RPA:lle?
    4.6 Miten RPA-palvelunne hinnoitellaan? Mihin hinnoittelumallinne perustuu?
5. Kuinka ajallisesti pitkiä RPA-prosessinne ovat? Kuinka suuri vaihteluväli erilaisten proses sien välillä on ajallisesti?
    5.1 Miten RPA ratkaisujen testaaminen käytännössä toteutetaan?
    5.2 Mitkä ovat yleisimmät vaihtoehdot RPA:lle?

6. Onko teillä tiettyä toimintamallia, jota sovellatte kaikkiin asiakkuuksiinne, vai onko teillä täysin asiakaskohtainen toimintamalli?

   6.1 Miten viestitte asiakkaalle? Mihin asioihin kiinnitätte erityistä huomiota asiakasviestinnässänne?

   6.2 Minkälaisia ongelmia kohtaatte asiakasviestinnässä sekä yhteistyössä asiakkaidenne kanssa?

   6.3 Onko teillä strategiaa laadittuna tällaisten tapausten varalle yrityksessänne?

7. Kokemuksiisi pohjautuen, mitkä ovat mielestänne RPA:n hyvät ja huonot puolet?

Appendix 6 Survey questions for the customer service team on the student loan application solution

1. Mikä on roolinne yrityksessä sekä tärkeimmät työtehtävänne?
2. Oletteko kuinka kauan työskennellyt yrityksessä?
3. Kuinka kauan opintolainahakemusten käsittelyyn kului aikaa päivässä/viikossa ennen robottia? Anna esimerkiksi kaksi arviota sesonkiajoista (elo-syys / joulu-tammi) sekä sesonkiaikojen ulkopuolella (jätä kohta tyhjäksi jos ei kokemusta ennen robotiikkaratkaisun käyttöä).
4. Kuinka kauan poikkeusten/käsittelemättömien kohtien käsittelyyn ja robotin työjäljen tarkastamiseen kuluu aikaa (esim. päivässä)?
5. Onko robotin toimintaa jouduttu päivittämään? Kuinka paljon?
6. Onko robotin käytössä ilmennyt ongelmia? Jos on niin minkälaisia? Kauanko ongelmien ratkaiseminen on kestänyt?
7. Minkälaista palautetta olet kuullut robotiikkaratkaisusta muilta tiimin jäseniltä? Onko palaute mielestäsi ollut positiivista/negatiivista?
8. Tiedotettiinko/viestittiinkö robotin käyttöönotosta tarpeeksi? Liittyikö sen käyttöönottoon epäselvyyksiä?
9. Tähän voit kertoa vapaasti ajatuksiasi tähän robotiikkaratkaisuun liittyen.
10. Kuinka hyödylliseksi arvioisit ohjelmistorobotin käytön tässä työtehtävässä asteikolla 1-10 (1 = ei lainkaan hyödyllinen 10 = erittäin hyödyllinen).

Appendix 7 Survey questions for the back-office team on the death record information update solution

1. Mikä on roolinne yrityksessä sekä tärkeimmät työtehtävänne?
2. Oletteko kuinka kauan työskennellyt yrityksessä?
3. Kuinka kauan kuolintietojen päivittämiseen, siihen liittyviin sulkemisiin (tilit, kortit) sekä yhteyksien poistamisten käsittelyyn jne. kului aikaa keskimäärin päivässä/viikossa ennen robottia?
4. Kuinka kauan poikkeusten/käsittelemättömien kohtien käsittelyyn ja robotin työjäljen tarkastamiseen kuluu aikaa (esim. päivässä)?
5. Kuinka paljon manuaalista työtä ohjelmistorobotin avulla on pystytty automatisoimaan? Anna keskimääräinen arvio esim. tuntia per viikko -muodossa.
6. Onko robotin toimintaa jouduttu päivittämään? Kuinka paljon?
7. Onko robotin käytössä ilmennyt ongelmia? Jos on niin minkälaisia? Kauanko ongelmien ratkaiseminen on kestänyt?
8. Minkälaista palautetta olet kuullut robotiikkaratkaisusta muilta tiimin jäseniltä? Onko palaute mielestäsi ollut positiivista/negatiivista?
9. Tiedotettiinko/viestittiinkö robotin käyttöönotosta tarpeeksi? Liittyikö sen käyttöönottoon epäselvyyksiä?
10. Tähän voit kertoa vapaasti ajatuksiasi tähän robotiikkaratkaisuun liittyen.
11. Kuinka hyödylliseksi arvioisit ohjelmistorobotin käytön tässä työtehtävässä asteikolla 1-10 (1 = ei lainkaan hyödyllinen 10 = erittäin hyödyllinen).