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Opportunities and Challenges of Robotic Process Automation (RPA) in the Administration of Education

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by

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Master of Science Thesis TRITA-ITM-EX 2021:302
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Möjligheter och utmaningar med Robotic Process Automation (RPA) inom utbildningsadministrationen

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Approved 2021-06-04	Examiner Terrence Brown	Supervisor Henrik Blomgren
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Abstract

As the amount of administrative work are increasing in the education sector, organizations has started to look for alternative solutions to the problem. One such solution might be to use automation within the field of administration in order to free the existing staff from the most burdensome and monotonous tasks. Robotic Process Automation (RPA) is a technology used to automate digital processes and perform tasks that were previously performed by humans. The implementation of RPA has however proven to be resource-intensive and in need of special technical skill in order to be successful.

This thesis has aimed to investigate how RPA automation can be managed within a smaller organization in the education sector and how the expectations of the opportunities and challenges of using RPA may change along with the RPA implementation. A smaller organization who needs to use outsourcing in order to carry out an RPA implementation may have limited knowledge of RPA, which means that the expectations for automation can be unattainably high or surprisingly low. Findings from the case study however suggest that once the first robots had been put into production and started to produce value to the organization, the expectations among the staff increased and a majority of them could see new opportunities of using RPA for further automations. These findings therefore suggest that it is important to generate short-term wins in order to reduce possible resistance to change and to move forward in the implementation of RPA.

This thesis has also identified several challenges. These are primarily attributable to limited resources, which means that the important work of reviewing and documenting manual processes for automation may be downgraded because of time restraint. Other challenges may consist of limited knowledge of RPA and an unclear ownership of processes when manually performed processes instead are being carried out by robots. By considering and taking advantage of the changed expectations and the opportunities and challenges that have emerged through this study, it is possible to ensure a successful implementation of RPA automation within the administration of education.

Key-words

Robotic Process Automation; RPA; Administration of Education; Case-study; Opportunities; Challenges; Expectations; Change Management



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Sammanfattning

Eftersom mängden administrativt arbete ökar inom utbildningssektorn har organisationer börjat leta efter alternativa lösningar på problemet. En sådan lösning kan vara att använda automatisering inom administrationsområdet för att befria befintlig personal från de mest betungande och monotona uppgifterna. Robotic Process Automation (RPA) är en teknik som används för att automatisera digitala processer och utföra uppgifter som tidigare utförts av människor. Implementeringen av RPA har dock visat sig vara resurskrävande och i behov av speciell teknisk skicklighet för att lyckas.

Denna fallstudie har syftat till att undersöka hur RPA-automatisering kan hanteras inom en mindre organisation inom utbildningssektorn och hur förväntningarna på möjligheterna och utmaningarna med att använda RPA kan förändras under en RPA-implementeringen. En mindre organisation som behöver stöd utifrån för att genomföra en RPA-implementering kan ha begränsad kunskap om RPA, vilket innebär att förväntningarna på automatisering kan vara ouppnåeligt höga eller förvånansvärt låga. Resultaten från fallstudien antyder dock att när de första robotarna hade satts i produktion och börjat producera värde för organisationen ökade förväntningarna bland personalen och en majoritet av dem kunde se nya möjligheter att använda RPA för ytterligare automatiseringar. Dessa resultat tyder därför på att det är viktigt att generera kortsiktiga vinster för att minska eventuellt motstånd mot förändring och för att gå vidare i implementeringen av RPA.

Denna fallstudie har också identifierat flera utmaningar. Dessa beror främst på begränsade resurser, vilket innebär att det viktiga arbetet med att granska och dokumentera manuella processer för automatisering kan få lägre prioritering på grund av tidsbrist. Andra utmaningar kan bestå av begränsad kunskap om RPA och ett oklart ägandeskap av processer när manuellt utförda processer istället utförs av robotar. Genom att överväga och dra nytta av de förändrade förväntningarna och de möjligheter och utmaningar som har uppstått genom denna studie är det möjligt att säkerställa ett framgångsrikt genomförande av RPA-automatisering inom utbildningsadministrationen.

Nyckelord

Robotic Process Automation; RPA; Utbildningsadministration; Fallstudie; Möjligheter; Utmaningar; Förväntningar; Förändringsarbeten

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List of Abbreviations

AI	Artificial Intelligence
API	Application Programming Interface
CIO	Chief Information Officer
CoE	Center of Excellence
CRM	Customer Relationship Management
ERP	Enterprise Resource Planning
FTE	Full Time Equivalent
HEI	Higher Education Institution
HVE	Higher Vocational Education
IT	Information Technology
KPI	Key Performance Indicator
PoC	Proof of Concept
RPA	Robotic Process Automation
SDG	Sustainable Development Goal
UI	User Interface

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1 Introduction

1.1 Background

In 2020, the Swedish Higher Education Authority published the annual status report on trends and developments for the higher education institutions (HEIs) of Sweden for 2019, where the HEIs reported a deficit for the first time in 15 years (Universitetskanslersämbetet, 2020). The report also disclosed that the share of administrative staff in HEIs was almost a quarter of the total number of employees in 2019 (24 per cent) and that this category was the only category among the non-teaching staff that were growing - indicating that the administrative need is growing. The reasons behind the 2019 deficit are said to have been caused by an increase in costs, where increased staff costs were the main contributor (2020, 92).

There have been several potential solutions of addressing this increase in the administrative burden. While solutions previously consisted of hiring more staff or review and improve workflows, Robotics Process Automation (RPA) may provide a relief by automating routing and burdensome tasks in order to improve efficiency and save costs. RPA is a technology used to automate digital processes or tasks, where robots (hence the name) or 'bots' replace human labor and perform tasks that were previously performed by humans. The advantage of using RPA consists first and foremost of the 24/7 operational time, the fast execution times and the improved accuracy (Santos et al., 2019). It may also lead to a reduction in staff costs and a reduced need for new employment (Fernandez, 2018). With the ongoing increase in the administrative burden and the similar increase in staff costs, there may be several obvious benefits in implementing and adopting RPA within the education sector.

There are however few case studies in known literature that has researched the implementation of RPA within the education sector (Ginige and Ginige, 2007, Chebotarev and Gromov, 2014, Matkovic et al., 2018, Nachouki and Abou Naaj, 2019, Turcu et al., 2019). Historically, the main area of research regarding the implementation and adopting of RPA has been focused on the financial and insurance sector, and particularly in the accounting sector (Bourgouin et al., 2018, Cooper et al., 2019, Fernandez, 2018, Hallikainen et al., 2018, Harrast, 2020, Kokina and Blanchette, 2019, Zhang, 2019). It is therefore an uncertainty of the effects of using RPA in the education sector, especially since education organizations may consist of

a smaller number of employees or have more limited resources than larger financial companies.

The three main components of an RPA implementation consist of technology, people, and process. While RPA is a technology and driven by the potential benefits of the technology, the people have often been the most underrecognized component in RPA implementations. According to research by Willcocks et al. (2018), change management has been a underrecognized and underfunded component of RPA implementation. Since RPA is built on existing processes and infrastructure, the workflow may also be extracted from people who has the knowledge of how to perform the tasks that the bots are about to take over. The automation process must therefore be handled with care and consideration for human interactions. Thus, it is of interest to examine both the requirements of the technology (i.e. what is required to automate a process) and how to handle the implementation of RPA in relation to change management theories.

This thesis will investigate how RPA has been used in smaller organizations in general, and in the education sector in particular, which may suffer from the lack of resources in the form of the number of employed administrators and technical competence of automating processes inhouse, as well as dealing with the automation transition. The thesis includes a case study of an organization that has implemented RPA and are currently running bots. This will provide insight for future implementations, and how to deal with challenges inherent by an implementation.

The aim of the thesis is thus to explore the theoretical implications and impact of RPA in the administration function to improve the conceptual understanding of RPA implementation in a smaller organization within the education sector.

1.2 Problem

Large enterprises within the financial and insurance sector may have the necessary resources and capabilities inhouse for driving an automation project. For smaller organizations within the education sector, there may not exist sufficient resources or competence to drive an RPA project. This means that, although there is a need and a desire for RPA, there is a discrepancy between capabilities and strategies. In order to implement RPA, and thereby reduce the administrative burden within the organization, these organization may need to seek help from outside, i.e. outsourcing. The current research in this field, case studies have mainly been investigating RPA

implementation in the financial sector (Syed et al., 2020). Furthermore, case studies have been focused on larger organizations, rather than smaller that are dependent on outsourcing, such as Fernandez (2018) case study of a global business service firm and Cooper et al. (2019) study of four global accounting firms. How these smaller organizations outside the financial sector have benefited from the implementation and adoption of RPA and how they have addressed the challenges in the process, is what this thesis is set to investigate.

1.3 Research Question(s)

The main research question for this study has been formulated as follows:

RQ: How are the expectations of the opportunities and challenges of automation changing when implementing RPA in the administration of education?

To address the main research question, the question was reduced into two sub questions:

1. *What are the expectations of the capabilities and limitations of RPA in the administration of education?*
2. *What was the resulting difference between the expectation and the final result of the implementation?*

1.4 Scope and Delimitation

The thesis will investigate RPA implementation in an organization that are missing the internal resources to initiate and foremost drive the implementation and development of RPA inhouse. The thesis will analyze the expectations of implementing RPA and how the expectations changed as a result of the implementation. The case study object will have recently implemented RPA and have left the procurement/initial phase of evaluating feasibility of running robots in the organization, and at least have reached a production level of running robots. This means that the robots produce value for the organization, e.g. cost or resource savings.

This thesis will review the technology aspects of RPA, since it is needed to understand what type of pressure the technology requirements have on the people within the organization. As one might expect, there are differences in software between different vendors supplying the technology. However, this thesis will not provide a review of the current providers of RPA, their advantages, or disadvantages. Furthermore, this

thesis will not review the practical aspects of developing a robot, that will be left to research studying these aspects in particular. Rather, the technological aspect of this thesis is limited towards the requirements of implementation RPA are and how they are affecting the people in the organization. Nevertheless, understanding the technology aspects of RPA is important to understand the dynamics between RPA and people's expectations of RPA.

Since people within the organization are not going to be using this technology, compared to technologies such as Customer Relationship Management (CRM) or Enterprise Resource Planning (ERP), this thesis will not look at technology or information technology adoption theories. Instead, this thesis will include change management theories since RPA is changing how people are working and what tasks they are performing (i.e. they are not the user of the technology, they do not need to learn how to use the software). Furthermore, people are not in contact with the robot since they operate unattended, where for example it-staff may monitor and maintain the robot's operation.

1.5 Contribution

This thesis aims to investigate the expectations of the opportunities and challenges of an RPA implementation in an area that has not previously been the subject of research. This thesis also aims to contribute to change management theories in relation to RPA implementations by answering the question whether the implementation of RPA in smaller organizations can be view through the perspective of change management. Furthermore, the theories will be used as a lens and analyzing what the expectations have been on RPA before and after and RPA implementation, and more importantly how the expectations has changed. This will contribute on the applicability of using the perspective of change management to analyze RPA implementations. The contributions are to be made through existing theories from the literature as well as from new valuable insights brought by the case study.

1.6 Disposition

This thesis consists of six chapters that are divided into three main sections governing the literature review, the methodology and the result with the following discussion. The first chapter will contain an introduction to the subject of this thesis where the background and problem are discussed and followed by a presentation of the research

questions. The scope and delimitations are later presented along with the thesis's contribution to existing theories. The chapter ends with a final section on how the thesis relates to sustainability. The second chapter will continue with a literature review where the current discussions on the impact and non-impact of automation in workplaces are presented. The literature review will also contain a discussion on what requirements RPA implementations have on processes and organizations and lastly what is known within the current theories of change work. The third chapter will contain the methodology of the study where the research approach and design are presented. Considerations of data collection and analysis are later presented followed by a review of the ethical concerns raised by the study. The fourth chapter will contain a presentation of the collected data and its analysis. The fifth chapter will contain a discussion of the results of the data collection and analysis are reviewed in relation to the literature review and the underlying theory. Lastly, the sixth and final chapter will provide a concluding discussion over the findings contained in this thesis with a summary of the study's contribution to existing theories, limitations, and suggestions for future research in the specific field of study.

1.7 Sustainability

The adoption and implementation of RPA in an organization is not sustainable in itself. It is rather the effect of automating processes that has sustainable effects. For instance, by automating a time-consuming task, an organization can use the resources and focus on more value-creating activities. Automating burdensome tasks may also improve the company culture and employee satisfaction. The author argues that the automation of burdensome tasks is related to the 4th and 8th goal of the United Nations Sustainable Development Goals (Figure 1.) included in the 2030 Agenda for Sustainable Development (UN General Assembly, 2015). In an education context, a teacher may increase the time spent on the actual education instead of spending the time on administrative tasks. Furthermore, by implementing RPA and streamline processes that results in cost-savings, the price of education can be lowered and thus more available for a larger group of people in the society.

1. INTRODUCTION

The topic of automation of labor is further elaborated in Section 2.2.



FIGURE 1. THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS (SDGs)

2 Literature Review

This section will present how the workplace historically has been affected by automation and shed light on predictions about the implications of automation in the future. It will also contain basics and requirements when implementing RPA as well as theoretical insight in the current change management literature.

2.1 Automation of Labor

Impact of automation in the workplace has been widely discussed and the main topic has been whether it contribute to a net increase of jobs or rather reduce the total numbers of jobs: complementary or substitution of labor.

It is obvious that while automation saves time and reduces costs, automation does substitute for labor: the robot replaced the human in some tasks. Bessen (2019) used historical data to research the effect of automation in US textile, steel, and auto industries. Bessen's research showed that with automation in manufacturing, jobs grew along productivity as long as demand was elastic. When demand was inelastic, productivity gains did not increase employment. These conclusions are interesting for this thesis, although education may not be considered manufacturing. Drawing on his conclusion and that demand for education is generally seen as inelastic (particularly in Sweden where tuition is free), productivity gains in this sector may not led to employment growth.

Frey and Osborne (2017) predicted that office and administrative support workers have a high-risk of being substituted by computers. The authors states that one of the reasons behind this is that big data and algorithms for process big data, already exists in this domain and there is an intuitive next step for more computerization in the domain. However, although these workers may be regarded high-risk of being substituted, in a study by Bhargava et al. (2021) investigating employee's perception on automation, they reported that participants directly affected by automation rather perceived automation as beneficial. The participants meant that automation eliminated low-value and routine tasks that in turn enabled them to focus on more valuable tasks resulting in better utilization of their time and skills (2021). Bhargava et al. reported that participants did not felt their jobs were at risk, rather they felt that their occupation would evolve with technology. This emphasizes the need of continuous learning by workers, and that workers need to acquire new skills that complements the technology change.

Autor et al. (2003) studied the correlation between computerization to the level of educated labor. The authors concluded that an increased level of computerization had a positive correlation with the demand of educated labor, meaning that automation may lead to a shift in favor of educated labor, nevertheless an increased total demand for labor. In his paper, Autor (2015) presents his prediction of middle-skill jobs in the future, where the definition of a middle-skill jobs morphs into a job where specific vocational skills are required in combination of more broader skills of literacy, numeracy, adaptability and problem solving. Autor expands his prediction by emphasizing the importance education and producing skills that are complemented, not substituted, by technological change, i.e. automation (2015).

These conclusions are supported by the findings by Bessen (2015) where computer automation may lead to major reallocation of labor, and this transition require workers to acquire new skills. Bessen suggests that it is rather the related difficulties (e.g. mass education, move to a new an occupation, social challenges) to these major reallocations of labor that could cause unemployment, rather than the direct effects of automation (Bessen, 2015).

The author of this thesis argues that the effect of complementary creation of jobs, the shift towards more educated labor and the reallocating of labor, should not be underestimated in the discussion whether automation creates unemployment or not. However, the author acknowledge that the transition and shift of labor will require workers to acquire new skills to complement the technology change instead of being substituted.

2.2 Robotics Process Automation (RPA)

2.2.1 RPA Basics

Robotic Process Automation (RPA) is a technology enabling digital processes or digital tasks to be automated. In a context, where several IT-systems or application are used, humans normally act as the middleman, transferring structured information between IT-systems, often in a repetitive fashion. One could say that humans serve as the interface or “the glue” between IT-systems in this context (van der Aalst et al., 2018). The robot, often called ‘bot’, replaces the human as the middleman, and perform the task through steps in a script. In a report for Gartner, Tornbohm and Dunie defined RPA as follows: “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." (Tornbohm and Dunie, 2017).

The technology provides a great advantage in terms of reducing human errors, working 24/7 and complete processes in a fraction of the time compared to a human. The technology relieves workers from burdensome tasks and enables people to use their time on more complex and advanced tasks, where human initiation may be required. Depending on the area of service, RPA may have several advantages. Santos et al. (2019) highlights the benefits in their literature review of the current [2018] state of RPA as:

1. Can work 24/7 every day
2. High scalable/extensible/reusable solutions to meet peaks in service demand
3. Performs tasks faster
4. Less errors and consistent quality
5. Allows employees to focus on more important tasks
6. FTE savings
7. Deploys new functionalities faster than other IT solutions
8. Integrates with systems through the application user interface
9. Fast return on investment (ROI)
10. More productivity. (2019)

However, there are several disadvantages, which relates to the technological limitations and the criteria for selecting suitable processes for automation. Beyond presenting the main benefits of RPA, Santos et al. (2019) states the disadvantages:

1. Only suitable for processes that include rule-based tasks
2. May be a temporary solution, which automates manual processes based on legacy IT systems
3. Increase process complexity when a part of the process still needs to be serviced by human workers
4. Creation of new tasks for the workers, as robots need to be supervised. (2019)

There are several criteria to consider when evaluating if a process is suitable for automation. Fung (2014) suggests some of the key characteristics of a process that are suitable for automation, including:

1. High volume of transactions: automating routine and repetitive processes with voluminous transactions have significant potential to save time
2. High value of transactions: high value justifies lower volume of transactions
3. Multiple system interactions: potential to eliminate human errors when interacting with multiple systems
4. Stable environment: since the rule-based characteristics of RPA, unstable or changing environments can lead to unexpected interruptions
5. Limited human intervention: one of the major disadvantages of RPA, is to make subjective decision makings, where cognitive abilities is required
6. Limited exception handling: a great number of exceptions requires greater exception handling that can result in longer developing time. However, once developed, a robot could handle exceptions faster than a human due to the greater computing power.
7. Error-prone IT processes: a robot can add value by reducing the number of errors and the need of re-works
8. Ease of decomposition into clear IT process: decompose a process into logical components is fundamental for RPA
9. Current cost of manual IT process: to justify the work of automating a process, an expected cost saving is preferable, if no other improvements are expected (i.e. data accuracy)

Lacity and Willcocks (2016) uses two surveys to collect service automation adoption stories from 48 people at two world summits in 2015 and 2016. Among the findings by Lacity and Willcocks (2016), they stated a list of sourcing options for organizations to consider when planning for implementing RPA, as follows:

- Insourcing: buying service automation software licenses directly from a service automation provider
- Insourcing and consulting: buying licenses directly from a service automation provider and engaging a consulting firm for services and configuration
- Outsourcing with a traditional business-process outsourcing (BPO) provider: buying service automation as part of a suite of integrated services delivered by a traditional BPO provider
- Outsourcing with a new provider: buying service automation from a new outsourcing provider that specializes in service automation; and
- Cloud sourcing: buying service automation as a cloud service. (2016)

For organizations with limited resources, insourcing may not be possible. The organization may lack the necessary means to drive this sort of project inhouse. The sourcing option of insourcing and consulting is interesting for this thesis, since this option was the approach used at the case-company.

2.2.2 *RPA as Lightweight IT*

Bygstad (2016) discusses the differences and suggests a definition of heavyweight and lightweight IT as two different knowledge regimes. The author describes heavyweight IT as fully integrated solutions, a discourse in software engineering, owned by the IT department, characterized by its back-end profile, and supporting documentation of work. In comparison, the author describes lightweight IT as non-invasive solutions (i.e. not integrated), a discourse in business and practice innovation, owned by its users and vendors, characterized by its front-end profile, and supporting work processes. Bygstad means that “Lightweight IT is generative in the sense that it allows the non-IT specialist to deploy, use and benefit from IT to support their work processes” (Bygstad, 2016, p. 189). In the light of RPA, the author presents RPA as lightweight IT, as driven by users’ immediate needs for solutions. This is relevant to this study for the understanding that RPA implementation and deployment is orientated to provide solutions by automating the interactions between elements of a process, rather than the development of a digital infrastructure. The author concludes that the two knowledge regimes are mutually dependent of each other but should only be loosely coupled and not tightly integrated. Interactions, instead of integration, reduces dependencies but still allows innovation of work processes.

Lacity and Willcocks (2016) also suggest that it is beneficial to involve IT and preferably involve IT early in the introduction of RPA instead of not involving IT. This supports the findings by Bygstad (2016) stating that despite that RPA could be regarded as lightweight IT not driven by IT-specialist, keeping a loosely coupled interaction between IT and process owners can be favorably.

2.2.3 *Preparedness for Adopting RPA*

Some processes cannot be automated without prior optimization and alignment of the process to the capabilities and limitations of the software (Rutschi and Dibbern, 2020). Furthermore, the number of exceptions in the ‘original’ process need minimized to prevent to potentially automate these ‘errors’ (Kokina and Blanchette, 2019).

Among the literature, there seems to be a consensus of the importance of standardization and documentation of existing processes. For instance, some processes may be documented to a great extent, while some processes exist as tacit knowledge with the people designing and doing the work (Rutschi and Dibbern, 2020). When processes are identified and evaluated as candidate for automation, the holistic view of the process is needed (Balasundaram and Venkatagiri, 2020). Using flowcharts and mapping decision points may provide this view and lay a foundation for a 'bot-onboarding' (Kokina and Blanchette, 2019).

To be able to automate a process, it is required to fully understand the landscape of a process and how it interacts with surrounding actors (systems and humans) (Rutschi and Dibbern, 2020). A system that is a foundational system for a process, or a whole company for that matter, must be up to date and used effectively before adopting RPA and automating processes (Hartley and Sawaya, 2019).

In the study by Cooper et al. (2019) the authors investigated the implementation of RPA in public accounting. The authors' findings were mainly related to accounting but disclose several interesting findings from the interviews, not unique for accounting. One example is that "...it is imperative that employees at this level understand the technology and are able to identify use cases for automation" (Cooper et al., 2019, p. 42). Based on the interviews in the study, the authors describe the interaction between accountants and computer programmers as crucial. In certain situations, where processes require complex and customized coding, an accountant may seek assistance from a computer programmer to code a bot. On the opposite, the programmers needed the accountants to identify the use cases for automation and understand the conditions of a process. The study also emphasized the discussion regarding if automation will lead to a reduced headcount. The authors write that some sample groups may be more optimistic about implementing RPA and reducing the potential risks about replacing humans with robots when using automation. The accounting firms have substantially reduced costs and improve the quality of services while reducing errors and improving the accuracy of data.

This study is relevant for this thesis since staff-level employees in higher vocational education may have a similar relationship towards technologies as accountants, where computer programmers are needed to aid when developing a bot.

Processes that do not involve surrounding actors, tends to be easier to automate and may be a candidate to establish a confidence of the technology. However, processes

with high degree of interaction with the surroundings, may result in greater cost savings (Kokina and Blanchette, 2019).

2.2.4 Leadership

Among the findings by Lacity and Willcocks (2016), the authors concluded several important fundamentals for automating services, including that a strategic service automation requires support from senior management. Furthermore, Lacity and Willcocks emphasize the importance of defining the ownership of the robots. Whether the ownership is appointed to someone in the staff, hire a robotics specialist, or create a CoE, it is important to define the ownership of the robots in an organization. Leaders and managers may overcome challenges by providing inspirational motivation, influence, and individual consideration in relation of implementing RPA (Mohd Yunus et al., 2019). Some organization may appoint a visionary to play an important role as the intermediate between IT and business (e.g., developer and accountant) and speak both languages (Hartley and Sawaya, 2019).

2.2.5 Implementing and Deploying RPA

Involving and providing training of staff, early in the RPA implementation, could help in identifying, selection, and evaluating processes as candidates for automation (Cooper et al., 2019). Some claim that involvement is even crucial for automating existing processes (Rutschi and Dibbern, 2020). Training in RPA for employees gains an understanding of a process in relation to the capabilities and limitations of RPA (Rutschi and Dibbern, 2020). Furthermore, by involving stakeholders and provide training, could facilitate the introduction of RPA (Radke et al., 2020). Moreover, one study empathized the importance to involve IT-departments to evaluate the surrounding systems for compatibility and leverage internal expertise (Hartley and Sawaya, 2019). This topic is further elaborate by Bygstad (2016) in his comparison between lightweight IT and heavyweight IT.

In a study, however, they claimed that in order to reduce the complexity of the initial implementation, no involvement or training of staff outside the project group takes place until after successful tests of selected automated processes (Balasundaram and Venkatagiri, 2020).

Before deploying robots in production, studies acknowledge that 'bots' needs to be tested. There is both a need of testing the technology aspects of a 'bot', e.g. that the bot can interact with the systems involved in a process. Likewise, that the 'bot' is fulfilling the business need (Radke et al., 2020). However, one study emphasizes that

these tests need to be repeated in production-level to fully test the automated process (Cooper et al., 2019). This to be sure to capture all possible errors and exceptions during run-time. Also, one study presented a method of splitting a process into sub-processes (Kokina and Blanchette, 2019). This could increase the flexibility of the test and possible enable to reuse sub-processes in subsequently RPA developments.

To facilitate confidence of the performance of RPA it may be appropriate to automate a simple process. This could be a low-risk process which does not require prior standardization, yet important to the organization. After facilitating the technology, this could be interpreted as a preparation for scaling up the transformation towards automation (Kokina and Blanchette, 2019).

2.2.6 RPA and Associating Automation

Some organization that may already have started their automation journey may seek to solve the shortcomings of RPA, specifically the need of rule-based processes. Accounting firms which have started with ruled-based automation, such as RPA, sees a move towards a cognitive automation (Cooper et al., 2019). Cognitive automation uses artificial intelligence for decision making that require judgment, traditionally done by a human. However, this move should not be seen as a shift from one automation to another, rather complementing the shortcomings and adding cognitive capabilities to a bot (Cooper et al., 2019). For this thesis, this topic is not further elaborated since the study focuses on organizations without prior automation, where RPA is often a first basic step towards automation.

2.3 Change Management

Organizations today are becoming increasingly digital. Digital technologies offer organizations and businesses new ways to operate and serve its customers or users. The introduction of digital technologies in an organization may have different motivations, and thus different implications. One organization may look at digital technologies to improve operations and reduce cost, others may use digital technologies to serve its customers or users in completely new ways (Yoon, 2020, Hartley and Sawaya, 2019, Tekic and Koroteev, 2019, Andriole, 2018).

RPA is one of the technologies that can help all functions within organizations to develop with digital transformation. Given the capacity of the RPA, organizations can address significant operational challenges, such as performing administrative tasks. Digital transformation is not only about technology, but it also includes

organizational change, resistance to change and how to tackle the rapid pace of digital technology changes (Polites and Karahanna, 2012). Leadership, culture and politics are importance variables to considering when an organization undergoes a digital transformation (Tekic and Koroteev, 2019). These ‘soft’ aspects are important to consider when researching technology implementations. These aspects involve deeper and broader human impacts of a digital transformation. Thus, change management can support the digital transformation in an organization. While this study acknowledges the literature field of digital transformation and the importance of the theories thereto, this study aim to focus its investigation on the managerial aspects of an implementation and the changes that an implementation may have on the expectations of a change. The theories of change management will therefore be considered as an integral part of this study.

For this reason, the next subsection in the literature review will provide the reader with a review of the most frequently used change management theories.

2.3.1 *Lewin's Change model*

Many of today's change management theories are based on the change model developed by Kurt Lewin in the 1940s. Lewin (Cited In Singh and Ramdeo, 2020) formulated a linear three-step process of change as:

1. Unfreezing
2. Moving
3. Refreezing (2020)

In the first step, it involves ‘unfreezing’ the current status quo by reducing the forces that inhibits change and increasing the forces that promotes change (Singh and Ramdeo, 2020). The analogy of ‘unfreezing’ may be regarded as an ambiguous message, but it boils down to create awareness and understanding of why there is a need for change. Not until the ‘unfreeze’ has occurred, the second step can begin.

The second step involves the actual moving, transition, or change. This step are marked by planning, developing and implementing the change (Singh and Ramdeo, 2020).

After the change has been implemented, the change is institutionalized in the organization in the last and third step. The organization is ‘refreezing’ the new status quo, and thereby locking the change(s) in the organization.

This model has been received criticism, both before and after Lewin's death. The criticism has been including concerns that the model was only relevant to small-scale changes in stable environments, linearity, unsuitability for continuous and unending change, and too simplistic and mechanistic (Burnes, 2004, Hussain et al., 2018). However, some studies have shown that the criticism is not justified, and that the method is still relevant (2004, 2018).

2.3.2 *The Eight Step Process of Leading Change by Dr. Kotter*

When discussing change management it is certainly difficult to go by without naming the works of Dr. Kotter. He spent a lot of years researching business, leadership and change, resulting in a 8-step process for leading change (Kotter, 2012). The process he calls "The Eight Step Process of Leading Change", which is summarized in Figure 2.

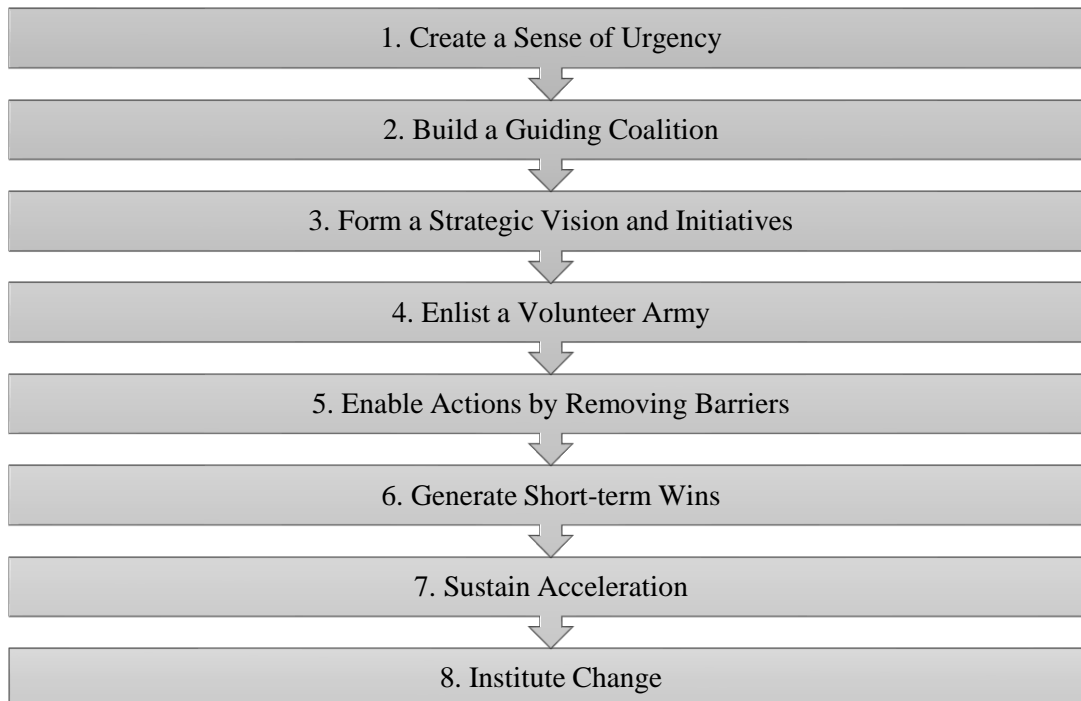


FIGURE 2. THE EIGHT STEP PROCESS OF LEADING CHANGE (2012)

In relation to implementing RPA, these steps make a lot of sense. Considering the first step, one urgency is the ever-increasing burden on the administrative staff which has to be relieved or there are frequent errors and need for reworks – here comes the urgency and need of automation. Moreover, considering step four, enlist a volunteer army which are relevant to the criteria when selecting process for RPA, namely that the “volunteers” is the workers doing the manual tasks today are required in order to

map the processes correctly. Consequently, if these workers are not on board this transformation and change for automation, the subsequent steps are guaranteed to be tough. Step six is practically relevant. For instance, this step can be achieved by automating a simple process, thus generating a short-term win as well as facilitate the benefits of automation in the organization.

2.3.3 The Road to Commitment by R. Loup and R. Koller

In addition to Dr. Kotter's 8-step process, "The Road to Commitment" is a three-phase working model by Loup and Koller (2005) in how to (1) create awareness and understanding, (2) evoking belief, and (3) building commitment for a change (Loup and Koller, 2005)

The first phase consist of expanding awareness and understanding for the change. Loup and Koller states that during this phase, the following needs to be addressed:

- Reasons the change is necessary
- The intended results of the change
- Actions needed to effect the change
- The "What's in it for me" (WIIFM)
- Features that distinguish this attempt from [any] previous attempts to change (2005)

During this phase, questions including "Why" and "How" often arise and it is necessary for change leaders to be prepared to answer these questions, or at least address the questions. Contrarily, if no questions arise it is equally important to incite dialogue in order to facilitate the understanding for the need of change. Furthermore, Loup and Koller means that it is important to anticipate rumors and deal with them directly in order to eliminate potential ambiguous messages about the change (2005).

In the second phase, one should evoke belief. Loup and Koller declare that a significant proportion of people in the organization should have acquired the following belief:

- The change is good for the organization
- The change is good for me (What is in it for me? WIIFM)
- The organization can make the changes necessary to succeed (2005)

These three beliefs form the foundation in why someone even should commit to the change in the first place. Without any these beliefs, one could not truly commit to the

change and will stay stalled in compliance or even resistance to change. However, Loup and Koller means that it is important to differentiate between believe in a change and understand the need of a change. In the former, the individual have started the journey to commit to a change. Meanwhile, in the later, the individual may understand the need of the change, but could stay in compliance merely to keep their jobs, without putting things to action (2005).

For change leaders, they should put the change in the employees' interest. Self-initiated energy built on belief is necessary to feed any successful change effort. Leaders need to listen without judgment and let everyone form their own beliefs about the change.

The third phase is about building the commitment to the change by making efforts to make the change happen. Loup and Koller list the goals of this phase as:

- Take the necessary actions to make the change happen
- Everyone sees these actions as part of her everyday work
- The individual takes the ownership to implement the change
- The individual, not commanded by someone else, initiates actions of commitment (2005)

Loup and Koller means that during this phase, people have questions regarding consequences if they fail, what type of help or training are needed to succeed, and how individuals can support and make others commit to the change. The authors suggests several ways to encourage participation to build commitment, including using cross-functional teams for planning and executing, hold large-group meetings, award those taking risks and making progress, build on successes and use failures as learning opportunities (2005).

Attitudes, behaviors, and questions related to resistance to change could in some cases be mistaken has elements in the process of creating understanding and evoke belief of the change. Loup and Koller believe that leaders must be careful not to misunderstand this behavior as resistance and not act accordingly. Instead, change leaders must rather acknowledge doubts and support individuals in the process of understanding and building commitment to change, rather than questioning individuals' beliefs in the change (2005).

Loup and Koller concludes that compliance is the enemy of change. They mean that individuals that are complying, these individuals are locked in to see what is going to

happen rather than being committed to change and taking necessary actions to make the change happen.

2.4 Summary of the Literature Review

The effects of automation and the threat of replacing workers have been recognized in studies. However, studies has shown that when automation has been used to automate tasks, it has led to automation complementing humans rather than replacing them. Furthermore, there are indications that workers in the future need to be multifaceted and possess the ability to learn new skills and be able to adapt to an increasingly technological work climate.

In order to be able to implement automation with RPA, one must understand how RPA works. RPA is a software that automates tasks. RPA is a so-called lightweight IT, which means that it is not integrated to the degree that other systems can be, instead it is like a shell that lies on top of the current IT infrastructure. Before a process can be automated, an extensive documentation is required. The process needs to be optimized along with the identification of the subjects that are involved in the process. In addition, the interaction between RPA-developers and employees performing the tasks today is important in order to grasp the essentials of the process. There are also studies that show that it is important to have an active leadership within the organization that undergoes an automation. Later when RPA is to be introduced within the organization, studies have shown it might be relevant to educate people in RPA in order to increase the opportunities with RPA. With this knowledge, the people who today perform the work manually get an understanding of how a robot can perform the task instead. In the long term, RPA is often the first step in the automation journey for an organization. An automation with a more cognitive ability may thereafter become relevant in order to achieve the full potential of automation.

Since the implementation of RPA is changing people's line of work, it is also important to look at change management. Within the field of change management, there are three models that are interesting when applying change management on automation namely: Lewin's Change Model; The Eight Step Process of Leading Change; and The Road to Commitment. These models include steps such as removing obstacles that prevent change within an organization and enable the possibility of change. These three models can help study the change within an organization as a result of an implementation of RPA. Both the purpose of automation, how RPA works, and how it affects the work within the organization are all important aspects that will build a foundation for the upcoming case study and the final discussion.

3 Methodology

This section describes and analyzes the methodological approach for this study and reflects upon the methods, procedures and approaches used to answer its research question. Firstly, the research approach will be presented followed by a discussion on the chosen research design. The decisions concerning the data collection methodology and the data analysis process will thereafter be described and analyzed. Lastly, a reflection of the study's reliability and validity will be provided followed by the ethical considerations made for the study.

3.1 Research Approach

The implementation of RPA in general is a field that has been subject to extensive studies in the past (Harrast, 2020, Lacity, 2016, Moffitt et al., 2018, Radke et al., 2020, Uskenbayeva et al., 2019, Zhang, 2019). How the requirements of RPA technology affects smaller organizations and what impact it has on change management is however an area that has been subject to far less investigation. Since the empirical purpose of this study was to increase the understanding of the implementation of RPA in smaller organizations and unfold what impact it has on its management, it was natural to select an inductive approach for the study. Whereas a deductive research strategy focuses on developing hypotheses and theories before the collection of data and then, through its observations, confirm or deny the hypotheses developed, an inductive research strategy collects data to later identify patterns and build theories (Bryman, 2011).

Consequently, by adopting an inductive research approach, it enabled the researcher to use the empirical data to identify patterns that emerged from the data and provide means for generalization of the findings in combination with the previous research of RPA and change management theories.

Studies involving researching information systems adoption and its uses, have mainly been employed an positivism research philosophy (Dubé and Paré, 2003). The positivism research philosophy advocates for a natural science model where science is the only way to learn new knowledge and where human behavior is both rational and predictable, whereas an interpretivism research philosophy rejects the natural science model and takes the differences between social actors and the natural science study objects in consideration in order to fully grasp the subjective understanding of a phenomena (Bryman, 2011). Therefore, by adopting a positivism

research philosophy, this enabled this study to get an insight into social constructions and realities of an RPA implementation in an organization, whereas the study focuses on the how and why of an implementation.

3.2 Research Design

This study adopted a qualitative research method. A qualitative research method is suitable for being able to answer research questions that contain “why” and “how”, to unfold behaviors, motivations, and other social realities and which in other ways can be challenging to answer through quantitative assessments. Unlike a quantitative method, the qualitative method emphasizes the inductive research approach and where the focus has been on generating theories (Bryman, 2011). Since the purpose of this study was to study a RPA implementation and its effect on the people within an organization, the qualitative research method were deemed suitable.

This study used a method for study a single case, in this case an RPA implementation in a smaller organization. By applying the case study method, the inherent phenomena of a study object can be investigated and analyzed. A common criticism for case studies is the potential challenge of generalizing the findings from a distinctive case. To address this criticism, it is important to point out that the findings from an individual case study do not have to represent a sample from an entire population, but rather a sample from a selected population (Yin, 2009). Another way of responding to the criticism and the difficulty of generalizing the findings of single case study is that with a single case study it is possible to analyze phenomena in depth while conducting multiple-case studies would require more time and resources (2009).

Since the research topic and questions of this study has been subject to far less investigation, there were few propositions that could be made on previous research, an exploratory case study approach was considered suitable (Yin, 2009). A exploratory case study is used in situations where there is challenging to construct base propositions or hypotheses to guide the research, because of lack of experience, knowledge or information in literature, and in research situations where there is no single clear set of outcome (2009). However, the lack of a base proposition does not equal that the research is missing a purpose, but it is particular important to state the purpose of a study when conducting an exploratory case study (2009).

3.3 Data Collection

Selection criteria for the case object, or the case-company, was private educational companies in Stockholm, Sweden and that had implemented RPA in their organization. Moreover, the RPA implementation should have reached a maturity level that have robots that are running automated tasks in production.

The case-company of this study is an educational company that offers a wide range of higher vocational educational programs. The company also offers preparatory courses and aptitude tests for students that need to improve their grades and meet the eligibility requirements of the educational programs. Throughout the application and admission process to the examination and graduation process, there is a constant generation of administrative work, which need continuous attention from the administration department. Therefore, the case-company considered implementing RPA in the year of 2019 and has of today (May 2021) six unattended robots currently running in addition with five robots in development. The robots perform tasks that are related to compilation of reports of the student's attendance, another example of tasks are registration of new students for preparatory courses and aptitude tests, registration of grades on a government agency platform, and generation of certificates. The case-company has an ongoing licensing plan with an RPA provider for delivering the technology and software. The robots has been developed in collaboration with an RPA consultancy firm, but the goal is to develop robots inhouse in the future.

3.3.1 Sampling

When applying a case study approach, this restricts the choices of sampling methods. Since a case-study investigates a specific case within a particular environment or context where only a limited part of a population is studied, whereas other members of a population are not able to participate since they are not associated with the case-company. This type of sampling is called non-probability sampling, as there are members in the remaining population whose probability of participating in the study is zero (Saunders et al., 2015). For studies with time and cost constraints, this type of sampling may be appropriate. In this study, the sample was limited to a relatively small organization where the opportunity to interview a large population was limited and the interviewees was not selected at random. Rather, they were selected based on their role and relevance to the studied phenomenon, which made non-probability sampling appropriate for this study. However, this type of sampling may affect the

ability to generalizing findings in the research in comparison with a probability sample (2015).

Snowball sampling, a form of non-probability sampling was considered suitable for this case study. This sampling method enables a researcher to recruit additional interviewees by get referrals from a first interviewee (2015). A first contact with the case-company is therefore required, which also is the most critical one for this method of sampling. The researcher can then request to get referrals that are relevant for the research questions. The sampling when the sampling has reached a predefined size, when the sample size is unmanageable, or when there are no more recruits that are considered relevant in relation to the purpose of the study (Bryman, 2011).

An early contact with the Chief Information Officer (CIO) at the case-company was established, which in turn recruited succeeding interviewees for the researcher. The CIO had a central role in the RPA implementation at the organization, whereas he took the initiative to investigate use cases for RPA. Thus, the CIO were considered to have insight in who were involved in the implementation, and which were affected by the implementation.

In the study, a total of 6 people were interviewed, of which five people belonged to the case-company and one interviewee was an external RPA-developer. More about the interviews and how they were constructed and conducted can be found in the succeeding section, 3.3.2. A final sample size of a study can be difficult to determine in the beginning of a study, and when saturation of collected data can occur. Data saturation in a qualitative study can occur when additional interviews stop adding any new data to confirm hypotheses (deductive) or generate new theories (inductive), i.e. when replication of data occurs (2011). Morse (1995) emphasizes that “The quantity of data in a category is not theoretically important to the process of saturation. Richness of data is derived from detailed description, not the number of times something is stated” (1995, p. 148). Data saturation and the final sample size in this study were determined by the point where no new themes emerged from the coding procedure and the respondents confirmed what already been stated by previous interviews.

3.3.2 *Semi-structured Interviews*

Reflections from the implementation were captured using semi-structured interviews. This method involves a list of topics or an interview guide to touch upon during an interview, but the interviewee is free to formulate their own answers

(Bryman, 2011). This form of interviews are suitable to understand underlying reasons (Saunders et al., 2015). Moreover, since there may exist key imperatives that the researcher is not aware of, this method allows the interviewees to ‘think aloud’, whereas in a quantitative study this fluent form of interview could be perceived as a disturbance to be avoided (2015).

To guide the semi-structured interview an interview guide or protocol is required. This helps to answer the research questions, as it provides an opportunity for the researcher to consider what the problem really is in the study and what is to be investigated. However, the components of the interview guide should not be so specific that the questions limit the interviewees' answers or in any way risk leading the interviewees in their answers (Bryman, 2011). Regarding the structure of the interviews, they were divided into two parts: (1) pre-implementation questions and (2) post-implementation questions. This enabled the researcher to separate and discuss the expectations of the implementation, before, during and after the implementation. The interview guide can be found in the Appendix A.

Because of the characteristics of the case company (small organization, in this case total number of employees are at the time of the study 30 people) and the fact that the RPA implementation is not affecting all the people in the organization, the number of people to interview was limited.

The types of roles were selected since they were either directly involved in the RPA-implementation and development of the robots or had staff that were involved in the projects. As a complement to the interviews conducted with the respondents at the case-company, an RPA developer was interviewed to also include the perspective of an external developer. It was considered relevant since the case company used a consultancy firm to develop the existing robots, see table 1 for a summary of the respondents.

Because of restrictions caused by the COVID-19 pandemic, all of the interviews were conducted remotely over video call. Conducting interviews remotely can make it difficult to capture body language, faces and behaviors that might otherwise be easier to record in an interview. Despite that video calls enables the researcher to see the interviewee, it is still a challenge to capture these non-verbal gestures because of the limitations of field of view of web-cams and their focus on faces (Weller, 2017).

Table 1. Information about the interviews and the respondents

Interviewee	Roles	Duration (min)
A	Administration & service coordinator	68
B	Marketing Director	43
C	Student and education administrator	44
D	Chief Information Officer (CIO)	64
E	Project manager student recruitment	43
F	RPA-developer	30

3.4 Data Analysis

Following the interviews, the interviews was transcribed in their original language (Swedish or English) as soon as possible. This has two effects: firstly that non-verbal gestures can be added and commented to the transcript, increasing the empirical value of the data (Bryman, 2011). In addition, this reduces the potentiality of “losing” yourself in the amount of data. The transcription was followed by an inductive coding procedure. When using an inductive coding procedure, it is preferable to use the research question as help to select codes and keep focus on which data to code (Saunders et al., 2015). Thereafter, by connecting codes to identified core themes provided means to create fragments of data, which enables a researcher to combine codes into more abstract codes which are useful to compare statements from different data points (interviewees) (2015). Furthermore, the exploratory case study approach emphasizes the exploration of collected data, where basic theoretical pattern can emerge from the data, thus support the theory generation (Eisenhardt, 1989).

3.5 Validity and Reliability of Research

Validity is about how accurate a method can measure in relation to what the method is actually intended to measure (Bryman, 2011). In qualitative research it is a

challenge to measure validity in a quantitative manner, whereas the statistically assurances and confidence intervals of the quantitative research offers a researcher a possibility (Yin, 2009). Moreover, in qualitative research, validity is related to how appropriate the choice of methodology are in relation to the ability of answering the research question correctly (Bryman, 2011). In order to maintain the validity of this study, a critical approach to the choice of methodology was adopted. In the preceding subsections, the author has provided insights into the process of choosing research methods for this study and justified the choices. In this study, the goal is to study the expectations and how the expectations have changed after the implementation of RPA at the case company, the method described in this section provides means to answer the research questions and maintain the validity of this study.

Reliability is about whether the conclusions from a research study are consistent if a similar (i.e. not the same) research study were to be conducted again (2011). Consequently, to enable a test of reliability of a case study and repeat a case study, it is necessary to document the methods and procedures of a case study to allow the succeeding researcher to repeat the study (Yin, 2009). Thus, the methodology section of a study is a crucial component of when reporting research. This study investigates the expectations of an implementation of a rather new technology. With the rapid technological development of today, the conclusions of this study may not be sufficient to cope with technology advancements of the future and the implementation thereto. However, since this study investigates the implementation of the technology defined as RPA and the requirements of RPA are provided and defined in section 2.2, together with the interviews of people directly affected by the implementation, reliability is an integral part of this study.

3.6 Ethical Considerations

This study has been conducted in accordance with the basic ethical principles that apply to Swedish research. These ethical principles include requirements of voluntariness, integrity, confidentiality and anonymity for the persons involved in the study, which can be more easily described as requirements for information, consent, confidentiality and use (Bryman, 2011). In order to fulfill these requirements, all respondents were sent written information regarding the research objectives and the usage of data prior to the data collection. The respondents were also given information about the approach of the interviews and that the participation was based on a strictly voluntary basis, giving the participants sufficient information to

assess whether or not they wanted to participate in the study before giving their consent. Prior to the data collection, the participants were also informed about anonymity and that their personal data would be handled with care and only for the purpose of being used for this specific research. After conducting and compiling the interviews, the author of this thesis has worked to ensure that information and personal data are stored securely. Like many other qualitative studies, the requirement for confidentiality has however been more difficult to maintain since the interviews contain more personal answers than what is usually found in quantitative studies. However, anonymizing the answers provided in the interviews has been considered a sufficient alternative to uphold the requirement for confidentiality, considering the area of research and the vulnerability of each respondent.

4 Result

This section will present the data from the conducted interviews. The following subsections were selected based on the themes identified in the data, according to the steps in the data analysis. Furthermore, the subsections were chosen in order to enable and facilitate the answer to the research questions in this study.

In this section, statements will be set against each other and assessed in order to present the result of the case study. The statements from the interviewees will however not be compared with the previous studies and theories presented in the literature review until the discussion in the succeeding section 5.

The section will start with a presentation of the context at the case company and continue with the overall result regarding automation in the workplace. The section will then continue with a presentation of the result regarding insourcing and consulting as well as the opportunities and challenges with RPA. The section will thereafter end with a presentation of the result regarding RPA in hindsight.

4.1 Context

The case company started investigating the implementation of RPA in the year of 2019 on the initiative of the CIO. At this time, the CIO had recently taken over as manager of the administration and support department that was internally named Business Support. The CIO had the presumption that the department was struggling to keep up with all the work which needed to be performed. However, according to the administrators that worked in the department at the time, this was not the case. Oppositely, they had time to perform the tasks and even some of the monotonous tasks were considered relaxing.

When I took over the [Business Support] department, I thought there was a lot of work lacking behind and that the administrators could not keep up with the workload. But the administrator first told me that there was no problem, they had time and some of the tasks was kind of relaxing. That they did not need to “think” so to speak. – Interviewee D

However, reviewing the backlog, the CIO found that there was indeed a lot of work that needed to be done:

...when I looked at their backlog, I realized that there was a lot of work needed to be done, which created a lot of frustration and stress, which in turn caused

them to do a lot of errors. So that created even more work, to correct the errors the had created. – Interviewee D

During the course of the implementation, the department experienced some staff related challenges as well. Two important staff members left the organization before and during the time when the first robots were about to be deployed. The Business Support department therefore struggled to keep up with the tasks, since the knowledge of how to perform specific tasks had left the company. This created a difficult situation, as one of the administrators explained:

We had key people with all of the knowledge of doing specific tasks and the problem was that the knowledge left the company. We were standing with tasks that we did not know existed, that we did not know how to perform, where the information came from, where we should submit it and so on. – Interviewee A

To address this issue, the company hired several new employees. However, the administrative burden persisted as the lack of documentation was one of the contributors to the burden. Despite the increased headcount, the immediate problem of administrative burden was therefore not resolved.

4.2 Automation in the Workplace

The interviewees of this study were asked to comment on their views on workplace automation and their perception of how automation would affect their own and other people's jobs. The majority of the interviewees saw no risk of losing their occupation as a result of automation or being replaced by a robot in the organization of the case study. On the contrary, they felt that automation was going to or had already made their work easier and less burdensome. Furthermore, the interviewees describe automation as a complement to their work, enabling them to spend time on other more complex tasks where there are higher demands on cognitive ability. As stated by one of the administrators:

My view of this is that automation relieves the human in the most boring and burdensome tasks. For the more complex decision making and cognitive complex tasks, a human takes over. Some decisions may require experiences in areas where an AI is not trained. – Interviewee A

Moreover, when asked about the use of RPA in the organization the second administrator stated:

Considering that the robot will perform the most boring and time-consuming tasks, we can spend our time on more creative and rewarding tasks instead. I therefore only see the positive side of automation. – Interviewee C

This theme is recurring in all interviews, namely the perception that automation free up time for the staff and enable them to spend time on more important and value-creating activities, such as supporting students on issues that are significantly more complicated. The project manager who leads a team of three people have so far only positive things to say about automation and robots:

... I strive to develop my own and my team's work to be as efficient and easy as possible. To be able to bring in a robot that perform the most burdensome tasks and for instance issue certificates and so on, it just facilitates our work. For me personally, it has only been a positive experience. – Interviewee E

On the other hand, several interviewees stated that their perception of automation is that robots or the like have a limited ability to make decisions with emotional aspects:

...At least at this stage we [humans] are needed for more complex and cognitive decision making but also in decision making where you have to consider an emotional aspect, since we are working with people. – Interviewee C

This was also shared by the other administrator:

...there may be decisions that need to consider an emotional aspect which a robot or AI may not understand. – Interviewee A

Overall, the interviewees presented a positive attitude towards automation in relation to their own organization. However, when talking about automation in relation to the society as a whole, the view of automation generally shifted. The interviewees admitted that certain professions may disappear in the future as a direct result of automation. The CIO for instance believed that there is a risk that robots and AI will replace humans in certain situations and in certain workplaces:

From a societal perspective, I do acknowledge the possibility that a lot of jobs are going to be replaced by robots or AI and that this is a development that I do not view very positively. – Interviewee D

However, the CIO thereafter restates that automation in their own organization have positive intensions:

However, I argue that in our organization we are automating tasks in order to remove boring and repetitive tasks and enabling our staff to spend their time on more valuable tasks. – Interviewee D

According to the RPA developer, there is still a need to keep people in the organization even if RPA is implemented. Using RPA in order to automate processes requires knowledge and know-how of how processes are designed and being performed, and it can be a difficult challenge to actually gain a correct understanding of an organization's processes:

...it is very, very time consuming and difficult to actually figure out what people and employees are doing manually and even more so if the applications or processes are changing. People are still required to see the bigger picture, respond to changes, and adapt the robots accordingly. – Interviewee F

Furthermore, the RPA developer explained that it was a similar situation in the past when the ERP systems were introduced in workplaces. The argument of that time was also that people would no longer be needed in the offices. However, this prediction turned out to be false and we now have more office personnel than ever before.

4.3 Insourcing and Consulting

The case company has applied a model where they have used internal resources in order to identify and map processes and thereafter signed a licensing deal with an RPA provider. The development of the current robots has thereby been outsourced to a consultancy firm.

In view of the administrative burden that has existed within the organization, it has been important to use the available working hours to perform tasks instead of engaging in developing robots internally. One of the administrators admitted that the use of consultants has enabled them to start automating with the help of robots while still being able to perform ongoing processes that are critical to the business:

Due to the administrative burden, it is beneficial to use consultants who both understands the processes and knows how to automate them using RPA. Absolutely, we could have learned it ourselves, which is the end goal, but it is important that we do not spend the time required for our current tasks to learn how to develop bots. – Interviewee A

During the interview, the interviewee admitted that the use of consultants was not the long-term strategy for the organization. However, by letting the consultants develop the first robots, the case company gained access to robots with better quality than they could have developed themselves. Thereby setting a standard of robots that they can use in succeeding developments.

However, one of the administrators admitted that if they had had the ability to develop robots internally, it might have been easier to handle when the robots stopped working. At the moment, the organization relies on external consultants via support agreements to be called in to support the organization when the robots stop working. When a problem arises, it is important to get help quickly and fix the occurred problem. In some cases, certain challenges have emerged with this approach in situations where the robots have failed. The consultants can usually identify and repair what has gone technically wrong with the robot, whereas if the environment has changed where the robot operates (i.e. changes in an application, repositioned buttons, or input-fields) the consultant may not have sufficient knowledge of the current process that has stopped in order to make changes to resolve the problem. In these cases, it is required that the consultant has the ability to understand the organization's process:

Then it has been difficult when we have had errors or when the robots have stopped working. Since we do not have the ability in our organization to resolve problems ourselves, we have had to contact the consultancy company, inform them that something has gone wrong, make them understand what is wrong and then make sure that the problems are handled. – Interviewee C

According to the interviewee, this dependency may prolong the time before potential problems are solved compared to if they had the ability to fix the errors themselves. However, the interviewee admits that if there had been a technical fault with the software itself, the consultants would have had to be called in anyway due to the limited competence of RPA in the organization.

According to the RPA developer, this is a difficult challenge that stands out in particular when an organization has not established a CoE and are relying on external support. Without proper documentation of the processes and of the robots that are running, it will only add another difficulty to address before resolving a problem. The RPA developer emphasized that organizations that do not have the facilities or the interest of establishing a CoE, it is sufficient to keep it simple and utilize one of the

current members of the staff as the responsible person for the robots. The important thing then is to give the responsibility to someone in the organization who can store the knowledge internally and keep records of the running robots.

4.4 Opportunities with RPA

This subsection will present the results and effects that the RPA implementation has had on the case –company and its administrative burden. In addition, the subsection will present an insight into how the expectations of the capabilities of RPA has changed during the implementation, which is relevant in order to answer the research questions.

4.4.1 *Result of RPA Implementation*

The majority of the interviewees at the case company have expressed that they are positive towards using RPA and that they already see the benefits of using the technology. These benefits include reducing the number of burdensome and monotonous tasks in the departments, saving time, and reducing the number of errors introduced in their systems compared to manually entering data. Furthermore, by removing the human from sequential tasks, where a human otherwise has to wait for a second party to finish his tasks, relieves the human by implementing an automatic trigger that starts the execution again after the second party has finished with his part. In this case, the administrator does not need to check the status of the tasks regularly or ask the second party if he has finished with his part, which has a relieving effect on the administrators.

On the same theme, one of the administrators described another benefit with the implementation which was not really expected. In one of the automated processes, the robot ran according to a schedule and read two dates that corresponded to a start date and an end date. The robot could then act in accordance with these dates and in the current case, start registering grades for a course. Previously, when this process was performed manually, the administrator had to set reminders based on these dates in the calendar, which created stress and anxiety in times when there were several courses that required attention.

After putting all of the preparatory courses remotely due to the effects of Covid-19, the case company saw a direct increase in volume. Even before Covid-19, the number of students attending to the preparatory courses were growing. The department of application and admission has therefore increased their productivity by 100 per cent

over the past three years, according to the marketing director. The marketing director admits that without some degree of automation, they would not have been able to handle the growth. Furthermore, the marketing director admits that a majority of the tasks that the robots perform are the most boring and monotonous tasks in the department. However, he would not give the full credit for the productivity increase to the robots., Instead, it has been a product of process reviews and improvements and an overall change to their routines.

One of the administrators has stated that the administrative burden has not been improved after the RPA implementation. Rather, the use of robots has made it possible to automate tasks that previously did not exist in the department. One of the new tasks that was automated was related to a certification service, that was not used before the RPA implementation. According to the administrator, it would not have been feasible to introduce this new service if RPA had not been implemented:

So far, I have not seen an improvement regarding our burden in our department. However, RPA have enabled new services for our business department that would otherwise not have been feasible, since our department is still occupied with other tasks. – Interviewee A

The certification service was an inquiry from the business development department who wanted to fulfill a demand from the students to receive a certificate after graduating from an education or passing an aptitude test.

Furthermore, we had an inquiry from our business development department to launch a new service for our students. We realized immediately that this task would have increased our workload so much that we could not have accepted to do it. But instead of saying no, we developed a robot and already it has saved a lot of hours and it has enabled us to offer this service for our students and improve their experience with us. – Interviewee D

According to the project leader at the department of application and admission, which is the department responsible for issuing the certificates, the major benefit with the implementation was that they were actually able to offer this service to the students. If the task of issuing the certificates could not have been automated, it would never have been possible for them to make hundreds or thousands of certificates themselves.

Other realized benefits with the implementation were the improved data quality in systems holding important information, such as study results. According to the CIO, some processes were not considered the best candidate for automation since they did not take a lot of time to perform. However, there was a problem with the data quality of the values that were manually entered into the systems. Consequently, this created additional work to correct the errors, which claimed unnecessary resources. With the accuracy of a robot, the data accuracy was improved, which meant that it was no longer necessary to spend time on correcting errors.

4.4.2 Expectations on RPA's Capabilities

The administrators in the Business Support department stated that the implementation resulted in an improved structure and order of their processes, as it was required to analyze and optimize the processes before automating them. This was also a crucial step in order for the Business Support department to realize the true capabilities of RPA. One of the administrators argued that the tasks she performed included a lot of exceptions that she did not expect the robot to be able to handle. However, in this case, it was only a matter of reviewing the processes to get a better understanding of the tasks at hand, review it and make a documentation before automating it.

Automation at the case company made the interviewees realize the true benefits of RPA by reducing the tasks that had been burdensome and monotonous. In addition, the tasks that were automated had been exhausted for the workers that performed the tasks. These tasks had also been prone to errors, resulting in even more work.

Part of the interviewees did not expect the RPA to be as capable as it turned out to be. One of the administrators stated that he thought that RPA would be the same as using a macro in Excel and that it would interact with a specific type of application. After seeing the first robots in action, the interviewees quickly realized the potential of RPA since it interacted with applications such as web browsers, ERP-system or any button or input-field in an application. By observing a robot in action, the administrators changed their expectation of the capability of RPA and believed it to be more capable than they initial thought. As a result, they suggested more tasks to be automated.

...after seeing a robot work in person, I have gained a better understanding of its potentials and limitations and the concept of robots is now more apparent.

– Interviewee C

One of the administrators had rather low expectations of RPA in the beginning and argued that it would just be another thing that they would have to monitor and not be able to work unattended. However, after seeing it in work unattended, this expectation also changed for the better. The CIO also expressed having rather low expectations of RPA before the implementation. The fact that the robot actually could perform a whole process, from start to end, was something he did not expect.

According to the CIO, there was another cause of concern where one of the administrators expressed worries about losing interaction with the students as one of her tasks became automated. These tasks were related to the registration of new students onto a platform while sending out a list of the course literature. When these tasks were performed manually, the majority of the students needed assistance with the simplest of tasks as getting their account details. In addition, the administrator showed a disbelief in the capabilities of the robot and was not convinced that it would be able to perform the whole process but rather small bits of it, leaving her to handle the rest. However, in the end, the automation and the use of robots did not make her lose the interaction with the students. Contrarily, the tasks were performed well, and she was able to spend more time helping those students who needed more complex assistance than getting their account details and passwords.

Some of the interviewees had expectations that the robots simply would perform the tasks correctly and quickly. Furthermore, that the effect of the robots would result in more time spent on more important stuff, e.g., support to their students. Another interviewee stated that she was looking forward to getting rid of burdensome and boring tasks and thought it would be an exciting experience. Moreover, the robots would improve the data quality as they would have to follow logical rules implemented into the robot. In comparison with manual work, the robot would always have to follow the rules without being tired or make a mistake:

When we were doing this manually, sometimes you lost your focus and by mistake entered the wrong value or something like that. – Interviewee C

During the start of the implementation, the CIO described that it was a challenge to get started with automation in the business support department, since the employees claimed that there was no burden and that they indeed had the time to perform their tasks. According to the CIO, however, there was indeed an administrative burden and processes that were suitable for automation. According to the CIO, the employees at the time did not understand that it was possible at all to use robots to perform their

tasks. Instead, a human performing the task was the only solution. However, after seeing that the most boring and burdensome tasks were able to be automated, they were convinced. More importantly, they contributed with the implementation by suggesting additional processes for automation, once they realized that robots in fact could perform their tasks.

This topic was also brought up by the project leader, which emphasized that before the deployment of the robots, she had not been thinking of using RPA for automating tasks. It was only after seeing that the robots were producing value and supporting the department by reducing the administrative burden that this realization was made. Furthermore, the experience of RPA in the organization made the project leader think of other areas for RPA and which other tasks could be suitable for automation. Before she started working at the case company, she did not think of using automation in order to improve operations.

In the marketing department, the marketing director described that their department has been focused on developing and improving their own processes, rather than focusing on automation. He believed that automation may only be an additional tool in the toolbox that could be used in order to streamline a business. Above all, it is the result of the improvements that counts:

I see no value in automation, per se, rather the resulting benefits of using it.
If you can save time and reduce cost, then I see it as valuable. – Interviewee B

Furthermore, the marketing director acknowledged that RPA has its place in the organization and that RPA solves a problem where any other type of integration (e.g. API) is not feasible.

4.5 Challenges with RPA

The following subsections will present the most significant challenges that were expected and other unexpected challenges that emerged during the implementation of RPA at the case company.

The first bottleneck experienced by the case company was the initial installation of the software that took longer than expected. Once the necessary infrastructure was in place and the RPA software was installed, it was time to start identifying suitable processes for the robot. This work was considered relatively demanding for the people involved. An administrator said that it was a challenge to first find a suitable

process, then analyze the process in order to identify all the steps and foresee all possible exceptions that may arise. It was also a challenge for them to be certain that the whole process had been captured in its entirety. If there was any part of the process that had been overlooked in this analysis, it could have a significant impact on the quality of the robot and its work performance. In order to avoid this, the case company applied a practice where they recorded how they performed the task manually during a meeting with the RPA developers. The benefits of practicing this was that they both got the process documented and that any questions could be answered during the meeting.

Furthermore, the extensive reviewing of processes and tasks gave the case company a reason to go through their own processes and systems in order to identify possible opportunities for improvements and to better understand the current workflows of the different departments. In that aspect, the administrator believed that this part of the RPA implementation, which included the identification and analysis of work to find the right process candidate, gave them the opportunity to review and document the processes in their department.

4.5.1 Risk Assessments

From the start, the implementation was very operationally focused, which meant that the robots would go into production as soon as possible. According to the marketing manager, this may have limited the time allocated to analyze the processes for the first robots, as well as the review of the associated risks. According to the interviewee, this limitation may have led to an error during the development of one of the robots, which caused incorrect data to be entered into a system when the robot was run unattended. The incorrect information then had to be corrected by hand, which resulted in loss of valuable time in an already time-pressured organization.

The expectations of RPA were that the technology would have a better ability to identify when an error had occurred and more importantly, to have a more sophisticated error-handling process than it was presented with in this case. Moreover, those involved in the case did not fully understand the risks of using RPA and that errors could go unnoticed.

Our understanding of the robot, at that time, was that if something went wrong during the execution of the process, the robot should stop. But it did not, instead it kept going and resulted in a lot of errors being registered in our system. – Interviewee B

According to the RPA developer, the capability of detecting and handling errors of a robot are much dependent on the amount of time allocated towards developing the error handling capability. The robot itself is not capable of handling an error, error handling must therefore be developed explicitly. This is further emphasized by the marketing director in his comparison with their organization to other bigger companies. If the case company had more resources, they would have been able to emphasize the importance of conducting proper risk analysis and quality assurances. Conversely, this meant that he was questioning if they had the means and resources to reach a sufficient level of quality when using RPA compared to manually performing the tasks.

The marketing director concluded that the main disadvantage they experienced during the first robot was the difficulty to detect if the robot did something wrong or not and that they maybe had an over-confidence in the capabilities of RPA.

4.5.2 Build a Robot-builder

As the initiator of the RPA implementation, the CIO had the expectation to let everyone in the organization use RPA in order to automate their own processes and tasks. In other words, he wished to enable employees to build their own robot and automate their own tasks. However, this expectation changed during the course of the first developments of the robots. The CIO quickly realized that it was going to be difficult to let everyone use the software without proper training and education. Even simple tasks were perceived as difficult. One of the administrators also made this observation after the deployment of the first robots. The difficulty the administrator saw in sending out the software to everyone was that people in the organization did not have a sufficient understanding for the importance of documentation when developing a robot. Because robots can be built, and more importantly, edited in a matter of seconds, the administrator experienced issues regarding distributing RPA to everyone in the organization. If everyone would be able to get the tools for developing a robot of their own, the organization could quickly be filled with a great variety of robots without proper documentation.

This was also emphasized by the RPA developer, who stated that because RPA is an incredibly flexible automation tool, without any guidelines there is a present risk of losing governance of the robots. If some robots prove to be useful and productive for the organization and these are generally implemented in the organization, who is responsible for keeping the robot running, if its developer is on vacation or otherwise

inaccessible. According to the RPA developer, the documentation of robots is equally important as the running performance of the robot.

4.5.3 Ownership

Related to the changed expectations of not being able to offer RPA as another software for all the office workers in the organization, the CIO expected that they could utilize a staff member as the owner of the robots, without having a lot of RPA knowledge. The CIO admitted that RPA was a little bit more advanced than initially expected and despite training in both programming and courses in RPA, it was still considered too complex without using the assistance from consultants for monitoring and maintaining the robots.

With the introduction of robots, the ownership of a process had also been shifted from being owned by the people who previously performed the task manually towards the administration and IT department. Before the automation, each process was performed at the respective department. However, since the automation, this ownership had been slightly shifted towards the administration department instead. In this regard, the CIO described a situation where the robot, in the event of an error, would be the main suspect and therefore the one to blame for a mistake. However, in some previous cases, it was not the robot that caused the error but instead an error that was placed in the input data to the robot, e.g., that a student had not paid his registration fee, which in turn meant that the robot did not register the student for the education. In this case, the process owner reported that the student had not been registered and that something had gone wrong with the robot. Since the student had not paid the registration fee, the robot had correctly removed the student from the registration process. Instead of confirming that the student in fact had paid the fee, the robot was the one to blame.

When the robot performed the tasks instead of a human, the process owners automatically lost the opportunity to identify potential improvements of the process. One administrator stated that after a process had been automated, the intrinsic details of a tasks were left for the robot which resulted in that the process owners only saw the output of the robot, not what it actually was performing. The marketing director also emphasized that if you are not involved in the design or the development of a bot, you do not know what the robot are actually doing.

The challenge of ownership of the robots is a difficult challenge to deal with. According to the RPA developer, one of the biggest difficulties with RPA is where the

ownership and the responsibilities of the robots are placed. The RPA developer meant that problem of ownership can be solved by multiple approaches. One is to appoint an internal resource in the organization that has the responsibility of monitor and maintaining the robots. Another solution would be to let an external resource (i.e. consultancy firm) handle the support and maintenance. However, the issue is that you want to place the ownership with the process owner as they know the answer to the process-related issues that may arise. On the other hand, the business owners rarely understand what the robot is doing or at least how it is doing it, since they have not had the education or training in RPA. The RPA developer therefore emphasized that it does not matter if it is a process owner or IT support staff that gets the responsibility, most importantly is to actually appoint someone for being responsible for the robots. According to the RPA developer, the most successful stories of implementing RPA are when an organization forms a virtual organization or a virtual team with a combination of at least two people from respective field: the department that own the process and the IT department.

4.5.4 Skepticism and Communication

During the implementation, Key Performance Indicators (KPIs) had been presented during weekly staff meetings, including updates of the status of the RPA implementation such as “now the robots are performing this task; we have saved x number of hours”. Despite the regular information about the status of the implementation, the majority of the interviewees expressed that they did not experienced that the rest of the organization was really interested. However, if an error had occurred, people became skeptical about using RPA. One of the administrators said that when the robots were working and doing their task, it was fine. However, as soon as anything went wrong, there was immediate calls for action and presented as a catastrophe. The administrator however emphasized, that he did not believe that there was a huge resistance against the use of robots, rather that there is a skepticism. It did not matter how much data they presented on what the robots had been doing, that they had saved the organization x number of hours or how many robots they currently had running. If there was an error, people started to question the robot abilities. Despite the experienced skepticism, the administrator thought that it was still important to continue to communicate to the rest of the organization the status of the RPA implementation.

4.6 RPA in Hindsight

After reviewing the expectations before and after the implementation and thereafter discussing the perceived opportunities and challenges of RPA, the interviewees were requested to discuss what they believed they would have done differently in order to improve the outcome if the project had to be restarted today or in succeeding projects.

The proposed measures or activities from the interviewees were all partly related to the previously described challenges with the implementation of RPA in the case company. Some of the proposed measures were however proposals to carry out certain steps that were not carried out at all during the first implementation. Other proposals included activities that were actually carried out during the implementation, but would preferably have been carried out more frequently, longer, or more thoroughly.

4.6.1 *Early Involvement of IT department*

At the beginning of the implementation, the IT department was not particularly involved in the project. This created a delay, as the IT department was responsible for setting up the infrastructure to be able to install the RPA software. One example was that the IT department did not know what requirements RPA placed on the infrastructure, for example that a remote desk was required to develop the robots or that a virtual machine was required in order to run a robot unattended. If the IT department had been involved from the start of the implementation, the administrator believed that the process of installing the software could have been more efficient.

4.6.2 *Review, planning, and risk assessments*

A majority of the interviewees stated that more time for planning and review of the processes would have allowed them to build more robust robots and possibly have avoided the issues related to the first robot that made significant errors by submitting incorrect values into a system. However, the interviewees stated that the challenge had been from the beginning that they did not have the time for implementation, because it consumed valuable time that was needed for other ongoing tasks.

According to one of the administrators, a suggestion for improving the review and planning of the automation process would be to involve the process owners during the development. Furthermore, it could have been beneficial if they invited the RPA developer during the session when they performed the tasks manually. Through this exercise, the one who were demonstrating the processes for the RPA developer would

achieve both the goal of performing the tasks and showing the RPA developer the steps of the process during the same time. However, the administrator stated that this would require preparation prior to the meetings and that the process could have taken longer to perform, since the steps of every task needed to be explained.

4.6.3 Communication and Performance Monitoring

During the implementation of RPA, the progress was communicated during weekly meetings with the staff. What kind of process that had been automated and what kind of benefits that had been achieved are some of the topics that were discussed during the meetings.

In order to improve the goal of these meetings, the administrators thought that it might have been beneficial to not only talk about the results and what kind of tasks that had been automated. The administrators instead suggested that to achieve a better understanding of using automation and RPA in particular, it might have been beneficial to also talk about the limitations of the robots and that they were not “bulletproof”. Despite how successful the robots were, if an error occurred this gained the main attention, which the administrator thought was unfortunate, since the use of RPA in fact had saved the organization time. Furthermore, another important aspect is that a robot is not better than what it is “told” or programmed by a developer, which would also have been beneficial to discuss during these meetings.

The marketing director wished for a better communication regarding the environment that the robots were working in. Which files were the robots using? Which files was not allowed to edit or move? In the past, the robots had been working in the “shadow” and performed the tasks without any information about what kind of files the robots were using. According to the interviewee, this created an unnecessary risk that could have been mitigated by improved communications with the rest of the organization. They could also have implemented a better error-handling in order to handle files with error and make sure that a robot informed the right people (e.g. send an email) in the event of an error.

On the topic of sending out email, one of the administrators suggested that it was not only valuable to send out an email when an error had occurred but also to send out an email to people in order to recognize when they had done their part of a process. The administrator believed that this could have an effect in two ways: firstly, that the robots were communicating with the organization more frequently, which could

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increase the awareness that RPA was used. Secondly, that the robot was not entirely associated with errors but also reminding people of doing their job.

5 Discussion

In this section, the data presented under results in section 4 will be compared with the previous case studies and the three models of change management as presented under the literature review in section 2. During the course of this study, several interesting aspects from the implementation at the case company have been gathered. The author of this thesis has however decided to focus his attention on aspects that are considered to be the most significant and interesting in regard to the purpose of this thesis and the research questions.

5.1 Automation of Labor

An interesting aspect that emerged in the case study was that none of the interviewees expressed a concern of being replaced by a robot or in any way lose their job as a result of the RPA implementation. On the contrary, most of the interviewees had a significantly positive attitude towards automation in this sense. Contrary to the conclusions of the study conducted by Frey and Osborne (2017), the interviewees did not present a perceived threat of losing their occupation. Instead, automation was rather considered to have improved their work situation. The improvements were above all the automation of burdensome and monotonous tasks, which resulted in more available time that could be used to perform more value-creating activities such as responding to support requests from students in need. Thus, this study provides findings that suggest a similar conclusion as the one found in Bhargava et al. (2021), where the respondents of the study stated that their perception of automation was that it was beneficial and enabled them to utilize their time more efficiently. Furthermore, the interviewees of this study felt that the technology complemented them in their work, rather than replacing them.

However, this positive attitude towards automation was closely linked to the discussion of their experience of automation in their own organization. When the interviewees were asked to give their opinion on automation in society in general, their perception rapidly changed. Several interviewees described automation as a possible threat to certain professions and that there was a strong possibility that some professions may be completely replaced by robots or other forms of automation in the future. In the light of this, it appears that when the interviewees discuss their own experience of automation in their proximity, they have a different perception than of automation in general. In their own organization, they have a perception of automation where automation does not necessarily lead to layoffs, but rather that

automation complements the staff and improves their current work situation. One may therefore argue that when people see automation in practice, it may not seem as harmful as some may fear. This conclusion is apparent from the interviews, where the interviewees in discussion about automation in other sectors acknowledge the risks of automation (sometimes incorrectly).

5.2 Expectations

As previously been stated in the introductory chapters, this study focuses on the implementation of RPA within the education sector. Designation for organizations in this sector is that they are usually smaller organizations with limited knowledge of automation and RPA, which means that they have to obtain the information from the outside. The lack of knowledge of automation and RPA within the organization means that employees and management may have scattered expectations of what automation can do for the organization and how automation can be achieved. Thus, the expectations of automation can be set very high (meaning that they are difficult to achieve) or set very low (meaning that each automation is a win for the organization).

As seen from the case study, there has been a broad spectrum of expectations among the interviewees of what automation can really achieve at the case company. Some of the interviewees stated that they had low expectations of the robot's ability to perform the tasks that were burdensome and monotonous. They also stated that the tasks were too complex and that the tasks contained too many exceptions in order to be standardized and performed by a robot. Meanwhile, other interviewees had expectations that the robot would be able to perform more tasks than the ones that were considered burdensome. In relation to the phases in “The Road to Commitment” by Loup and Koller (2005), where the phases include creating understanding, belief, and commitment to change, these varied expectations highlight a significant challenge when implementing RPA.

The low expectations of an implementation could indicate that the intended result of a change had not yet been established within the organization. In this particular organization that was the subject of the case study, this disbelief created an obstacle for further implementation since the staff was still unaware of where they were going. According to some of the interviewees, they did not realize the potential of RPA, and thus did not see it as a possible alternative compared to performing the tasks manually. This could indicate that the staff did not realize the purpose or the final

result of the change – which meant that they could be freed from the most burdensome tasks and focus on more rewarding tasks. According to Loup and Koller (2005), understanding the purpose and what the final outcome of the change may be is an important component of the first phase of a change. However, in the case of the case company, the perception of the robot's abilities changed once they had seen a robot actually perform a task. This exercise made the interviewees realize the robot's true potential of actually being able to automate a process. It also helped increase their understanding of which details in a process were needed to be considered in order to achieve an automation.

Findings from this study also suggest that once the first robots in an implementation have been put into production and start producing value, it may demonstrate that automation really works in the organization and thereby reducing the resistance and barriers for automating other processes. Similar to Kotter's "The eight step process of leading change", where the importance of generating short-term wins is shown, the case study shows the potential of demonstrating exactly how the robots work and what they can produce in value to the organization (Kotter, 2012). For an organization that has planned to implement RPA, this means that it may be important to select a couple of processes that the organization as a whole can understand and that it knows are critical to the business. If these processes can be automated, it may create a homogeneous understanding that automation works well in the organization and thereby create the conditions for normalized expectations in the organization before continued automation.

The case study exemplifies that automation can not only take place on the initiative of the management, which was the case during the process for issuing the certificates, where the initiative for the automation came directly from the business development department instead of the RPA initiator. This phenomenon can be explained using Loup and Koller's model in "The Road to Commitment", where this behavior indicates that people have become involved in the change and that the change has been recognized within the organization (Loup and Koller, 2005). The task of issuing these certificates was also a completely new service to the organization and had not previously been performed by hand. This suggests that it may also be possible to automate a process directly, without having previously been performed manually. In the case study, the interviewees stated that they would not have been able to carry out the requested process, given their existing workload. The automation therefore

enabled them to realize the new process directly through the robot and thus met the need for the requested certificates.

Overall, the case study shows that the benefits of RPA in the education sector seem to be in line with the benefits of RPA in other sectors that have emerged from the literature. These benefits include, among others, that the robot can perform tasks at all times of the day and all days of the week, that it reduces human-errors, perform the work faster, and in general contributes to increased productivity (Santos et al., 2019). In addition to these benefits that have been highlighted in previous studies, this study has shown the ability to automate new processes without having them previously been performed manually, with is a new addition to the existing literature.

5.3 Challenges

Besides the general benefits of automation that may be seen as are equal between the educational sector and other sectors, the findings from the case study indicates that there are several challenges associated with the educational sector and smaller organizations in particular when implementing RPA. Challenges that may be more associated with smaller organizations are the parts that relates to the constraint in resources, the underestimated complexity of robot development, and the ownership of processes and robots.

The case study shows that the review and documentation of processes was an underestimated and demanding part in the implementation of RPA. Previous studies have shown that this is an important part of the implementation in order to reduce mistakes in the development of robots and capture all parts of a process (Balasundaram and Venkatagiri, 2020, Hartley and Sawaya, 2019, Kokina and Blanchette, 2019, Rutschi and Dibbern, 2020). It is also a vital step in Lewin's "Change Model", namely, in step two, to get an organization to move, transition or change, which includes elements such as planning and preparing to carry out a change (Singh and Ramdeo, 2020). However, previous studies have not emphasized the problem of this step being resource-intensive, but instead that it is a challenge in itself since the knowledge of a process can be found in an organization as tacit knowledge (Rutschi and Dibbern, 2020). Interviewees of this case study however stated that it took an unexpected amount of time and resources to map processes, which systems to be involved, and find potential errors that may occur when performing the tasks. The findings of this study show that it can be a particular challenge to obtain sufficient resources for review and documentation of processes

prior to an automation, since the organization in the study was so limited in its resources. Although the resources are limited, the case study shows that it is still an important element in the RPA implementation and that it should not be overlooked.

This case study shows that the work of review and documentation of the processes before the RPA implementation was underestimated, which may be related to an incorrect picture of RPA and a lack of understanding of the requirements of an RPA implementation. It has previously been stated that the interviewees had varied expectations of the possibilities of the robots, which may also be linked to the degree of understanding of how the robots works. However, the work of review and documentation contributes to the organization gaining increased transparency in its processes, increased control, and at the same time a complete documentation of how the processes are performed. It is therefore still an important part of the implementation and will lead to obstacles if the activity is not carried out. This points out that the implementation of RPA can be a paradox: it takes time to free time.

What has further emerged in this case study is that there have been cases where the robots have failed and performed tasks incorrectly. What was missing in these respects was a correctly performed risk management and an analysis of the automated processes, were important steps of the processes had been missed. What the cause of these errors did not appear from the interviews and have not been valuable for further investigation. However, the effects of the errors that have occurred have been of interest to this study. When errors have occurred, this has received more attention from the rest of the staff within the organization than when the robots have functioned as they should. This is in itself a threat to change as it can create a distrust of using robots and automation in general. In addition, it can create an internal mistrust of the organization itself, as the confidence that the organization can make the changes required to succeed may decrease. This is an important part of phase two of "The Road to Commitment", namely that the belief that the organization has the ability to change has brought about a change (Loup and Koller, 2005). Furthermore, it is important to maintain the legitimacy of the change by predicting any rumors and dealing with them directly. In relation to when errors occur in connection with robots working, proactive handling is needed where it is acknowledged in advance that errors may occur when robots are used, that robots are no better than what they are told to do, and that robots are not free from errors just like any other system.

An additional expectation that changed during the course of implementation was the degree of complexity of developing a robot. The case study shows that some interviewees had expected to be able to put the software in the hands of anyone in the organization in order to develop their own robots. It was later discovered that this was not the case. However, it has been shown in previous studies that it has to some extent been possible to do so. For example, in the study by Cooper et al. (2019), auditors developed their own robots and consulted RPA developers only in special situations when more complex scripting was required. What can be stated from this case study is however that it is a much greater challenge and threshold to be able to let non-RPA developers develop robots themselves, which has not been emphasized clearly enough in previous studies. On the other hand, it may be that this phenomenon is limited to the education sector and especially smaller organizations whose knowledge of automation may be more limited. Furthermore, there are associated risks with allowing non-RPA trained personnel developing robots. One of the interviewees stated that a major risk in letting people develop robots without previous software developing is that documentation and version control may be neglected. This creates a difficult situation when the robots need maintenance or adjustments, and the necessary documentation are missing.

The situation in this case study and the fact that it was unexpectedly complex to develop the robots may be related to the lack of understanding of RPA's opportunities and limitations. It should therefore be noted that it is important to understand what RPA is really about before initiating a change. Rigorous planning is needed to be able to succeed with an RPA implementation and it may be argued that that there existed a lack of a basic understanding of the degree of complexity that robot development entails within the case company.

Furthermore, the case study showed a challenge regarding the actual ownership of both processes and robots. In the data from the interviews, it was revealed that ownership tended to shift from the process owners to the robots. In the situations when the robots stopped, this created a major problem. If the robot had failed, who was responsible for carrying out the task? Since the person who were in charge of the robot did not have the knowledge of how the process were to be performed manually, it became difficult to continue with the tasks. For those who previously performed the tasks manually, who were partly the process owners, it was instead difficult to realize what the robot had done or not done after it had failed since they were not informed of the automatic process. It is possible that this problem is specially

characterized for a smaller organization and possibly mainly in the educational sector. In order to alleviate this type of problem, there are a number of solutions. According to the RPA developer, the organizations that have had a successful RPA implementation have been clear in assigning the responsibility of managing the robots to a specific person within the organization. No matter where the responsibility may lie, the most important thing is to actually assign the responsibility to someone. Advantageously, this responsibility may be placed with one person or a unit that can act as an interface between the process owners and the person responsible for the IT. The advantages are that the interface then acts as a glue between these two professions. It has also emerged in the literature that it can be important to assign the responsibility for the robots to someone within the organization or alternatively create a CoE for this purpose (Willcocks et al., 2018).

From the previous studies, the role of leadership has also been emphasized in connection with RPA implementation (Mohd Yunus et al., 2019). This challenge shows that assigning responsibility to someone is an important step from a change management perspective, namely in order to be able to keep the momentum in a change or to institutionalize the change, to use the words of Kotter (2012).

In summary, it can be stated that there are a number of opportunities and challenges with the implementation of RPA and that expectations of what RPA has to offer may be subject to change over time. Some opportunities and challenges have been considered overarching and general for different types of organizations, while some are more prevalent in smaller organizations or more specifically in the educational sector. Understanding the technology and how the technology can affect the work within the organization are all important parts to keep in mind before implementing any automation. It is also important to put time and resources into completing the basic automation, as it lays the foundation for future automations and the organization's view of automation in general.

6 Conclusions

In this section, the findings of the study will be concluded, and the research question and its subordinate questions will be answered. Furthermore, the implications for theory and practice will be provided. The section will then end with the limitations of the conducted research and suggestions for future research.

6.1 Answers to the Research Questions

RQ: How are the expectations of the opportunities and challenges of automation changing when implementing RPA in the administration of education?

To address the main research question, the question was reduced into two sub-questions:

- 1. What are the expectations of the capabilities and limitations of RPA in the administration of education?*
- 2. What was the resulting difference between the expectation and the final result of the implementation?*

In the case company, none of the interviewees perceived automation as a threat that would replace them in their work, but rather that automation would complement them by performing burdensome and monotonous tasks, and thereby relieving them from a major part of the administrative burden. The expectations of the capability of RPA were however divided prior to the implementation of RPA. It was everything from low expectations that RPA would not have the ability to automate tasks to high expectations that RPA would have sufficient ability to be able to perform the tasks at hand. The low expectations for RPA have meant that it has been a challenge to implement RPA in this context. When expectations are low, it has made it difficult to get the change in the organization to start. This has been shown by members of the organization believing that there are no processes to automate, or that there is no need for it. On the other hand, once the first robots have been deployed and are creating benefits for the organization, the expectations changed and those who have previously been more or less skeptical accepted the change and suggested further processes to be automated. Thus, these findings suggest that generating short-term wins is important to reduce possible resistance to change and to move forward in the implementation of RPA.

The study also showed that new processes, which had not previously been performed manually, could be automated in order to directly respond to a need for a solution while lacking resources in the organization to perform the process manually. A result that was not expected. In addition, in this sector, similar benefits were shown with RPA as those that emerged in previous studies, which was expected.

However, an underestimated part of the implementation was the amount of work required to prepare the processes prior to automating them. The work of reviewing and documenting processes was significantly more resource-demanding than expected. The results from the case study indicate that the work of reviewing and documenting processes is particularly stressful for a small organization, where the workload even before an RPA implementation can be unsatisfactorily high. It can therefore be a challenge to spend time in order to save time.

An additional expectation was the perception that it would be possible to allow everyone to use RPA and that all of the staff would be able to develop their own robots. It turned out to be more complicated than expected. The study also showed several associated risks with allowing everyone to develop their own robots with regard to the fact that it would reduce how well the robots were documented and maintained.

Another underestimated challenge was the unclear ownership between process and robot. In the case study, the problem showed that once a process had been automated, ownership tended to shift from the process owner to the one who handled the robot. In these cases, it is critical to assign the responsibility to a person who understands the technology and the details of a process that is performed. Getting the resources to be able to define the ownership in this type of organization proved to be difficult. However, the study showed that it may still be important to define ownership, even though resources are limited.

6.2 Theoretical Implications

The study has been based on an exploratory starting point in order to investigate expectations of an RPA implementation in an area that has not previously been the subject of research. The study has therefore used recognized research in RPA and Change Management and applied existing theories in new areas. Thus, this study did not develop any new theory in the field of study. Instead, this research has found new areas of application and thus built on previous theories and drawn attention to aspects that has not previously been presented in the existing literature.

Theories that have been used in this research have mainly consisted of theories in Change Management, namely: Lewin's Change Model; The Eight Step Process of Leading Change; and The Road to Commitment. The theories have been used for the purpose of analyzing and explaining expectations before an implementation of RPA and how these change after change work has been performed. It has therefore been concluded in this research that these theories are suitable for use in this particular field. The study has therefore contributed to the research by identifying new uses for these existing theories.

The conclusions from this study indicate that there are opportunities to apply these models from the area of Change Management to, among other things, deal with differences in expectations and how to deal with these in order to promote continued automation within a smaller organization in the education sector.

6.3 Practical Implications

For an RPA initiator who is considering implementing RPA in a similar organization to the one that was the subject of this case study, it may be of interest to consider the following guidelines:

- For an organization planning to implement RPA, consideration should be given to prioritizing automating processes that can generate short-term wins in order to recognize robots' ability to operate in the organization's environment. This will lay the foundation for future automation and disseminating knowledge about opportunities and limitations of RPA within the organization.
- Although an organization may have a smaller number of staff or limited resources, the case study has shown that it is important to assign responsibility for the robots to a person and make the ownership clear to those involved and those affected by the implementation. This will reduce the uncertainty of who is responsible for the maintenance and operation of the robots and to ensure that the implementation of RPA is sustained within the organization.
- It is important not to underestimate the significant work of reviewing and documenting processes prior to implementation. This requires time and resources but will in the long run enables the opportunity to save time. This

work will also contribute to the organization by gaining knowledge of existing processes and more easily identify the processes that are relevant for automation. In addition, this work may contribute with documentation and identify potential opportunities for later improvements.

6.4 Limitations

This study has investigated the expectations of the opportunities and challenges of RPA in the administration of education. The study has not been focused on the technological aspect of an RPA implementation, e.g. how to best set up the IT infrastructure. Instead, the focus has been on the implications of changes rendered by the RPA implementation, e.g. change management.

Because of the purpose of this thesis, to investigate a smaller organization in the administration of education, the subject of the case study have not been part of a larger sample population, thereby limiting the amounts of conducted interviews and the result of the research. They findings of this research may therefore be in need of validation through succeeding research. This would both improve the reliability of the research and enable a generalization of these finds. On the other hand, nothing has emerged in the study that would suggest that the result is limited to a smaller organization or specifically to the education sector. Based on the results of the study, it may therefore be possible to apply the discussed theories and its conclusions in other fields of study or other types of organizations.

6.5 Future research

In this case study, findings has mainly been related to the education sector in general, and smaller educational organizations in particular. Future research could either validate the findings of this study in the same context or further generalize these findings in a case study outside the education sector and in a small organizational context.

A suggestion for future research would be to investigate how to utilize the findings suggested by this study and adopting a change management model in order to promote the change and anticipate potential barriers for change in an organization when implementing RPA. Furthermore, a majority of the interviewees stated that they had a positive view of automation, especially when it comes to automation that were discussed in relation to their own organization. However, when the interviewees were asked to give their views on automation in general, this view was generally

6. CONCLUSIONS

different, and they acknowledged that automation can be a possible threat to certain professions. Another suggestion for future research could therefore be to investigate people's perception of the threat of automation in a field where people commonly believes there is a threat to a specific profession, e.g. taxi driver or warehouse staff.

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Appendix A. Semi structured interview protocol

BACKGROUND

- Describe your position and associated responsibilities?

AUTOMATION IN THE WORKPLACE

- How are you feeling about automation in the workplace?
- Any previous experience of automation?
- Do you encounter automation in your daily work?
- What is your view of automation and robots? Are you threatened by the possibility of robots replacing humans?

PHASE 1: PRE-IMPLEMENTATION

- How did you perceive the administrative burden on the organization? Was there an immediate need for a solution for the increasing burden?

DECISION MAKING

- When was the decision regarding software robot implementation made?
- What was the initiative to implement RPA?
- What was the motivation to implement RPA?
- How was the decision to adopt RPA made?
- Who were involved in the decision?
- Who was the driving force behind the decision?

STRATEGY

- How prioritized is business process development in general and at your department?
- What effect do you think automation have on business process innovation?
- Were there any actions before the implementation that facilitated/hampered the process?
- Could you describe the implementation?
- Could you describe the implementation process of a specific robot?
- What is the strategy and vision of using robots?
- What distinguishes the implementation from other IT solutions? Some examples?

EXPECTATIONS

- What were your expectations for using robots?
- Prior to implementation, what did you expect of using RPA for automation?
- What did you perceive as the major benefits of the RPA in comparison with your previous way of working?
- What did you perceive as the major disadvantages of RPA in comparison with previous way of working?
- Did you understand the robot's potential and limitations before the implementation?

CHANGE MANAGEMENT - COMMUNICATION/RESISTANCE

- How was the change communicated?
- How was the change received among the people affected by it?
- Did you feel that you understood the need of the change?
- What was the outspoken purpose with the implementation process?
- Did you get to understand the value of the change for the organization?
- What was communicated about the robots prior to implementation? How was it communicated?
- What was communicated with regards to the bots leading up to the implementation?
- Did you expect that the organization were capable to make the changes necessary to succeed?
- To what degree was the people most effected by the implementation involved in the planning?

PHASE 2: DURING/POST IMPLEMENTATION

WORKING ENVIRONMENT AFTER AUTOMATION:

- Has your responsibility areas changed?
- Did RPA have any effect on the working climate?
- How do you perceive the administrative burden on the organization after the use of robots?
- What effect did RPA have on administrative tasks? The amount changed or did the tasks changed?
- Did you find that your work performance improved or deteriorated?

EFFECT AFTER THE IMPLEMENTATION OF ROBOTS

- What is your experience of the RPA implementation? Success or failure? Challenges?
- What effects have you seen of the bots?
- Did your expectations on the robots change during implementation? If so, how?
- What value have you seen so far automated processes?
- What effect did the implementation had on operation? (e.g. performance, quality of data, cost, secondary processes)
- What effect did the implementation had on the organization? (e.g. size and structure of organization)
- Were the implications in line with the expectations?
- Do you consider the implementation successful? If yes, elaborate.
- What is the outcome for the automated processes so far?
- Did your perception regarding the 'bots' complexity change during the implementation? If yes, how?
- What are the most important risks you think should be considered for RPA utilization going forward?

CHANGE MANAGEMENT

- Did you get an understanding why this change or implementation was necessary?
- How did experience the transition from no or limited RPA experience to work in an organization using robots?
- What vision do you encompass for RPA in the organization in the future?
- What challenges were identified? What successful practices have been employed?
- Has the project been promoted on all levels within the company?
- How do you experience the transition from an organization without RPA to using RPA?

INTERNAL FACTORS

- Do you believe that the size of the organization has facilitated or made the implementation process harder in any way? Could you give an example?

- How has the organizational structure facilitated or hampered the implementation? Could you give an example?
- How has the implementation been facilitated among the employees? Positive/negative
- What was the effect on employee satisfaction?
- Did you perceive any internal resistance during the implementation? If yes, how did it play out? How did you handle it?

EXTERNAL FACTORS

- Do you recognize any external factors that have hampered the process? If yes, how?
- Do you recognize any external factors that have facilitated the process? If yes, how?
- What effect did any external factors (other organizations or stakeholders) on the process?
- How do you perceive that the current IT infrastructure has facilitated or hindered the implementation?

INSOURCING AND CONSULTING

- Comparison with other IT projects you have had in the department.
- Have you seen any challenges with bringing in consultant to develop the robots, rather than developing inhouse?
- Have there been any benefits?
- How do you see that it is you who drives the development and the order of how the robot should work compared to the IT department you set up?
- What bottlenecks are most notable for RPA implementation according to you? Are these different for any other implementations/changed to operations?

If the process would have been made again, what changes would you have made?

Do you have any comments or opinions that you want to highlight?

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