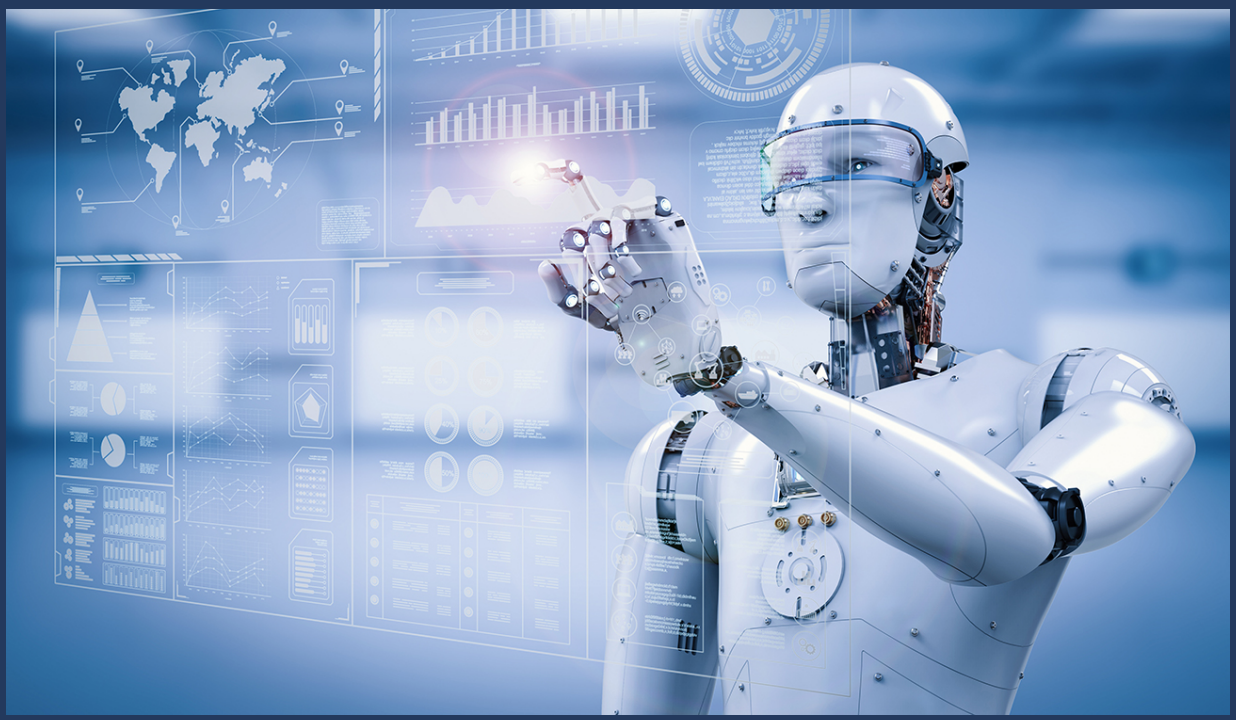
The role of managerial communication in the adoption of IT automation

RPA in the recruitment industry

Jan Mark Dannenberg



TU Delft

The role of managerial communication in the adoption of IT automation

RPA in the recruitment industry

Thesis Report

by

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Preface

This master's thesis addresses a common problem of the adoption of IT automation; the nonoptimal use of the technology due to ineffective managerial communication. It searches for a solution by using the Design Science Research methodology to create a design artifact in the form of a managerial communication framework. This framework provides values to all stakeholders in the IT automation adoption process; the managerial level, the employees, and the technology provider. It improves managerial communication during the adoption process and identifies actionable guidelines for managers.

Narrowing down the scope of the thesis to the adoption of Robotic Process Automation (RPA) within the recruitment industry allows the research to be manageable within the constraints of a master's thesis. A literature review is used to investigate the knowledge base of the topic of the thesis. Additionally, semi-structured interviews with managers and employees are used as a means of collecting data from the environment. Combining these inputs, this research designs a model that explains the role of managerial communication in the effective adoption of IT automation. The model consists of four main components: managerial communication, motivation & vision, impact awareness, and the effective adoption of IT automation. It explains the constructs that were found relevant in this process and how they relate to each other. Several root constructs are used as a basis to create actionable guidelines to facilitate an effective adoption process. Together with the explanatory model, these guidelines form the managerial communication framework. The main goal of the framework is to bridge the gap between the manager's and the employee's views on the nature of the change. This study finds that managers often view the change as a process optimization, whereas employees view it as an organizational change. The managerial communication framework allows to identify these differences and act upon them.

This study not only designs the communication framework, but also evaluates its defined objectives with several experts. The results of these evaluation interviews demonstrate the validity and usability of the research conducted and the design artifact. Future research can extend the framework to other domains & technologies and tailor it to specific problem cases. Furthermore, the framework can be researched and evaluated in practice by conducting a case study.

Contents

Nomenclature

List of Abbreviations

AI	Artificial Intelligence
ATS	Applicant Tracking System
BI	Behavioral Intention
CVF	Competing Values Framework
DSR	Design Science Research
DSRM	Design Science Research Methodology
IT	Information Technology
ML	Machine Learning
PEOU	Perceived Ease Of Use
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PU	Perceived Usefulness
RPA	Robotic Process Automation
TAM	Technology Acceptance Model
TOE	Technology-Organization-Environment

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1 Introduction

Automation, specifically Information Technology (IT) automation, is becoming increasingly popular today. Not only because of the ever-existing demand for efficiency and cost reduction, but also because of the countless possibilities that the fourth Industrial Revolution provided. Artificial Intelligence (AI), Machine Learning (ML), and robotics are just a few examples that open the way to automate processes in our daily lives. These techniques can provide great benefits to organizations that want to improve the efficiency and effectiveness of their processes.

However, implementing a new automation technique in an organization requires more than simply buying or developing it, as it impacts the organization in various ways. Of course, IT automation's main impact can be delivering the promised benefits such as the (short-term) efficiency and effectiveness benefits. However, IT automation can be quite a radical change in the existing processes and work activities of an organization, which naturally has some impact on the employees of that organization. Questions and uncertainties can arise during the process of IT automation, for example, about how this change will create a shift in work activities or whether certain jobs will be rendered redundant.

Management of organizational change and processes has always been an important field of research. It aims to provide an understanding of change in the organizational context and offers tools for managers to improve their work and avoid common pitfalls. Automation has been another widely studied concept over the last few decades. However, in the last five to ten years, automation techniques have been developing ever more quickly, with the latest example being the emerging AI technique; ChatGPT. These AI techniques have also become more mature in the sense that they are not mainly used and applied in research or solely in big corporations. They have found their way into systems that can be used by increasingly more organizations, who recognize the need for efficiency and effectiveness. Furthermore, these applications are working closer to the fellow human colleague than ever. These developments further emphasize that the need to understand IT automation and the way it can be effectively adopted in organizations is constantly growing.

This thesis aims to propose meaningful research on the adoption of IT automation, with a specific focus on the role of managerial communication in this process. Furthermore, it narrows down the scope of research by selecting one specific IT automation technique; Robotic Process Automation (RPA). In this first chapter, the research problem and its background will be introduced to provide a basic understanding of the thesis research. First, the problem will be illustrated by means of a hypothetical scenario to provide a practical example in which the value of solving the research problem becomes clear. Then, a short explanation and some background information will be given to motivate why this research area and this specific problem were chosen for this master thesis. In the thesis research, the scope will be narrowed down to a specific automation technology in a certain domain. This scope, Robotic Process Automation in the recruitment industry, will be discussed and explained to provide a context for the other contents of this thesis. Finally, an overview of this report will be given along with the way it is structured.

1.1. Hypothetical scenario

Consider a company where the upper management has become interested in some information technology (IT) automation technique offered by a technology provider based on some promised benefits, such as increased efficiency and reduced errors. This could be due to good marketing by the technology provider

or word of mouth from friends, partners, etc. Business processes that could be automated range from administrative back-office tasks to certain services provided to clients.

Management decides that this IT automation is worth the costs of acquiring and is optimistic about the benefits it will yield to the organization. As the employees are the ones who have the most knowledge about the business processes that need to be automated by this technology, they are left with the implementation and use of the acquired technology. However, when it comes to automation, employees often have concerns and doubts about how this new technology will affect their work and whether it could potentially replace their jobs. These concerns can lead to misconceptions and misunderstandings among employees about automation and could even lead to resistance against the adoption of the novel technique. These issues can, in turn, hinder the successful adoption of the technology by creating additional costs, including both time and money.

This can create problems for both the technology provider and the company as the adoption of the technology is not optimal. Management now feels that IT automation is not delivering the promised benefits (fast enough) and encounters confusion and/or resistance from employees. Employees in turn can feel misunderstood and undervalued if they do not understand the purpose and need for IT automation. Furthermore, not knowing the impact of the automation on their work is an even bigger factor that causes confusion and doubts among employees. On the other hand, the technology provider could be dealing with high service and maintenance costs due to constant problems and questions from the organization where people do not understand (and maybe do not want to work) with automation technology. Furthermore, it cannot use this organization as a positive marketing example and could miss out on new customers due to the failure of the adoption process.

As one can see, there are multiple stakeholders in the adoption of IT automation which would benefit from a more effective adoption process. The proposed master thesis aims to explore the potential source of nonoptimal adoption, specifically whether miscommunication between upper management and employees is a contributing factor. This hypothetical scenario is illustrated in Figure 1.1 and will serve as an example to make the proposed research more concrete/practical.

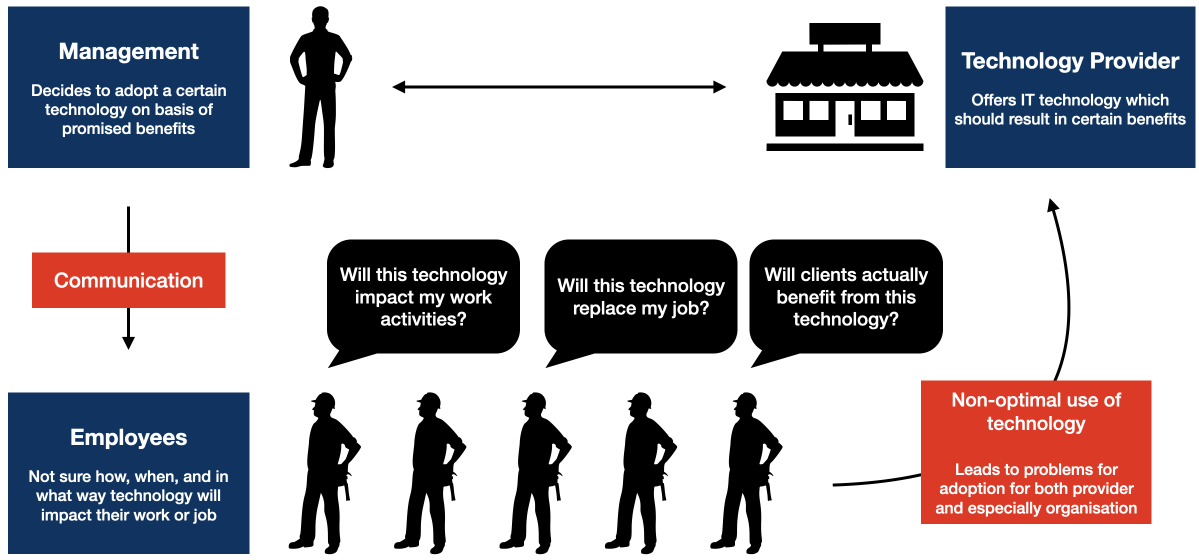

Figure 1.1: The non-optimal adoption of IT automation

1.2. Motivation

The research proposed in this document is inspired by both personal interests and experience, as well as the findings of a literature review for the Preparation for Master Thesis course at the faculty for Technology,

Policy and Management. This literature review specifically looked at one type of automation technology, Robotic Process Automation (RPA), and explored the often overlooked challenges and potential drawbacks in evaluating this technology. The familiar problem of overlooking the long-term impact of a technology and solely focusing on short-term (financial) benefits seems to be also the case for RPA. This problem has a lot in common with the automation technology adoption process, where the (long-term) impacts on employees and the organization are ignored. The focus is often on the benefits and use cases for these techniques, but not so much on people and the impact they have on them.

Personal experience of working in a software company that develops automation software further reinforced the idea that there can be many obstacles, especially communication, to effectively adopting IT automation. Customers who purchase automation software and leave the implementation and usage to their employees are often the customers that encounter the most problems and take the longest to reap the benefits of the automation technology. Employees who do not understand the impact of the technology on their work activities lead to many questions and many reiterations about how to use automation tools. This leads to high maintenance and service costs and does not benefit either organization.

The impact of this research could yield significant benefits for all stakeholders in the IT automation adoption process. A clear understanding of the role of managerial communication in this process would not only provide relevant knowledge, but could also improve current processes by being the foundation for a generic framework for managerial communication during the adoption of IT automation. This framework would allow for practical guidelines to assist managers in their communication with employees in the process of adoption. Management, employees, and technology providers would benefit from the effective adoption of IT automation.

1.3. Scope

The thesis research narrows its scope to a specific automation technology in a specific domain. The reasoning behind this will be described further in Chapter 2. To ensure that the main concepts of the scope for this thesis research are clear, this section will briefly explain the selected automation technology and domain.

1.3.1. Robotic Process Automation

Robotic Process Automation (RPA) technology automates repetitive manual tasks using software robots, also known as 'bots', which are programmed to follow a set of rules on systems or data [1]. These tasks are often referred to as 'swivel-chair' processes, as they involve moving data or operating between systems that are not connected [1] . This process could be depicted as an employee moving between several desks, having to manually transfer or operate data between different systems. This process is illustrated in Fig. 1.2. They are often described as repetitive, manual tasks that do not require creativity. RPA promises benefits such as significant cost and time reduction by automating these standardized tasks [2, 3]. Furthermore, it can reduce errors and is cheaper compared to other software alternatives. RPA is a relatively novel technology, with the first paper written on RPA dating back to 2015 [1]. As RPA meets all the common properties of IT automation technologies, it presents an interesting case for narrowing down the scope of this thesis.

1.3.2. Recruitment Industry

The recruitment industry consists mainly of companies that specialize in finding candidates and connecting them with the right company (or client) for a certain position. Therefore, the main input of an organization in the recruitment industry is candidates and vacancies. Often, they are collected in an Applicant Tracking System (ATS), such as Bullhorn or Greenhouse [4]. The main power of successful recruitment companies lies in the matching of vacancies and candidates and in the communication to the candidates. However, recruiters have to find candidates and vacancies somewhere. Global job platforms such as Indeed and LinkedIn are the main source of candidates for a recruiter [5]. Finding suitable candidates and copying them into their ATS is often a tedious task which can be boring and extremely time-consuming. Often the same applies for finding vacancies, unless they are provided by a company that specifically pays a recruitment company to find candidates for them. An abstract view of the operation of a recruitment company is shown in Fig. 1.3.

One can now easily see how RPA comes into the picture, as the main strength of RPA is automating

Figure 1.2: RPA as a swivel-chair, from [1]

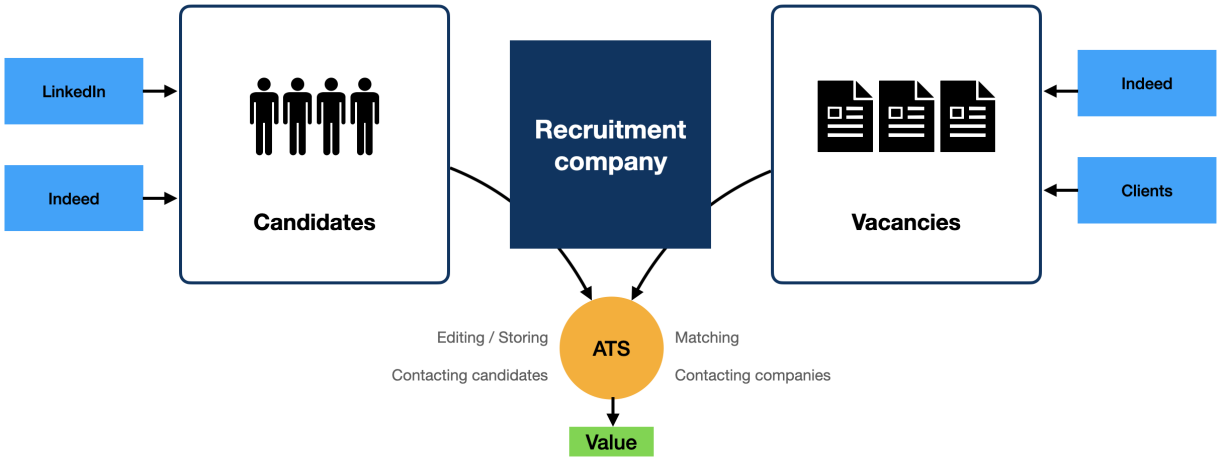

Figure 1.3: Abstract view of a recruitment company and its value creation

these manual repetitive tasks by using software bots. Therefore, RPA is often used to find a wide range of candidates and/or vacancies and connect them to the recruiter's ATS. Additionally, RPA can even automate communication in the early stages between recruiter and candidate or give some indication of potential matches between vacancies and candidates. RPA is used more frequently than ever in the recruitment industry, and its impact is only increasing [6]. By using automation for the dull, repetitive parts of the recruitment process, the organization can focus on its core competencies which create its value; matching candidates to vacancies and getting in touch with the relevant parties.

1.4. Structure

The purpose of this report is to inform the reader about the research on the role of managerial in the IT adoption process that has been conducted for this master's thesis. The content of this report will discuss the methodology used in the research and the way it was applied. Furthermore, research findings will be presented, including the main design artifact: a managerial communication framework.

The structure of the report is as follows. First, to motivate the research, the problem will be defined with its corresponding knowledge gap and research questions in Chapter 2. Additionally, in this chapter, the different methodologies used during the course of the research will be discussed. The Design Science Research Method (DSRM) [7, 8] will be used to establish a method to conduct the research and create

an artifact as a contribution. Subsequently, Chapter 3 will show the preliminary literature review done for the Preparation for Master Thesis course along with additional background information on the relevant literature streams (which have not been discussed in the preliminary literature review) for this research. Relevant models and concepts will be covered, as they will serve as a solid foundation for the actual thesis research. Then, Chapter 4 will discuss the experiments that were conducted to find answers to the research question. This chapter also covers the methodology used to obtain meaningful results from the data collected. Chapter 5 shows how these results are translated into a model that explains the role of managerial communication in the IT automation adoption process. Furthermore, it builds a managerial communication framework that contains actionable guidelines for managers on top of the model. Then, this managerial communication framework is evaluated in Chapter 6 to prove its relevance and correctness. Limitations, personal reflections, and future research directions will be discussed in Chapter 7. Finally, Chapter 8 concludes this report by highlighting important findings and discussing how the research addresses the research questions.

2

Methodology

This chapter will dive into the problem that was selected for this master's thesis and briefly introduced in Chapter 1. Using personal experiences and examples from the business world the problem will be described. Then, by defining the problem more formally, a knowledge gap can be formulated. In later chapters, this knowledge gap will be further motivated and explained by research of existing literature. Combining the knowledge gap with the definition of the problem, the potential value gained from solving the problem will be illustrated. Research questions for the research will be introduced as a means to dissect the bigger problem into manageable parts. Furthermore, the focus for RPA in the recruitment industry will be motivated.

After the problem and its research questions are clearly defined, the Design Science Research framework literature will be used to come up with a solid methodology foundation for the research that will be conducted. This will also help to set goals and objectives, which will be further discussed in Chapter 3). In addition, the planning that was made for this master's thesis project was based on this methodology.

2.1. Problem

A classic instance of the problem for this master's thesis is an organization that decides to use a certain IT automation technology. However, the adoption process for this technology appears to be ineffective. The employees who have to actually work with the novel technology are not sure about the impact of the technology and have certain fears and doubts. Management does not provide clear communication with its employees and is not satisfied with the results of the adoption process. This is a summary of the hypothetical scenario described in Section 1.1 and shown in Fig. 1.1.

Drawing from personal experience, this problem seems to occur more often when selling IT automation technologies. In the end, it causes negative consequences for all parties involved. Management is not satisfied with the results from adopting the automation technology and may blame either their employees for not using it in the right way, or the technology provider, as the technology seems to not function properly. Furthermore, it might also cost them money as they must spend more to get the novel technology up and running. Employees may feel that their concerns and doubts about using this novel technology have not been addressed and may experience less job satisfaction. The technology provider could struggle with high service and maintenance costs due to the frequent questions and problems that arise on the side of the organization. As the willingness of employees to use the technology might be limited, the communication between organization and technology provider might become unpleasant, which further causes high costs and non-optimal work activities. Furthermore, it becomes harder for the technology provider to retain customers and find new customers with fewer 'success stories'. Organizations that experience this problem are often the least satisfied with the results of the acquired automation technology and the least profitable customers of a technology provider. Fig. 2.1 gives an overview of the above-mentioned consequences and will be used later in this chapter to formulate the value that could be gained by solving the problem.

For this master's thesis, the focus will be on the doubts and fears of the employees in the adoption process. Preliminary interviews with customers of a software company that primarily develops RPA solutions have confirmed the idea that these concerns are almost always present among employees. The employees have also indicated that they feel that these questions (e.g., the questions of Fig. 1.1) need to be addressed at some point in the adoption process to provide clarity. However, sometimes this is not the

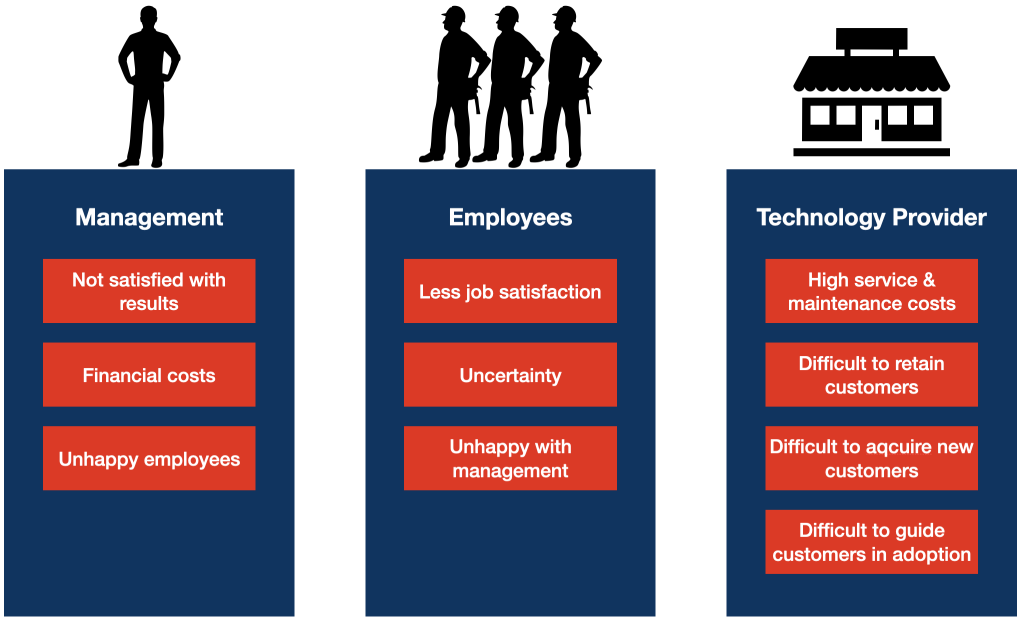

Figure 2.1: Negative consequences for stakeholders due to a non-effective adoption process

case, and employees are left with uncertainty. These concerns appear to be a logical reaction given the nature of automation technology and the radical change it can cause. Although IT automation does not fit the definition of radical organizational change, it might be perceived this way by employees due to the uncertain impact on their job (activities). Therefore, it is important for managers to realize this and address the questions of their employees properly when adopting IT automation technology.

Addressing questions as a manager seems to naturally lead towards the concept of managerial communication. Communication between management and employees could help resolve concerns about the new technology and lead to an effective adoption process. The question remains, however, of how this managerial communication should take place. To summarize the contents of this section, the problem description has been defined more formally as follows:

Problem

Non-optimal use of IT automation technology due to concerns of the employees, which leads to negative consequences for management, employees, and the technology provider.

2.2. Knowledge Gap

Drawing from the definition of the problem and from the literature researched in Chapter 3, it can be seen that there seems to be ignorance and disregard for the role of managerial communication in the IT automation adoption process. The hypothesis for this master's thesis research is that this causes a nonoptimal use of technology, which causes problems for several stakeholders (see Fig. 2.1). To solve the problem and move to a more desirable situation where the adoption process is effective, management needs a way of identifying and addressing employee concerns. Currently, to the best of our knowledge, a systematic approach is missing. Furthermore, the role and impact of managerial communication in the adoption process are unclear.

More formally, the identified knowledge gap from the researched literature and examples in the business world and personal experience could be described as:

Knowledge Gap

A lack of a structured method on how handle and understand the role of managerial communication in, and the impact it has on the adoption of IT automation.

Solving this problem by gaining more knowledge about it and providing a systematic solution delivers value to all parties. First, management would have a concise and clear way to identify and address employee concerns. This consists of knowing what to communicate and how to communicate it. Furthermore, this knowledge would allow us to reap the promised benefits of IT automation as the adoption process is effective. Management would be more satisfied with the results and could identify other possible sources of problems more reliably, as they have a clear idea of what is happening in the process. On the other hand, the manager would identify, recognize, and act on the doubts and fears of the employee, which positively impacts the employees. Furthermore, since they have a clear understanding of the impact of this automation technology, they would have greater certainty, which leads to greater job satisfaction. The technology provider would benefit from being able to inform their customers about a structured approach to adopting their technology. This would help reduce high maintenance and service costs and make it easier to retain and acquire customers. The value provided for each stakeholder is summarized in Fig. 2.2.

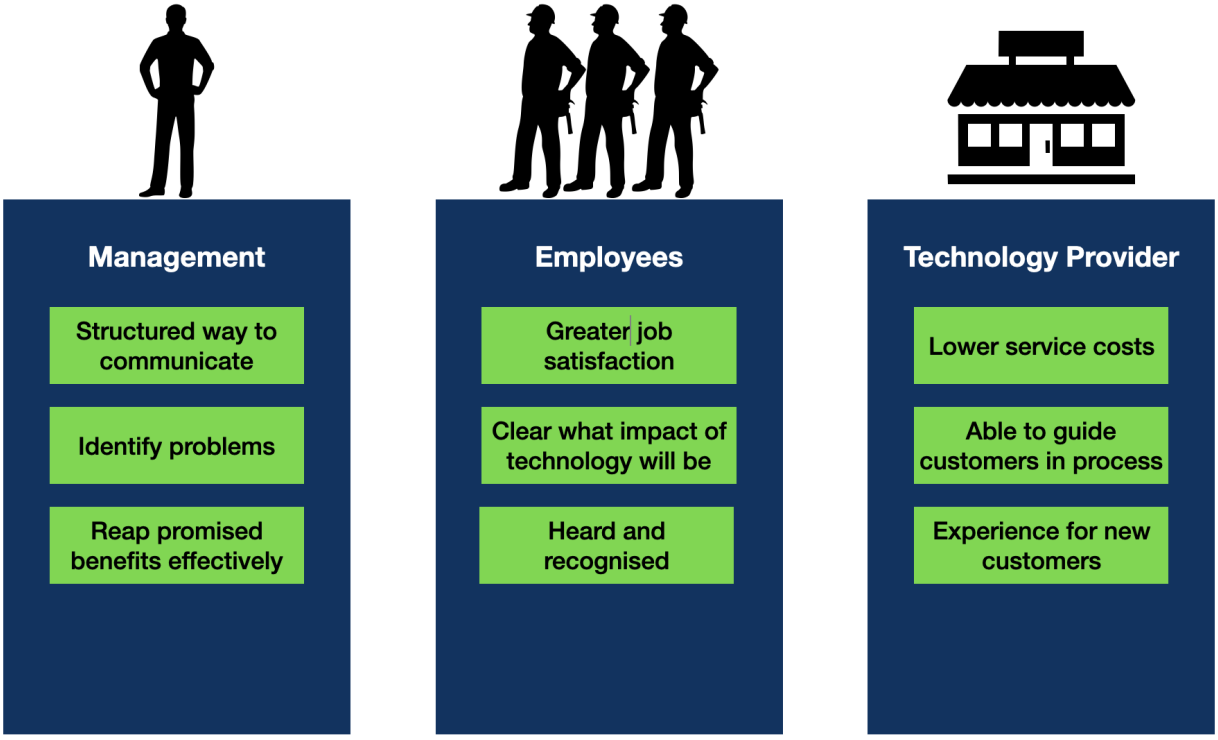

Figure 2.2: Value for stakeholders gained by solving the problem

Furthermore, the value of solving this problem also lies in the intellectual contributions that this research could make.

2.3. Research Questions

To conduct meaningful research, clear research questions are needed to guide the process. Using the problem definition and knowledge gap from the previous sections, the primary research question has been formulated as:

Primary Research Question

How can managerial communication lead to effective adoption of IT automation?

This research question tries to encapsulate the unknowns about the role and impact of managerial communication in the IT automation adoption process. Furthermore, since the adoption process could be hindered by the concerns of employees, this is also taken into account. To answer this research question and create manageable research parts, the research has been divided into several subquestions:

Research Question 1

How can the adoption of IT automation best be explained by existing models?

Research Question 2

What are the fears and doubts of employees with respect to automation and how can they be explained?

Research Question 3

What is the relationship between managerial communication and the adoption of IT automation?

Research Question 4

How does managerial communication impact the stakeholders in the adoption process?

Research Question 5

How can managerial communication be used to improve the process of adopting IT automation?

Answering these questions will help formulate an answer to the primary research question. The five research questions can be used to create a flow for the research conducted over the course of the master's thesis. This flow, along with a description of the goals and means at each stage, is illustrated in Fig. 2.3.

Figure 2.3: A flow of the research questions with their means and goals

2.4. Process

Now that the problem, knowledge gap, and research questions have been defined, a process can be outlined for the research of the master's thesis. This process roughly corresponds to the flow of the research questions shown in Fig. 2.3. Furthermore, the process will also be a basis for the latter sections, which will use the Design Science Research principles as a mold for the research methodology.

The first stage of the research, consisting of Research Question 1 & 2, dives into the existing literature to create a solid foundation for the research to be conducted. This literature review is divided into several

streams of literature, which will be discussed in more detail in Chapter 3. This literature review will further support the knowledge gap developed.

As briefly mentioned before, the research in this master's thesis will focus on Robotic Process Automation (RPA) as the IT automation technology and the recruitment industry as the domain. By narrowing the scope of the research to RPA in the recruitment industry, it allows for more feasible and manageable research given the time constraints of a master's thesis. Contacts from working in an IT automation company can be used to gather data and insights for the research. Generalizing from the RPA recruitment industry setting to general IT automation seems challenging but doable, as RPA covers all the core concepts of an IT automation technology. This research, which consists of gathering data, corresponds with Research Question 3 & 4.

The final stage of the research will zoom out from the RPA in the recruitment industry focus and attempt to create a generalizable framework for managerial communication during the adoption of IT automation technologies. This framework serves as the objective to solve the knowledge gap, providing the value described in Section 2.2 and the desired result will be described in Subsection 3.8.2. Furthermore, creating a framework as an artifact for the research provides an answer to Research Question 5. The process described in this section has also been illustrated in Fig. 2.4.

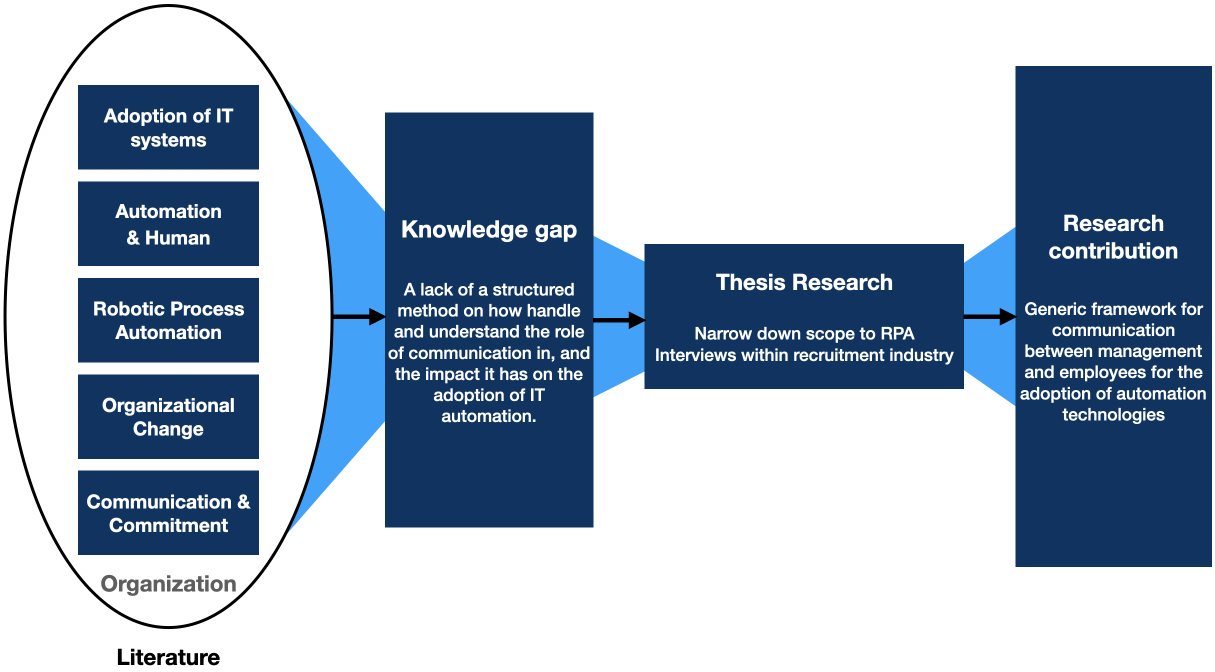

Figure 2.4: Research process for the master's thesis

2.5. Design Science Research Framework

To conduct the thesis in a structured and meaningful way, the three pillars of the Design Science Research Framework [7], shown in Fig. 2.5, will be discussed and applied to the topics of this research. This framework was designed to show how information systems (IS) research is embedded in a certain environment and knowledge base. In addition to this framework, the authors also provided seven guidelines for Design Science Research in IS [7]. These guidelines ensure the utility of the design artifact and the rigor of the research. They will not be discussed explicitly, but they are interwoven in the following sections as they are drawn from the Design Science Research Framework.

The three different pillars of the Design Science Research Methodology in IS; environment, IS research, and knowledge base, will be briefly explained, and the application of these concepts with regard to the current thesis research will be made.

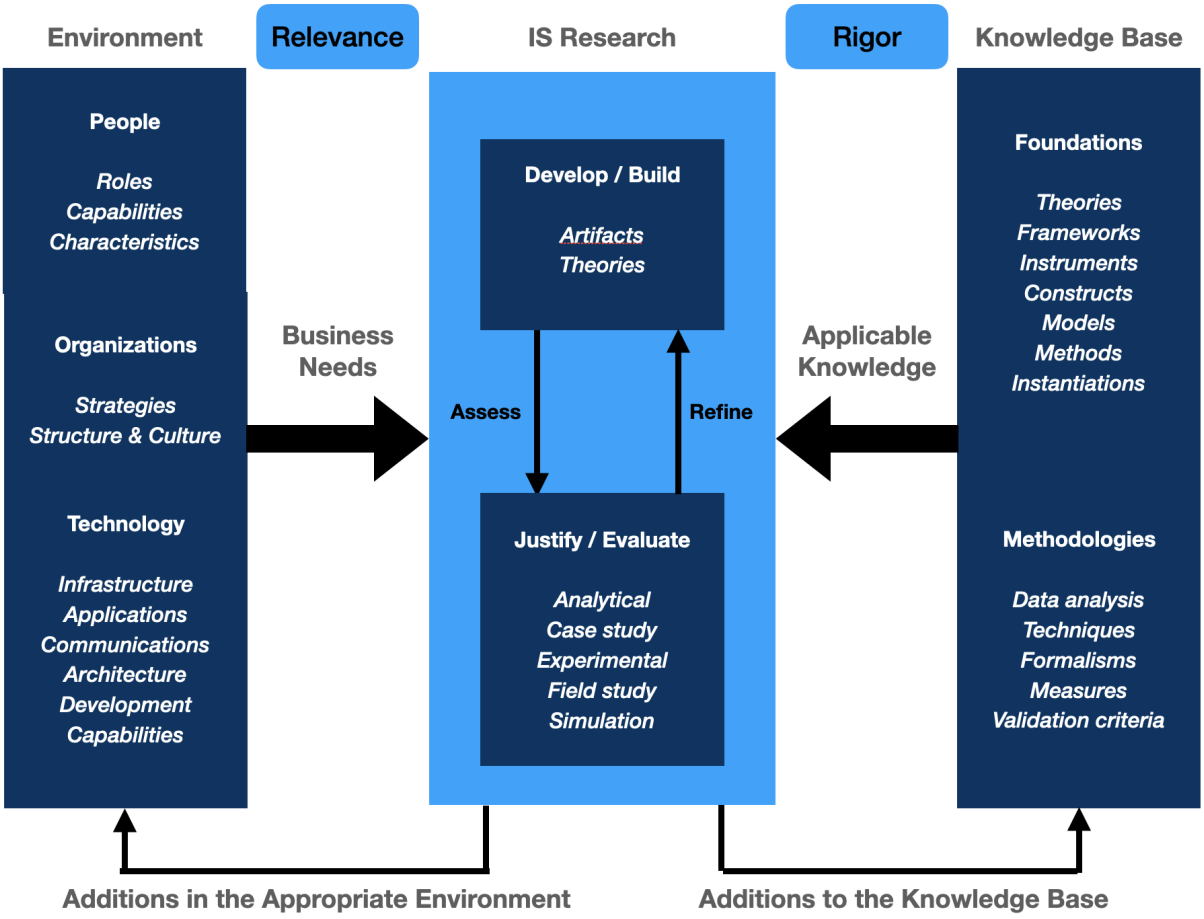

Figure 2.5: Three pillars of Design Science Research in IS, adapted from [7]

2.5.1. Knowledge Base

The knowledge base serves as a basis for methodologies and foundations for conducting research from [7]. It refers to previous research that has been conducted and upon which current research will be built. These models, theories, and other foundations help in the *develop/build* phase of the research and ensure that the research is not started from scratch. The methodologies, on the other hand, support the *justify/evaluate* phase of the research. They provide a way to conduct the evaluation in a meaningful and structured way. This could be by using a technique or measure defined in previously conducted research. In general, the knowledge base ensures the rigor of the research in order to justify and validate the research. This means that research needs to have some basis in previous research and cannot be completely disconnected.

For this thesis research, the knowledge gap is of paramount importance. Literature research is the main method that will be used to investigate the knowledge base and find useful theories, models, and evaluation & search methodologies. The literature review in Chapter 3 will start by dividing the necessary literature into different streams and concepts to provide some structure to the literature research. As for the role of managerial communication in the IT automation adoption process, there seem to be various concepts from different disciplines that could provide important knowledge for this research. The PRISMA statement [9] (a method of performing a structured review of the literature) is used to ensure the rigor and traceability of the research.

In addition, the knowledge base can help provide validated methodologies for conducting and evaluating research. As the research data will be obtained from interviews, methodologies for structuring and conducting them can be learned by researching the knowledge base. Furthermore, the evaluation methods found can be used to validate the design artifact in the *justify/evaluate* phase. This phase will be conducted primarily in Chapter 6 using methodologies found in the knowledge base. Naturally, the Design Science Research methods discussed in this chapter are also part of the knowledge base and provide research

rigor.

2.5.2. Environment

The environment is related to concepts that are of interest and defines the research problem [10]. It consists mainly of people, organizations, and technologies and their respective attributes, which can be found in Fig. 2.5. This specific context for the research defines the business needs and thus shapes the research to be conducted. These business needs provide the context for the solution that will be sought in the *develop/build* phase. In addition, they are of guidance in the *justify/evaluate* phase of the research, as the solution must be 'good enough' for the environment. The environment justifies and motivates the research by providing relevance for solving the problem.

Although the problem environment might be broader, RPA (a technology) for the recruitment industry (a set of organizations with certain people in it) has been chosen for this research. The main reason for narrowing the scope down to this environment is to keep the research manageable for a master's thesis. This environment has been investigated by preliminary interviews with real RPA customers in this industry. This was done to motivate and justify the proposed research by providing relevance. However, this relevance has to be further proved by conducting more interviews. This will also help in specifying the business needs which need to be incorporated in the solution artifact.

2.5.3. IS Research

The information systems (IS) research pillar is where the actual research is conducted in two separate phases [7]. The first phase, *develop/build*, the research should produce a certain design artifact. Constructs, models, methods, and implementations are examples of what an artifact could be [11]. This means that an artifact is broader than only implementations, such as software and hardware. However, the artifact needs to address the problem defined by the business needs and should use the (raw) applicable knowledge from the knowledge base. The other phase of IS research, *justify/evaluate*, assesses the artifact produced and provides feedback on which the artifact can then be refined in the *develop/build* phase. Evaluation can be carried out from a variety of possibilities (see Fig. 2.5) where knowledge base methodologies can be applied.

The final design artifact should create value in the sense that it will provide additions to both the environment and the knowledge base. For the environment, it should be useful to the business needs and the definition of the derived problem. On the other hand, it should add knowledge by contributing to the existing knowledge base. If an artifact fails to provide these additions, it would have been addressing a non-existent problem [7].

For this thesis research, the previously defined environment and knowledge base will be used to carry out IS research. As mentioned in Section 2.4, the artifact that will be created in the *develop/build* phase is a framework, which consists of a combination of constructs, models, and methods. Constructs and models can be created from researching the environment in combination with the existing knowledge of the knowledge base and extending upon it. These constructs and models provide an answer to Research Question 3 & 4 which ask for an understanding of the relationships and concepts of the role of managerial communication in the adoption process of IT automation. This knowledge can then be used to create a method that defines how managerial communication can be used to improve the process of adopting IT automation (Research Question 5). Designing such a framework as artifact for the IS research would be useful to the environment, as organizations can use it to gain the value described in Section 2.2. Additionally, understanding the concepts and relations at play would be an addition to the knowledge base.

In the *justify/evaluate* phase, the artifact must be evaluated and improved. The main goal is to justify the artifact by providing means to evaluate it. As the artifact is a framework and given the relatively short course of the master's thesis, the evaluation part is rather challenging. Therefore, it will likely be a relatively small part of the research. However, providing a way to quantitatively evaluate the artifact is a goal of this research. This was briefly alluded to in Subsection 2.5.1 and will be extended in Chapter 6.

2.6. Design Science Research Process Model

In addition to the Design Science Research Framework [7] discussed in Section 2.5, a sequential model based on this framework will be discussed. The DSRM Process Model [8] was introduced to structure the research to be conducted on IS. This model, illustrated in Fig. 2.6, will provide an additional perspective on

the structure of the research and will serve as a basis for drawing a planning for the course of the master's thesis.

This section will briefly explain the different steps in the model and will apply them to the master's thesis research to be conducted. Note that this model has a lot in common with the Design Science Research framework discussed above. Therefore, there will be some overlap between these sections. However, the main difference between those two is the sequential nature of the Process Model which is utilized to create a planning for the research. However, certain parts of the Process model will be adapted to the scope and requirements of a master's thesis.

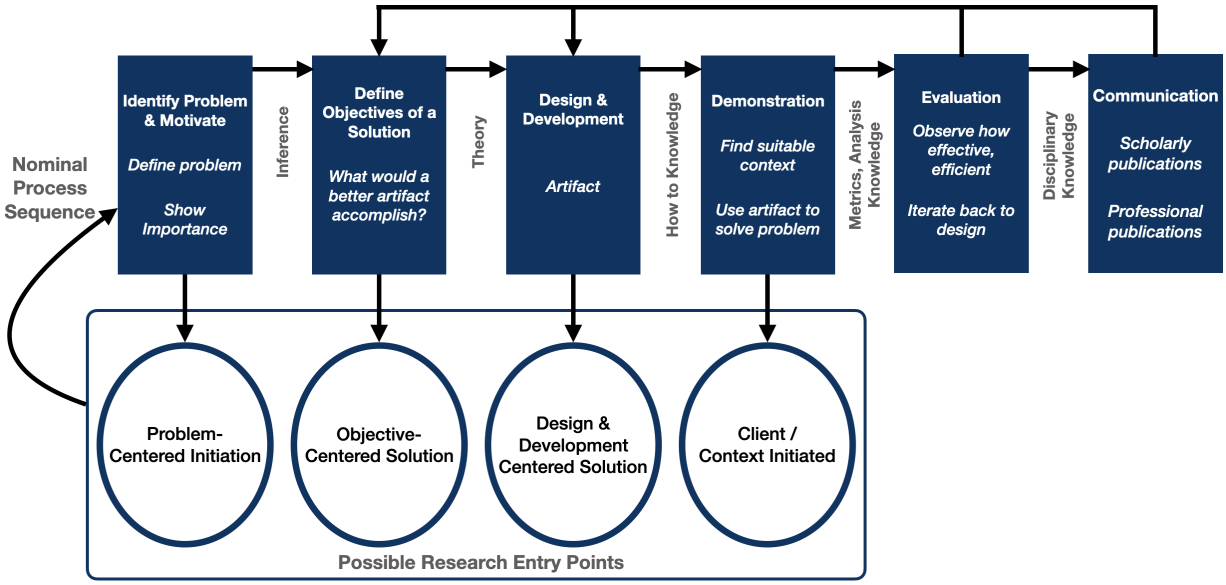

Figure 2.6: DSRM Process Model adapted from [8]

2.6.1. Problem Identification & Motivation

The main goal in the first stage of the Process Model is to identify a problem for the research. Defining a problem can be done by finding a certain knowledge gap, identifying certain business needs, or a combination of both. Formulating a clearly defined problem is important because the design artifact will be based on it. In addition, at this stage, the problem needs to be motivated by providing relevance to solving the problem. There should be value in creating a design artifact for this problem.

For the thesis research, this stage consists mainly of literature research, investigating the knowledge base, and some preliminary interviews with RPA customers from the recruitment industry, which investigate the environment. Formulating a definition of the problem and the value to gain from solving it (motivation) has been done in Section 2.1 and Section 2.2. In Chapter 2, this problem will be enriched by means of a literature research to be able to conduct experiments in Chapter 4.

2.6.2. Solution Objectives

After identifying and motivating the problem, the objectives of a design artifact should be defined. This requires the researcher to think about what the goals of a better/novel artifact would achieve. It also allows the researcher to check the design artifact at the end of the research and to be able to give a clear answer to whether it is 'good enough'. The value to be gained, defined in the previous stage, should be taken into account when defining the objectives of a solution.

As mentioned above, this thesis research aims to create a framework for effective managerial communication in the IT automation process. The requirements of this framework are based on the value it needs to create. The value that could be gained is best summarized in Fig. 2.2. These values will be used to define the concrete objectives of the communication framework. Furthermore, the knowledge base, in more extensive literature research, will allow to identify requirements for the framework to be formulated

while adhering to certain domain standards. How both of these inputs will be translated into the objectives and requirements of the communication framework will be discussed in Subsection 3.8.2.

2.6.3. Design & Development

Similar to the IS research pillar discussed in Subsection 2.5.3, this stage is where the actual research and the creation of the design artifact take place. Using the problem and the objectives defined in the previous stages, an artifact can be created. This artifact can consist of constructs, models, methods, and implementations.

At this stage, a framework for effective managerial communication in the IT automation adoption process will be designed. The output of the previous stages should give an understanding of the goals of this framework and the way it should be constructed. The design of this framework will be based on the findings of interviews with people in recruitment organizations that use RPA and models found in the literature. It will consist of constructs and models explaining the underlying dynamics and relations of the concepts. In addition, based on these models, guidelines will be created for effective communication in the IT automation adoption process. This design and development process is described in Chapter 5.

2.6.4. Demonstrate

The demonstration stage involves showing the artifact and experimenting with it within the described environment. A wide variety of methods can be used to demonstrate the artifact.

This stage will be combined with the following stage and be relatively short given the scope of the master's thesis. A selection of experts among the interviewees will be used as an audience to demonstrate the created artifact. Like in the next stage, this phase is conducted in Chapter 6.

2.6.5. Evaluation

In the evaluation stage, the design artifact will be observed in terms of how effective and efficient it performs its task. It also combines the objectives of the second stage with the artifact of the third stage and evaluates whether it satisfies these goals. Note that this stage is not linear with regard to the other phases, as its output is fed back into the objectives and design stages.

As mentioned above, this stage overlaps with the demonstration stage. For this master's thesis the evaluation consists of evaluation of the designed communication framework with experts (selection from the interviewees). This evaluation is carried out in Chapter 6, where the relevance and usefulness of the communication framework will be evaluated. The goal is to make the results quantifiable and to be able to evaluate the framework in a quantifiable manner.

2.6.6. Communication

The final stage involves communicating the findings and artifacts of the research to relevant audiences. This can be done through scholarly or professional publications.

This thesis may not incorporate the full communication stage as this might require additional work and disciplinary knowledge to transform it into a publication. However, the communication stage can be done using this thesis report, as it will be published publicly on the TU Delft repository.

2.7. Semi-structured Interviews

The thesis research consists mainly of qualitative research due to the nature of the research questions and the way it deals with human perceptions and emotions. However, as mentioned in Section 2.6, in the evaluation stage of the study, an attempt will be made to quantify the correctness of the framework created. The main methodology for collecting data selected for this thesis research is conducting semi-structured interviews. Therefore, this section will discuss why this methodology was chosen and how it will be applied in this thesis.

Interviews are the most used data collection technique [12]. Especially in the context of this thesis, when looking at humans and their perceptions [13] of IT automation, interviews seemed the right choice, as they allow to get in contact and retrieve data from real people who have to deal with the adoption of IT automation. Additionally, semi-structured interviews have been chosen as the means of data collection in this thesis, due to common reasons such as the possibility to ask follow-up questions and the diversity of

the interviewees [13]. Furthermore, semi-structured interviews are the most widely used technique when conducting qualitative research [14].

Semi-structured interviews involve interviewing based on a predetermined structure, but questions do not have to be set in a specific order or phrasing [15]. The determined structure, called the interview guide, provides the basic questions and themes that should be used in the interviews [16]. Furthermore, it also describes possible follow-up questions and how to move in certain directions if needed [17]. A specific type of follow-up questions, *probing*, can be used to further explore certain topics and feelings of an interviewee, which can be done by verbal and non-verbal actions [13, 16].

The main questions in the interview guide should direct the conversation between the interviewer and the interviewee towards the research topic [18, 16]. It is recommended that there should be around five to six main questions in the guide [19]. This has to do with the main challenge in the semi-structured interview process, allowing each interview to be unique and open ended, but also ensuring that the interviews are aligned on the same core topics to allow comparative analysis [18]. The interview process requires active participation of both the researcher and the interviewee to effectively explore the research topic together [18].

Several authors have conducted research to come up with an effective interview guide for semi-structured interviews [18, 16]. Several steps have been identified in creating an interview guide, the main ones being: (i) identification and retrieval of prior knowledge, (ii) creation of a preliminary interview guide, (iii) testing the interview guide by *expert testing* or *field testing*, and (iv) incorporating feedback and new knowledge to create the final interview guide [16]. For this thesis, research (i) consists mainly of preliminary discussions with employees and managers and conducting a literature research on the problem area. The creation and testing of the preliminary interview guide will be done in Chapter 4 and will be tested by field tests with a subset of the final participants. These results along with the final interview guide will be presented in Section 4.1.

The main output of conducting semi-structured interviews are interview transcripts of the conversation with the interviewee. These documents serve as input to the analysis phase. Coding is a technique frequently used when working with interview transcripts. This technique will also be used in this thesis research and will be further discussed in Chapter 4 when the collected data are converted into meaningful findings.

2.8. Ethical considerations

As we are dealing with real people with real jobs, there are ethical considerations of this research that should be addressed. Up to now, the assumption has been that all stakeholders in the process have good intentions, which will be mutually beneficial to the other stakeholders. However, this might not be the case in all situations. To illustrate this, imagine a company that has high personnel costs and wants to reduce these costs by laying off 50% of its workforce. To achieve this, they want to adopt a novel IT automation technique (perhaps based on ChatGPT or some other AI technique). To effectively adopt this technology, they could decide to use the proposed framework in this research. The framework could be used as a means of deception for their employees, merely to effectively adopt the technology and then fire 50% of the employees.

This example illustrates that stakeholders might have different intentions than the underlying explicit or implicit assumptions of this research. Themes like misleading, deception, and strategic managerial information sharing could pop up at various stages of the research (e.g., conducting interviews, designing the framework, demonstrating, and receiving feedback on the framework). To account for these risks, it is important to be aware of the implications and ethical considerations of the adoption process. It is not claimed that these influences can be fully avoided, but they will be mitigated in this research where possible. Some challenges and risks will remain for future research, which will be further extended in Chapter 7.

The main risk that will be taken into account in this research is the risk of deception. This could be encountered in the interviews with managers as a means to get their employees to believe that the reasons for adoption or the implications of the adoption of IT automation are different than they actually are. Additionally, the final deliverable of this research might be abused to learn how to effectively mislead employees to achieve more effective adoption. If left unaddressed, one might even argue that this is not in

conflict with the purpose of the communication framework. Therefore, this research consciously addresses this concern upfront by embedding transparency as a core value in the research design. This will mainly show in the objectives of the communication framework artifact in Chapter 3. Additionally, these risks will be constantly considered when conducting interviews and designing the framework to be mindful of the (ethical) responsibilities of the researchers. However, as mentioned, while focusing on this particular risk, other risks may not be addressed and left for future research in Chapter 7.

3

Background

This chapter serves as a review of the literature in several different fields needed to provide a solid basis for the research conducted in this master's thesis. The selected literature clarifies the different research perspectives on the topics of the thesis and will help to better motivate the knowledge gap formulated in Chapter 2. Thus, it is the starting point for answering Research Question 1 & 2 as well as the first stage of the DSRM Process Model [8]. Furthermore, this chapter will provide a better understanding of the automation technique which is the focus of this research; Robotic Process Automation (RPA).

First, the literature selection process will be described and explained. On the basis of the selection, the different literature streams and concepts relevant to the thesis research will be discussed. In the latter sections of this chapter, each of these concepts will be reviewed in more detail and connected to the research problem. Section 3.7 is a bit different and more extensive, as it consists of a slightly modified version of the literature review conducted for a master thesis preparation course on the evaluation of RPA. The conclusions of this review of the literature support the formulation of the problem given in Chapter 2 and highlight why RPA might be a suitable focus for the course of this research. Finally, the main goal of this thesis research will be discussed; a managerial communication framework for the IT automation adoption process. The objectives of this framework will be defined using the literature and the input of Chapter 2.

3.1. Literature selection

This section will discuss the literature selection process and the search process of the relevant literature for the research problem. First, the structured method used for this process will be discussed and applied. Then, the findings of this method in terms of literature streams and concepts will be presented. These findings serve as the reasoning for the different concepts that will be discussed in the latter sections of this chapter.

3.1.1. PRISMA

To find relevant literature for the thesis research in a structured way, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [9, 20] was (partially) applied to the literature search of this thesis. This way of conducting the literature search and selection helps researchers explain why and how they conducted the literature review and how certain choices were made [9]. It also provides the audience with a simple way to understand how the literature was selected and which process was followed. Therefore, for this research, the PRISMA 2020 statement flow diagram [20] was used to illustrate the literature selection process. The flow diagram showing the selection process for the thesis research can be seen in Fig. 3.1.

There are three different sources for the literature used in this research. First, there are the records that originate from the left column of Fig. 3.1. These are the records that have been identified for the preliminary literature review on RPA conducted for the Preparation for Master Thesis course. These records were selected in a different way, which will be discussed in Section 3.7.

The second source of the selected records is found in the center column. These records were identified in the first stage of the literature search for this master thesis and its research problem using traditional

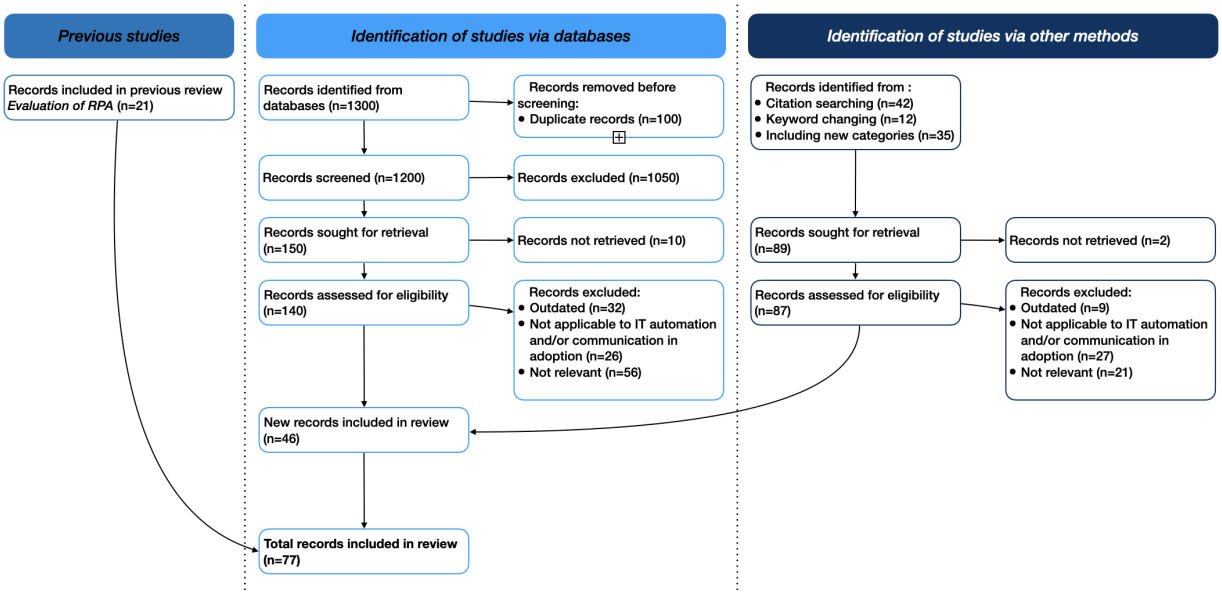

Figure 3.1: PRISMA flow diagram [20] for the literature selection process of this thesis

keyword searches in databases such as Scopus and Google Scholar. This first phase focused on two literature streams alongside RPA: IT adoption models and the Automation & Human perspective.

The third and largest source of literature are records identified by other sources. These other sources are (i) citations searching in papers found in the second column, and (ii) searching new keywords based on papers found in the second column. In addition, over the course of this research new categories were found to be relevant to help in certain parts of the thesis. Examples of these categories are the type of change management and the methodology for conducting semi-structured interviews. Most of these categories are discussed in this chapter. However, the methodology to conduct and analyze interviews is only discussed in Chapter 4 where it is also applied. All categories identified using the PRISMA method [9, 20] will be highlighted in the following section.

3.1.2. Literature streams & concepts

This section aims to provide an overview of the different concepts and literature streams that will be discussed in the rest of this chapter. Furthermore, it will illustrate how they relate to each other and why they are included in the literature review. After selecting the records, they were divided into six categories to remain organized. These categories serve as the foundation of the knowledge base, to which contributions can also be made by creating an IS research artifact. Fig. 3.2 shows how these categories have been separated and which concepts have been chosen as the main topics of the review of the literature. The selected concepts are colored light blue. The order of different search phases in this section roughly corresponds to the order of the columns of the PRISMA method illustrated in Fig. 3.1 (except for the preliminary literature review on RPA).

Most of the literature falls into the broader category that could be called *organization*. This category was used for this research because it appeared after some rounds of literature research that the literature could not easily be divided into a few distinct and non-overlapping categories. The literature search started with an examination of the adoption of IT systems and the automation & human perspective. These streams seemed a logical choice for the start of literature research as they touch upon the most basic concepts of the adoption process of IT automation. However, both proved to be too broad, as they include a lot of information that was not relevant (e.g., not applicable to IT automation or focusing on perspectives different from the ones in this thesis) or was outdated/not applicable to novel automation developments. The very foundations of this research were useful as they provided a basic understanding of adoption and the ethical and social considerations of automation. The two concepts that were identified from this phase and will be explicitly discussed in this chapter are Technology Adoption Models and Employees' Fears & Doubts.

By using citation searching and tailoring keyword searches more towards communication, several new

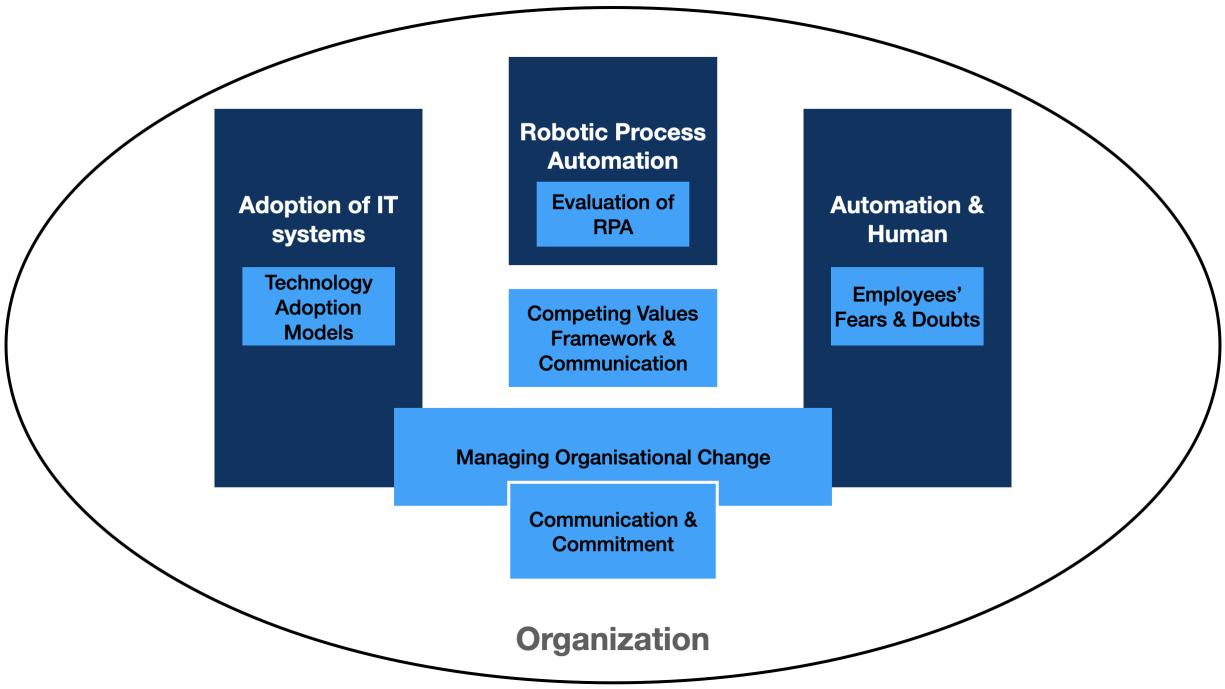

Figure 3.2: Literature streams used for the master's thesis research

concepts were identified. The organizational change literature was first chosen not to be considered, as the deployment of a novel automation technology to make certain processes more efficient and effective is generally not considered to be organizational change. However, this could be perceived differently by stakeholders in such an adoption process. This paradoxical view on the nature of change by automation is described in Section 3.4, where the concept Managing Organizational Change is discussed. Therefore, Fig. 3.2 shows that this concept has some overlap with the adoption of IT systems and the automation & human category. In addition, Communication & Commitment was identified as another category that also overlapped with organizational change. In the search for more literature on managerial communication and organizational change, the Competing Values Framework (CVF) was found. Although it does not fit into one of the categories already described or has some overlap, it does provide an interesting additional perspective on an organization adopting automation technology. In addition, literature on research linking CVF with managerial communication was found.

Lastly, Robotic Process Automation (RPA) was also included, as it will be the focus of the research conducted in the thesis. The main concept within this field described in this chapter is the evaluation of RPA. Prior to this thesis, this subject was researched in the Preparation for Master Thesis course and (partially) led to the research problem identified in Chapter 2.

3.2. Technology Adoption Models

The field of technology adoption is very broad, but in this section, we will narrow down to the technology adoption models out there, specifically related to IT systems. This literature will serve as a foundation for analyzing elements in the IT automation adoption process, with particular emphasis on managerial communication.

There has been a significant amount of research on the adoption of IT in organizations, with a focus on identifying and explaining variables in the adoption process to improve understanding of the process. Two widely used models in this field are the Technology Acceptance Model (TAM) and the Technology-Organization-Environment (TOE) framework [21, 22, 23]. Both models explain the adoption of a certain to some extent by using identified variables and constructs. The adoption of technology is defined as the acceptance and use of a new technology and is related to individual behavior [24].

TAM attempts to explain the acceptance and adoption of a new technology using four key variables

[21]. First, the Perceived Ease of Use (PEOU) defines how a user feels about the difficulty of using the technology. Naturally, this is a subjective variable from the perspective of an individual. Second, Perceived Usefulness (PU) describes how much utility the user experiences the technology could achieve. Again, as the adoption of technology is a process concerned with (non-rational) individual behavior, this is also a subjective variable. TAM states that PEOU partially influences PU, which logically follows from the assumption that a technology that is easy to use offers more utility to users. The Behavioral Intention to use (BI) is influenced by both previously described variables, which itself influences the actual use of the new technology. This model is illustrated in Fig. 3.3.

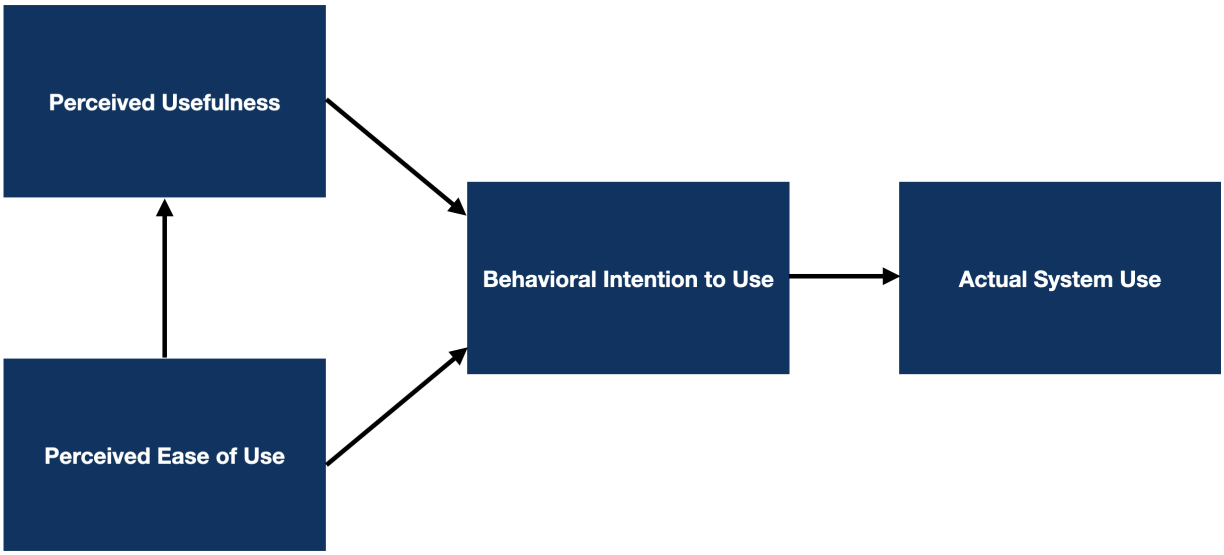

Figure 3.3: Technology Acceptance Model, adapted from [21]

Upon the basic model offered by TAM, there has been research on additional variables, such as exogenous factors, that influence the adoption process [25, 26, 27]. The extensions that this research delivers are tailored towards specific technologies and/or types of organization. Regarding effective managerial communication, research has found that it has a significant impact on PEOU, but not on PU [26]. Effective managerial communication with users of a new technology seems to influence how they perceive the ease of use of the technology,but does not alter their views on the usefulness of this technology too much.

The TOE framework provides another perspective on the adoption process, dividing the variables into three distinct contexts [23]. The first, the *technical context*, focuses on the technical properties of the environment that affect the acceptance and use of the new technology. The *organizational context* considers the properties of the organization, such as the size of the firm and the management beliefs and the impact they have on the adoption process [22]. Furthermore, it incorporates the firms' capabilities to achieving innovation and knowledge management. Lastly, the *environmental context* includes areas in which the organization operates and external factors, such as government regulations.

Both models, TAM and TOE, have proven useful in analyzing the adoption process, but have their limitations as well. Their predictive power is lacking, which hinders the use of these models for practical situations [22]. The TAM model only partially explains the adoption process and would need to include variables related to the social and human perspectives [28, 29]. This further illustrates the need for a more integrated approach to analyze adoption processes where uncertainty of employees needs to be considered. The TOE method suffers from unclear constructs and being too generic [30, 28]. This justifies the search for a more specific adoption model tailored towards specific information technologies. Researchers have also proposed integrating TAM and TOE together, as they might complement each other in their weaknesses [22]. However, limitations to this approach have also been identified [22].

Another way of looking at the adoption process of a technology is described by the five stages of technology adoption [31]. This approach does not focus on a single individual but rather considers the adoption among a population of individuals. In this group, five different categories of adopters are identified;

innovators, early adopters, early majority, late majority, and laggards [31]. The main differences between the people in the categories are the speed and proactiveness with which they embrace the innovation. Furthermore, the sizes of the categories differ, being, respectively, 2.5%, 13.5%, 34%, 34%, and 16% [31].

The first group of adopters, innovators, is likely willing to take risks and will be enthusiastic about an innovation. They might even be the initiators of the change. Although innovators are easily convinced to participate early and actively in the adoption process, they are likely a small percentage of the total group of people. The early adopters consist of people who like to have a better look at an innovation before jumping in, but still join the adoption process relatively early. The early majority consists of people who need proof of the usefulness and effectiveness of the novel technology. In that sense, they are data- and logic-driven in their decision to start using the innovation. Someone in the late majority is very similar to someone in the early majority, however, will be a bit more risk averse and cautious in their decisions. They will also look at other people and only start using the innovation if it has proved its worth to quite some people. The last group of adopters, the laggards, are skeptical and resistant to change. It takes a lot more to convince this last category to start using the innovation. The different groups provide a basis for explaining the (differences in) behavior of people with respect to innovations and allows for identifying strategies to convince the different categories of adopters to participate in the adoption process [31].

3.3. Employees' Fears & Doubts

IT automation is different from other IT systems that might need to be adopted within an organization. The automation and human perspective are important aspects to consider when researching the adoption of IT automation, as it helps address concerns and doubts that employees may have regarding IT automation [32, 33]. Additionally, it helps incorporate the social and ethical considerations associated with automation [34]. Research confirms that IT automation does indeed have an impact on humans in various ways [35].

Job insecurity and uncertainty remain subjective concepts, as they could be perceived differently by each individual [36]. However, job insecurity is one of the most extreme factors that fuel employees' fears and doubts. Especially for IT automation, a field which people associate with job replacement [32], this should be taken into account. In addition to having negative consequences for the organization, this uncertainty can negatively affect the mental health of the employee in question [36]. The current literature provides research on the phenomenon of job insecurity, but does not combine this with the adoption of IT automation specifically. However, framing IT automation as organizational change could provide meaningful insights, as employees might perceive the change towards automation as organizational change.

Aside from job insecurity, change processes can cause multiple reasons for uncertainty amongst employees. The goal, purpose, and implications of the change are often the main issues that give rise to uncertainty [37]. This includes uncertainty about the change in work activities and doubts about technology performance. Effective managerial communication is of paramount importance in trying to manage this uncertainty, as it can provide knowledge about the change and the motivations behind it [38]. Additional research indicates that these uncertainties influence the readiness of employees and therefore are a contributing factor to the effectiveness of the change process [39]. Therefore, effective managerial communication that influences employee uncertainty can be an important component in ensuring more effective change [39].

3.4. Managing Organizational Change

At first, it was not clear whether the literature on organizational change would be of use in the thesis research. Adopting IT automation is generally not considered organizational change, as it is merely a way to perform existing processes in a more efficient and effective way. However, as alluded to in the previous section, it could be possible that this is viewed differently by certain stakeholders in the adoption process. Management could view automation as only improving current processes and as no significant organizational change. However, employees could perceive the technology to be very impactful, as mentioned in Section 3.3. This leads to a paradox in which the adoption process can be approached differently based on the perceived nature of the change. Therefore, the literature in this field was researched to obtain knowledge about organizational change, its impact, and the way to manage it.

Organizational change refers to the process of modifying a significant part of the respective firm. This

includes several areas such as the structure, culture, or core processes of the organization [40]. As change is a natural and necessary process in firms, it is shocking that at least half of these change efforts fail [41]. These failures included not meeting the requirements or not delivering all the benefits that the change would yield.

Managing organizational change has been frequently researched over the years and has often led to guidelines on how to manage change processes [42, 43]. Proposed good practices to manage change include seeking involvement with employees and addressing concerns during the change process [44]. The measurement and evaluation of the actual effectiveness of the organizational change is not fully addressed in the literature [39]. A variable that influences the effectiveness of change is the readiness of employees, which can consist of resistance and support for the change [45]. Therefore, a manager can aim to increase readiness by means of managerial communication, resulting in a more effective change process [39].

Managerial trust by employees is a hallmark of effective firms [46]. In times of organizational change, trust has a more direct effect on employees but at the same time is often lower [47]. Trust is based on three core variables of an individual including ability, benevolence, integrity [48] of which the latter two are mainly of concern in a change process. Trust can directly influence or moderate other important variables in the change process, such as information sharing, cooperation, and commitment [47, 49]. In addition, managerial trust has an interesting relationship with managerial communication as they both influence each other. Providing accurate information and explaining motivations contribute to the trust that a manager enjoys [49]. This has some overlap with the previously discussed uncertainty of employees and how managers can help by providing information about the how and why of change processes. On the other hand, trust was found to have a significant positive effect on communication between managers and employees [50, 51]. Organizational change can be effectively managed on the basis of trust, when the levels of managerial trust are high [47]. However, when trust is low, managing by providing a very structured environment and detailed managerial communication will be more effective [47].

3.5. Communication & Commitment

Communication appears to play an important role in change (and adoption) processes by influencing factors, such as trust and managing employee uncertainty. Managerial communication within the organization context serves two goals; to inform employees and to create a community feeling [52]. The first goal relates to the management of uncertainty and change processes, such as informing employees about the impact of the change [39], while the latter applies more creating commitment within an organization [53].

When it comes to communication and commitment, horizontal communication (between employees) is a less significant contributor to the commitment of employees. However, vertical communication (manager and employee interaction) greatly influences commitment and is much appreciated by employees [53]. This commitment originates from the access to adequate and relevant information provided by the managerial communication [53]. These findings further support the idea that good management consists of communicating clearly and openly, especially in times of low trust and organizational change [47, 39].

Five important aspects have been identified with respect to managerial communication about organizational change: discrepancy, efficacy, appropriateness, principal support, and personal valence [54]. Discrepancy is about explaining why the organizational change is necessary and what the difference is between the current and desired situation [45]. Efficacy should convince individuals that the change is doable, which is further emphasized by principal support; communicating how this change process will be supported [54]. Appropriateness is needed, as employees might feel the need for change, but do not support the chosen alternative [45]. Personal valence is about the self-interest of the employees, as they could be affected by the change [54]. This is especially relevant for cases where individuals might feel threatened by the change [55]. Therefore, personal valence seems especially relevant for a change process that includes IT automation due to possible uncertainties.

Based on these five key aspects of managerial communication, three approaches have been formulated to achieve readiness for organizational change [56]. Of these strategies, the management of information strategy seems to best fit the adoption of IT automation, as there can be uncertainty and low trust. This strategy focuses on providing adequate information to all stakeholders in the change process [45] and supports the idea that managerial communication about information and motivations is crucial to successfully managing organizational change [47, 39].

3.6. Competing Values Framework & Communication

As mentioned, the Competing Values Framework (CVF) [57] does not have a direct relationship with the role of managerial communication in the IT automation adoption process. However, it does include some similar concepts and themes that have also been identified in other sections. Therefore, this section will dive into the CVF and especially its relationship with managerial communication.

The CVF tries to describe the culture of an organization using two different dimensions; flexibility-control and internal-external [57]. This approach creates four quadrants in which managers will have to take on different roles, as illustrated in Fig. 3.4. Additional research on the application of this framework on managerial communication has also led to the definition of a specific type of communication for each quadrant [58]. Extensions of this model can help managers formulate their messages appropriately and choose the correct communication channel [59].

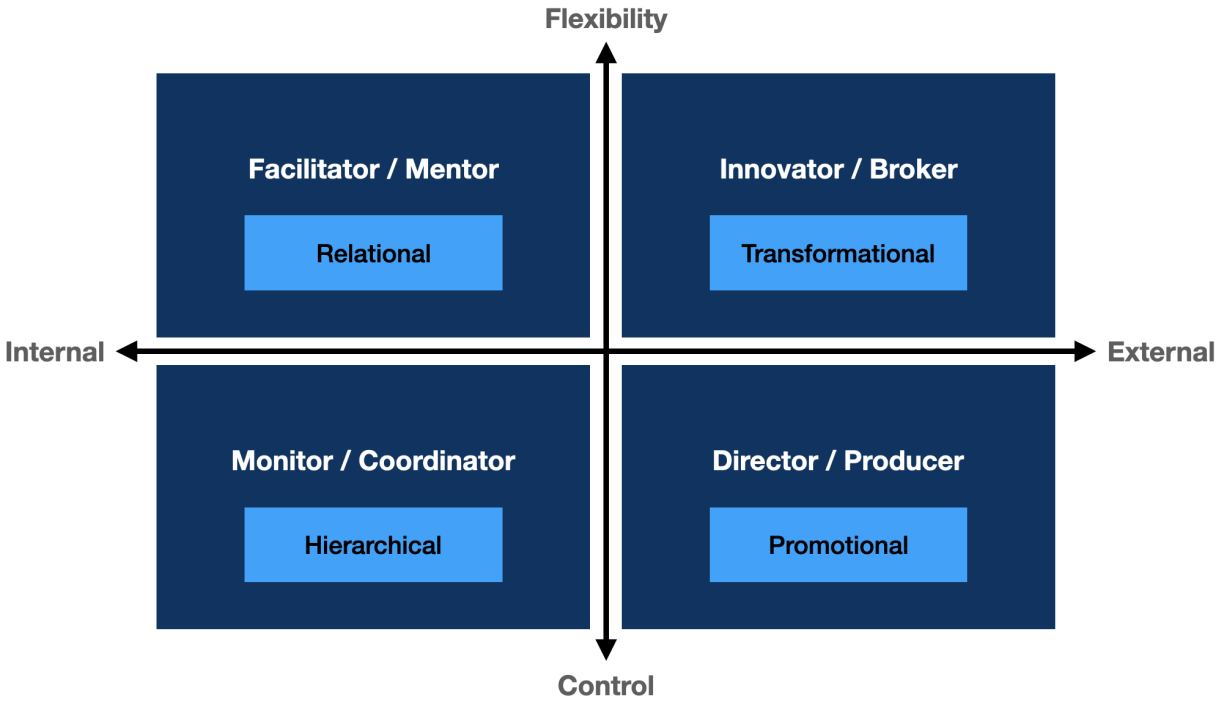

Figure 3.4: Competing Values Framework [57], including roles and communication types (light blue)

As for managerial communication about IT automation framed as organizational change, it becomes apparent that this communication spans two opposing quadrants; the transformational and hierarchical quadrants. The transformational quadrant is focused on change management, while, on the other hand, the hierarchical view focuses more on the improvement and quality of the process (which should be achieved by IT automation) [59]. This could be the cause of the inherent struggle when it comes to the role of managerial communication in the adoption of IT automation processes. However, the use of CVF should be carefully considered when it comes to managerial communication about adoption processes, as it does not always appear to be applicable.

3.7. Robotic Process Automation: *Literature Review for MOT2004*

This section presents a slightly altered version of the literature review done in the Preparation for Master Thesis (MOT2004) course. Although the thesis aims to create a generic managerial communication framework for a broader scope, this review presents the specific problems of the field of RPA, which are linked to the larger problem of adopting IT automation techniques. Furthermore, since the largest part of the research will focus on RPA (by conducting semi-structured interviews), it provides a clear understanding of the definitions, dynamics, and problems in this field.

3.7.1. Introduction

Nowadays, back offices of businesses in highly competitive industries are increasingly reliant on many Information Systems (IS) to handle processes for recruitment, administration, sales, or any other domain of tasks. Efficiency, effectiveness, and cost reduction of these processes are crucial to ensure survival in such a competitive landscape. Furthermore, execution of the business processes often spans multiple IS, such as Customer Relation Management (CRM), Human Resource Management (HRM), or even simple spreadsheets [60]. Many of these processes (partially) entail simple, repetitive interactions between these components done by an employee. For example, when a candidate registered in the Applicant Tracking System (ATS) is hired, the data likely needs to be transferred into the HRM system.

Tasks like these for back offices could be described as routine, repetitive, and structured. For employees, this can lead to the feeling that they have to perform repetitive and boring tasks which do not require advanced skills or different insight. Employees would rather focus on interesting, high-value tasks and their 'real' jobs. In addition, these tasks often also take up a lot of time and are prone to human errors thus a solution would be in the interest of the business as well.

Robotic Process Automation (RPA) is a software-based solution that can deliver a reduction in time, costs, and effort on these repetitive tasks [61]. RPA can achieve this by imitating a human operating on top of IS that are already in place. The virtual human is called a 'robot' or a 'bot', which can perform structured routine tasks. The robot operates on top of existing systems, which means that it is non-invasive [1] and does not interact with other layers of an application as a human would. RPA tools consist of a sequence of operations/conditions, written in some programming language. For example, RPA tools can automatically check an email inbox for incoming applications and put them into an ATS. Or, they could provide a solution for the repetitive task of putting incoming invoices into an administration application.

In summary, the possible applications for RPA are endless and can be tailored toward an industry sector or even a particular business. RPA is a solution that can be deployed to handle structured, logical tasks that would otherwise require manual, repetitive labor by human employees. It is aimed at reducing costs, reducing errors, and improving efficiency. Some research finds that one robot can reduce time spent on these tasks by 90% [62], while one robot only costs between one-third and one-fifth of one full-time employee [63].

IS are present in almost every business nowadays. Businesses are increasingly reliant on them due to the benefits that they provide in efficiency and effectiveness in supporting (core) business processes. One could argue that they are necessary for a business to survive. Although it is unimaginable that a business would not use some kind of information system, it remains necessary to evaluate these systems as they can entail big investments and some amount of risk. Furthermore, adopting a new information system within a business is not a straightforward procedure. Evaluation of these IS is therefore crucial to monitor the performance and analyze the realized benefits during all phases of the life cycle of an information system [64].

Evaluation methodologies for IS have been around for some time [64, 65, 66]. They have evolved as software systems can get increasingly complex and the decision-making regarding them has become more difficult [67, 68]. It can be hard to evaluate the effectiveness and benefits of using IS as this should include more than only simple metrics such as Return On Investment (ROI) and cost reduction. Benefits do not only manifest themselves in financial numbers and measuring the performance of an information system is more than the number of times it went down.

RPA and the evaluation of IS are concepts that could and should be linked to each other. RPA interacts with IS but is also an information system itself as IS are socio-technical by nature. Furthermore, RPA aims to deliver certain benefits, which can not be evaluated simply due to the complexity of IS. Evaluation needs to take several levels of evaluation into account, especially for RPA as the software interacts with and could replace human employees.

This review will review the relevant literature regarding the two introduced topics; Robotic Process Automation (RPA) and the evaluation of IS. In the following section, the search process and description will be described. Then, the findings from the research process will be presented. From these two sections, it will become clear that there is a lack of research on the evaluation of RPA and why the literature on the evaluation of IS was included. Finally, conclusions will be drawn from the findings and a knowledge gap will be identified which could serve as a research topic for a coming thesis.

3.7.2. Search Description and Selection Criteria

The topics of this literature review were sparked by personal interests and work experience at a software company that provides some RPA solutions (albeit very primitive) for mainly recruitment companies. Initially, I started looking at scientific papers about RPA in general, using keywords such as *robotic process automation* and *rpa*. Although terms and synonyms like *(ro)bot*, *intelligent process automation*, *service automation*, and *virtual workforce* are used in RPA literature, these terms would yield results that are not related to RPA. Furthermore, papers on RPA do not omit the term Robotic Process Automation. For this initial stage of literature research, I mainly used Google Scholar. I quickly realized this was way too broad as there are many papers on the use and adoption of RPA in specific domains. Furthermore, there are a lot of case studies that are not easily integrated as they span different domains.

Then, I tried focusing on the disadvantages and advantages of RPA by adding the keywords *disadvantages*, *advantages*, or *benefits* to my initial queries. Although there are quite some papers on the advantages and benefits obtained by using RPA in case studies, the disadvantages/negative implications are often not explicitly mentioned, except for one paper which I found [62]. As RPA is a relatively new emerging technology, the literature on this topic is mainly about the adoption and benefits of RPA. During this phase, I extended my search to Scopus.

Talks with a TU Delft professor helped me to shift my focus to the evaluation of RPA, as it can not be simply evaluated and operates closely to humans which makes evaluation more interesting. This also connected to my findings that literature on the disadvantages of RPA was lacking.

At this point my search description and direction were quite clear; I needed to dive into the main literature on RPA, discussing the core concepts of RPA and the motivation to use RPA. This literature would be used to understand and describe RPA and its usefulness and properties. I selected papers based on the number of times it was cited and whether they were used in case studies about the adoption of RPA. I used snowballing on the main papers regarding RPA, which I found in my initial research, to find more literature and evidence on the core concepts and claims of RPA. Many papers also focus on the technical aspects and progression (e.g. machine learning techniques) made in the field of RPA. I chose to omit these papers as they focus more on the technical details of RPA, which are not relevant for viewing this technology from a management and evaluation perspective. In that sense, I view RPA in this literature research as a technological advancement but do not focus on the computer science details of the inner workings/improvements of RPA.

Although some generalizable case studies could be used for this literature review to provide useful insights regarding RPA and lessons learned, I did not want to include too many as they quickly broaden the scope of the literature review. I decided to include some that were used for the basis of one of the earliest papers on RPA [1]. These case studies formulated the core concepts of RPA and showed the benefits in practice. Although they were for specific companies in different domains, the 'lessons learned' listed were generalizable. Furthermore, I included one paper that summarized ten case studies. This would allow me to still have a broad overview of the lessons learned and use cases in other domains (lessons that were overlooked in the other two papers) but doable within the scope and resources of this literature review.

As I wanted to focus on the evaluation of RPA within a business context I needed to also find literature on the evaluation of such IS. RPA itself is also an information system as it is inherently socio-technical. As research on the evaluation of RPA lacked, I included several older and newer papers about the evaluation of IS in general. Most of those were proposed by the professor who is an active researcher in this field and some were found using snowballing references. Using Google Scholar and Scopus at this stage, I found the same articles as they remain relevant and their value is confirmed by the number of citations using these papers. Searching for literature on the evaluation of RPA did not yield good results (using keywords such as *robotic process automation evaluation*) regarding the real evaluation on different levels for RPA. However, I did find some papers related to the evaluation of processes that are suitable to be automated by RPA. These papers I included as well as they cover more on the general concepts and purpose of RPA.

Although incomplete, due to the limited time, space, and resources of this literature review I chose to mostly stick with the papers that an expert in the field recommended on the evaluation of IS. The papers that are in this review are selected based on containing relevant concepts that can be applied to RPA and serve only as a start of the evaluation of RPA. Of course, the paper selection could be biased as it is based on an expert view. This should be researched more thoroughly for thesis research.

Search Objective	Keywords	Method(s)	Articles	Comments
Initial general research on RPA	*robotic process automation* or *rpa*	Google Scholar	[69, 61]	Too broad without a clear focus. There were a lot of results, and many case studies.
Focusing on advantages and disadvantages of RPA	(*robotic process automation* or *rpa*) and (*disadvantages* or *advantages* or *benefits*)	Google Scholar, Scopus	[70]	Few results, mostly just focusing on benefits of adaption of RPA. A lot of overlap with first search step.
Switching to core concepts, purpose, use of RPA	*robotic process automation* or *rpa*	Scopus, snowballing from first step	[60, 62, 71, 72, 73, 74, 1]	Still broad, but with a clear focus in mind some papers were really useful.
Finding use cases, adaption, lessons learned of RPA	(*robotic process automation* or *rpa*) and (*case study* or *lessons learned* or *adaption*)	Scopus, snowballing from first & third step	[2, 75, 3]	A lot of results, only selected two specific case studies with generalizable lessons and a paper summarizing 10 case studies.
Research on evaluation of IS	(*evaluation framework* or *evaluating* or *evaluation*) and (*information system* or *IT system*)	Scopus, recommendations from expert	[76, 67, 68, 64, 65, 66]	These papers span IS evaluation as a whole, but the relevant core concepts can be linked to RPA. By no means complete, may be some bias due to the expert view to choose these papers.
Research on evaluation specifically for RPA	(*robotic process automation* or *rpa*) and (*evaluation* or *evaluation framework* or *evaluating*)	Scopus	[77, 78, 79]	Found papers I was not specifically looking for as there is little on evaluating RPA systems. I included some papers as they touch upon a core concept of RPA; selecting processes fit for RPA.

Table 3.1: Search description, criteria, and selection process.

In Table 3.1 the search process has been described and the different search steps are structured. I divided the steps to roughly correspond with the steps described above. At each step, I have listed the methods used to find literature, the articles used that were found at this step, and additional comments on this step. However, it is a simplification of the entire search process as it omits some dead ends and details.

3.7.3. Findings

Now the concepts this literature review is focused on are introduced and the search description, criteria, and process have been discussed, this section will present the findings of this research. First, the core concepts of RPA will be discussed including its purpose, benefits, and use cases. Lessons learned and use cases of RPA will be described concerning the analyzed case studies. After that, literature on the evaluation of IS will be discussed and relevant concepts connected to RPA.

Robotic Process Automation

To remain competitive, businesses have to optimize their processes. These processes should be efficient, effective, fault-tolerant, and reliable [62]. Aguirre and Rodriquez state that employees spend substantial time handling operations like copying, pasting, and merging data between or within IS [60]. Lacity et al. have identified several transformation levers that can be used to optimize the performance of such back-office processes, including the newer addition of the automation lever [1]. Automation and redesigning of these processes through information technology offers a solution to routine tasks. However, Syed et al. report that automation is not easy as many companies find themselves stuck with (legacy) systems that can not easily be accessed or customized [74]. Automation can be extremely expensive as new applications have to be developed and existing systems should likely be altered.

Robotic Process Automation aims to provide a software-based solution to reduce the burden of these manual, repetitive tasks on workers [61]. It does this by deploying 'robots' or 'bots' that perform these tasks previously done by employees. In RPA, one software license equals one robot, which can be run in the cloud or a local server [1]. This means that it is not a tangible, physical robot co-worker, but rather a virtual employee. Furthermore, compared to human employees robots do not take holidays and can be run 24/7 [62]. RPA uses simple logic and rules to operate on graphical interfaces which would otherwise be used by the human employee [69]. Van Der Aalst et al. further stress that it concerns an 'outside-in' automation perspective [61]. This perspective is different from the traditional view of automation which focuses on 'inside-out', where the IS used in the processes are changed. RPA does not change IS it interacts with in any way, as it uses only the presentation layer of these applications. This is further discussed by Lacity et al. stating that RPA software is non-invasive. The authors mean that, compared to regular software, RPA does not interact in new ways with existing systems [1]. Therefore, using RPA entails teaching a 'robot' to follow a set of structured and predefined logical rules [62].

Lacity et al. acknowledge that classical Business Process Management (BPM) and RPA are closely related [2, 1]. However, they show certain key differences between the approaches such as the previously mentioned difference that RPA does not require a new application as it accesses the presentation layer instead of the business layer of the systems it interacts with. Furthermore, they show that software developers are not needed to orchestrate and teach RPA robots. Other papers also confirm this as RPA can be configured easily with a graphical user interface (GUI) [60, 70, 73]. Furthermore, both Lacity et al. and Ivančić et al. recommend based on findings, case studies, and interviews that BPM and RPA can be used side by side to enhance each other [69, 1]. When used in the right combination RPA and BPM can be used to achieve the strategic goals of the business [1]. Furthermore, Ivančić et al. state that RPA can be used as an inexpensive substitution for BPM when there is a lack of resources [69].

Benefits of RPA Cost reduction within businesses is one of the core benefits of RPA according to most authors [60, 62, 69, 61, 1]. Only Ansari et al. argue that the implementation of RPA can be (too) expensive for a business that deals with a limited budget [70], which is a somewhat weak argument as it focuses on short-term costs and benefits. However, they acknowledge that RPA is inexpensive for high-level businesses. If RPA is configured correctly, it should be able to perform these repetitive tasks faster, cheaper, and even better than a human employee would [1]. Regarding cost reduction studies show that RPA can reduce the time spent on a task up to 90% [62] and that one robot only costs between one-third and one-fifth of a full-time employee (FTE) [63]. Anagnoste even reports cost savings compared to an FTE of between 75% and 90% [62]. Furthermore, the author states that the reduced costs are likely even bigger as one robot can replace up to three FTEs and can run 24/7. RPA software is also inexpensive compared to other software solutions that can take years of implementation. Various authors report on the fact that RPA can be implemented with lean and agile methodology [62, 74, 1] and a fully functioning RPA robot can be implemented in four to six weeks [62]. This makes RPA a relatively cheap investment and, concerning the achieved cost reduction, a quick method to achieve a relatively high Return on Investment (RoI) [61].

Other benefits of RPA as reported in the literature are a boost in productivity and speed in which processes are handled [62]. Furthermore, RPA can reduce errors, make the process more reliable, improve customer satisfaction, and increase process accuracy [60, 61, 1]. These benefits have been validated in practice by several case studies and interviews [2, 75, 3]. Syed et al. offer a more nuanced view on these benefits as they acknowledge that RPA can provide tremendous benefits, but they can not be taken for granted and depend on many factors within the business [74].

Task selection for RPA Many authors indicate that not all business processes are suitable for automation by RPA [60, 72, 75, 74, 1]. Lacity et al. argue that RPA is especially suitable for so-called 'swivel-chair' processes [1]. These are processes in which the human employee has to take a set of inputs from one system, perform a set of rule-based operations on these inputs, and then transfer them to another system. Fung further elaborates by stating that the process should not require subjective judgment or interpretation, should occur frequently, and should require few exception handlers [72]. Furthermore, when the task is prone to human error, automation gives additional value as it reduces errors [72]. Syed et al. stress that business processes should be mature, well-documented, standardized, and highly manual/repetitive [74]. This confirms the initial criteria posed by Lacity et al. in their case studies on the adoption of RPA, where

they find that processes should first be standardized and thoroughly understood in order to be fit for RPA [2, 1, 3]. Beetz and Riedl developed a multi-criteria framework to select and prioritize business processes that could be automated by RPA, but this approach seems to lack generalizability to other domains [77]. Wellmann et al. argue that processes can be selected for RPA based on criteria from several perspectives including task (maturity and standardization), time (frequency and duration of processes), data (degree of structure, multiple IS), system (stability and interfaces), and human perspective (prone to errors and resources) [79]. Leopold and Reijers acknowledge the usefulness of selection frameworks but argue that they are not feasible in big businesses where there is a multitude of processes [78]. Therefore, they apply machine learning techniques to retrieve candidate processes based on textual descriptions to save time identifying candidates.

Disadvantages of RPA Diving into the benefits and advantages of RPA yielded many results and some of the advantages have already been discussed about the usefulness of RPA. However, from the analyzed papers only Ansari et al. mention some of the disadvantages of RPA. One of the disadvantages is the need for the technical ability for using RPA [70]. The authors do not elaborate on this, but this differs from the findings of other research. However, likely Ansari et al. mean the technical capabilities to work with a semi-technical GUI, which is not a task every employee can perform. Aguirre et al. and Lacity et al. argue that no technical knowledge about the implementation or scheduling of RPA robots is required when operating on the GUI [60, 1]. Hofmann et al. agree that the employee does not need to have any knowledge of programming language but should have a basic understanding of the IS used [73]. Furthermore, Ansari et al. argue that RPA might be disruptive if the adoption is not handled correctly and might cause employees to feel redundant [70]. However, some papers did also already elude to the notion of employees feeling replaced and not comfortable with 'robots' as virtual co-workers [62, 1]. Anagnoste identified this challenge and stated that jobs would likely not be let go, but instead moved to high-value, more cognitive tasks [62]. Although this claim was backed up with some evidence that businesses are likely willing to expand, this assumption seems to be a bit naive and lacks evidence. Lacity et al. stress that it is an option that businesses could move employees to more intelligent, high-value tasks [2]. Furthermore, they mention that internal communication about RPA (purpose and capabilities) is of paramount importance for the expectations and perceptions of RPA by employees [3].

Ivančić et al. mention that maintenance of RPA can be costly as it interacts with the presentation layer of applications, which can be unstable and dynamic [69]. Hofmann et al. briefly mention that although RPA might deliver benefits, it might make governance structures more complex and challenging [73]. However, there is little research on these aspects of RPA which is troubling as it has a huge impact on long-term benefit realization. Promised benefits could be too optimistic without consideration of these costs and impacts.

Case studies & lessons learned Lots of case studies have been conducted on the adaption of RPA. Ansari et al. find that the main domains where RPA is currently applied are banking, health, education, and telecommunication [70]. Syed et al. argue that RPA could be used in any business that cares about improving the efficiency, and effectiveness of business processes and state that it is likely to emerge further in industries that always have been quick adaptors of new technologies [74].

Many authors report on the lessons learned within these case studies [2, 75, 1, 3]. Osman argues that processes should be constantly monitored to see whether they are fit for automation [75]. Lacity et al. find that an innovative culture accelerates the adoption of RPA [3]. Furthermore, they argue that RPA should comply with governance and architecture structures already existent in the business, as this could otherwise pose new risks and scare customers. Sourcing alternatives pose a challenge for firms choosing where to develop RPA solutions [73, 2]. Another major hurdle is the misconceptions on RPA [1]. Employees should be informed how RPA works and that it is not a replacement for BPM or enterprise IT [2]. Furthermore, they should know what RPA can and can not do to know what to expect from RPA. Multi-skilling robots can be used to further reduce costs and prevent wasted time [3].

Evaluation & challenges of RPA Although RPA promises massive benefits in terms of cost reduction, efficiency, and effectiveness [71], it can not be taken for granted that all benefits will be realized within a business [73, 74]. RPA implementation is not a straightforward process without challenges. Lacity et al. stress that processes should be standardized before RPA is applied to reap maximal benefits [2]. They

argue that RPA needs piloting and a champion [3]. However, a clear systematic evaluation methodology is lacking and the future impact of robots on the (perceptions of) employees is not considered [73].

In the future, the field of RPA is expected to grow substantially [80]. Various authors find it likely that technologies like Artificial Intelligence and Machine Learning will be applied to RPA to further improve the performance and scope of tasks that RPA can handle [70, 61]. Furthermore, the focus will shift to the analytics that can be obtained from RPA [62]. The main challenges for the future lie in the governance, risk management, and ethical aspects according to Van Der Aalst [61]. According to Syed et al., other main challenges are the evaluation of realized benefits and finding techniques for proactive monitoring and control [74]. Hofmann et al. also stress this as the focus should not only be on the short-term benefits but also on the long-term effects [73]. Furthermore, they state that there is a lack of theoretical understanding and analysis of RPA. Lacity et al. report that businesses should not focus on 'quick wins' but should build a scalable foundation for the future when implementing RPA [1]. However, how this can be achieved remains vague and no concrete evaluation or advice is given in this regard. There is a clear knowledge gap in the evaluation of RPA, which should take several aspects into account such as the human interactions, redundancy of human employees, performance, and scalability. Therefore, we turn to research on the evaluation of IS in general.

Evaluation of IS

IS are used in many businesses nowadays. However, simply using them because competitors also use them or for their promised benefits is not sufficient. IS should be evaluated to check if benefits have been realized and to assess performance at different levels [64]. Symons states that IS are difficult to evaluate as there is no clear understanding of what should be evaluated and how evaluation should be performed [65]. Traditional evaluation is often merely focused on cost and benefit analyses [76]. However, Symons states this is too narrow as focuses only on short-term (financial) criteria. Therefore, he proposes the CCP evaluation framework which focuses on the interactions of the three elements of content (what?), context (why?, who?), and process (how?, when?) [65]. Smithson and Hirschheim build upon this in their evaluation framework which consists of several zones to cover all relevant aspects of IS evaluation [64]. The different zones are efficiency (e.g. software metrics), effectiveness (e.g. cost-benefit analysis), and understanding zone. These first two zones relate to the basic metrics that could be used for the evaluation of RPA as they cover the main goals and benefits of RPA. The understanding zone touches upon subjective and political perspectives related to IS evaluation where the CCP framework can be used as an evaluation tool [64]. This zone could relate to the employee evaluation perspective on RPA concerning satisfaction, understanding, and expectations.

Ward et al. show that businesses feel the need for evaluation of IS, but often have insufficient methods in place to evaluate the realized benefits of IS [66]. Furthermore, they stress that is important to perform evaluation methods during the entire life cycle of an IS to ensure benefits are maximally realized. McNaughton et al. review several evaluation approaches and propose a novel evaluation framework for IT service management [68]. They distinguish four perspectives for evaluation: management, technology, IT users, and IT employees perspective. These perspectives closely relate to concepts from RPA as the management perspective focuses on the business goals of IS, with examples being cost reduction and improved customer satisfaction. The IT users' perspective is also highly relevant as it touches on the interactions of employees with IS and focuses on expectations and perceptions, which was recognized as an important consideration of RPA [62, 2, 1, 3].

Love et al. stress that evaluation should be used to validate promised benefits of IS, especially when they seem too good to be true [67]. They argue that critical thinking should be applied to understand what the new technology would entail, where the value would be created for the business, and what the prerequisites of the technology are. This also entails recognizing the contextual fit between technology and business [67], which relates to the context element of the CCP framework [65]. These concepts apply to RPA as the business processes, governance structures, and infrastructures have to be fit for RPA [77, 72, 74, 79] to realize the promised benefits. The findings from Love et al. confirm the arguments of other evaluation research that IS should be constantly monitored on different levels to realize benefits [67].

3.7.4. Conclusions

Business processes often interact with several IS. To survive in competitive markets businesses have to optimize their processes to be efficient, effective, and reliable. Employees spend substantial time

on processes that have simple, structured interactions with different IS [62]. A possible approach is to automate processes employing software technology which reduces costs and errors. RPA is a set of tools that are based on so-called 'robots' that can imitate human interactions to perform manual, repetitive tasks. Research shows that RPA can deliver huge benefits in terms of cost reduction, speedup, and reliability [62, 2, 3, 63]. It is non-invasive as it does not interact differently with applications as a human would and is easy to configure without requiring technical detail knowledge [1, 60]. There has been quite some research into the selection criteria for tasks that can be automated by RPA [79, 74, 77, 78]. The main findings are that tasks should be high volume, repetitive, manual, standardized, well-documented, and span multiple IS to be suitable for RPA. Although one research pointed out that the development of RPA might be too expensive for businesses with a limited budget [70], researchers agree on the main benefits of RPA, which include cost & error reduction, increased customer satisfaction, cheap development, and reliability [61, 60, 62, 1, 69].

There is a lack of research on the disadvantages of RPA, especially concerning the replacement and interactions with human employees. Although some authors mention the fear of replacement of employees [70, 1, 62], they do not provide sufficient evidence for their claims that employees will be moved to intelligent, high-value tasks. These and other disadvantages are not researched properly regarding RPA and should be included in the evaluation criteria. Lacity et al. do recognize that internal communication to employees is crucial and RPA should not be viewed as a black box [3]. This is confirmed by other case studies [2, 75] that also emphasize that processes have to be mature and constantly monitored to obtain good results by using RPA.

The main challenges for RPA in the future are the governance, risk management, and ethical considerations [61]. Furthermore, multiple authors recognize the necessity of evaluation of RPA beyond simple metrics and short-term benefits [73, 74]. Current evaluation criteria are almost non-existent and do certainly not address the concerns of the human-labor perspective (employees might feel redundant and replaced) and the future impact of RPA on governance and employees. This is a too narrow view on the evaluation of IS as recognized in a broader context by Symons [65]. The CCP framework is used to view evaluation at different levels (content, context, and process) and the relations between those elements. Smithson and Hirschheim incorporate this framework in their broader framework which also contains efficiency and effectiveness evaluation zones [64]. These zones are also necessary for RPA evaluation as they contain the basic performance at an objective level of RPA concerning the strategic business goals. The perspectives (management, technology, IT user, IT employee) from the framework proposed by Ward et al. [66] are also applicable to RPA as this technology has many interactions with human employees in orchestration and replacement. This could be an initial approach to take the human employee - robot relation into account. Lastly, Love et al. stress that promised benefits of new IS should be critically reviewed and evaluated [67]. RPA research focuses mainly on achieved benefits and adoption but lacks focus on a general evaluation for realized benefits and other impacts of RPA.

In conclusion, this literature review has discussed two important concepts in the field of automation: RPA and evaluation of IS. Literature on RPA seems to primarily focus on the benefits, use cases, and adoption of RPA. This research lacks a critical view on the disadvantages and evaluation of RPA, especially concerning ethical considerations like responsibility and a human-labor perspective on the possible replacement of jobs. Systematic evaluation of the promised benefits and hidden costs of RPA is lacking, which is crucial to understanding and assessing the long-term effects and sustainability of RPA. Concepts of evaluation frameworks of IS could be taken as an initial start to building an evaluation framework tailored towards RPA.

3.8. Managerial Communication Framework

This section will discuss the managerial communication framework that is the desired design artifact of the research to be conducted in the master's thesis. It will outline the goals and requirements that this framework should meet in an ideal scenario. This outline serves as a draft to keep in mind when creating the actual artifact. The first section will show what the framework would look like and what would be needed to build it. Then, the main objectives that the framework should meet will be discussed. Finally, as a design artifact always needs a way of evaluation, several methods and ideas will be discussed to achieve this.

3.8.1. Artifact

As discussed in the sections in Chapter 2 that discuss the Design Science Research Methodology, research should be able to produce an artifact as the deliverable to provide contributions to both the knowledge base and the environment [7, 8]. This section will briefly discuss what such an artifact will look like for this thesis research.

First, as mentioned in Subsection 2.5.3, an artifact in IS research can be a construct, model, method, or implementation of some sort [10]. As the artifact desired for this research is a framework, it does not strictly fall into one of the four categories. However, it is rather a combination of categories, more specifically, of a set of constructs, models, and methods. Constructs combined into a model would be the foundation for the managerial communication framework by defining and explaining the underlying variables in the IT automation adoption process. It would also describe the relations between these variables and how they affect the adoption process. The input for the constructs of the model and the relations between them would come from two sources. First, the literature review conducted in this chapter serves as the basis for relevant concepts. This part corresponds to the knowledge base of the pillars of Design Science Research [7]. In addition, the deduction of constructs from experiments conducted to collect data from the environment ensures that the constructs are relevant and applicable to the context of the research.

Using the built model of the role of managerial communication in the effectiveness of the IT automation adoption process, certain guidelines and good practices can be defined to provide concrete advice to organizations that will have to go through such an adoption process. These lessons and guidelines can be seen as method artifacts in the framework. Together, with the constructs and models, they create a managerial communication framework that can be used in the adoption process of IT automation. An abstract view of the envisioned structure of the final managerial communication artifact is depicted in Fig. 3.5.

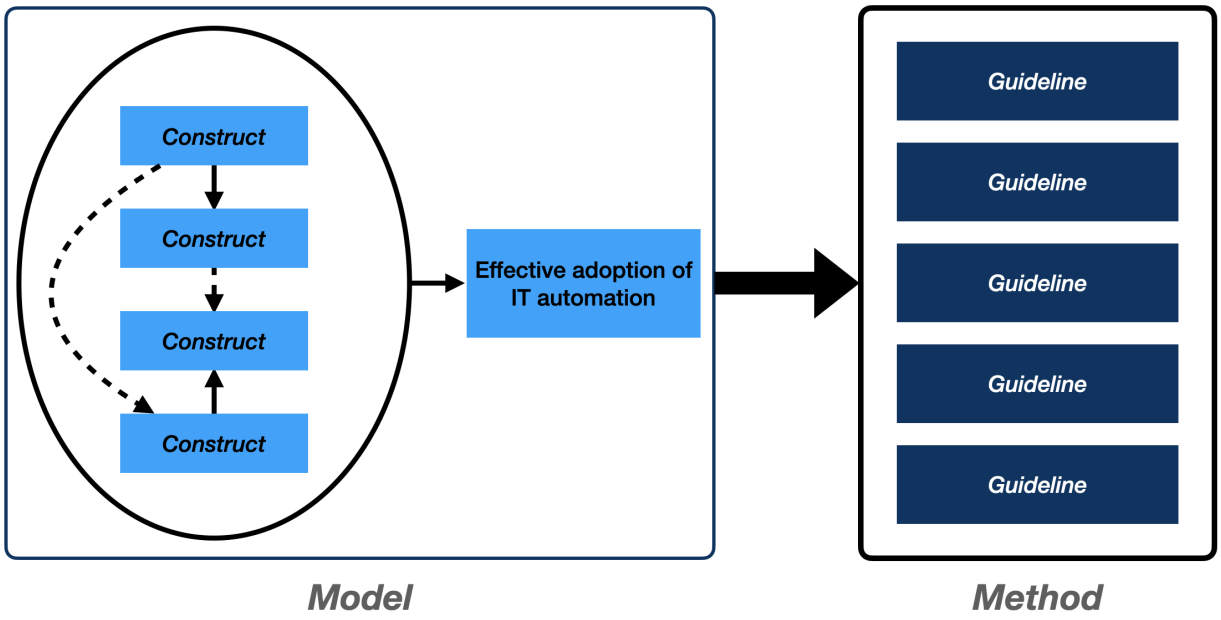

Figure 3.5: Abstract view of the final artifact: a managerial communication framework for IT automation adoption

The main user of this framework will be the management level in a company that wants to adopt IT automation technology. By using the framework, they will have a better chance of successfully and effectively adopting the technology, as they understand the important factors in the process and how to act on them using effective managerial communication. Additionally, they can justify their processes to employees by using the logical framework on which to base their decisions.

3.8.2. Objectives

As the solution artifact is designed using the methodology defined for Design Science Research [7], it should be created with certain objectives in mind. These objectives are found by investigating both the environment and the knowledge base. The business needs of the environment define certain requirements which a solution would need to meet. On the other hand, the knowledge base defines requirements for how the artifact should be shaped and structured. The objectives listed in this section serve as a blueprint to which the final managerial communication framework should adhere. First, the main goals that the managerial communication framework will have to accomplish are the following:

- 01 **Define variables of adoption process:** First of all, the artifact should be able to identify and define the variables at play in the adoption process. This includes the relevant concepts from both the managers' and the employee's view. This goal has mostly to do with creating constructs.
- 02 **Explain relations of variables:** The framework should also be able to connect the identified variables with each other and provide an explanation for the relations between them. Understanding the underlying dynamics of the adoption will be crucial to be able to contribute to both the environment and the knowledge base in later steps. This goal relates to creating models for the final artifact.
- 03 **Provide guidance to the manager:** The framework should provide clear guidance to the manager on how to communicate with his employees during the IT automation adoption process. A structured method of managerial communication will allow him to make sure that employees feel heard, and problems can be identified more easily in the adoption process.
- 04 **Impact of technology:** The managerial communication framework creates a way to explain the impact of automation technology to both management and employees. As the nature of the novel technology can be experienced differently by employees and management, the managerial communication framework will ensure that there will be a common ground of understanding.

In addition, some more general objectives have been described. The managerial communication framework that will be designed in this research should meet the following requirements:

- 05 **Not specific to RPA/recruitment industry:** As the thesis research will focus on RPA in the recruitment industry, a common flaw would be to tailor the framework to these specifications. However, the managerial communication framework should serve as a tool for IT automation in general in various domains. Therefore, this research also needs to take this into account by making sure that the models and methods are generalizable.
- 06 **Ease of use:** The managerial communication framework should be easy to use for managers who want to know who they should communicate with their employees during the IT adoption automation process. Creating complex methods would obstruct the use of the framework.
- 07 **Flexibility:** The framework should be flexible to be applied to specific situations. As each organization has its own specific context, this should be accounted for in the managerial communication framework. For example, guidelines should not be too strict or situational to allow use in different environments.
- 08 **Transparent:** As employees will be affected by the framework, it should be transparent. The guidelines that will be created should be explainable by the underlying designed constructs and models. This will also ensure the integrity and rigor of the research. This is directly related to the ethical considerations discussed in Section 2.8 and the core value of transparency that was selected.
- 09 **Evaluation:** While designing the managerial communication framework, evaluation should be incorporated into the final artifact. Evaluation is necessary to validate the usefulness and justify the existence of the framework. This objective will be discussed in more detail in the next section.

3.8.3. Evaluation

As mentioned in Chapter 2, evaluation is of paramount importance in the Design Science Research Methodology. It is the core of one of the two phases of the IS research pillar; the *justify/evaluate* phase [7]. However, given the scope and time constraints of this thesis, it cannot be fully incorporated into the research. Therefore, the evaluation will probably cover a smaller part of the research, which will be reflected in the final managerial communication framework. After designing the framework, a subset of the interviewees could be asked for another interview where the artifact will be demonstrated. This subset of managers in the recruitment industry could be considered experts and asked to give their opinion on

how the framework turned out and how it performs using questions related to the objectives defined in Subsection 3.8.2. Quantitative evaluation is, as mentioned previously, an important goal for framework evaluation. Although interviews are generally a qualitative evaluation method, the questions asked in these interviews could be tailored towards a category of responses, which makes it possible to somewhat quantitatively evaluate the framework. This will be discussed in more detail in Chapter 6.

4

Interview Investigation & Analysis

This chapter will describe the (process of) conducting research experiments to collect data related to the research questions of this thesis. The main purpose of data collection is to gain insights on which the framework can be built. The conduct of these experiments is mainly related to finding answers to Research Question 2, 3 & 4.

As discussed in Section 2.7, semi-structured interviews with employees and managers in the recruitment industry will be used as the main data collection method. Therefore, in the first section of this chapter, the interview guide used for these interviews will be discussed. Then the way interviewees were selected and contacted will be briefly explained. Furthermore, the methodology for collecting, processing and performing an analysis of raw interview data will be highlighted. Finally, this analysis will be performed and the method used to translate the results into constructs and relations of the model designed in Chapter 5 will be explained.

4.1. Interview Guide

The purpose and requirements of the interview guide for semi-structured interviews have been discussed in Section 2.7. Building on these requirements, this section will establish the interview guide that will be used in interviews with managers and employees of various companies operating in the recruitment industry and that have started using RPA. The slightly altered steps to create an interview guide presented in Section 2.7 and originating from [16] will be used to develop the interview guide.

4.1.1. Identification & Retrieving Prior Knowledge

The first step consists of investigating the research topics and the knowledge required to have a meaningful conversation with the interviewee and to be able to gain insight from the interviews. Furthermore, it should validate the necessity and appropriateness of the semi-structured interview strategy [16].

A first attempt to gain knowledge about the research topic was made by conducting some preliminary informal interviews with several employees to validate the assumed problem. Furthermore, the main effort to complete this step is to perform a literature review on the problem area described in Chapter 3. This provided sufficient knowledge to know what themes and topics are relevant when talking about managerial communication during the process of adoption of IT automation. Furthermore, the literature review revealed that the research topics and questions deal with human perceptions and opinions, and thus the semi-structured interview method is appropriate [13].

4.1.2. Creating Preliminary Interview Guide

The next step involves creating a preliminary interview guide that can be used to conduct several pilot interviews to test and improve the interview guide. Often certain insights and improvements are only found after testing the guide in real scenarios. Therefore, the preliminary guide will include findings and knowledge retrieved from the previous step. It consists of around five or six main questions to direct the interview towards the research topic, and includes several follow-up questions to allow for a dynamic and unique interview [13, 16, 18]. Furthermore, verbal and nonverbal probing can be used to collect more data from the interviewee [81].

In addition to the mentioned requirements, the created interview guide includes a question to get to know more about the role and work activities of the interviewee in the organization, and a question to provide space for the interviewee to comment on something which was not discussed yet. As interviews are conducted with both managers and employees, the main body of the interview guide differs for both.

Table 4.1 shows the preliminary interview guide that was created. There are seven main questions about the research topics, apart from the introduction and closing questions. Question 3 to 7 are slightly different for the two categories of interviewees; managers and employers, and are aimed at being counter parts of each other. Having these side-by-side will allow one to ask about the same topics in the IT automation adoption process, but from a different perspective. Furthermore, where applicable, the interview questions have been annotated with the research questions of Section 2.3 to which they correspond. This also shows that the interview covers the different topics of interest.

4.1.3. Testing Preliminary Interview Guide

To evaluate the usefulness and suitability of the preliminary interview guide created, both methods mentioned by [16], *expert testing* and *field testing*, have been used to some extent.

First, for the *expert testing*, the interview guide was shown to the chair supervisor of the master's thesis to check if the interview guide was set up in a generally good way. In general, feedback caused two changes in the interview guide. The first change was to merge the different interview guides for managers and employees together into one overview with a separation from Question 3 up to Question 7 as seen in Table 4.1. This feedback was incorporated before the first *field testing* interviews. The other point of feedback concerned the open questions at the end of the interview guide which focused solely on RPA as an automation technology but could be extended to asking about RPA *and similar automation technologies*. This allows the interviews to gather more information on the adoption of IT automation in general, which will be useful in creating the generic framework.

In addition, *field testing* was used as the main means to test the preliminary interview guide. This consisted of conducting three interviews to find out whether the questions followed each other logically and if they provided enough structure, on the one hand, while also providing enough flexibility for each interviewee, on the other. Furthermore, the duration of the interview was estimated at 30 minutes, to be able to validate and adjust the guide if necessary. Another point of interest was to check whether the questions were clear enough and interpreted correctly by the interviewees. The interviewees were also made aware that the interview guide was still under review and that they could provide feedback if they wanted.

The three interviews that were conducted to test the preliminary interview guide proved extremely useful. The structure and order of the questions turned out to be logical as the conversations flowed naturally. The interviewees understood the general context and 'story line' of the interview and thought this captured well by the main questions. However, Question 5 (in Table 4.1) was always discussed to some extent in the conversation derived from Question 4. Furthermore, according to the interviewees, Question 3 and Question 6, seemed to overlap and clarification was always needed to explain the difference between them. Often, while following up on Question 6, some contents of the second to last question were already discussed. Lastly, Question 2 was always perceived as vague and needed to be clarified and followed up in some way.

4.1.4. Finalizing Preliminary Interview Guide

After testing the preliminary interview guide, the final step of the method proposed in [16], consisting of finalizing the preliminary interview guide, can be completed. In this step, feedback will be incorporated and used to adjust the interview guide when necessary. The final result can be seen in Table 4.2. The main changes compared to the interview guide found in Table 4.1 have been highlighted with bold text for updates, italic text for additions, and red text boxes for deletions. The rest of this section will discuss the changes made and motivate them.

First, Question 2 was, as mentioned, perceived as vague and required clarification in each of the test interviews. However, the question could not be changed as it would push the interviewee in a certain direction. Therefore, some follow-up questions have been added to provide guidance for various situations that could be encountered during the interview in this question. Question 4 and 5 (from Table 4.1) have been merged as they often go hand in hand. What was previously Question 5 has been added as follow-up

<table>
<tr><th colspan="2">Interview guide</th></tr>
<tr><td colspan="2">1: Before we begin, could you tell me a bit about your role and work activities within [organization name]?</td></tr>
<tr><td colspan="2">2: How do you view the change within your organization to use RPA?
• Why do you view it this way?
• Does this view differ from the way you viewed it before your company adopted RPA?</td></tr>
<tr><th>Manager</th><th>Employee</th></tr>
<tr><td>3: How did you communicate the intention to use RPA within your organization towards your employees? (RQ 3&4)
• How did you decide on this way of communication?
• Does this way of communication differ from other changes you would inform your employees about?</td><td>3: How was the intention to use RPA within your organization communicated towards you? (RQ 3&4)
• What did you think about the way of communication?
• Would you have preferred an alternative way of communication?</td></tr>
<tr><td>4: Did your employees have any doubts or concerns about the use of RPA in your organization? (RQ 2)
• How did you find out about this [doubt or concern]?
• Did this [doubt or concern] surprise you?
• Do you know if other employees have/had this [doubt or concern] as well?</td><td>4: Did you have any doubts or concerns about the use of RPA in your organization? (RQ 2)
• Could you tell me a bit more about [doubt or concern]?
• Why was this specifically a concern about the use of RPA for you?
• Do you know if other colleagues have/had this [doubt or concern] as well?</td></tr>
<tr><td>5: How did you handle these doubts and concerns? (RQ 2&4)
• If so, how did you attempt to address this [doubt or concern]?
• How did your employees respond to this?</td><td>5: Did you feel that the management level recognized these doubts and concerns? (RQ 2&4)
• If so, how did they address this doubt or concern?
• Why was this specifically a concern about the use of RPA for you?</td></tr>
<tr><td>6: Can you describe the managerial communication process with your employees about the use of RPA to me? (RQ 3&4)
• Do you feel like you handled this process is well?
• Do you think you would do something different next time?</td><td>6: Can you describe the managerial communication process with you about the use of RPA to me? (RQ 3&4)
• Do you feel like this process is sufficient?
• Did you miss anything specific?</td></tr>
<tr><td>7: How do you think the communication process affected the RPA adoption process? (RQ 3&4)
• Do you think this positively or negatively affected the adoption process?
• How can these effects be mitigated?</td><td>7: How do you think the communication process and your doubts and concerns affect the RPA adoption process? (RQ 3&4)
• Do you think others colleagues share these beliefs?
• How can these effects be mitigated?</td></tr>
<tr><td colspan="2">8: What do you think can be improved in managerial communication in the RPA adoption process? (RQ 5)
• What problem would this address?</td></tr>
<tr><td colspan="2">9: Is there something else you would like to discuss or comment on regarding the adoption of RPA that we have not talked about yet?</td></tr>
</table>

Table 4.1: Preliminary interview guide for interviewing managers and employees.

Interview guide	
1: Before we begin, could you tell me a bit about your role and work activities within [organization name]?	
2: How do you view the change within your organization to use RPA? • Why do you view it this way? • Does this view differ from the way you viewed it before your company adopted RPA? • *What type of change did you perceive this change?* • *What is, in your opinion, the motivation for the choice of this change?*	
Manager	**Employee**
3: How did you communicate the intention to use RPA within your organization towards your employees? (RQ 3&4) • How did you decide on this way of communication? • Does this way of communication differ from other changes you would inform your employees about?	**3:** How was the intention to use RPA within your organization communicated towards you? (RQ 3&4) • What did you think about the way of communication? • Would you have preferred an alternative way of communication?
4: Did your employees have any doubts or concerns about the use of RPA in your organization? (RQ 2) • How did you find out about this [doubt or concern]? • Did this [doubt or concern] surprise you? • Do you know if other employees have/had this [doubt or concern] as well? • **How did you attempt to address this [doubt or concern]?** • **How did your employees respond to this?**	**4:** Did you have any doubts or concerns about the use of RPA in your organization? (RQ 2) • Could you tell me a bit more about [doubt or concern]? • Why was this specifically a concern about the use of RPA for you? • Do you know if other colleagues have/had this [doubt or concern] as well? • **Did you feel like that the management level recognized these doubts and concerns?** • **If so, how did they address this doubt or concern?**
5: Can you describe the managerial communication process with your employees **during the RPA adoption process** for me? (RQ 3&4) • Do you feel like you handled this process is well? • Do you think you would do something different next time?	**5:** Can you describe the managerial communication process with you **during the RPA adoption process** for me? (RQ 3&4) • Do you feel like this process is sufficient? • Did you miss anything specific?
6: How do you think the communication process affected the RPA adoption process? (RQ 3&4) • Do you think this positively or negatively affected the adoption process? • How can these effects be mitigated?	**6:** How do you think the communication process and your doubts and concerns affect the RPA adoption process? (RQ 3&4) • Do you think others colleagues share these beliefs? • How can these effects be mitigated?
7: What do you think can be improved regarding managerial communication in the adoption process of RPA **or a similar automation technology**? (RQ 5) • What problem would this address?	
8: Is there something else you would like to discuss or comment on regarding the adoption of RPA **or a similar automation technology** that we have not talked about yet?	

addition Additions to the preliminary interview guide.

update Updates to the preliminary interview guide.

deletion Deletions from the preliminary interview guide.

Table 4.2: Final interview guide for managers and employees interviewing.

questions to Question 4 to still be able to explore this direction if it does not come up automatically while discussing Question 4. Question 6, now Question 5, was slightly altered to avoid confusion and overlap with Question 3 and now specifically mentions the RPA adoption process. Furthermore, one of the follow-up questions has been removed because of the overlap with Question 7. Lastly, the possibility for extending the scope of the discussion has been added in the final two questions, where it now also mentions similar automation techniques and does not restrict itself to RPA.

4.2. Interviewee Selection

The main interest of this thesis research is the adoption of RPA in the recruitment industry. Therefore, to conduct relevant interviews, people in this specific context have been selected as interviewees. The main source of interviewees was through connections from personal work experience in a software company that develops RPA solutions for various domains, the largest being the recruitment branch.

The recruitment industry uses roughly two main types of entities in their work activities; candidates and vacancies. Some companies use RPA to automate the finding of both, some only use RPA to retrieve one of the two. Furthermore, the usage of RPA also differs in the amount of business processes that are automated by RPA. Some organizations use automation all the way up to communicating with the candidates; some only use it in the initial search phases, and even keep a human in the loop. The interviewees were selected from all types of organizations with respect to their use of RPA and the type of entities for which they use it.

Another facet that was used to try to differentiate the types of RPA customer is the firm size along with the team size. This also has to do with the number of levels between the person who decides to acquire the automation software and the employees who actually use the software. The mentioned differences between companies have been used to choose a diverse set of interviewees within the recruitment company. However, not all the companies contacted were open to participating in the research.

For contacting the organizations, the main contact person was retrieved using personal work experience. The main contact person was then sent an email explaining the content of the research and the purpose of the interviews. Additionally, interviews were requested with both a manager and employees. After conducting some interviews, suggestions from the interviewed participants were acquired from new potential interviewees. Some interviewees were extremely enthusiastic about the content of the research and provided contact details for potential leads for more interviews. These potential interviewees were also contacted.

The interviewees who accepted the interview request were sent an invitation to an online meeting in the MS Teams environment, which facilitates the transcription software. For each participant, a summary was written about his role in the company and his work activities. These summaries do not include any personal identifiable information and can be found in Table 4.3. Additionally, an extended version of the participant overview can be found in Appendix A.

ID	Category	Domain	Role & Work Activities
M1	Manager	Technology provider of RPA	Operational manager within a company that provides RPA technology to mainly recruitment companies.
M2	Manager	Company connects vacancies to freelancers.	Manager responsible for the sales and recruitment departments.
M3	Manager	Company that connects vacancies to truck drivers.	Owner and director of a company that matches vacancies to candidates in the logistic domain.
M4	Manager	Recruitment agency for IT professionals for permanent positions.	Recruitment manager within a company connecting developers to vacancies.
M5	Manager	Large software provider specialized in developing smart solutions using RPA.	HR manager within a RPA software provider also responsible for internal engagement and delivery management.

M6	Manager	Company that operates as an intermediary company for IT professionals.	ICT coordinator. Focused on improving the business process using IT automation.
M7	Manager	Executive search company that finds candidates for specific client requests.	Operational excellence and digitalization manager. Identifying automation opportunities for business processes.
E1	Employee	Intermediary broker company for connecting developers to companies.	Back-office employee that works mainly with salary administration.
E2	Employee	Company connects vacancies to freelancers.	Match consultant. Connecting supply and demand in the freelancer and employer market.
E3	Employee	Company that connects vacancies to truck drivers.	Consultant. Sourcing, reaching out to, and having interviews with potential candidates.
E4	Employee	Recruitment agency for IT professionals for permanent positions.	Consultant. Sourcing of candidates and maintaining relationships with clients.
E5	Employee	Intermediary broker company for connecting developers to companies.	Back-office employee. Back-office tasks such as salary administration.

Table 4.3: Summaries of generic job and domain description of interviewees.

4.3. Conducting Interviews

After requesting interviews with potential participants, the interviews were conducted with managers and employees who accepted the invitation to a research interview. All of the interviews were conducted via the MS Teams environment of the TU Delft, for which a meeting invitation was sent. Although participants were always given the option to have an interview on site, all participants agreed that the interview would take place online.

4.3.1. Interview Ethics & Privacy

Because this research study deals with human subjects, the approval of the Human Research Ethics Committee (HREC) [82] was required, as stipulated by TU Delft. For this study, the application for this approval consisted of three distinct documents. The first one, the HREC checklist, includes a general overview of the research to be done that is requested and a risk assessment & mitigation plan. Second, an informed consent form was required to be submitted as this will be used to inform the interviewee of the conditions to which he consents when participating. Lastly, a Data Management Plan was required as there needed to be clear rules on where and how long data could be stored and used.

The most important content of these files was the use of data collected from the interviews. Audio recordings of the interviews would be necessary to transcribing the content of the interviews. However, these recordings and transcriptions will be deleted one month after the thesis research is complete and cannot be published. Findings, quotes, views, and opinions derived from these documents can be used in the thesis. Furthermore, a short anonymous summary is included for each participant in Table 4.3 and Appendix A to provide some context for each interview.

These three documents were reviewed and signed by the responsible researcher and the data warden of the Technology, Policy & Managment faculty, after which they were submitted to the committee for approval. Fortunately, they were accepted relatively fast, which allowed to start conducting interviews in the early stages of the thesis research.

4.3.2. Interview Procedure

Before the interview, the participant was introduced to the general content of the thesis research by showing and reading the opening statement. Then the consent form checklist, which is derived from the HREC checklist, was shown and asked if the candidate consented to all the statements. Additionally, it was made explicitly clear that when the interview started, the audio of this meeting would be recorded for transcription purposes. Also, it was made clear that only a short anonymous summary would be published in the thesis report. This short summary will also be sent to the participant after the interview for information purposes. A signature was then requested to finalize the consent form.

After completing the consent form, the interview would take place, following the interview guide created for the semi-structured interviews. Follow-up questions and prompts defined in the interview guide were used to clarify or expand questions when necessary.

4.4. Interview Data

In total 12 interviews were conducted to collect data on the Research Question 2, 3 & 4. As mentioned in Section 4.3 the recordings and one-to-one transcripts of these interviews will not be permanently stored and deleted after one month after the thesis research is completed. However, for the remainder of this chapter and mainly for Chapter 5 the results of these interviews will be used.

The data gathered by conducting interviews was stored in the MS Teams environment ordered per interviewee to allow for easy deletion in case an interviewee wanted to withdraw from participating in the interview. For each participant there was a folder with the following contents: a signed consent form, a .mp4 file of the interview recording, a .vtt file of the raw transcript generated by MS Teams, and a .pdf file of the finalized and reviewed transcript. The final transcript was also used as input to the analysis step discussed in Section 4.5.

Although the main (raw) results of the interview will not be published in this thesis report to comply with the HREC checklist submitted and the Data Management Plan, quotes, views, opinions, and an anonymized summary of the interviewee (which can be found in Appendix A and the extended version in Appendix A) can still be used in this report. These will mainly be used to explain and underpin the findings of Chapter 5 and Chapter 6.

As mentioned, 12 interviews were conducted with companies and people operating in the recruitment industry and dealing with IT automation in some way. This group of interviewees consisted of 7 managers and 5 employees distributed over 7 companies. The size of the companies was quite diverse, ranging from small companies with 20-30 employees to a company with seven locations in the Netherlands. A summary of the selection of interviewees can be found Fig. 4.1.

4.5. Interview Analysis

Using the results of the experiments discussed above, this section will dive into the analysis of the collected data. This analysis will be used to derive concrete research findings that address Research Question 2, 3, and 4. The answers to these questions will be derived mainly from Chapter 5 where they will also be translated into the creation of the design artifact of this thesis study.

First, this section will discuss the main methodology used to translate interviews into transcripts and for analysis. Then, the coding process for coding the transcripts will be discussed, which will dive into the way the code groups and individual codes were identified. Finally, some coding results will be highlighted to explain how the findings and artifacts presented in Chapter 5 were identified and constructed.

As mentioned, quotes of the interviewees can be used in this thesis report to illustrate or clarify a particular view, idea, or finding. These quotes will all be presented in this format to be consistent and clear: “Some quote (*clarification of researcher*) of an interviewee” (`M1`). In this format, `M1` could be any ID referencing a manager or employee from the interviewee summary table that can be found in Table 4.3 or .Appendix A Important to note is that all quotes used from the interviews have been translated from Dutch to English. This also holds for the following chapters.

4.5.1. Methodology

As mentioned earlier in this chapter, all interviews were conducted using the Microsoft Teams environment of the TU Delft. Furthermore, all participants agreed to have the audio of these interviews recorded. The

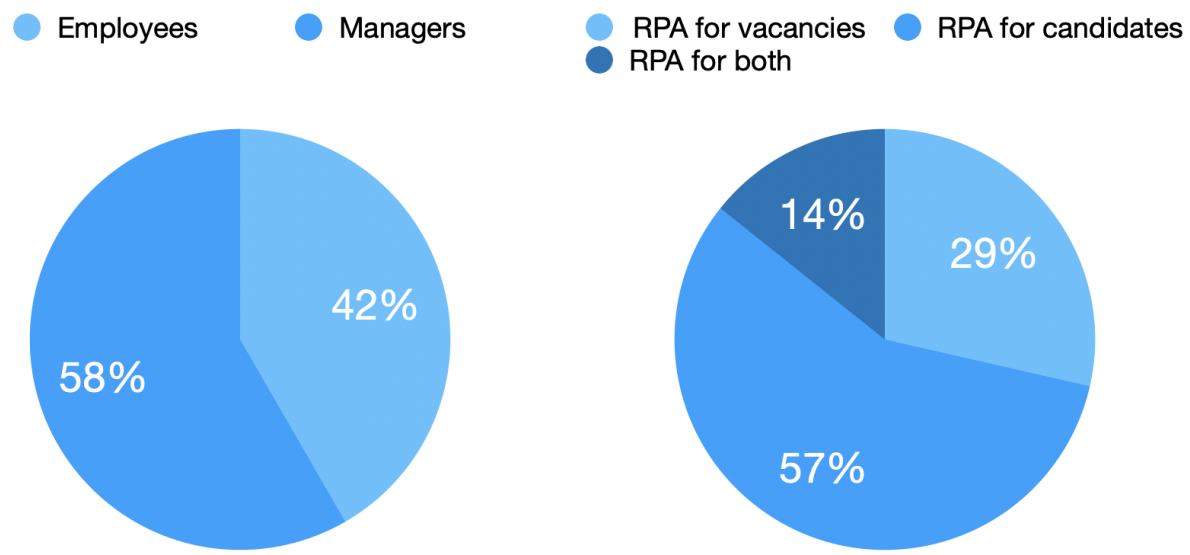

Figure 4.1: Summary data of the distribution of (i) categories of interviewees and (ii) the tasks for which the companies use the automation for.

Microsoft Teams environment offers a convenient way of transcribing the audio of a meeting, which served as the basis for the transcription document. The output (a `.vtt` file) of this tool was used in combination with the audio recording of the interview to create accurate transcriptions.

After the transcripts were retrieved, finalized, and stored, they were imported into the ATLAS.ti software application for further analysis. This tool provides an easy way to process documents and analyze them for meaningful results. It supports conducting a qualitative analysis by means of coding. In addition, the codes used on documents can then be analyzed within or between multiple documents (or document groups). The remainder of this chapter will dive into the way codes were constructed and used to obtain results.

4.5.2. Coding Process

For this thesis research, thematic coding was used as the main means of analyzing the data collected from the interviews. Thematic coding is a qualitative data technique which is used frequently when conducting semi-structured interviews. The aim is to find themes among the data that will be researched by analyzing the sentences and words that occur in these documents [83]. The output of thematic analysis is the list of themes identified and certain sentences or words annotated with these themes or codes.

Thematic analysis can be performed mainly using one of two different approaches; deductive and inductive coding [84, 83]. The first technique starts with having a predefined set of codes based on previous findings or derived from a literature review and assigning them to the data [85]. The latter technique takes another approach, where codes are created based on the data and evolve over the course of the analysis [85]. This could include multiple iterations to apply newly identified codes to all data [86].

For this thesis research, a hybrid approach has been used combining the two previously mentioned techniques [87]. The main reason for this is the specific scope of the thesis and the relative novelty of the concepts studied. A fully deductive approach would not suffice, as some newly identified or scope-specific concepts would not be considered in the coding process. On the other hand, by only using inductive coding, the research findings would be hard to connect to the literature, which would reduce the validity and value of the research. This hybrid approach complements the IS research framework [8], where two different pillars need to be considered; the environment and the knowledge base. The deductive part corresponds to the knowledge base, whereas the inductive part accounts for the context of the environment.

The deductive part of the coding is used in the construction of predefined code groups. Inductive coding is used to fill these code groups with meaningful concrete codes that capture the elements encountered in

ID	Name	Description	Literature
CG1	Approach	Contains codes that describe the approach that was used within an organization when adopting IT automation.	Technology Adoption Models, Managing Organizational Change
CG2	Commitment	Codes describing what led to the commitment of employees during the IT automation adoption process.	Communication & Commitment
CG3	Communication	Codes describing the communication used and the communication between stakeholders in the adoption process.	Communication & Commitment
CG4	Doubts & fears	Contains codes that describe doubts and fears that were encountered during interviews related to the IT automation.	Employees' Fears & Doubts
CG5	Goals of automation	Codes that describe what organizational goals were to use IT automation according to the interviewee.	Technology Adoption Models, Managing Organizational Change
CG6	Impact of automation	Codes that describe how interviewees perceived the impact of the adoption of IT automation.	Managing Organizational Change
CG7	Type of change	Contains codes related to describing the type of change caused by the adoption of IT automation.	Technology Adoption Models, Managing Organizational Change

Table 4.4: The set of predefined code groups used in the coding process.

the interviews. In the following two subsections, both parts will be further discussed and the results of the code creation will be shown.

Code Groups
As mentioned, the code groups are created as a predefined set before analyzing the interview transcripts. The defined code groups are based on concepts identified in the literature in Chapter 3 and serve as a categorization of the codes. The findings and artifacts of Chapter 5 will use these groups to easily explain the advice for managers regarding the role of managerial communication in the IT automation adoption process.

Chapter 3 identified several relevant literature concepts that have been translated into eight distinct code groups. Each code group relates to one or more of the literature concepts. Table 4.4 displays the different code groups with a short explanatory description and the related literature concepts.

Individual Codes
Based on the different code groups discussed in the previous section, roughly fifty codes have been created using an inductive approach. Interview transcripts were analyzed one by one using ATLAS.ti software. Every time a theme related to one of the code groups was encountered, a code was created to capture this information. It is important that each code was concrete enough and did not capture multiple themes at once. After creating the code, the code was connected to the related code group.

If after analyzing an interview transcript, new codes were created, the already analyzed transcripts were reread, and if necessary, the newly created codes were also applied in this document. This led to multiple reiterations of the analysis, which is necessary when conducting an inductive approach [85, 86]. Additionally, the code names were carefully evaluated and adjusted when necessary to capture the essence of the specific theme as best as possible.

A complete overview of the individual codes can be found in Appendix B, where in Table B.1 every code is listed with a description and the code group it belongs to.

4.5.3. Coding Results
Using previously defined code groups with their respective codes, the twelve interview transcripts were analyzed with research goals (mainly Research Question 2, 3, and 4) in mind. This resulted in a total of 447 quotations being annotated with at least one of the codes. This section will briefly go over how the results

were obtained from the coding process. In this research, three different methods were used: (i) constructs created from inductive coding, (ii) findings from similarities and differences between document groups, and (iii) relations created from cooccurrences of codes. This section will discuss these three methods and will also present examples of how these methods were used to provide validation for the construction of the model in Chapter 5.

The inductive coding approach provided for the identification of relevant concepts and themes that were presented in the interviews. These concepts are used as the main input to the creation of constructs in Chapter 5. Since these concepts and themes defined by codes are part of a code group, they are related to the literature concepts from Chapter 3. This ensures that the designed constructs in this thesis research are grounded both in the context of the environment and in the knowledge base.

Comparing the coding results (for certain questions) between the two interviewee categories, managers and employees, is one of the main inputs for the design phase of this thesis research. These discrepancies, differences, or similarities show how both groups view certain aspects of the adoption process and the things they value or dislike. For example, throughout this thesis report, the potential paradox of different views on the type of change, either process optimization or organizational change, has been highlighted. In Chapter 4, where the semi-structured interview guide was designed, this has been taken into account in mainly Question 2 (Table 4.2). Using the codes of code group `CG7` (Table 4.4), the matrix in Fig. 4.2 can be constructed with the results of the coding process.

	Employees	**Managers**
Process optimization	1	15
Organizational change	12	4

Figure 4.2: Matrix with the number of *type of change* code occurrences across document groups (managers & employees)

This figure indicates that in fact the employees and managers interviewed view the type of change differently. Employees' quotations are annotated with *organizational change* much more often than managers. Managers focus with their answers on process optimization, with a manager putting it as "the essence of the adoption is improving the efficiency of the process" (`M7`). Employees, on the other hand, mention the impact on the organization: "this (*RPA*) would have a major impact on the organization" (`E4`).

Besides evaluating the occurrence of codes between different interviews and document groups, the co-occurrence of codes was used to find relationships between the codes. This will be the main input for the relation between the identified constructs in Chapter 5. This analysis was performed in a backward and iterative fashion with the objective of ensuring correct relations and obtaining a complete picture of all the interview data. This approach could be compared in some way to requirements engineering, where the end goals of the system are defined, and the relations between elements are mapped to obtain a model which influences these end goals. For this specific thesis research, the main end goal would be the effective adoption of IT automation and the elements would be the identified constructs by means of coding.

As an example of the use of methods (i) and (iii), the identification of three constructs and the relation between them will be highlighted. *Aware of performance*, *aware of benefits*, and *perceived usefulness* are three constructs that were identified from the inductive coding process (from a combination of codes `C5`, `C9`, `C19`, `C32`). These constructs are displayed in Fig. 4.3. *Perceived usefulness* was identified as an important factor (mentioned by all participants) with some relation to the commitment of employees to the adoption process (the exact relationship does not matter for now). After this was identified, the

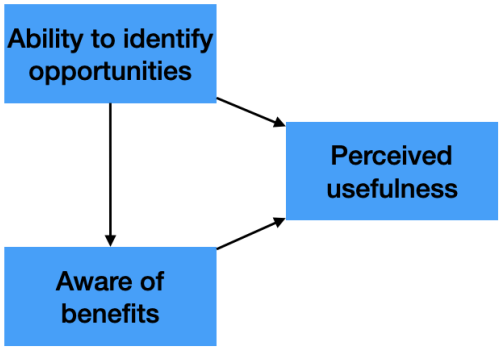

Figure 4.3: Three constructs of the final model and the relation between them.

interviews were analyzed for codes / themes related to the interviewee mentioning the concept of *perceived usefulness*. All but one employee mentioned that the awareness of the benefits of the IT automation technology (*aware of benefits*, C5) was mentioned by all but one employee as something that heavily influences the perceived usefulness of employees. Therefore, this identified construct was added as a 'predecessor' of *perceived usefulness*. Furthermore, the ability to identify opportunities was identified as another construct that influenced *perceived usefulness* (mentioned by 10 out of 12 interviewees). However, most interviewees (8 out of 12) also related this theme to the creation of awareness among employees, therefore, another relation was created between those two constructs.

5

Framework Design

This chapter will use the outputs of previous steps of the Design Science Research approach to design the artifact of this research; a managerial communication framework for the effective adoption of IT automation. This framework aims to answer the Research Question 3, which investigates the relation between managerial communication and the adoption process, and Research Question 4, which investigates the impact of managerial communication on stakeholders in the adoption process. Furthermore, by creating a framework for managerial communication to achieve effective adoption of IT automation, Research Question 5 will be answered.

In the first section of this chapter, the interview data collected in Chapter 4 combined with the analysis described in Section 4.5 will be used to present certain findings that are relevant to the concepts of this research. These findings are not directly translated into constructs but help to understand certain parts and relations of the model. This part will mainly draw on the Environment pillar of the Design Science Research cycle[7] in order to design the desired artifact for this thesis research; a communication framework for the IT automation adoption process.

Then, from Section 5.2, the results of the literature review in Chapter 3 will be used in combination with the findings to establish the constructs. The creation and explanation of the relations between these constructs will allow the creation of a model for the role of communication in the effective adoption of IT automation. Finally, this will be translated into guidelines for effective managerial communication. These guidelines in combination with the constructs and the model will allow the creation of a managerial communication framework as the design artifact in Section 5.3. In these last two steps, the ethical considerations discussed in Section 2.8 will be taken into account and it will be shown how the core value of transparency is incorporated into the design artifact. A hypothetical scenario will be highlighted to explain the use of the communication framework in practice.

5.1. Design Inputs

As mentioned, the first section of this chapter will mainly focus on the Environment pillar of the Design Science Research [8]. To investigate this pillar, semi-structured interviews have been conducted with managers and employees in the recruitment industry, as described in Chapter 4. The data from these interviews have been analyzed in Section 4.5 using a qualitative analysis approach; thematic coding. Besides the creation of constructs and the relations between them, which will be used in later sections of this chapter when a model is created, the coding analysis presented more general findings. These findings are more general, as they span multiple codes and code groups and relate to multiple constructs of Section 5.2. However, they present a good overview of the key findings and main themes that will be encoded in the model and are therefore listed below.

- **Motivation for change:** All participants mentioned that motivation for change is an important factor in the change process. Managers indicate that a clear motivation for change is essential to convince employees to use the new IT automation. Additionally, they argue that it is a crucial part of having a long-term vision for the company in which the change to use IT automation plays a certain role.

  The employees, on the other hand, explain that the motivation for the change to use IT automation was essential to understand the decision made by the manager. They feel that the motivation gives

them reason to cooperate in the change process and understand why the change is necessary. Without it, they could be very skeptical about these decisions and have less confidence and trust in the manager.

Both groups argue that the most important contributing factor to understanding the motivation for the change is communication.

- **Problem awareness:** In the companies of interviewees who perceive the adoption process as a success (both employees and managers), both categories indicated a high level of problem awareness. Managers feel that awareness of the problem among employees helped to generate support for the adoption of IT automation. It allows for a problem-oriented approach in which the employees have a clear view on what problems the IT automation addresses and why it is needed.

  Employees who are aware of the problems present in the organization perceive the change to use IT automation as simply logical and show higher levels of active cooperation in the adoption process. They understand that the problem needs to be solved and only need to be convinced that the IT automation in question accurately addresses the detected problem.
- **Vision is required:** Following the two previously mentioned findings, (long-term) vision and the goals the automation technology tries to achieve are crucial to the success of the adoption process. Managers imply that having a vision and being able to convey it to their employees is essential to being a good manager. Especially during change management, it is a crucial part of the communication and the justification of the IT automation change.
- **Managers confident about employees' fears & doubts:** Most of the managers indicate that they feel confident in their opinions and understand the fears and doubts of employees that could play a role in the IT automation adoption process. They argue that they have a good enough understanding of what their employees could think about the change to use certain technologies and feel these concerns have been addressed well.

  However, most of them have not actively communicated with their employees about these potential fears & doubts. Employees also confirm this, as only a few had talks with employees about potential issues in the adoption process due to their concerns. They also explain that this is not always necessary, but with upcoming automation technologies, this would be preferred.
- **Performance doubts:** Performance doubts are the most common category in the doubts & fears code group (`CG4`) among employees. In Fig. 5.1 all codes within this category are displayed. From this figure, the *performance doubts* (`C30`) can be seen as a clear outlier with over 30 occurrences throughout the interview transcripts. Job insecurity (`C28`) is less frequently mentioned in interviews. This might be because the recruitment industry is a human-centered domain, where everyone feels that the human worker can never be fully replaced by means of automation. This will be further discussed in Chapter 7.
- **Being able to understand what a technology can and cannot do:** When especially employees can understand what IT automation is capable of and also *what it is not capable of*, it allows the organization to identify opportunities and problems earlier in the adoption process. This greatly benefits all stakeholders (including the technology provider) in the process, as it allows for seeing opportunities instead of employees being doubtful about the capabilities of the technology. It also sets clear boundaries on what the technology can not do, saving the organization from disappointments and the technology provider from a lot of customer service.

  In order to achieve this sense of awareness about the IT automation, communication between all parties is necessary. Managers indicate that stimulating direct communication and feedback loops between employees and the technology provider is helpful.
- **Organizational change versus efficiency paradox:** As mentioned before, there might be a paradox in which managers perceive the adoption of IT automation only as enhancing processes, while employees feel like it is an organizational change. As shown in Fig. 4.2 in Section 4.5, there is certainly a difference in views on the type of change. This is also further confirmed by the automation goals mentioned by both groups. Managers often mention speed, efficiency, and accuracy as reasons for the use of IT automation and imply that it is about tweaking and optimizing business processes. Employees often indicate that they perceive the change more as a shift in work activities and view it more as an organizational change.

- **Retrospective look on IT automation:** Most managers and employees state that their view of the change to use IT automation changed during the adoption process. Both indicate that sometimes they were surprised by certain aspects or barriers of the adoption process and that these surprises could have been prevented by earlier information exchange between stakeholders.
- **Expectations need to be managed:** Management of IT automation expectations by managers and employees can be crucial to the success of the adoption process. This is an essential aspect to consider for both the manager and the technology provider, as their communication plays an important role in managing these expectations. The absence of communication/feedback between employees and technology fosters misunderstandings and can lead to misaligned expectations among employees. In turn, this can lead to disappointment and an inefficient and bumpy adoption process. The lack of this communication is often the case as the manager may act as a middleman between the employees and the technology provider. This is also illustrated by the appearances of the *misaligned expectations* (C29) code in Fig. 5.1.
- **Employees are different in what they expect from communication:** This may seem obvious, but is often overlooked by managers of the employees interviewed. Some employees indicate that they enjoy being very involved in the IT automation development process and want to know the technologies used and the way they work. This gives them a sense of control and helps them to think proactively in the adoption process. Furthermore, this stimulates awareness of the capabilities of the automation technology and allows one to identify opportunities. These employees like to be included early on in the process and do not mind getting 'too much' information about the upcoming change.

  However, other employees indicate that they prefer the 'just enough information' approach. This entails the manager only providing them with the essential information such as the way they need to use the IT automation, what they need to provide in the adoption process, etc. Companies in which the adoption process was a success established the preferences of their employees early on and acted on them.

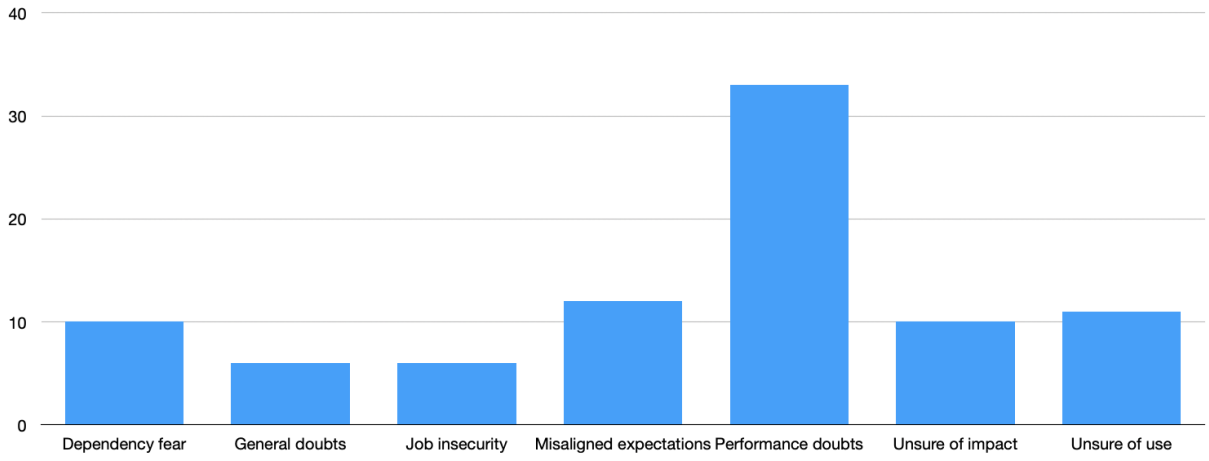

Figure 5.1: Code occurrences of the codes in the doubts & fears code group.

5.2. IT Automation Adoption Model

In this section, an IT automation adoption model will be constructed which explains the role of communication in this process. The model is based on the results of the previous stages of the research and will use those to create constructs that capture concrete and actionable items that relate to the stakeholders in the adoption process. Thus, this model mainly answers Research Question 3 and 4. The objectives defined in Subsection 3.8.2 for the framework will be kept in mind as the framework builds on the constructed model. The methodology used to obtain this model has been discussed in Section 4.5 (specifically Subsection 4.5.1 and Subsection 4.5.3).

The model presented in this research consists of two layers; a high-level overview and a zoomed-in layer on each of the separate four components of the model. First, the overview will be discussed to create

a basic understanding of each of the components in the model. Then, each component will be discussed separately in more detail in which the constructs of each component will be shown. Furthermore, the interlinkages of between the component and its neighbors will be discussed.

5.2.1. Overview

The constructed model explaining the role of communication in the IT automation adoption process consists of four components; managerial communication, motivation & vision, impact awareness, and effective adoption of IT automation. These components are displayed in Fig. 5.2.

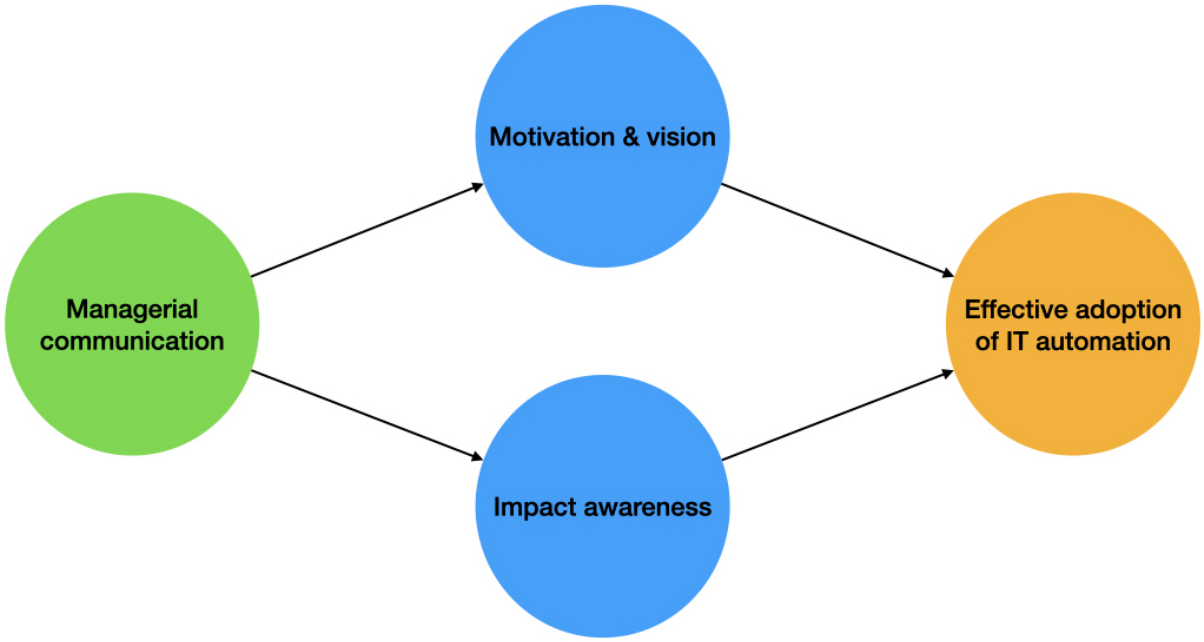

Figure 5.2: High-level overview of the designed model.

The managerial communication component on the left is the main focus of this research and is related to relevant topics encountered in both the literature and the interviews. This component encapsulates the actions that a manager can directly influence through managerial communication. Furthermore, this is the only component which contains root constructs that do not have any predecessors affecting them (in this model). Therefore, it follows that, considering the scope of this thesis, this is the component in which the manager can take action to influence the other components of the model to improve the effective adoption of IT automation in his organization.

The motivation & vision component of the model focuses on the reasons and goals of the IT automation. It focuses on the motivation that drives the change process and discusses what messages are important to convey to employees to make them committed. On the other hand, the impact awareness component focuses on the impacts that IT automation will have on the organization and the work activities of employees. This component is closely related to the possible fears and doubts of employees and how they can be avoided or mitigated. In summary, the motivation & vision component reasons about the *why* of the use of IT automation and the impact awareness component dives into the *what* and *how*. Finally, the effective adoption of IT automation component is derived from the literature and is connected to the other components, which are based more on the environment (interview data). This component explains how the actions in the former components relate to and affect the effective adoption of IT automation.

5.2.2. Managerial Communication

First, the the managerial communication component of the model and its constructs displayed in Fig. 5.3 and Table 5.1 will be discussed. The constructs in this part of the model are crucial to this research, as communication is the main focus. Additionally, this component acts as the root of the overall model and is the place where the manager can actively influence the effective adoption of IT automation through

communication. Therefore, the root constructs of this model are highlighted in Fig. 5.3 and printed in bold in Table 5.1 as they provide clear and actionable elements for a manager. These root constructs will serve as the starting point and basis for the guidelines of the communication framework in Section 5.3.

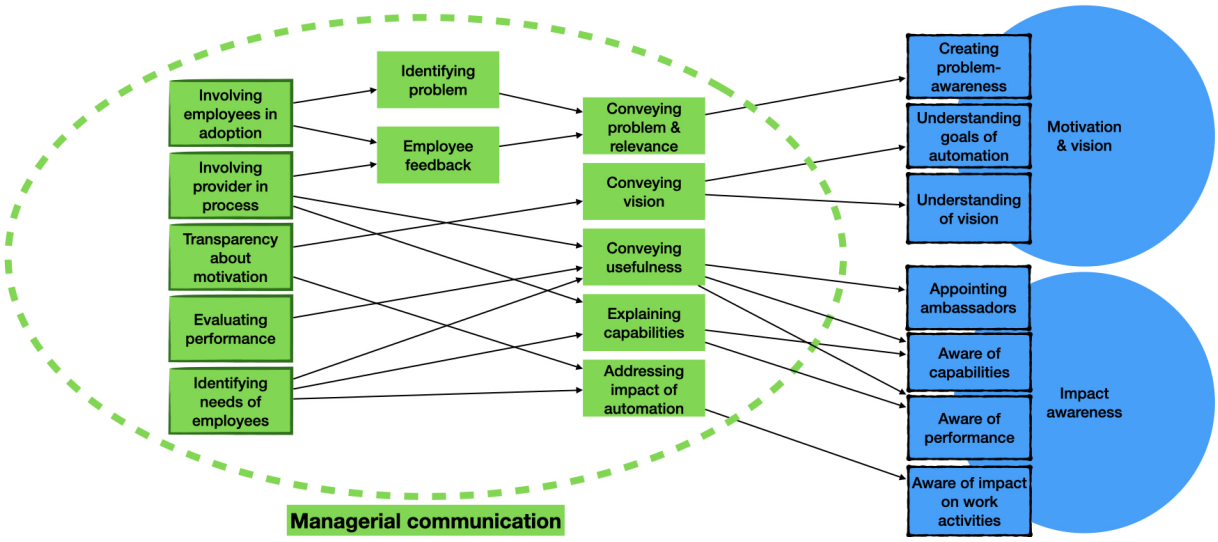

Figure 5.3: Zoom-in on the managerial communication constructs and relations of the designed model.

The first root construct, *involving employees in adoption process* (MC1), was mentioned by most of the participants (11 out of 12) as an important actionable step taken by the manager. For both managers and employees, this is viewed as having a positive relation to the adoption process. The degree of involvement differed slightly and can be seen in these quotes: “I involved them (employees) actively in the process from start to finish, even in the development phase” (M2) and “we (employees) were constantly kept up to date with the changes which would be coming” (E2). The involvement of employees positively affects the discovery of problems and the definition of what automation technology was supposed to do. In addition, it generates employee feedback, which is crucial in the early stages of the adoption process. A manager described that “it is crucial to involve the users and listen to their wishes” (M6). Both these elements make it easier to communicate the problem and its relevance, which is an important construct that influences the problem-awareness of employees in the motivation & vision component.

Involving provider in process (MC7) is identified as a factor that led to the successful adoption of the IT automation. This consisted of actively letting the provider join meetings about the adoption or having open communication between employees and the provider. According to interviewees this “creates trust in the people building the technology” (E1) and “allows for faster development and adoption” (E4). Furthermore, this stimulates employee feedback, which can be quickly incorporated by the provider. It also helps organizations where there is a lack of understanding or expertise in technology, which would otherwise negatively affect *promoting usefulness* (MC10) and *explaining capabilities* (MC11).

Transparency about motivation (MC7) is crucial to ensuring that employees understand the reasons for the change and the impact it will have on their jobs. This construct and its children can mitigate or even eliminate employees’ fears and doubts and create a healthy environment for the adoption of IT automation. Based on interview analysis, it was found that employees less often mention the goals and impact of adoption and are less sure about it. This is the main cause for doubts (which are discussed in the impact awareness component). Therefore, being transparent about motivation and impact is an excellent actionable point to influence these obstacles of the effective adoption process.

To be able to convey the usefulness of the IT automation technology, most of the interviewees (10 out of 12) indicated that the performance of the technology must be proven. *Evaluating performance* (MC6) is therefore a root construct that can positively influence the perceived usefulness of the technology by employees. Some interviewees mention that their organization has a structured way of evaluating performance, such as a “three-stage model to evaluate the business case” (M7). All managers mention a testing phase in which it is “evaluated whether it (the technology) provides value for the business” (M1).

Managerial Communication		
ID	Name	Description
MC1	Involving employees in adoption process	Actively involving employees in the adoption process. This could consist of inviting them to join meetings about the novel technology (with the technology provider), asking them to evaluate/use and provide feedback for the technology, or assigning them some other role in the adoption process.
MC2	Identifying problem	Identification of the problem which the IT automation is crucial, not just for managers but especially for employees. Concurrent constructs in the model are heavily influenced by the problem awareness that originates from effective communication about problem identification.
MC3	Employee feedback	Taking feedback from employees into account is crucial in the managerial communication process with regard to the adoption of IT automation. Employee feedback will result in active participation and awareness of the new technology.
MC4	Conveying problem & relevance	For the manager, it is important to be able to communicate the problem that the IT automation will solve and the relevance of this problem. If this part is lacking, the biggest part of the actions steps in the motivation & vision segment will be hard to complete.
MC5	Transparency about motivation	Being transparent about the reasons why the decision was made to adopt a certain IT automation. This is based on the concept of managerial trust and greatly affects the expectations of employees. If done correctly, the manager can eliminate many doubts and concerns of the employees.
MC6	Evaluating performance	Communication about the way the IT automation technology will be or is evaluated. As there may be performance doubts about the new technology, it is important to address how the performance will be evaluated and ensured.
MC7	Involving provider in process	Involving the technology provider in the process can be done by facilitating open communication between employees and the technology provider or putting them together in meetings throughout the adoption process. This is optional but can be of great use when there is a lack of understanding of the usefulness, performance, or implications of the technology within the company.
MC8	Identifying the needs of employees	Managerial communication can be used to identify the (different) information needs of employees. As employees might have different expectations and wishes about what will be communicated with them, it is crucial that a manager identifies these needs and acts accordingly.
MC9	Conveying vision	Managers should be able to convey the vision of the organization together with its business goals towards employees through managerial communication. This consists of explaining the why and how questions and convincing employees to participate in this process.
MC10	Conveying usefulness	Managerial communication in the IT automation adoption process also consists of communicating the use and usefulness of the technology. This increases the awareness of employees about the performance and capabilities of the technology and clarifies the function of the IT automation.
MC11	Explaining capabilities	The capabilities of the technology need to be clearly communicated. If there is uncertainty about what a technology can do, it also becomes unclear what impact and performance can be expected. Furthermore, it limits the identification of opportunities among employees.
MC12	Addressing impact of automation	Addressing the impact the IT automation technology will have on the organization and specifically on the employees is crucial to managerial communication. Clarifying and explaining the impact will eliminate many doubts and concerns of the employees and create an environment where the manager only needs to worry about the use(fulness), performance, and problem awareness related to the IT automation technology. This construct does rely on the transparency about the motivation for the change and the managerial trust associated with it.

Table 5.1: The constructs in the managerial communication segment of the model.

Another crucial construct in the model in the identification of the differing communication needs of employees (MC8). In the interviews, varying expectations of managerial communication were shared. For

example, some employees indicate that they like “understanding how the technology works” (E1) whereas others prefer a more minimal approach: “I only wanted to know impact it will have on my job and how I should use it” (E5). Therefore, this construct is of paramount importance to consider when focusing on its children: *conveying of usefulness* (MC10), *explaining capabilities* (MC11), and *addressing impact of automation* (MC12).

5.2.3. Motivation & Vision

This section will discuss the managerial communication component of the model and its constructs displayed in Fig. 5.4 and Table 5.2. As mentioned in Subsection 5.2.1, this part of the model focuses on the *why* of the adoption process. Understanding the motivation and vision of the manager is an important factor that influences the commitment among employees that is needed for the effective adoption of IT automation.

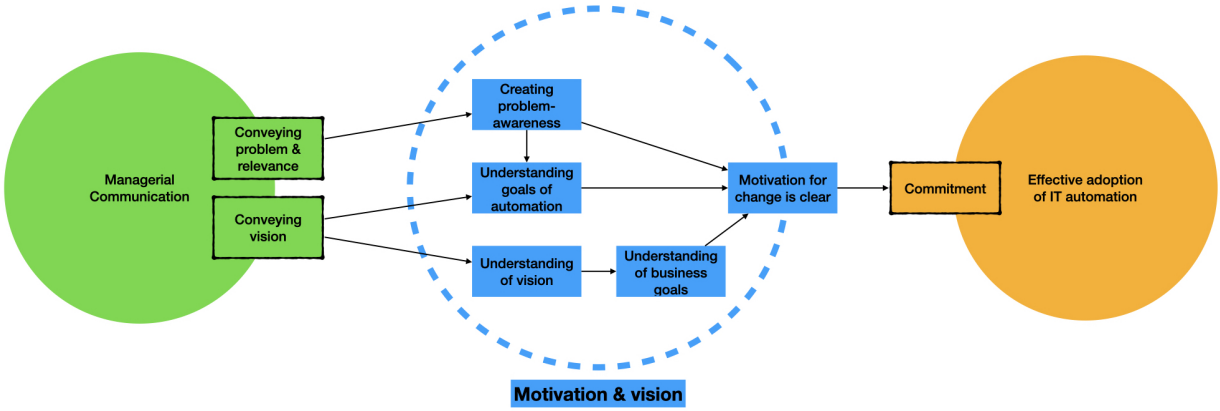

Figure 5.4: Zoom-in on the motivation & vision constructs and relations of the designed model.

Motivation & Vision		
ID	Name	Description
MV1	Problem awareness	Creating awareness of the problem that will be solved by adopting IT automation is an important factor in the motivation & vision component that leads to effective adoption. Employees who are aware of the problem understand why the IT automation is needed and what the organization’s goals are to adopt it.
MV2	Understanding goals of automation	Employees who understand the goals of IT automation will have a clear view on the motivation of the manager for this change. Problem awareness is a straightforward way to create this sense of understanding, as solving the problem is a clear goal. Additionally, the manager who conveys the vision also leads to understanding what the IT automation tries to achieve. These goals are more concrete than the business goals of construct MV4. Examples are efficiency, speed, competitiveness, etc.
MV3	Understanding of vision	When the vision is clearly conveyed by the manager to the employees, they will understand why certain changes are needed to move towards this vision. The adoption of a novel IT automation might be a (small) part of achieving this vision and is therefore clearly motivated.
MV4	Understanding of business goals	The understanding of the business goals is closely related to understanding the vision as the business goals find their origin in the vision of the manager. Employees who understand the organizational goals can see how the adoption of IT automation aims to achieve (some of) these goals.
MV5	Motivation for change is clear	The motivation for the change must be logical and clear for employees. Understanding the role of the IT automation in the organization (business goals) or the goals that it is trying to achieve (problem awareness and goals) creates a solid foundation for this motivation. In turn, the motivation for the change creates commitment among the employees.

Table 5.2: The constructs in the motivation & vision segment of the model.

Problem awareness is a concept that was encountered in every interview conducted. Especially managers are aware of the fact that this awareness plays a crucial role in the adoption process. One manager indicated that the core of the adoption process should be “solving a problem that employees are aware of” (M4). Furthermore, problem awareness creates a solid foundation for the *understanding of the goals of the automation* (MV4) and makes the motivation clear (MV5). When these constructs are present in an organization, it becomes easier to create commitment among employees. In addition to the relatively short-term benefits of the change, vision and business goals should support motivation in the long term. Having a “clear spot in the horizon is a crucial part of the communication towards employees” (M2) which leads to a clear motivation for the change. Conveying the problem & relevance and the vision are direct inputs from the managerial communication component that influence the constructs in this component.

5.2.4. Impact Awareness

Motivation and vision is not enough to ensure the success of the IT automation adoption process. Alongside the *why* of the adoption process, managerial communication should provide clear answers to the *what* and *how* of this process. The impact awareness component of the model addresses these additional factors. This part of the model and its constructs displayed in Fig. 5.5 and Table 5.3 will be discussed in this section.

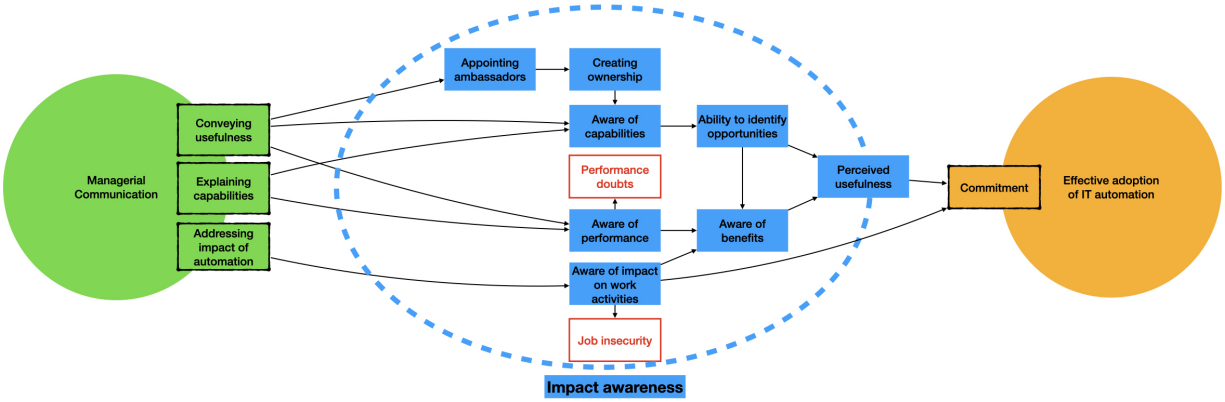

Figure 5.5: Zoom-in on the impact awareness constructs and relations of the designed model.

The constructs that influence the constructs in this component of the model (MC10, MC11, and MC12) are straightforward as they have to do with the usefulness, capabilities, and impact of the automation technology. They address the main topics that employees should be aware of in the adoption process. First, the *awareness of capabilities* (IA3) influences the ability to identify opportunities (IA8). This can be easily derived from the interviews: employees who knew what the technology can and cannot do were more aware of the opportunities that the technology provided. In turn, this positively affects the *awareness of benefits* (IA9) and the *perceived usefulness* (IA10). Another way to create awareness of the capabilities can be done by creating ownership and a sense of responsibility of the technology (IA2). Some managers interviewed (3 out of 7) indicate that *appointing ambassadors* (IA1) for the technology was an effective method of creating ownership among employees.

The employees also need to be aware of the performance of the technology (IA5) for the adoption process to be effective. *Performance doubts* (IA4) were the most encountered during interviews (33 occurrences) and are a major obstacle to successful adoption. These doubts range from “whether the technology would be as efficient as hoped for” (E4) to “distrust (in the technology), as employees think it is done better manually by a human” (M1). Addressing the performance of the technology will not only mitigate these doubts, but will also be beneficial to *awareness of benefits* (IA9), as they can understand what benefits the technology will bring to them personally or to the organization in general.

Lastly, awareness of the impact on work activities (IA7) of employees needs to be clear for an optimal adoption process. This construct directly relates to the possible *job insecurity* (IA6) of the employees. As mentioned in Table 5.3, job insecurity is broadly defined here. It not only captures the code *job insecurity* (C28) code, but also consists of uncertainty about the use or impact on work activities. Addressing the impact of the automation mitigates these doubts and leads to better *awareness of benefits* (IA9) and *commitment*

Impact Awareness		
ID	Name	Description
IA1	Appointing ambassadors	Appointing certain employees to become ambassadors for the novel technology is a method of communicating the usefulness of the technology. These ambassadors will receive more training and knowledge about the technology and can support other employees in the adoption process. This can also make management communication about usefulness and capabilities easier.
IA2	Creating ownership	Ownership is an excellent way to raise awareness of the usefulness and capabilities of the novel technology. Employees will feel a sense of responsibility for the effectiveness of the adoption process. Furthermore, they will have more knowledge about technology, which will lead to benefits for the other constructs in the model.
IA3	Aware of capabilities	When employees understand the things the technology can and cannot do, it becomes clear to them what they can expect from the IT automation. Furthermore, it helps employees be proactive in identifying problems and opportunities as they understand the capabilities of the technology.
IA4	Performance doubts	Performance doubts are a crucial obstacle in the effective adoption process. If employees are not sure of the effectiveness, speed, or other qualities of the technology, this can result in reluctance to use it or even resistance. A common example is not trusting the technology to perform tasks as well as a human would.
IA5	Aware of performance	The awareness of the performance of the IT automation technology is of paramount importance to avoid performance doubts among employees. It should become clear to employees what they can expect from the performance of the IT automation and make them trust the technology to do what it does best. Furthermore, this helps identify where assistance or evaluation of a human is still required.
IA6	Job insecurity	The fear of job loss is defined here as ranging from 'what will my work activities be after the adoption process?' to 'will I still have my job after the adoption process?'. Essentially it is the uncertainty about the impact of the IT automation. When these doubts and concerns exist, employees will be skeptical about the new technology and might even lead to resistance.
IA7	Aware of impact on work activities	The awareness of the impact of the adoption of IT automation critically influences the perception of employees. It not only can mitigate the doubts and concerns employees can have about uncertainty about their job and work activities, but it also provides a clear view on what can be expected from the technology and what it will change in the business processes.
IA8	Ability to identify opportunities	Identification of (future) opportunities for the use of the IT automation technology depends on the active participation of employees. If they understand the capabilities of the technology, this will aid the ability to identify these possibilities. Note that this is not a mandatory part of the process: effective adoption can be achieved without this ability. However, this greatly improves perceived usefulness and creates a sustainable innovation environment.
IA9	Aware of benefits	The awareness of the benefits of the IT automation for the employee personally or for the organization is crucial to the perceived usefulness of the IT automation technology. Some examples of these benefits are more creative tasks instead of repetitive tasks, delivering better services / products to clients, and enhancing human performance.
IA10	Perceived usefulness	The perceived usefulness describes the way employees feel about the usefulness of the technology. If they understand the benefits and capabilities of the technology, they will highly value the usefulness. When these constructs are lacking, it becomes hard to convince employees to use the IT automation technology as they do not perceive the value in doing so.

Table 5.3: The constructs in the impact awareness segment of the model.

(EA1), as employees will feel less threatened and view the technology more neutral or optimistically.

5.2.5. Effective Adoption

Finally, the effective adoption of IT automation component shows how the previously discussed components and their constructs relate to the effective adoption of IT automation. The constructs of this last component of the model are shown in Fig. 5.6 and described in Table 5.4. This shows how certain constructs from the previous components relate to the constructs of this component.

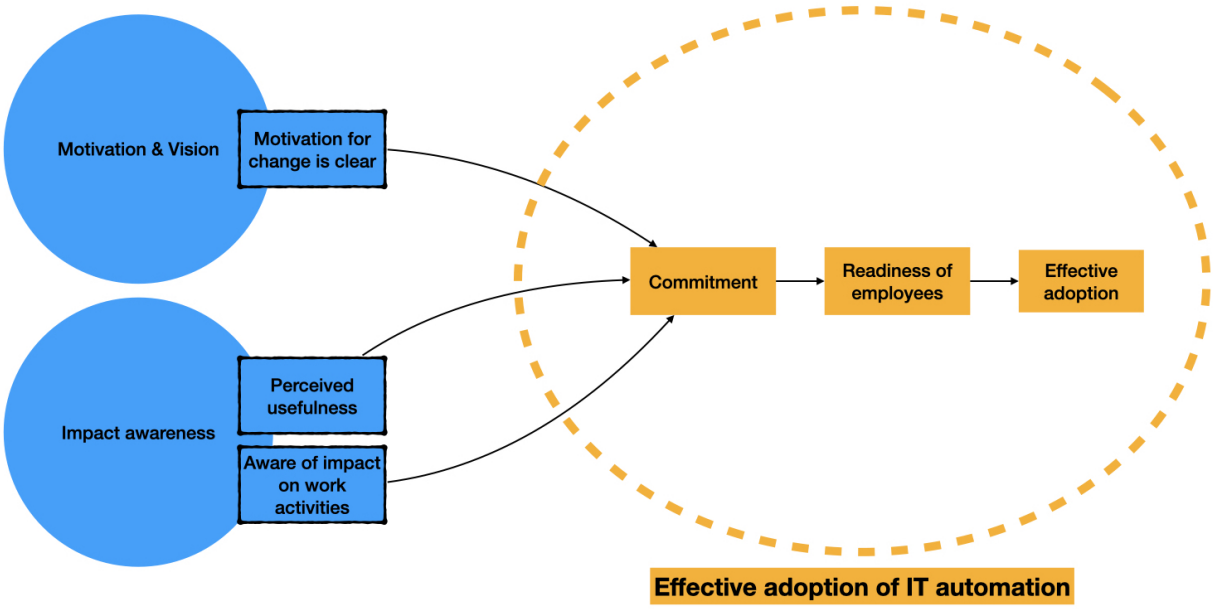

Figure 5.6: Zoom-in on the effective adoption of IT automation constructs and relations of the designed model.

Effective Adoption of IT Automation		
ID	Name	Description
EA1	Commitment	Commitment describes the motivation among employees to participate actively and positively in the adoption process. It consists of a feeling that the change matters to the organization and is also relevant to the employee. Uncertainty and lack of a clear answer to the why question will negatively impact the commitment among employees.
EA2	Readiness of employees	The readiness of employees to embrace the change and participate in the adoption of IT automation is crucial to the success of the process. Readiness is influenced by the commitment among employees, which, in turn, is dependent on multiple constructs.
EA3	Effective adoption	Effective adoption of the IT automation is the end goal of the model which describes the role of managerial communication in this process.

Table 5.4: The constructs in the effective adoption of IT automation segment of the model.

Creating commitment is the most important factor that this part of the model includes. This *commitment* (`EA1`) is influenced by three constructs from the previous components of the model. First, the motivation behind the change, including the goals it tries to achieve, should be clear for employees to be motivated to participate in the adoption process. In addition, the higher the perceived usefulness of the technology, the more the employee will be committed to make sure it is successful as there is something at stake. Finally, being aware of the impact not only creates commitment but also eliminates doubts and concerns which could hinder an effective adoption process. As mentioned in Chapter 3 and confirmed in the interviews conducted, commitment leads to readiness of employees. In turn, this will positively affect the effective adoption of IT automation.

5.3. Communication Framework

After defining the model that explains the role of managerial communication in the effective adoption of IT automation, a framework can be built based on this model with actionable guidelines for managers. This section will discuss the creation and content of this managerial communication framework. This framework should adhere to the objectives defined in Subsection 3.8.2. The evaluation of the framework with regard to these objectives will be conducted in Chapter 6.

First, the guidelines based on the root constructs of the model displayed in Section 5.2 will be discussed. These guidelines combine the input of the previous chapters and the research findings from interviews and the literature studied and are the final design artifact of this thesis research. Then, a hypothetical scenario will be discussed in which the communication framework will be applied to highlight the use of the artifact.

5.3.1. Guidelines

This section will discuss several guidelines which are based on the model presented in Section 5.2. These guidelines provide guidance to managers who want to improve their managerial communication in an IT automation process. They are based on the root constructs of the model discussed in Section 5.2, which can be found illustrated in Fig. 5.3 and described in Table 5.1. These root constructs allow the manager to actively influence them and thus affect the other constructs in the model. The guidelines are annotated with an ID to make referring to them in the latter chapters easier. Furthermore, each guideline will be discussed with a brief description and actionable items that can be used to put the guideline into practice.

G1: Involve employees actively and early in the adoption process.
Based on MC1: Involving employees in adoption process. This might seem obvious, but is of paramount importance for the effectiveness of the IT automation adoption process. Employees need to be able to process and ask questions about the decision to use the IT automation. Involving employees even earlier before the final decision is made might also be beneficial, as they might come up with overlooked questions and useful feedback. Early involvement of employees ensures that they do not feel threatened by the change and have enough room to ask questions. It also allows the manager to explain up front what the goals and impact of the change are, so that doubts and concerns can be mitigated as early and as best as possible. This is directly related to bridging the gap between the different perceptions of the type of change.

Involving employees actively in the process is beneficial for awareness of the problem among employees and creates an environment where the motivation for the change is clear. Furthermore, this helps to focus on solving the problem rather than simply adopting a new fun technology. Employee feedback is of great value in the early stages of the adoption, as it can prevent greater problems later in the process. Furthermore, actively involving employees fosters commitment among employees. This guideline mainly corresponds with the managerial communication and motivation & vision components.

- Involve (some) employees, where possible, in meetings about the IT automation technology.
- Provide a structured way for employees to submit/communicate any feedback about the IT automation technology.
- Involve employees as early as possible and actively monitor for any doubts or concerns among employees.
- Ensure that the problem or goals that the IT automation technology addresses are clear to employees.

G2: Be transparent about the motivation for & impact of the adoption of IT automation.
Based on MC5: Transparency about motivation. As discussed, communication about the motivation for the adoption of IT automation and the impact of this technology is crucial to mitigate doubts and concerns among employees. When these topics remain unaddressed, employees will have to guess what this change will mean to them. This fosters uncertainty, which is detrimental to the effective adoption of IT automation. Employees may not ask questions about these topics because they might be risk-averse. Therefore, the manager should communicate about the purpose and impact of the IT automation as early as possible.

By not including the core value of transparency in this guideline, this research would not address the ethical considerations mentioned in Section 2.8. More specifically, the main risk of deception about the

motivation and impact of the adoption of IT automation would not be considered. Therefore, transparency is embedded in this guideline, although it may mean that employees understand that certain concerns may be correct. However, transparency is crucial to prevent abuse of this communication framework and treat employees fairly. Furthermore, as found while conducting interviews, doubts and fears are very often not correct, as most organizations aim to grow and improve their services instead of replacing human jobs. A shift in work activities occurs more often, which is important to communicate upfront to employees. Like the first guideline, this guideline also directly addresses the difference in perceptions of the type of change.

Naturally, the extent to which these topics need to be addressed can differ per case. For some adoption processes, the motivation and/or impact will already be clear to the employees, and further communication might not be necessary. However, this is something that requires active investigation rather than an educated guess. This guideline mainly corresponds with the managerial communication and motivation & vision components.

- Communicate the vision and business goals of the organization towards employees. This helps them understand the motivation for the change.
- Have meetings with employees at the start of the adoption process to discuss the impact of this change for them.
- Be transparent and honest when communicating about purpose and impact.
- Give employees the possibility to ask questions about the impact and motivation.
- Investigate to what extent explicit communication is needed about the purpose and/or impact.

G3: Create a structured methodology to evaluate the performance of IT automation.
Based on MC6: Evaluating performance. This guideline focuses on the *what* and *how* of the adoption process. This research showed that performance doubts are common among employees and need to be addressed. A concise way to do this is to provide a structured way to evaluate the technology to be adopted. This will create trust among employees that the technology is thoroughly tested and that, if the evaluation results are good, the performance and usefulness of the technology is proven.

However, simply having this methodology in place is not sufficient as this along with the results needs to be communicated to the employees. Convincing employees that the performance of the technology is sufficient will eliminate any skepticism about the technology, which might cause a nonoptimal adoption process otherwise. In addition, a manager could also choose to let employees participate in the evaluation process or even let them conduct the evaluation themselves. Important to keep in mind is that this evaluation needs to take place before the decision to fully use the technology is final; otherwise, the evaluation is no more than a sham. This guideline mainly corresponds with the impact awareness component.

- Have a structured evaluation method/procedure in place for novel technologies.
- Communicate the procedure and its results to employees. A meeting in which the results (and a demo) are shown is an effective way to do this.
- In case of skeptical employees, let them participate in the evaluation process or even let them conduct the evaluation themselves.

G4: Be aware of the different information needs of employees and act accordingly.
Based on MC8: Identifying needs of employees. One of the most important things for a manager to pay attention to is the different information needs of employees. Although it holds that for all employees that the motivation, impact and usefulness should be clear to create commitment which leads to effective adoption, the extent to which these and other properties need to be communicated to them differs. For example, to convince some employees of the performance, showing them the results of a structured evaluation might suffice. For other employees, it might be necessary to let them try it themselves or give them more insight into the inner workings of the technology.

Providing employees with too much or too little information can annoy or confuse them. Therefore, a simple approach to communicating with everyone as much as possible will not be beneficial. The manager needs to actively investigate the information needs of (groups of) employees and act accordingly. These information needs can be based on profession (which is easier to identify) and personality (which is harder to identify). Communicating enough information to each employee is a challenge, but when done correctly,

the employee will be happy and motivated for the change process. Employee feedback can help identify whether your information needs are met. Furthermore, this can also shed light on their preferred type of communication for certain topics (more visual, more formal, more meetings, etc.). This guideline mainly corresponds with the managerial communication and impact awareness components.

- Decide in early stages of the adoption what information every employee needs, thus establishing the minimum basis.
- Actively investigate whether additional information is needed for certain (groups of) employees. This can be done by thinking about obvious information needs and asking employees when uncertain.
- Monitor and allow for feedback on the information that and the way it has been communicated.

G5: Involve the technology provider in the adoption process if necessary.
Based on MCT: Involve provider in process. The involvement of the technology provider in the adoption process can be of great help when certain topics are difficult to communicate internally in the organization. For example, a lack of technical understanding of the IT automation could hinder the awareness of capabilities or performance. Bringing in the technology provider to explain these topics could be an excellent move by the manager to mitigate possible doubts and concerns. In addition, the technology provider also brings a lot of experience obtained by adoption processes at other clients.

(Direct) communication with the technology provider also allows employees to ask questions and provide feedback on the technology and get an immediate response. Although they might trust the manager, receiving answers from the technology provider about the capabilities or usefulness of the technology might convince them more easily. Allowing employee feedback to be sent directly to the technology provider also eliminates the role of a conduit for the manager. However, the manager needs to be cautious that this does not create a lot of overhead and unnecessary requests. Furthermore, the manager must be able to capture the full picture and not lose control of important information that is communicated between the employees and the technology provider. Clear rules need to be defined for when and what employees can communicate with the technology provider. This guideline mainly corresponds with the managerial communication and impact awareness components.

- Involve the technology provider for topics relevant in the adoption process where the organization lacks expertise through joint meetings.
- Define clear rules for communication (when and what) between employees and the technology provider.

5.3.2. Applying Communication Framework

Now that a model that explains the role of managerial communication has been derived from the input of the previous chapters and a communication framework has been built on top of it, it remains to be discussed how this framework can be applied in practice. The main purpose of the model is for a manager to discover which constructs are present in the organization and applied well and which are lacking or need to be acted upon. For example, a manager could identify that the motivation and vision component of the model is well implemented within the organization. However, he could find that addressing impact awareness is still needed and that this currently hinders the effective adoption of IT automation. Furthermore, the guidelines presented in this section can be used to define an actionable communication plan for the manager. Based on the guidelines, the manager can identify which aspects of the adoption process he needs to pay attention to and in which ways he can do this.

To illustrate how this can be implemented, consider the hypothetical relatively young company RecruitDirect, which wants to start using a novel RPA technology developed by the software provider SoftwareNow. The core business of the organization in recruiting and employees is dedicated to providing the best services to their clients. Additionally, RecruitDirect employees are diverse in age and personality. Some employees are risk-averse and do not prefer to change existing proven methods. The manager, Alice, does not have a technical background, but recently learned about the novel technology that can increase the speed and efficiency of the current processes of retrieving candidates and vacancies. Given the ambition of RecruitDirect to grow significantly in size over the coming years, she thinks that this technology might provide a way of automating manual, repetitive labor so that her employees can focus on more creative and intelligent tasks. Making sure employees can focus on the core business instead of the (considered

boring by Alice) sourcing of candidates and vacancies will ensure that RecruitDirect can grow and improve its services.

Using the five guidelines of the communication framework, Alice can think about the adoption process up front. Taking into account G1, Alice decides to involve relevant employees early and actively in the adoption process. After conducting her own research on the novel technology, she proposes this technology to the employees and collects feedback. Using the input from employees, she gets a better understanding of the actual problem at hand; she understands which parts of the processes are the most time-consuming and inefficient. In addition, she informs the employees about the motivation and impact of the change based on G2. She lets the employees know that the adoption of this technology is aimed at business growth, speed, and efficiency. Additionally, she relates these goals to the vision of the organization. She also informs whether the impact of the IT automation is unclear and clarifies where necessary that indeed some work activities might differ after the adoption, but that the goal is to shift towards more intelligent and creative tasks.

Some employees remain skeptical about the IT automation as they do not believe that the technology provides the same quality as a human would do. Therefore, Alice decides to create a structured methodology for the evaluation of this technology and lets some employees also participate (G3). The results of this evaluation are shared with all relevant employees and serve as a basis for trust in the performance of the technology. For most employees, the information provided about the performance and motivation suffices. However, Alice has identified that some employees prefer to know more about the inner workings of the technology (G4). Although she could retrieve this information from the provider and communicate it herself, she decides to allow open communication between her employees and SoftwareNow (G5). She believes that the provider can provide the most relevant information and that this will also generate more trust in the technology among employees.

6

Communication Framework Evaluation

Simply designing a framework based on research findings does not suffice in proving its usefulness in the environment in which it should be used. Therefore, this chapter aims to evaluate the framework in a structured way with experts within the recruitment industry. This will validate the relevance and value of the framework in the environment in which the research was conducted. Like the design of the communication framework, this part of the research has mainly to do with Research Question 5 on the use of managerial communication in the IT automation adoption process.

First, in Section 6.1, the purpose of the framework evaluation and how this fits into this thesis research will be discussed. Furthermore, the method of evaluation will be presented and explained; semi-structured evaluation interviews. Then, an evaluation interview guide will be constructed in Section 6.2. In Section 6.3 and Section 6.4, the results of these interviews will be analyzed and formulated into results.

6.1. Purpose & Design

The most important reason for conducting an evaluation research phase in this thesis research is to validate the findings of Chapter 5. Although the constructs, model, and framework are based on both the literature and thorough research, it remains unknown whether they are valuable and relevant in practice. Furthermore, the framework must be validated with the objectives defined in Subsection 3.8.2 in mind. Due to time constraints, this thesis research cannot fully evaluate the research findings. However, by conducting a basic evaluation, the objective is to demonstrate the fundamental value and relevance of the research findings. Without any form of validation, the research findings could very well be based on the literature and the outcome of the interviews, but could not have any practical application. Furthermore, the research design methodology used in this research is based on the DSRM model [8], which includes an evaluation phase. As mentioned earlier when discussing these phases in Chapter 2, this research cannot carry out this phase to its full extent.

The method used to evaluate the managerial communication framework is the same as the method used to collect data in Chapter 4; semi-structured interviews with people in the recruitment industry. However, instead of conducting interviews with managers and employees, the focus will now be only on managers, as the managerial communication framework is designed with managerial use in mind. Additionally, only a subset of the managers already interviewed will be interviewed. The managers who are invited for this second round of interviews will also be referred to as experts in the remainder of this chapter. More specifically, these experts correspond to the managers in Table A.1 with IDs: `M2`, `M4`, and `M7`. These managers were selected as they work at diverse companies (size and purpose of automation) and were easy to contact and find a suitable time for an interview. These experts will be interviewed with the evaluation of the designed framework as the main focus.

6.2. Interview Guide

As mentioned, semi-structured interviews will be the core of the evaluation phase of this thesis research. Therefore, an interview guide will be constructed again using the same methodology as Chapter 4. However, this time not all the separate phases will be discussed in detail and some phases, such as preliminary testing, will not be performed due to time constraints.

Interview guide
Show participant the high-level overview of the model with the four components. Explain to the participant what the different components of the model encapsulates and what they are based on.
Show participant the zoom-in on each of component of the model. Explain to the participant the general constructs and relations, and and what they are based on.
Show participant the guidelines of the communication framework. Explain to the participant that they are based on the root nodes of the managerial component.
1: Do you agree with the general overview of the model explaining the role of managerial communication on effective adoption of IT automation? (O1, O2, O5)
2: Do you think the managerial communication component contains relevant constructs and their relations? (O1, O2, O3)
3: Do you think the motivation & vision component contains relevant constructs and their relations? (O1, O2, O8)
4: Do you think the impact awareness component contains relevant constructs and their relations? (O1, O2, O4)
5: Do you think that the effective adoption of IT automation component contains relevant constructs and their relations? (O1, O2)
6: Do you agree that you have the ability to directly influence the root constructs of managerial communication? (O3, O6, O7)
7-11: Do you think that you could apply this guideline (for each of the 5 guidelines) to managerial communication in an adoption process of IT automation? (O3, O4, O6, O7, O8) • Do you think that it would positively affect the effective adoption of IT automation? • Do you see any obstacles to implementing this guideline?
12: Do you think that this framework and model provide an answer as to how managerial communication leads to effective adoption? (O2, O5)
13: Do you have additional feedback on the model or guidelines that we have not talked about yet?

Table 6.1: Interview guide for expert interviews with managers.

Expert interviews will focus on the outcome of the discussed research; the managerial communication framework including the constructed model and the derived guidelines. Discussing every single construct and relation in detail will be too time consuming and is not relevant for the validation of the practical application. Therefore, the main focus of the interview will be to ask managers to evaluate the usability and correctness of the overall framework and its actionable elements. The questions in the interview guide should also be related to the objectives defined in Subsection 3.8.2. Furthermore, the interview questions are designed in a less open-ended way to be able to conduct a meaningful analysis focusing on yes/no and positive/negative answers. This also allows for a somewhat quantitative analysis of the results.

At the start of the interview, the model that contains constructs and relations along with the derived guidelines will be shown to the participant. A brief explanation should suffice to clarify the contents and purpose of this framework. In addition, the way the guidelines were created based on the root constructs of the model will be explained explicitly. The participant will be asked whether there are any things that remain unclear and need to be explained in more detail. Then, the evaluation interview questions will visit each component of the high-level overview of the model. This mainly relates to the main goals that were defined in the objectives of the framework. Additionally, the guidelines with their practical implications will be discussed with the manager. To find an answer to the primary research in the main goal of this research, Question 12 was added to validate whether this was achieved. As explained in Section 2.8, the main ethical risk that this research addresses is deception. The method of addressing this risk will also be evaluated in the interviews by asking questions about Guideline G2. This also makes it possible to validate the feasibility and willingness of managers to implement this guideline.

Finally, the manager will be asked for any additional feedback or comments on the designed managerial communication framework. The described process is translated into an interview guide, which is shown in Table 6.1. For each question, the objectives of Subsection 3.8.2 to which it relates are also displayed. Therefore, by analyzing the responses, it will be possible to ensure that the framework has met the objectives. Note that objective O9 is not mentioned in the interview guide, as this evaluation itself achieves this objective.

6.3. Analysis

Like the other methodology used in this chapter, the analysis of the evaluation interview data follows the same approach as used in the first round of interviews. Analysis of the results uses the same coding technique as discussed in Section 4.5. However, the coding process focuses more on deductive coding [85], where the individual codes are defined upfront. This is mainly due to the fact that the questions are designed to probe a positive or negative response (instead of being open-ended). Therefore, the codes defined up front aim to capture the sentiment of the answer of the participant. For each question that this applies to (Question 1 to Question 12), a set of four codes has been defined. This set consists of negative, neutral, positive, and extremely positive. A response would be coded 'negative' if the participant disagrees or thinks there is something important missing in the content that the question discusses. If the participant indicates that the content looks okay but he does not agree or disagree, the 'neutral' code will be assigned. A 'positive' response consists of the interviewee agreeing with the content that the question is about. A response would be coded as 'extremely positive' when the participant strongly agrees with the content and feels that it addresses its purpose very well.

In addition, some codes with common feedback or comments have been defined inductively. This type of coding was used mainly for responses to the follow-up questions of Question 7 up to 11 and Question 13. The complete list of codes used for the analysis of the evaluation interview data can be found in Appendix B.

6.4. Results

This section will discuss the results of the evaluation of the managerial communication framework designed in Chapter 5. As alluded to earlier in this thesis report, the evaluation was aimed to be conducted quantitatively. Therefore, the results of the coding of the previous step will be converted into a quantitative score for each of the elements evaluated by the expert interviews. After these results have been presented, some interesting findings will be discussed. Then some of the general feedback encountered will be discussed.

To obtain a score for each of the elements, the questions that aimed to evaluate the coding results were collected. These results indicated for each manager whether he responded negatively, neutrally, positively or extremely positively for each question that was coded with these four categories in mind (Question 1 to Question 12). Then, each category was given a number of points and the corresponding points were aggregated into a final score for each element. The number of points given was 0, 1, 2, or 3 for, respectively, a negative, neutral, positive, or an extremely positive response. The results of using this method on the coding analysis can be found in Table 6.2 for the model and Table 6.3 for the framework.

Question	Negative	Neutral	Positive	Extremely positive	**Score**
Q1: High-level overview model	0	0	3	0	**6**
Q2: Managerial communication component	0	0	3	0	**6**
Q3: Motivation & vision component	0	1	2	0	**5**
Q4: Impact awareness component	0	0	1	2	**8**
Q5: Effective adoption component	0	0	2	1	**7**
Q6: Actionable root constructs	0	0	1	2	**8**

Table 6.2: Results of evaluating the different components and aspects of the model.

Table 6.2 shows that the experts evaluated the model positively, which shows the validity and usability of the model. Furthermore, it ensures that most of the objectives are indeed achieved, as the questions asked about the model correspond to certain objectives. It can be seen that the motivation & vision component has the lowest score of the other elements. One expert manager (M7) responded neutrally to this part of the model, although he agreed that all the constructs in this component are relevant. However, he indicated that "a sense of urgency for the adoption process is necessary" (M7) to ensure that the employees are motivated and committed. This element could be seen as part of problem awareness (MV1) and could be incorporated into the model after further research.

All participants responded positively to the actionability of the root constructs in the managerial communication component. This shows that these constructs can actually serve as a basis for formulating

concrete advice to the manager for the communication process during the IT automation adoption process. The experts agreed that they can influence these constructs and that they think that it will indeed result in a more effective adoption process.

Question	Negative	Neutral	Positive	Extremely positive	**Score**
Q7: Guideline G1	0	0	2	1	**7**
Q8: Guideline G2	0	0	3	0	**6**
Q9: Guideline G3	0	0	2	1	**7**
Q10: Guideline G4	0	0	0	3	**9**
Q11: Guideline G5	0	0	2	1	**7**
Q12: Addresses research question	0	0	1	2	**8**

Table 6.3: Results of evaluating the managerial communication framework.

Table 6.3 shows that the framework was positively evaluated by all experts. All five guidelines of the framework were evaluated by each manager at least positively and in some cases extremely positively. Guideline G2 touching on transparency about the motivation and impact of the change received the lowest score of the guidelines. Although all managers responded positively to this guideline and agreed on its importance, they had some concerns about possible conflicting business and employee interests. In some cases, these might contradict each other, and it might be hard for the manager to fully commit to this guideline. This conflict, with the risk of deception, was already mentioned in the ethical considerations of this research and definitely deserves attention in future research.

Guideline G4, referring to the different information needs of the employees, was extremely positive, as the managers indicated that it is actionable and something commonly forgotten. Involving employees and acting on their information needs is something that provides value in, and ensures the effectiveness of the adoption process.

Inductively, two codes were created to capture the feedback that was given in multiple interviews. First, *identifying relevant employees* (EC49) was suggested as an addition to the framework. Experts indicated that the framework talks about employees in a general sense. In some cases, this is not desirable as the manager needs to identify which employees are relevant for (different phases in) the adoption process. The model and framework could be extended in some way to identify the relevant employees for each guideline, but this is left for future research. Another comment found in two of the three interviews is related to the relatively low score of Guideline G2. Participants indicated that sometimes full transparency is not possible due to business interests. In those cases, this guideline might be impossible to fully implement. However, this feedback is left for future research to address by finding a proper solution for situations where the business interests obstruct full transparency.

The results presented in this section are very positive, which can be a reason to doubt the validity and value of the findings. There can be several reasons why the results can be overly positive [88]. These reasons and whether they apply or not will be discussed in these last few sections, discussing the results. First, the questions asked in the interviews could be nonoptimal in a sense where they do not sufficiently cover the topics that needed evaluation or were misinterpreted by the interviewee. To ensure that this would not be the case, the interview guide was constructed using a structured methodology [16]. Furthermore, the interviewees were given the opportunity to ask questions at any time if anything was unclear. Additionally, they could also provide comments at the end of the interview if they felt something needed to be considered in the evaluation other than the questions in the interview guide. As the participants did not indicate anything was missing or unclear, misinterpretation or misleading / incorrect questions is believed to be not the cause of the positive results.

Another cause could be the careless or lazy participation of interviewees during interviews [89]. This boils down to the participant not being involved or interested in the content of the questions. This would lead to positive answers as the interviewee does not care about the outcome and would rather 'be done with it'. These careless responses are often indicated by quick and fast responses [90]. As all interviewees expressed their concern about the process of adopting IT automation and indicated how improvements would bring great benefits to their organizations, this cause is also not applicable to the results of this thesis research.

Finally, positive results could be caused by the current situation and the context in which the problem is located. If there is no alternative or the proposed solution is better than anything else currently used, asking questions would lead to relatively positive responses. This is applicable to the results of the evaluation interviews, as the participants indicate that there is no current structured solution other than that each manager communicates the way that he feels is best in the adoption process. However, the positive results have more merit than only being the only current solution/methodology, as the evaluation interviews also touch on the validity of the underlying model and constructs. Therefore, the results show that the framework is valuable and valid, but future research will have to evaluate the framework in an evolved research field with alternatives.

7

Discussion

This chapter will discuss the findings of this study and will especially focus on its limitations. As some limitations and constraints were encountered over the course of this research, it is important to be aware of these and address them properly. Additionally, a personal reflection will dive into findings or elements of the research that were surprising or worth mentioning. Finally, possible future research directions will be discussed, some of which relate to the limitations listed in the first section of this chapter.

7.1. Limitations

This section will discuss the limitations of the research conducted. Most of the limitations relate to the scope and (time) constraints of a master's thesis. Considering these limitations is important as it addresses the boundaries of the research carried out and explains why they were encountered. Furthermore, some of the limitations will also serve as a basis for future research directions mentioned in Section 7.3.

- **Recruitment industry limitation:** The research carried out has only investigated the recruitment industry, which may not be representative of other domains. The recruitment industry is very human-centered, since the contact between candidates and recruiters is the main aspect of this business. Often, the automation tools currently deployed do not completely redefine these business processes, but are used to optimize other processes and used as tool to enhance the human work. Employees feel that the human component will remain essential to their line of work, which causes the fear of replacement to be likely less prominent than it would be in other more manual processes-centric industries such as the automotive industry. Applying the findings of this research to other less human-centered domains must therefore be done with caution as the time constraints of this thesis did not allow it.
- **RPA limitation:** The research carried out has only investigated RPA as an IT automation technology. However, RPA is not the most complex automation technique, especially when considering newer AI-driven automation techniques. This might limit the applicability of the managerial communication framework to automation technologies that have multiple different properties. Although it is expected that this will only make certain constructs of the communication more dominant/important, which results in certain guidelines being more prevalent, this is a limitation which this research could not address within the scope of a master's thesis.
- **Managerial trust limitation:** Although managerial trust has been touched on in the literature research phase of this thesis in Chapter 3, this topic could not be fully addressed in the remainder of the research. Therefore, it is also not explicitly implemented by one of the constructs of the model (only to some extent by `MC5` which refers to transparency). However, this topic could be relevant to managerial communication in the IT automation adoption process and could be considered as future research.
- **Ethical considerations**: Although Section 2.8 discussed some of the ethical considerations of designing a managerial communication framework for the IT automation adoption process, this research only actively addressed one of the risks: deception. There might be other ethical considerations that need to be addressed, but that is left for future research because of the constraints of this master's thesis.

- **Limited number of interviews:** In total 15 interviews have been conducted with a total of 12 interviewees. Although in Chapter 4 it is shown that the interviewees and their companies are diverse enough, 12 participants is still a limiting number of interviews. However, conducting more interviews was not possible within the scope and time constraints of the master's thesis.
- **Lack of extremely bad adoption processes:** The organizations where the adoption process went extremely poorly are undersampled in the interviews of this research. Although several attempts have been made to especially include these "bad examples", interview invitations were rejected most of the time, or communication was ignored or extremely slow. This means that certain aspects which were obstacles to the adoption process of IT automation might have been overlooked and would require further investigation.
- **DSRM adapted:** Due to the time constraints of the master's thesis, not all steps of the DSRM Process Model [8] could be conducted to their full extent. Therefore, the DSRM Process Model [8] has been adapted to fit the constraints and scope of the master's thesis. For example, the demonstration and evaluation phases have been combined and the communication phase has been significantly compressed.

7.2. Reflection

This section will discuss some personal reflections on the findings of this thesis research. The main reason why this thesis research was conducted was the lack of research on the combination of topics such as job insecurity, adoption, and fears and doubts of employees with regard to IT automation. Therefore, this thesis research attempted to combine these concepts and create a meaningful tool in a business setting. The reason this was not previously addressed is perhaps the lack of a sense of urgency in this domain, as adoption studies are focused more on the rational and positive aspects of adoption. However, in the coming years it will be extremely important to consider the human perspective as well in automation adoption processes, even if the automation does not fully replace the human. Personal experience from this thesis research confirms that the value of this research is also acknowledged by managers and employees in the recruitment industry.

Although research on these topics is important, it might be difficult to research this area. (Personal) connections to collect research data and to get in touch with the right people were crucial for the conduct of this thesis research. And even with these connections, it was not possible to conduct interviews at companies where the adoption process was unsuccessful. This might be a barrier to future research in this domain.

It was surprising to find how human-centered the recruitment industry is. As mentioned in the limitations of this research, the fear of replacement by automation or other IT technologies was found to be relatively low in this domain. Managers and employees indicated that the core processes of their businesses, such as the communication and interviews with candidates, require the 'human touch' which can not be replaced by any amount of automation. This was surprising because information technology has had a significant impact on this industry over the past couple of years. Most organizations can no longer exist without the help in efficiency and speed of IT automation. However, the confidence that human recruiters will always be needed is a pleasant surprise. It could very well be correct, as the future will show what activities remain essential to be done by humans in the processes within the recruitment industry.

Another surprise was the amount of enthusiasm and positive responses to the designed managerial communication framework. Although the research was always conducted with practical use in mind, the perceived usefulness of the framework as indicated by the experts was a surprise. Additionally, conducting interviews was very pleasant, something that was not expected at all at the beginning of this thesis.

7.3. Future work

In addition to the limitations and personal reflections of the research, this section also presents several future research directions. These suggestions can be used to address certain limitations and unknowns of the research conducted.

- **Extend to other domains/technologies:** Future research could investigate the applicability of the managerial communication framework to domains other than the recruitment industry and other (automation) technologies. Although this research suggests that the framework still provides values

in these domains and for these other technologies, it remains to be validated by further research. There may also be elements that were not identified in this study but are relevant in other domains. Future research could identify these differences and similarities and combine them into a more complete and generalizable framework. A concrete example of a domain where the framework could be researched is the automotive domain, where new and differing aspects of the adoption process could be discovered and incorporated in the framework.

- **Address other ethical considerations:** This thesis research has only explicitly addressed the risk of deception as one of the ethical considerations. However, many more risks could be identified and addressed with respect to managerial communication in the IT automation adoption process. These risks were left out of the scope of this master's thesis, but deserve attention in subsequent research. For example, the amount of information shared by the manager could be researched. Furthermore, this also relates to the evaluation feedback discussed in Section 6.4, where the core value of transparency could be obstructed due to business interests. Future research should address these concerns by designing a solution for these cases.
- **Identifying relevant employees:** In some cases, the proposed managerial communication framework may not fully address the complexity of (larger) organizations where the manager has to identify relevant employees for each guideline. In these cases, an extension of the framework that helps the manager with this identification process could be a solution. This would extend the usefulness of the existing framework and be another valuable tool for managers.
- **Evaluating framework in practice:** As mentioned, the DSRM Process Model [8] has been adapted to the scope and constraints of this research. Therefore, the demonstration and evaluation phases have not been carried out to a full extent. For example, the managerial communication framework has not been evaluated in a real organizational context. This would further confirm the validity and usefulness of the framework. Future research could conduct a case study in which the managerial communication framework is implemented within an organization that wants to adopt IT automation technology.

8

Conclusion

This thesis started by describing a common problem within an organization that wants to adopt IT automation. This problem consists of the nonoptimal use of IT automation technology due to concerns and uncertainties among employees. This affects not only the organization and its managerial layer, but also the employees and technology provider. In the coming years, understanding this problem will be crucial to the effective adoption of novel technologies such as ChatGPT. This research proposed designing a managerial communication framework for the IT automation adoption process addressing the root cause of the problem as defined in this thesis. This comes down to the gap between managers and employees in their perception of the change. The employees view it as an organizational change process, whereas the manager sees only a process optimization. As the scope of the problem is quite broad, this thesis research focuses on RPA in the recruitment industry.

The primary of this research was as follows: ”How can managerial communication lead to effective adoption of IT automation?”. This question encapsulates the problem that led to this research and seeks a solution. To answer this question, the main question was dissected into five subquestions. The Design Science Research methodology [7] was used and adapted to the constraints of this thesis to create a solid scientific structure where each of the subquestions spanned one or multiple phases of the Process Model [8]. By using structured proven methodologies from the knowledge base, research rigor and traceability was ensured. This also involved the goal of designing an artifact which addresses the problem and knowledge gap studied. The artifact created in this research is a managerial communication framework that consists of a model and guidelines with actionable elements for managers.

A literature review has been conducted to answer the first two subquestions about the adoption of IT automation and the doubts & fears of employees regarding this adoption process. Furthermore, this literature review identified relevant concepts which are the basis for the research in this master’s thesis. Semi-structured interviews were used as the main means of collecting data from the environment of the problem. Conducting and analyzing these interviews with employees and managers was carried out to answer subquestions 3 and 4. This analysis was built on top of the knowledge base by using concepts in the coding process that were identified in the literature review. The results of this analysis were the basis for the designed model that explains the role of communication. This model consists of four main components: managerial communication, motivation & vision, impact awareness, and effective adoption of IT automation. It consists of constructs and their relation explaining how managerial communication can be used to influence the adoption process. Furthermore, the interviews showed that there is a difference in perception of the nature of change between managers and employees.

For the managerial communication component of the designed model, several root constructs were identified by combining interview data and the literature review. These root constructs can be directly influenced by the manager to steer towards an effective adoption process. Therefore, five guidelines based on these root constructs were designed to address the last subquestion. These guidelines show how managerial communication can be used to address relevant topics in the adoption process. First, the manager should involve employees early and actively in the adoption process to not surprise employees with a sudden change and to allow them to provide feedback. This also improves the problem-awareness of employees and clarifies the motivation of the change. Second, the manager should be transparent about the impact of and motivation for the change. When considering the ethical concerns of a managerial

communication framework, it was found that deception was the main risk of this study. Therefore, transparency is embedded as a core value in the framework. This ensures that the manager communicates about the impact of the change that addresses uncertainties and fears that could exist among employees. Third, this research finds that a structured methodology should be created to evaluate new IT automation technologies within organizations. This will address performance doubts, which were found to be the most prevalent in the interviews conducted. Fourth, employees have different information needs that the manager should act on properly. This eliminates possible doubts about unknown information and possible frustration about information overload. Finally, involving the technology provider in the adoption process when necessary can be extremely valuable for organizations that lack expertise in automation technology.

In addition to designing the managerial communication framework, this research evaluated the validity and usability of the framework with experts. This evaluation consisted of another round of interviews with several managers. The questions aimed to evaluate the defined objectives and the usefulness of the framework. The results of these interviews were extremely positive. They show that the framework is indeed a valuable tool for the manager and addresses the primary research question. By using the framework, the manager can bridge the gap between the different views on the adoption of IT automation to ensure an effective adoption process. The answers or methods used to find answers to the research questions have been summarized in Table 8.1.

How can managerial communication lead to effective adoption of IT automation?	
Question	Answer
1: How can the adoption of IT automation best be explained by existing models?	A literature review was conducted to find relevant models. TAM [21] and TOE [23] explain the positive side of the adoption process, and the five stages of adoption [31] explain the difference in adopters. However, the existing literature does not fully explore possible fears of employees, ethical concerns, and especially the role of communication.
2: What are the fears and doubts of employees about automation and how can they be explained?	A literature review was conducted to find relevant concepts. Job insecurity is mentioned as a common fear among employees when it comes to automation, in general. Furthermore, uncertainty about the goal, purpose, or implication of the change is relevant to consider when adopting a novel technology. Especially managerial communication can influence these fears and doubts.
3: What is the relationship between managerial communication and the adoption of IT automation?	This question was addressed by conducting semi-structured interviews based on the concepts encountered in the literature. Managerial communication greatly influences the adoption process in various ways. The findings regarding this relation are summarized by the model created from constructs in Chapter 5.
4: How does managerial communication impact the stakeholders in the adoption process?	Using semi-structured interviews, the impact of managerial communication on especially employees was researched. The communication of the manager is of paramount importance for the success of the adoption process. It can eliminate or mitigate possible blockers to effective adoption, such as uncertainty among employees. The contents of this answer are summarized in the model created in Chapter 5.
5: How can managerial communication be used to improve the process of adopting IT automation?	The findings of the semi-structured interviews were translated into an actionable managerial communication framework (Chapter 5). This framework shows how the manager can use communication in a structured way to achieve effective adoption. Furthermore, the created framework is evaluated by semi-structured with experts in Chapter 6.

Table 8.1: The five research questions of this thesis research and their answers.

The use of the managerial communication framework creates value for all stakeholders in the IT automation adoption process, which is illustrated in Fig. 2.2. First, the manager can use it as a method to structure managerial communication during the adoption process and identify problems earlier. It allows him to reap the promised benefits of the IT automation more effectively. Employees benefit as their doubts are fears are addressed, and they understand what the impact of the adoption will be. This results in greater job satisfaction. Lastly, the technology provider also indirectly benefits from managers implementing the communication framework, although this is not explicitly researched in this thesis report. In summary, this research contributes to both the knowledge base and the environment of the Design Science Research methodology [7], as mentioned in Section 2.5. It contributes to the knowledge base by constructing a model that explains (the relations of) existing and novel constructs in the IT automation adoption process.

In addition, it provides valuable additions to the environment by creating an applicable management communication framework with actionable guidelines to implement during the adoption process. The design part of the research consists of constructing the managerial communication model and framework.

This research is relevant in multiple ways. First, the research has scientific relevance, as it adds new knowledge to the existing knowledge base. The main contributions here are contained in the model that explains the role of managerial communication in the IT automation process. This model and its constructs are based on and extend existing literature and provide a better understanding of managerial communication in the IT automation adoption process. Furthermore, the research has societal relevance, as it provides value to all stakeholders in IT automation problems. The managerial communication framework can prevent/mitigate the negative consequences of a nonoptimal adoption process. It provides actionable guidelines and items that the manager can use to ensure a more effective adoption process. It also serves as a tool for the manager to analyze managerial communication and discover weaknesses or areas of interest. This relevance is also validated by conducting evaluation interviews with several experts in the recruitment industry when it comes to managing an IT automation adoption process. The results show that the communication framework is perceived as valuable and actionable for practical use. Both the scientific and societal relevance are also embedded in this research as it adopts the Design Research Science methodology [7, 8]. The additions to the knowledge base and the environment, respectively, capture the scientific and societal relevance.

Lastly, the research conducted in this master's thesis is also relevant when viewed from a Management of Technology perspective. The research consists of studying technology, in this case IT automation, within an organizational context where the aim is to develop services and products. The research also takes place in a technological context where innovation and adoption processes are studied using a scientific methodology (DSRM [7, 8]). The automation technology discussed in this thesis, mainly RPA, is approached from a corporate perspective, as the organization aims to use the technology to achieve business goals. Therefore, understanding the effective adoption of IT automation and the role of managerial communication is crucial to ensure this. Finally, this thesis research has applied scientific methodologies where possible to ensure the research rigor and validity of the results. The requirements stated for a Management of Technology thesis can also be related to the core properties that the Design Research Science methodology encapsulates [7, 8].

The research carried out in this thesis has several limitations which were discussed in this report. As mentioned, its focus is on RPA in the recruitment industry, which limits the immediate generalizability to other domains and technologies of the designed framework. Furthermore, this thesis research could only conduct 12 interviews in total (excluding evaluation interviews) and could not include organizations where the adoption process went extremely bad. This thesis has also set clear boundaries on what it does and does not research and therefore could not address all of the intricacies of managerial trust and ethical considerations. Addressing these limitations, extending the framework with solutions for specific use cases, and evaluating the framework in a case study is, therefore, left as future research.

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A

Interview Summaries

This appendix contains the summaries of participants who were interviewed for this thesis research. They include the role of the interviewee in the organization and his or her work activities. The summaries can be found in Table A.1.

ID	Category	Domain	Role & Work Activities
M1	Manager	Technology provider of RPA	Operational manager within a company that provides RPA technology to mainly recruitment companies. Operates within a smaller company, which leads to having multiple roles, including marketing and sales. Is in frequent contact with clients who are in some phase of the IT automation adoption process.
M2	Manager	Company connects vacancies to freelancers. Uses RPA for retrieving vacancies.	Manager responsible for the sales and recruitment departments of a company that connects vacancies to freelancers. RPA was an active decision to make business processes more efficient.
M3	Manager	Company that connects vacancies to truck drivers and uses RPA on multiple fronts.	Owner and director of a company that matches vacancies to candidates in the logistic domain. RPA and automation is an core component of managing the successful company and is crucial for the growth of the company.
M4	Manager	Recruitment agency focused on the mediation of IT professionals for permanent positions. RPA tooling improves business processes.	Recruitment manager within a company connecting developers to vacancies. RPA is used as a tool for sourcing candidates and making processes more efficient.
M5	Manager	Large software provider specialized in developing smart solutions using RPA for big companies.	HR manager within a RPA software provider also responsible for internal engagement and delivery management, has a lot of experience with IT automation. RPA and smart solutions are the core of the business.
M6	Manager	Company that operates as an intermediary company for IT professionals. RPA is used to improve the efficiency of finding vacancies.	ICT coordinator focused on improving the business process using IT automation. RPA was an active choice to improve the speed and accuracy of getting vacancies into the company's internal IT systems.

M7	Manager	Executive search company that finds candidates for specific client requests and uses IT automation to optimize their business processes.	Operational excellence and digitalization manager that takes care of identifying automation opportunities for business processes. RPA tooling is used to source candidates and improves data quality, which allows for a better ability to perform meaningful analysis on the collected data.
E1	Employee	Intermediary broker company for connecting developers to companies.	Back-office employee that works mainly with salary administration and administration tasks in general. RPA tools help automate some of the standardized and time-consuming manual tasks.
E2	Employee	Company connects vacancies to freelancers. Uses RPA for retrieving vacancies.	Match consultant which mainly works on connecting supply and demand in the freelancer and employer market. RPA tools help to find vacancies and get relevant information about them.
E3	Employee	Company that connects vacancies to truck drivers and uses RPA to source candidates.	Work activities include sourcing, reaching out to, and having interviews with potential candidates. RPA is used in optimizing processes and making them more efficient.
E4	Employee	Recruitment agency focused on the mediation of IT professionals for permanent positions. RPA tooling improves the candidate acquisition process.	Mainly focusing on the sourcing of candidates and maintaining relationships with clients. Recently, switching between roles (manager and consultant). RPA improves sourcing processes of company.
E5	Employee	Intermediary broker company for connecting developers to companies.	Work activities mainly include back-office tasks such as salary administration and administration in general. RPA tools help in automating some of the standardized, time-consuming manual tasks, such as the invoicing and hour registration.

Table A.1: Summaries of generic job and domain description of interviewees.

B

Codes

This appendix includes tables with all the codes used in the thesis research to analyze interview transcripts. The methodology of constructing the codes can be found in Section 4.5 for the first round of interviews (corresponds to Table B.1) and Section 4.5 for the second round of interviews for evaluating the framework with experts (corresponds to Table B.2).

ID	Name	Description	Group
C1	Evaluating performance	The interviewee indicates that the IT automation was evaluated by performance.	Approach
C2	Identifying manual processes	The interviewee indicates that manual processes were actively identified before or during the adoption process.	Approach
C3	Involving employees in adoption process	The interviewee indicates that the employees were actively involved in the adoption process.	Approach
C4	Appointing ambassadors	An ambassador was appointed within the organization for the new IT automation to create commitment.	Commitment
C5	Aware of benefits	The interviewee was aware of the benefits of IT automation and / or indicated that this is important for commitment.	Commitment
C6	Aware of business goals	The interviewee was aware of the business goals that the IT automation aimed to achieve and/or indicated that this is important for commitment.	Commitment
C7	Aware of capabilities of technology	The interviewee was aware of the capabilities of the the IT automation technology and/or indicated that this is important for commitment.	Commitment
C8	Aware of impact on work activities	The interviewee was aware of the impact on their work activities caused by IT automation and / or indicated that this is important for commitment.	Commitment
C9	Aware of impact on performance	The interviewee was aware of the performance of the IT automation technology and/or indicated that this is important for commitment.	Commitment
C10	Aware of impact on problem	The interviewee was aware of the problem that should be solved by IT automation and / or indicated that this is important for commitment.	Commitment
C11	Creating ownership	Ownership was used a means to create commitment among employees.	Commitment
C12	Addressing impact of automation	The interviewee indicated that the impact of the automation was addressed by the manager.	Communication

C13	Addressing job insecurity	The interviewee indicated that the manager addressed the possible job insecurity.	Communication
C14	Crucial	The interviewee indicated that managerial communication was crucial (in the success of the) adoption process of the IT automation.	Communication
C15	Different needs of employees	The interviewee indicated that employees can have different information needs in the adoption process.	Communication
C16	Employee feedback	The interviewee indicated that employee feedback was actively provided and used in the adoption process.	Communication
C17	Explaining business goals	The interviewee indicated that the business goals related to the IT automation were explained by the manager.	Communication
C18	Explaining problem	The interviewee indicated that the problem that was attempted to be solved by the IT automation was explained by the manager.	Communication
C19	Explaining usefulness	The interviewee indicated that the (target) usefulness of IT automation was explained by the manager.	Communication
C20	Explaining vision	The interviewee indicated that the vision related to the IT automation was explained by the manager.	Communication
C21	Mails	E-mails or similar textual means of communication were used in the IT automation adoption process by the manager	Communication
C22	Meetings	(Online) meetings were used as a means of communication in the IT automation adoption process by the manager	Communication
C23	Open communication	There was some form of direct communication with the provider used by the manager or the employees during the adoption process.	Communication
C24	Start of adoption process	The manager started communication to employees about the adoption at the start of the process.	Communication
C25	Visual explanation	The interviewee indicated that visual explanation was crucial to the managerial communication in the adoption process.	Communication
C26	Dependency fear	The interviewee expressed that concerns about dependence on the IT automation played a role in the adoption process.	Doubts & fears
C27	General doubts	The interviewee expressed that general concerns about the IT automation played a role in the adoption process.	Doubts & fears
C28	Job insecurity	The interviewee expressed that job insecurity caused by the IT automation played a role in the adoption process.	Doubts & fears
C29	Misaligned expectations	The interviewee expressed that misaligned expectations about the IT automation played a role in the adoption process.	Doubts & fears
C30	Performance doubts	The interviewee expressed that doubts about the performance of the IT automation technology played a role in the adoption process.	Doubts & fears
C31	Unsure of impact	The interviewee expressed that uncertainty about the impact of the IT automation played a role in the adoption process.	Doubts & fears
C32	Unsure of use	The interviewee expressed that uncertainty about the usefulness/use of the IT automation played a role in the adoption process.	Doubts & fears

C33	Accuracy	The interviewee indicated that accuracy should be obtained by the IT automation.	Goals of automation
C34	Automating boring tasks	The interviewee indicated that the IT automation was aimed to automate otherwise boring tasks.	Goals of automation
C35	Business growth	The interviewee indicated that the IT automation was aimed to achieve business growth.	Goals of automation
C36	Competitiveness	The interviewee indicated that the IT automation was used to get ahead/obtain an advantage over competitors.	Goals of automation
C37	Completeness	The interviewee indicated that the IT automation was used to make the processes/data more complete.	Goals of automation
C38	Efficiency	The interviewee indicated that the IT automation was used to make the business processes more efficient.	Goals of automation
C39	Enhancing human tasks	The interviewee indicated that the IT automation was used enhance human tasks such that the human can do more/better.	Goals of automation
C40	Improving services	The interviewee indicated that the IT automation was aimed to improve services of the organization.	Goals of automation
C41	Removing human dependency	The interviewee indicated that the IT automation was aimed at removing the human dependency in processes.	Goals of automation
C42	Speed	The interviewee indicated that the IT automation was intended to increase the speed of business processes.	Goals of automation
C43	Change of tasks	IT automation resulted in a change in work activities / tasks for employees.	Impact of automation
C44	Creating jobs	IT automation resulted in the creation of more jobs as more work can be handled.	Impact of automation
C45	More creative tasks	IT automation resulted in a shift of focus in work activities for employees towards more creative tasks.	Impact of automation
C46	Removing jobs	IT automation resulted in employees being fired due to the impact of IT automation.	Impact of automation
C47	Different after adoption	The interviewee indicated that his view on the type of change of IT automation differs from the view he had before the adoption process.	Type of change
C48	Optimizing processes	The interviewee indicated that he perceived the type of change of IT automation before the adoption process as optimizing business processes.	Type of change
C49	Organizational change	The interviewee indicated he perceived the type of change of the IT automation before the adoption process as organizational change.	Type of change
C50	Replacing human	The interviewee indicated that he perceived the type of change of IT automation before the adoption process as replacing the human in the process.	Type of change

Table B.1: Codes, their description, and code group for the first round of interviews.

ID	Name	Description
EC1	Q1:negative	The interviewee responds negatively to Q1 in the interview guide.
EC2	Q1:neutral	The interviewee responds neutrally to Q1 in the interview guide.
EC3	Q1:positive	The interviewee responds positively to Q1 in the interview guide.
EC4	Q1:extremely	The interviewee responds extremely positively to Q1 in the interview guide.
EC5	Q2:negative	The interviewee responds negatively to Q2 in the interview guide.
EC6	Q2:neutral	The interviewee responds neutrally to Q2 in the interview guide.
EC7	Q2:positive	The interviewee responds positively to Q2 in the interview guide.
EC8	Q2:extremely	The interviewee responds extremely positively to Q2 in the interview guide.
EC9	Q3:negative	The interviewee responds negatively to Q3 in the interview guide.
EC10	Q3:neutral	The interviewee responds neutrally to Q3 in the interview guide.
EC11	Q3:positive	The interviewee responds positively to Q3 in the interview guide.
EC12	Q3:extremely	The interviewee responds extremely positively to Q3 in the interview guide.
EC13	Q4:negative	The interviewee responds negatively to Q4 in the interview guide.
EC14	Q4:neutral	The interviewee responds neutrally to Q4 in the interview guide.
EC15	Q4:positive	The interviewee responds positively to Q4 in the interview guide.
EC16	Q4:extremely	The interviewee responds extremely positively to Q4 in the interview guide.
EC17	Q5:negative	The interviewee responds negatively to Q5 in the interview guide.
EC18	Q5:neutral	The interviewee responds neutrally to Q5 in the interview guide.
EC19	Q5:positive	The interviewee responds positively to Q5 in the interview guide.
EC20	Q5:extremely	The interviewee responds extremely positively to Q5 in the interview guide.
EC21	Q6:negative	The interviewee responds negatively to Q6 in the interview guide.
EC22	Q6:neutral	The interviewee responds neutrally to Q6 in the interview guide.
EC23	Q6:positive	The interviewee responds positively to Q6 in the interview guide.
EC24	Q6:extremely	The interviewee responds extremely positively to Q6 in the interview guide.
EC25	Q7:negative	The interviewee responds negatively to Q7 in the interview guide.
EC26	Q7:neutral	The interviewee responds neutrally to Q7 in the interview guide.
EC27	Q7:positive	The interviewee responds positively to Q7 in the interview guide.
EC28	Q7:extremely	The interviewee responds extremely positively to Q7 in the interview guide.
EC29	Q8:negative	The interviewee responds negatively to Q8 in the interview guide.
EC30	Q8:neutral	The interviewee responds neutrally to Q8 in the interview guide.
EC31	Q8:positive	The interviewee responds positively to Q8 in the interview guide.
EC32	Q8:extremely	The interviewee responds extremely positively to Q8 in the interview guide.
EC33	Q9:negative	The interviewee responds negatively to Q9 in the interview guide.
EC34	Q9:neutral	The interviewee responds neutrally to Q9 in the interview guide.
EC35	Q9:positive	The interviewee responds positively to Q9 in the interview guide.
EC36	Q9:extremely	The interviewee responds extremely positively to Q9 in the interview guide.
EC37	Q10:negative	The interviewee responds negatively to Q10 in the interview guide.
EC38	Q10:neutral	The interviewee responds neutrally to Q10 in the interview guide.
EC39	Q10:positive	The interviewee responds positively to Q10 in the interview guide.
EC40	Q10:extremely	The interviewee responds extremely positively to Q10 in the interview guide.
EC41	Q11:negative	The interviewee responds negatively to Q11 in the interview guide.
EC42	Q11:neutral	The interviewee responds neutrally to Q11 in the interview guide.
EC43	Q11:positive	The interviewee responds positively to Q11 in the interview guide.

EC44	Q11:extremely	The interviewee responds extremely positively to Q11 in the interview guide.
EC45	Q12:negative	The interviewee responds negatively to Q12 in the interview guide.
EC46	Q12:neutral	The interviewee responds neutrally to Q12 in the interview guide.
EC47	Q12:positive	The interviewee responds positively to Q12 in the interview guide.
EC48	Q12:extremely	The interviewee responds extremely positively to Q12 in the interview guide.
EC49	Identifying relevant employees	The interviewee mentions it is important to identify relevant employees to communicate to in different stages of the adoption process.
EC50	Business & honesty	The interviewee indicates that in certain situations honesty about the impact and motivation might be difficult when viewing it from a business perspective.

Table B.2: Codes and their description for the evaluation interviews with experts.