

**ROBOTIC PROCESS AUTOMATION IMPLEMENTATION IN  
RECORD-TO-REPORT PROCESS**

Case Company X Oy



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Nina Ilo

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<b>Author</b>	Nina Ilo	<b>Year</b> 2018
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<b>Supervisor</b>	Kyllikki Valkealahti	

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ABSTRACT

Robotic Process Automation (RPA) uses software to capture and interpret existing IT applications to enable transaction processing, data manipulation and communication between multiple IT systems. Robotic process automation helps businesses to improve the efficiency and makes their operations faster with lower cost. Over the past few years, robotic process automation has become a dominant theme of back-office performance improvement. RPA adoption will grow within the next two to three years.

The objective of this thesis was to get a clear picture how Company X Oy can implement robotic process automation in accounting and especially in the Record-to-Report process. The aim of this study was to investigate possibilities for robotic process automation usage in the Record-to-Report process and how to implement robotic process automation in practice in the Record-to-Report process. This thesis describes RPA Model and RPA implementation process in Company X Oy. In addition, Company X Oy Record-to-Report process is described. Case company of this thesis is a Finnish company, referred as Company X Oy, which has started an implementation of robotic process automation recently.

As a result of the study, a RPA analysis of Record-to-Report process tasks was created. It has been handed over directly to the commissioning party and it is not presented in this study. This thesis includes evaluation of RPA possibilities in the Record-to-Report process. In addition, documentation and analysis of the implemented RPA tasks is presented and development ideas for the implementation process. At the end of the thesis, there are proposals for next Record-to-Report RPA implementation tasks.

**Keywords** Robotic process automation, Record-to-Report, financial processes, process automation, digital accounting

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## TIIVISTELMÄ

Ohjelmistorobotiikka (eng. robotic process automation, RPA) käyttää ohjelmistoja hallitakseen ja tulkitakseen nykyisiä IT-sovelluksia tapahtumien käsittelyyn, tietojen muokkaamiseen ja tiedonsiirtoon useiden IT-järjestelmien välillä. Ohjelmistorobotiikan käyttö auttaa yrityksiä parantamaan tehokkuutta ja nopeuttamaan toimintaa alhaisemmilla kustannuksilla. Viimeisen vuoden aikana ohjelmistorobotiikan käyttö on tullut hallitsevaksi teemaksi rutiininomaisten tehtävien suorituskyvyn parantamisessa. Ohjelmistorobotiikan käyttöönotto kasvaa voimakkaasti seuraavien kahden tai kolmen vuoden aikana.

Tämän opinnäytetyön tavoitteena oli saada kokonaiskuva siitä, miten Yritys X Oy voi hyödyntää ohjelmistorobotiikkaa kirjanpidossa ja erityisesti Record-to-Report-prosessissa. Tämän tutkimuksen tarkoituksena oli tutkia mahdollisuuksia ohjelmistorobotiikan käyttöönottoon sekä tutkia miten käyttöönotto toteutetaan. Tässä opinnäytetyössä kuvataan Yritys X Oy:n RPA-malli ja RPA:n käyttöönottoprosessi. Lisäksi kuvataan Yritys X Oy Record-to-Report-prosessi. Toimeksiantajayritys on suomalainen yritys, joka on käynnistänyt ohjelmistorobotiikan käyttöönoton viime aikoina.

Tutkimuksen tuloksena syntyi RPA analyysi Record-to-Report prosessin tehtävistä. Se on luovutettu suoraan tilaajalle eikä sitä ole käsitelty tässä työssä. Tämä työ sisältää ohjelmistorobotiikan mahdollisuuksien arvioinnin Record-to-Report prosessissa. Myös ohjelmistorobotiikalla käyttöönotetut tehtävät on dokumentoitu ja analysoitu. Lisäksi on esitetty kehitysideoita ohjelmistorobotiikan käyttöönottoprosessiin. Opinnäytetyön lopuksi esitetään ehdotuksia seuraavien tehtävien automatisoinniksi ohjelmistorobotiikalla.

**Avainsanat** Robotic process automation, Record-to-Report, financial processes, process automation, digital accounting

**Sivut** 61 sivua

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## GLOSSARY

AI	Artificial intelligence
BPM	Business Process Management
CoE	Center of Excellence
EDI	Electronic data interchange
ERP	Enterprise Resource Planning
GBS	Global Business Services
RPA	Robotic Process Automation
Record-to-Report	Finance and Accounting management process including collecting, processing and reporting

## 1 INTRODUCTION

Robotic process automation (RPA) can be seen as big change as Internet was in year 1994. No one can predict how revolutionary it will be. If we look back to the history, robotic process automation is today's version of outsourcing. The future of work will be different. There will always be work, just a very different kind of work. If we look to the future with RPA in our mind, we can predict what kind of education, skills, and domains our children should be committing to and preparing for what is inevitable. Robotic process automation will stay. RPA is appealing because it is quick and cost effective and doesn't send jobs offshore. (Institute for robotic process automation, 2015, p. 2-4)

In concern of RPA, there's a lot of further possibilities in financial and management accounting. In most organizations, the new mantra is simplification, standardization, compliance and unbundling. This is to cut the costs and improve transparency. By unbundling organizations recognize the benefits of moving back-office functions like accounting to varying degrees of automation to shared service centers. There is a new focus on financial process improvement and standardization of IT systems and human behavior by improving and standardizing the process and blending the human and automation elements. Business process improvement and financial transformation expertise plays key role in this change. In the future, RPA will grow steadily over the next few years. The accountants will do less repetitive, number-crunching tasks and increasingly focus on the value-add contributions of their profession. (Herbert, Dhayalan & Scott, 2016, p. 26)

This thesis deals with robotic process automation and its possibilities in accounting and especially in Record-to-Report process. Case company of this thesis is a Finnish company, referred as Company X Oy, which has started implementation of robotic process automation recently. In this thesis robotic process automation possibilities in Record-to-Report process are evaluated and robotic process automation implementation process described and analyzed. This thesis gives an overview of robotic process automation implementation in Record-to-Report process.

### 1.1 Objectives and defining of the thesis

The objective of this thesis is to get clear picture how Company X Oy can implement RPA in Record-to-Report process. The aim is to investigate possibilities for RPA usage in Record-to-Report process and how to implement RPA in practice in Record-to-Report process.

The main research questions are formulated as:

What are company's biggest opportunities for utilizing RPA in Record-to-Report process?

What are the steps for implementing RPA in Record-to-Report process?

What are the possibilities and challenges for RPA implementation in Record-to-Report process and how to develop the implementation process?

The main point of this study is to investigate what are the RPA possibilities in Record-to-Report process and on the other hand describe and analyze the implementation process.

As a result of the study, there will be documentation of implemented tasks in Record-to-Report process and development ideas for the implementation process. There will also be proposal for next Record-to-Report RPA tasks to be automated via RPA.

This thesis will concentrate on evaluating and implementation of tasks in Record-to-Report process. Other accounting processes are left out of scope.

## **1.2 Research methods and structure of the thesis**

Theoretical framework starts with company introduction. Next chapters describe Digital accounting, Process automation and Robotic Process Automation. Also, Financial management and financial processes are described. This study concentrates to Record-to-Report processes and therefore Record-to-Report process and tasks will be described in detailed level.

The theory base for this thesis has been gathered mainly from professional articles and literature. Also, observation and material from the company has been used. The researcher and author of this thesis works in the case company.

The research starts with going through company's RPA model and implementation process. Information is collected from interviews and company internal material. Ideas for RPA usage has been collected from workshop. Record-to-Report process is described in detail and data is collected from company's internal material.

Data for RPA implementation in Record-to-Report process is collected by observing the implementation work and by interviewing RPA experts and persons involved in the implementation process.

This master's thesis is development thesis concentrating in implementing RPA in Record-to-Report process. The aim of this study is to investigate



how Company X Oy can utilize opportunities of RPA and on the other hand to recognize development areas for implementing RPA in Record-to-Report process. This study also describes RPA implementation process in Record-to-Report process and steps in Company X Oy.

Conclusions are made at the end of this thesis. As a result of the study, there will be documentation of first implemented RPA tasks in Record-to-Report process. This study will give analysis of development ideas for next RPA cases. Also, development ideas for implementing RPA processes will be presented. The result will benefit the company in next RPA implementation cases.

Research part of this thesis will be done as qualitative study. This thesis is commissioned by Company X Oy and therefore case study method is a natural choice for the research method. Since the researcher works in the Company X Oy, also observation method will be used. Observation can be done by making notes. Also, Company X Oy internal material will be used as information basis for this study.

Qualitative research means research which aims to results without statistical methods or other quantitative methods. The purpose of qualitative research is to describe, understand and make meaningful interpretation of the phenomenon. The qualitative research aims to deep understanding of the phenomenon. Analysis is big part of the qualitative research. It is part of the research process, not the last part of the research. (Kananen 2008, 24)

Case study means a research about present phenomenon. The research is carried out in its natural context using many sources of information. The subject of the study is one or several cases of which deep understanding is wanted. The formulation of research questions should be “how” and “why” in addition to traditional “what”. (Kananen, 2013, p. 54; 66) The case study method is about the processes that take place and their irrelationship. With case study there is possibility to do full analysis in deep level in limited number of conditions and their relationships. (Kothari, 2004)

In case study answers to the research questions are collected from many sources. These sources are written documents, theme interviews, inquiries and observation. (Kananen, 2013, p. 77)

In qualitative research, interview has been the main method for collecting data. Theme interview means that the themes of the interview are known but the exact form and order of the questions are missing. (Hirsjärvi, Remes & Sajavaara, 2007, p. 199; 203) In this thesis, theme interviews are used to collect data from persons involved in Company X Oy RPA implementation in accounting. Data is collected by interviewing RPA manager and RPA expert from Company X Oy.

Observation helps to find out whether people are doing what they say they do. Observation has been regarded as a common and essential tool for science. There are several methods for observation. Observation can be systematic or participatory. In systematic observation, observer is external actor and in participatory observation observer is participating in the group action. (Hirsjärvi et al., 2007, p. 207-209)

### 1.3 Case company

Because of the confidentiality, the case company is referred as Company X Oy in this thesis. The case company is a large Finnish company based in Helsinki. Company's net sales in 2017 amounted to EUR 1,6 billion. Company has approximately 20 000 employees and they operate in 11 countries. (Company X Oy, 2018)

Company X Oy has a service center which delivers agreed services efficiently, timely and with good quality to company's businesses. Service center provides services in following areas: IT, HR, sales and customer service and, finance and sourcing, mainly to internal customers. Service center employs more than 350 professionals in Finland and Baltic countries. Service center was established in 2017. (Company X Oy, 2018)

## 2 DIGITAL ACCOUNTING

Digital financial management is widely known term in Finland, but there are different ways to define digital financial management or electronic accounting. In this chapter digital accounting is described.

### 2.1 Digitalized financial management

The term digitalization can be described for example like this:

“Digitalization is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business.” (Gartner, 2017)

“Integration of digital technologies into everyday life by the digitization of everything that can be digitized.” (Business dictionary, 2017)

Digitalization means processing, transmission and storing, as well as the presentation of the data in electronic form. Data is usually stored in database and the structure of data is defined by database software. Digital data is transferred and handled with applications or software that are in electronic format produced via one of the known software languages. Digital data is transferred with wire or wireless in data network. Digital format data is more efficient and faster way of handling, transforming, presenting and storing of data than in traditional format data, like paper. (Lahti & Salminen, 2014, p. 19)

From the technical point of view data transmission between organizations have been possible for over 30 years, but still the technology has not been utilized as much as it could have been used. Electronic data interchange (EDI) means predefined, automatized and electronic data transmission between companies. The most common ways of EDI usage are Edifact, Finvoice, and GS1 XML. These can be used e.g. in transferring data to Tax authorities or to Customs office. 70% of all electronic data interchanges are Edifact based and 30% are XML based messages. The advantages of EDI are fast data processing, less mistakes and it is more cost effective. Also, customer satisfaction, competitiveness and business processes have been improved. EDI usage is expected to grow in the future. (Lahti & Salminen 2014, p. 20-21)

Electronic services mean all those services and digital data handling done in electronic format via e-mails, internet or other data network. In practice this means all the tasks that could be handled in network or via e-mail. Electronic services include also information searching or filling of electronic forms in authorities' internet webpages. Electronic services in organizations' business usually means electronic business, electronic or

digital services. Digitalized services and electronic commerce have increased rapidly from the end of 1990's. (Lahti & Salminen, 2014, p. 21-22)

ICT2015-working group has been analyzing the digital economy and has proposed ways of automating data flows between organizations and authorities, so that routine work is declined, risk control is improved, and real time data is increased. The target of the analyzing work is to develop the infrastructure required for real time economy. Examples of the development projects are real time payroll reporting and building of centralized income register, automatized vat-reporting via electronic invoice data, XBRL-format annual financial statement reporting to tax authorities and to trade register and small and medium sized organizations accounting automation based on cash transactions and electronic invoice data. (Lahti & Salminen, 2014, p. 23)

It is difficult to find definition for digital financial management since the financial management and accounting has been facing lot of changes and improvements during the last years. Digital financial management is more than electronic sales and purchase invoices. It is also more than electronic invoice standards or data languages, like XML or XBRL. Digital financial management is more than paperless accounting. Nowadays digital financial management means automation of all financial management data streams and data processing in digital format. In digital financial management all accounting and its sub-process transactions, are automatized and handled without paper. Digital financial management can be also called Automated accounting. (Lahti & Salminen, 2014, p. 24)

Fully digitalized financial management means that all financial management data flows need to be handled electronically with vendors, customers, authorities, personnel, financiers and other interest groups. Digitalized financial management is integrated with organization's real processes. This way digital format data handling manually in other systems is avoided. Digitalized financial management can also be called Integrated financial management. (Lahti & Salminen, 2014, p. 24)

In practice digital financial management is a process which consists of people work, work organization, information systems and technologies and straight forward operating chains and by automatization the aim is to remove overlapping tasks in digitalized format accounting material handling. The development of digital financial management includes development of all financial management processes and re-design where unnecessary operations or tasks will be eliminated even if those could be automatized. The remaining tasks will be handled in a standardized way. Digital financial management does not mean paperless accounting. Also, digital financial management is paperless, but paperless accounting can be produced in an ineffective way like scanning the invoice after receiving it paper format. (Lahti & Salminen, 2014, p. 25-27)

In a nutshell organizations' fully digitalized financial management means that all accounting material is handled in electronic way and financial management transaction processing and reporting is automatized. It also means that data is transferred electronically between different parties, systems and sub-processes and data is handled electronically inside the organization as well as between different systems. In fully digitalized financial management archiving is handled electronically and data can be accessed electronically. It also means that different systems over interest group borders have been integrated to the processes. (Lahti & Salminen, 2014, p. 26)

Digitalized financial management in Finland has developed slower than expected. Electronic financial management and paperless accounting has been available since 1997. During that time Finland was number one in using internet and making payments in internet. Finland was also fore-runner in reference payments and with TITO-standard which enabled bank statement handling electronically and with electronic invoicing standard, but the biggest break through with electronic invoicing is still missing. One of the obstacles for the digitalization development has been lacking usable accounting systems. Also, human and organization's ability to adopt new technologies and operation models takes time. Third obstacle has been the complexity of practice electronic accounting, it has required separate IT-project for implementing electronic operations. (Lahti & Salminen, 2014, p. 28-30)

In Finland digitalization is utilized most in large companies. Most of the large companies have electronic purchase invoice handling systems and most of the vendors send their sales invoices in electronic format. (Lahti & Salminen, 2014, p. 26-27)

## 2.2 Tools and systems

Financial management system choices play an important role in adopting digitalization. Software and information system architecture should support the company's strategy. Software selection priorities are influenced by many factors like strategy, industry, competition, growth plans, resources and internationalization. The company's situation and targets should be analyzed first and then based on the analysis the frame of the financial management system architecture should be built. (Lahti & Salminen, 2014, p. 34)

There are many factors that affect to the selection of software system like how well the functionality needs are met, technology, vendors, the total cost of the system, initial investment, the flexibility of the system, maintenance and development as well as end-user usability. (Lahti & Salminen, 2014, p. 35)

Despite of the size of the company, all companies have some kind of financial management system. Information system solutions can be classified to two groups: to financial stand-alone system and to comprehensive integrated Enterprise Resource Planning (ERP) systems. ERP systems include also financial modules. (Lahti & Salminen, 2014, p. 36)

Another key issue in system acquisitions relates to software licenses. The question is whether company should pay the licenses themselves or should the company acquire the software as a cloud service. (Lahti & Salminen, 2014, p. 44)

### 2.3 Advantages of digitalization

Digitalized automated financial management provides large advantages for companies compared to traditional paper format and manual processes. The biggest benefits of digitalization are effectiveness and speed. Organizations which have adopted digitalized financial management, have achieved 30-50 percent efficiency improvement in their financial management. It is possible to achieve even 90 percent efficiency improvements in single process. (Lahti & Salminen, 2014, p. 32-33)

By digitalization need for resources and archiving space is reduced remarkable. Digitalization provides possibility to review and process e.g. purchase invoices or reports despite of place and time. Digitized documents are quick to transmit, store and access. Real-time reporting is available due to automatized general ledger processes like periodization or reconciliations. Digital financial management improves quality of operations and transparency and reduces errors. Human errors are minimized with automation of transactional manual work. (Lahti & Salminen, 2014, p. 32-33)

Digitalized financial management is also ecological solution. Electronic accounting saves nature and reduces CO<sub>2</sub>-emission in many ways, like reducing transportation costs, paper usage and electricity and heat consumption. (Lahti & Salminen, 2014, p. 32-33)

According to Accenture analysis, by 2020, finance-staff productivity will increase by two to three times. Also, according to the analysis, the finance organization's costs will decline by 40%. This all is due to digital technology that changes the accounting work. (Axson, 2015)

New technology also creates new jobs. In year 2015, approximately 4.4 million IT jobs were created to support the big data and data science initiatives to strengthen artificial intelligence development. (Peccarelli, 2016)

## 2.4 Future of digitalized financial management

During latest years, digitalization of financial management has been concentrating on data flow digitization between organizations and systems. Currently major part of data flows is digitized. In following years, it is time to concentrate on measuring the advantages of digitalization and utilize digital data for automatizing finance processes and financial reporting. This means that processes are automatized based on the transaction data with using set of norms and validation. That way system can perform independently tasks which have been performed by employees. This means huge improvement in financial management efficiency. Figure 1. shows financial management development in Finland. In future employees will concentrate on building the norms for automatized processes and handling of exceptions. Resources for handling transaction data is not needed anymore. (Lahti & Salminen, 2014, p. 27-28)

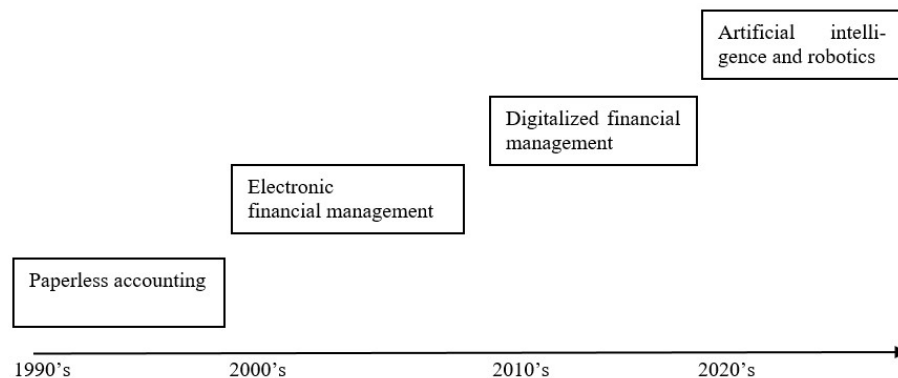


Figure 1. Development of electronic financial management in Finland. (Lahti & Salminen, 2014, p. 27)

Digitalization has created new service models within financial management markets. Accounting firms are facing challenges with providing digital services to their customer and therefore they are forced to re-new their systems to be able to provide electronic services to the customers. There are also service concepts available in the markets, which have been directed to large companies' needs. Also outsourcing is one possibility for large companies and systems are already partly used as cloud-based services. The usage of cloud-based services will increase in the future. (Lahti & Salminen, 2014, p. 30-31)

Reporting can be automatized also with structured data, like electronic invoicing and XBRL-financial statement reporting. Automatization of structured data can help in company's internal reporting and also reporting to authorities like tax authorities and trade register. (Lahti & Salminen, 2014, p. 26-27)

XBRL is open international standard for digital business reporting. XBRL is used in more than 50 countries. XBRL documents are replacing paper-based reports with useful, effective and accurate digital versions. XBRL (eXtensible Business Reporting Language) is XML based coding language for corporate financial reporting like the presentation of financial statements in electronic form. XBRL enables automated formatting, processing and further processing of business financial documents. (XBRL, 2018)

## 2.5 Digital transformation in GBS organization

The global business services (GBS) is an advantaged version of the shared services model for delivering finance, procurement, human resources, information technology and other business services. Originally shared services model was adopted to improve operational efficiencies through standardization, specialization and economies of scale. Multifunctional, enterprise-wide GBS organizations were established to increase value to customers. Digital transformation is encouraging development actions in global business services. In customer-centric world GBS organizations are required to find new levels of standardization, consistency and quality in customer-facing operations. GBS organizations should capitalize opportunities to move from transaction-related work into knowledge-centric analysis and other capabilities that support organization's functions. (Dorr, Frank, Kracklauer & Rombough, 2016, p. 2)

For GBS digital transformation is about reorganizing work and reinventing service delivery models to produce value and basis for ongoing performance improvement. Digital transformation of business services will help in creating the agility to adapt business models rapidly and efficiently in changing business conditions. Digital transformation is about driving new sources of value for the company. GBS organizations have improved productivity and efficiency by using technology and most of them have already digitized business processes like converted paper documents to electronic format and created portals to interact with customers. Now it is even more quickly and cheaper to employ technology and still generate substantial benefits. (Dorr et al., 2016, p. 2)

GBS organizations will play an important role in digital transformation by using evolving technology to create the agility and insight necessary for achieving customer strategy, product and service innovation, business model innovation and cost-reduction goals. To achieve those goals, they will build digital business capabilities in five areas: digital customer engagement, digitally enabled workforce, digital service optimization, digital ecosystem and insight-driven enterprise. (Dorr et al., 2016, p. 4)

Digital transformation is wide and complex topic. Digital transformation roadmap is unique for each GBS organization. Although there are few



principles that applies in all circumstances. First, GBS organizations need to study the technology landscape. There are six key technologies which are driving business innovation: cloud, mobile, social media, analytics and big data, the Internet of Things and cognitive computing. The question is how these technologies and innovations are utilized in GBS operations and business forward. (Dorr et al., 2016, p. 2)

Secondly, GBS organizations should start digital transformation from small, focused, low-cost and low-risk initiatives that offer rapid payback potential and then using these quick wins to sell and fund larger changes. For GBS organizations adopting new technologies like robotic process automation (RPA), it is suggested to develop a proof of concept, a small project that shows if the idea is possible to take in use in larger scale. Later, after successful project is possible to extend the project to other similar tasks. These initiatives provide input for mapping the GBS organization's future use of digital technology and digital channels. A digital roadmap should be defined to addition to these series of initiatives. This roadmap should include an approach for evaluating new applications such as RPA. Leading GBS organizations have already taken steps for digital transformation with harmonizing master data, adopting end-to-end process management, consolidating core ERP systems and making greater use of core system functionality. (Dorr et al., 2016, p. 2-3)

Third, GBS organizations should align with continuous improvement. GBS organizations can use principles such as Lean and Six Sigma to simplify and standardize a process and then apply a digital solution to automate it can improve performance. One example of improvement, could be RPA which can improve both efficiency and effectiveness of work. It delivers the greatest benefit when coordinated with ongoing continuous improvement programs. (Dorr et al., 2016, p. 4)

Fourth, a master data strategy and governance are required to drive digital transformation. Data is a strategic asset and the flow of feedback information is the basis for business decision making in agile organizations. Many companies have lot of unstructured data and excel-data, but they don't know how to use it or how to manage it. Data is resided in silos which makes the data analysis difficult. (Dorr et al., 2016, p. 5)

Also, careful workforce planning and communication and change management are required to maintain productivity. Digital transformation has big implications to talent management. New skills are required when employees are changing away from routine functions. Leadership skills are needed to keep up high performance. Company's success depends on having talented persons who understand the business, the data and the technology. Most important thing is how to look for opportunities and how to use the data for adding value to the business. (Dorr et al., 2016, p. 5-6)

GBS organizations should establish expertise centers. This means that GBS organization builds a team of core resources to support additional process owners. Some companies who have adopted RPA, have established Center of Expertise (COE). In the future, COE should develop for incorporating process experts who are aligned with continuous improvement and subject matter experts in core applications like SAP, Hyperion, PeopleSoft etc. GBS organizations should also encourage innovation. GBS employees can for example to encourage to present and pilot ideas for improvement. (Dorr et al., 2016, p. 6)

It is also important that GBS organizations engage the IT function. When scaling RPA or other new technology, IT will have an important role e.g. in security. It is also important to build strong working partnership to enable digital transformation. It is also important to modernize the IT infrastructure to increase agility and improve execution. (Dorr et al., 2016, p. 6-7)

GBS organizations should re-invent the services provided to customers. By designing and building services and interfaces around the customer needs and preferences, helps GBS organizations to become more effective and productive. (Dorr et al., 2016, p. 8)

## 2.6 Digital disruption

It is expected that half of the jobs relating to transaction work will disappear due to digitalized accounting. In Finland there is lack of accounting work force and therefore it is welcomed that accounting can be made more efficient through automatization. Digitalization also changes job descriptions and job tasks and requires new competences from personnel. Transaction work will change towards process supervising and process control. (Lahti & Salminen 2014, 30-31.) Transactional tasks will move to integrated business services solutions that use robotics, which will automate or eliminate up to 40 percent of transactional accounting work. Finance staff can spend more time, from 25 percent to 75 percent, on decision support, predictive analytics and performance management. (Axson, 2015.)

Digital transformation will affect the size, placement and skills of a GBS workforce. The GBS organization will need to redesign roles, responsibilities and structures. (Dorr et al., 2016, p. 4)

RPA is becoming business as usual in wide range of service sector. There is a lot hype, both in terms of our relationship with robots and the likely extent of job losses. The main assumption is that low-level jobs disappear first, but it might not be correct. Modern technology has the power to disrupt work and the way in which work is performed. (Herbert et al., 2016, p. 22)

What will the career paths for internal employees look like in a world full of software robots? There are concerns about the future skills it will need in a highly robotized environment. Transitioning to software robots can be tough on workers if they are not supported in succeeding in the new environment. Real aim should be in focusing and empowering staff on customer service and business enablement. Automation can help free up employees for more valuable tasks. This will lead to a new organizational design for shared services. (Lacity, Willcocks & Craig, 2016, p. 16)

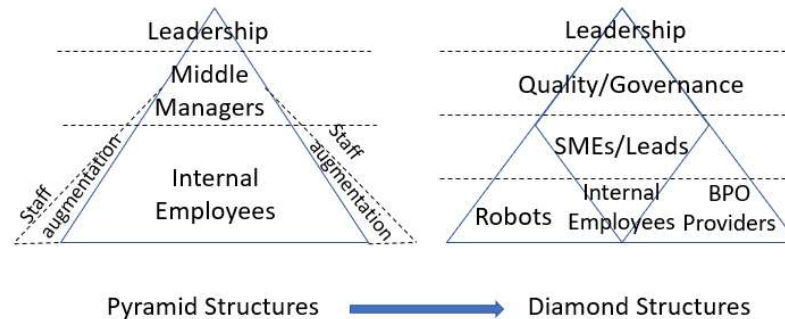


Figure 1. Transforming Shared Services from Pyramids to Diamonds. (Lacity et al., 2016, p. 17)

New organizational design would be shaped like a diamond instead of a pyramid as shown in Figure 6. Pyramids are heavily populated with employees doing transactional work. This model is strong on retained knowledge, but it is costly. Diamond-shaped retained organizations replace the heavy bottom of the pyramid with robots. Machines perform many transactional activities that were once performed by employees now. There are fewer middle managers needed. The diamond-shaped organization needs more subject matter experts, quality assurance and governance skills to coordinate services with internal business units and with RPA. The benefits of the diamond-shaped retained organization are lower costs, access to providers with best-of-breed skills and greater flexibility because robots can more easily adapt to increases or decreases in service volumes. (Lacity et al., 2016, p. 16-18)

Organizations that have deployed automation are focused on increasing the efficiency and effectiveness of their workforce rather than eliminating it. Employees relieved of routine tasks are re-focused toward more valuable or rewarding activities. With more advance and complex automation comes with increased efficiency and increased dependency on the accuracy and skill of the human operators involved. Increased automation may lead to workforce augmentation. Employees can focus on more advanced and engaging task. Over time organizations can see lower

turnover, higher morale and increased internal innovation. (Lowe, Cannata, Chitre & Barkham, 2016, p. 6)

### 3 PROCESS AUTOMATION

This chapter gives overview of processes, process development and process modelling. Process thinking is important part of process development and robotic process automation. Process understanding plays a key role in process automation. (Sharp & McDermott, 2008, p. 93)

Process thinking has already during many decades been important part of company's quality management. Process thinking can be applied in any company's performance and productivity development. Key elements of process thinking are systematic thinking, customer focus, focusing the goal, concentrating in value-adding activities, utilizing the feedback in developing the process and productivity systematic development by improving the process. Process thinking also includes efforts to increase productivity and reduction of non-value adding work. (Martinsuo & Blomqvist, 2010, p. 3)

#### 3.1 Definition of process

Process can mean different things in different contexts. It can mean anything from the procedure for completing a single task through to an enterprise-wide set of activities. (Sharp & McDermott 2008, 32) It is quite common that business process is defined as the end-to-end chain from the initial, first triggering event through to the end results. (Sharp & McDermott, 2008, p. 49)

Processes are value-adding event chains to customer in which company uses resources. Business process means those processes which produces money to the company. Other than business process can be any type of process. Processes can be classified as key processes and supporting processes whether they are related to customers or company internal processes. Processes can also be classified as main processes and sub processes. (Martinsuo & Blomqvist, 2010, p. 4)

According to Sharp & McDermott (2008, p. 45) process starts with certain triggering event as shown in figure 2. It can be action or decision, time or condition. A process consists of activities or steps that are done in defined order to get defined result. Result can be product, service or information. Process should be named as descriptive as possible, so that process name describes the defined result.

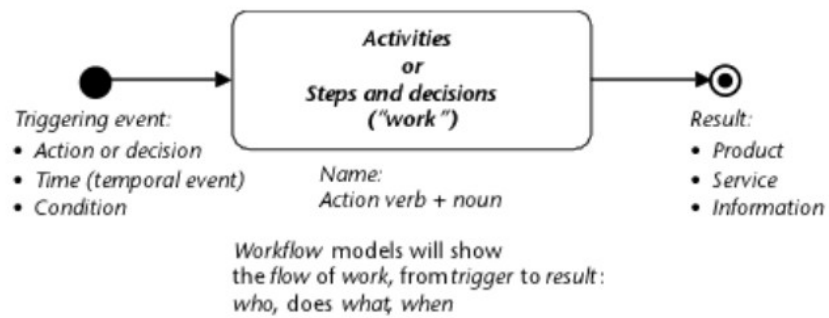


Figure 2. Essential components of a process (Sharp & McDermott, 2008, p. 45)

Sometimes it is difficult to say where process ends, and next process starts. According to Sharp & McDermott (2008, p. 51) process start and end can be defined with using 1:M or M:1 ratio. If the processes are connected on a 1:1 basis, then it can be said that they are part of a single, end-to-end, business process. Those linked processes might be subprocesses or they might be activities or tasks or steps. Generally business process has 5 +/- subprocesses. A subprocess has significant milestone on the way to the achievement of the final result of the business process. Subprocess is often something that the organization would like to count or measure. (Sharp & McDermott, 2008, p. 51-52)

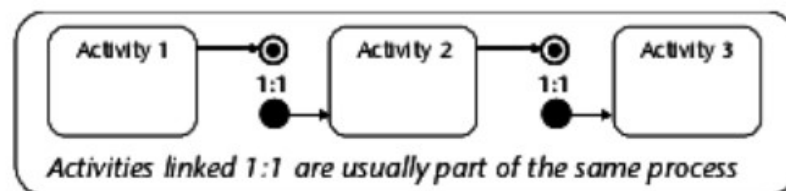


Figure 3. Guideline for "assembling" activities into business processes (Sharp & McDermott, 2008, p. 52)

### 3.2 Process automation

Process automation is about process effectiveness and process development. It is important to figure out the best way to design steps in an end-to-end process that would make automation worthwhile. If a human must intervene at too many points, end-to-end processing time may not be significantly reduced with process automation. There might possibility that some steps are taken out of the critical path and completed

at another time. (Lacity et al., 2016, p. 10-12) Therefore it is important that process automation is started with defining processes.

There are several criteria for a process to be automated. According to Lacity & Willcocks (2016, p. 46) tasks that use structured data, have explicit and well-documented rules, produce high transaction volumes and are stable, are good candidates for process automation.

According to PwC (2017) most suitable candidates for process automation are those processes which have high volume, process is based on rules, process is simple and there is small amount of process exceptions. In addition, the data is structured, and it is taken from several sources. For example, tasks prepared by controllers during month end closing include above mentioned steps. Month end closing steps are done regularly and they are based on same rules. Usually controllers are preparing analysis or bookings based on data taken from several sources for centralized use or for further guidance.

The effectiveness of the application areas of software robotics depends heavily on the company's other system environment features and the degree of automation. The scope of application of the robotics must be evaluated through the benefit and repayment period. (PwC, 2017)

### 3.3 Process development and modelling

Process automation can be seen as one type of process development. Figure 4 shows typical phases of process development. Those are development project scope limitation, process analysis, process re-design, process piloting and improvement, process implementation and process execution and follow-up.

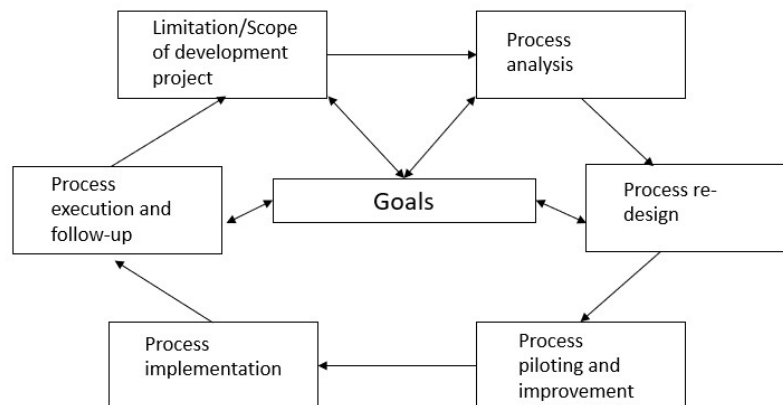


Figure 4. Process development phases. (Martinsuo & Blomqvist, 2010, p. 6)

First development project scope limitation need to be made and project scope need to be defined. Next step is to collect reliable information on current process or if there is a new process, all needed information for producing the added value. Many type of information collection methods can be used, e.g. interview, group work or process observation. After process analysis, there is a need to recognize those areas which need to be improved. Target process is described as it should be executed. Next step is the process piloting phase when process will be observed and supported, and final changes can be made. (Martinsuo & Blomqvist, 2010, p. 6-7)

During process implementation phase, new ways of working, instructions and routines are taken in use. This requires training for personnel. Process execution and follow-up means whole end-to-end process follow-up and feedback collection for continuous improvement. (Martinsuo & Blomqvist, 2010, p. 7)

Process development requires that there is enough information about the process. Process modelling is a way to describe current process or target process. By process modelling it is possible to show current process challenges and development needs. (Martinsuo & Blomqvist, 2010, p. 3)

To recognize the most important processes, first thing to do is to start from company's operating environment. In process development, it is important to understand which part of the entire process map one single process is linked. To recognize the entire process map, it is important to understand who the key customers are and what kind of chain customers, company and its subcontractors are building. After this step critical processes which increase value to customers can be defined. For each process there is need to be defined who are direct customers, how process is linked to value chain and what kind of additional value process gives. (Martinsuo & Blomqvist, 2010, p. 8-9)

One part of process development is to make process description. It means that value adding tasks and related information and material flows are identified and described. Process description can be on high level or detailed level depending on how standardized the process is. If the process is done always same way, detailed description is needed. If the process has some uncertainty or the process is not needed to be executed always same way, then high level process description is enough. (Martinsuo & Blomqvist, 2010, p. 9-11)

When considering process development targets, measures can give more information for process assessment work. To find concrete development targets, the value adding activities should be recognized. That way process bottlenecks can be recognized by recognizing the most important value adding tasks. Process modelling is a tool for finding the key value adding activities. (Martinsuo & Blomqvist, 2010, p. 17)



Typical process development areas are missing investments to value adding activities, wasting or incorrect choices. Missing investments can mean for example low resourcing. Low resourced part of the process means a bottleneck in the process in which weakens the functionality of the process. Wasting can mean over resourcing, loss or extra waiting times. Loss can mean resources, materials, products, components or time. Incorrect choices are relating to process appropriate usage whether the process is used in appropriate way and for correct purposes. (Martinsuo & Blomqvist, 2010, p. 17-18)

## 4 ROBOTIC PROCESS AUTOMATION

In this chapter robotic process automation is introduced. Also process automation potential for robotic process automation and robotic process implementation are described.

### 4.1 Introduction to RPA

Traditionally the term “robot” is understood as machines executing humanlike tasks. Nowadays the term describes a class of software applications, software robots that automate work by imitating tasks executed by human operators. This form of automation is referred to as robotic process automation (RPA). (Dorr, Frank, Kracklauer and Rombough 2016, 6.) Robotic process automation means the application of technology that allows employees to configure computer software or a “robot” to capture and interpret existing applications. With robotic process automation it is possible to process a transaction, manipulate data, trigger responses and communicate with other digital systems. (Institute for Robotic Process Automation, 2017)

According to Deloitte (2018) multiple robots can be seen as virtual workforce. Robots can be seen as a back-office processing centre. There are financial and non-financial benefits in owning a robot license which has lower cost than typical salary. In other benefits include improved accuracy, timeliness and operational flexibility.

According to Asatiani and Penttinen (2016, p. 68) RPA can be seen as the technological imitation of a human worker, which aims to tackle structured tasks in a fast and cost-efficient manner. RPA is implemented through a software robot, which mimics human worker using software such as ERP systems or productivity tools. RPA software, also called “robot”, comes from its operating principle. An RPA robot is integrated across IT systems via front-end which communicates with other IT systems via back-end. This means that the software robot uses IT systems exactly the same way a human would by repeating precise, rule-based steps, and reacting to the events on a computer screen.

Robotic process automation can expedite back-office tasks in finance, procurement, supply chain management, accounting, customer service and human resources, including data entry, purchase order issuing, creation of online access credentials, or business processes that require “swivel-chair” access to multiple existing systems. (Institute for Robotic Process Automation, 2017)

In addition to above described RPA (Robotic Process Automation) there seems to be two other types of products in the market and they all are called RPA. These are all different and should be critically evaluated.

One type product is macros, scripting and screen-scraping (record and replay). These products offer fast record functionality. These products record what a user does and captures keystrokes and mouse clicks. However, this software robot does not know what it is doing in any enterprise context. It has set of actions performed when called upon. It is difficult to manage in a large implementation. This kind of robot works best as a fast and fine desktop assistant. (Lacity & Willcocks, 2015, p. 5)

Other type of product is SDKs (software development kits). These are offering IT development teams the ability to build a robot according to their own design. These products offer the opportunity to develop a localized, agent assisted robot focusing on individual scripts. They need to be built by experienced development teams and are designed for building single robots, not robot teams. These don't offer possibility for multi-purposing, load balancing, multi-configuring, audit and management information functions. (Lacity & Willcocks, 2015, p. 6)

Almost five years ago analysts started seriously studying and projecting the potential impact of robotic process automation on business operations. Adoption of RPA has remained low, but according to Hackett group research, functional executives expect it to increase significantly in the near future. Finance and global business services (GBS) executives are particularly interested in RPA. GBS executives expect adoption to grow by more than five times to over 52%. They expect that 85% of GBS organizations will use RPA on either a limited or mainstream basis within two to three years. (Dorr, Kumar & Morrison, 2018, p. 1)

There is considerable overlap between the concepts of automation and robotics. Automation is largely technical capability focusing on replacing human mechanical actions. On the other hand, robots can do relatively cognitive tasks which require capability to sense the surrounding environment and react flexibly towards an overall outcome. (Herbert et al. 2016, p. 23) RPA technology continues to mature and offers more functionality. At the same time organizations are developing new RPA-related skills, knowledge and experience. Organizations are beginning to approach RPA as part of a broader enterprise digital strategy. A critical element of this strategy is the transformation of operations based on principles of smart automation. This means using a combination of emerging technologies that include RPA. (Dorr et al., 2018, p. 5)

Smart automation requires a solid foundation of enterprise automation, workflow, RPA and cognitive technology technologies. According to Hackett Group research, many organization is now piloting cognitive computing and artificial intelligence capabilities, including nearly half (47%) of GBS organizations and more than a third (38%) of finance organizations. (Dorr et al., 2018, p. 5)

According to the Hackett Group, smart automation is the optimization of the execution of transactional, knowledge-based and decisioning work through deployment of emerging RPA, intelligent data capture and cognitive automation technologies. (Dorr et al., 2018, p. 6)

#### 4.2 Advantages of RPA

RPA is not part of a company's information technology infrastructure, it's on top of it. This enables a company to implement the technology quickly and efficiently. RPA technology can also be seen so that it is not designed to be a business application but designed to be a proxy for human worker to operate business applications. (Institute for robotic process automation, 2015, p. 6-7)

In the last decades, offshoring and outsourcing have become popular business tactics for decreasing operating costs. Robotic process automation is reducing labor costs by 25 to 40 percent in both IT and business process environments. (Institute for robotic process automation 2015, 9-10) Company that employs robotic process automation quickly gains a competitive advantage. Despite how the RPA is used, it increases operational speed and performance. (Institute for robotic process automation, 2015, p. 18)

Data gathered by robot executing a task, can be used for analysis. This drive better decision making in the areas of the processes being automated. When each step of the process is traced, a company is able to identify gaps in the process and increase efficiency. (Institute for robotic process automation, 2015, p. 11)

RPA helps in industries that have functional areas highly regulated by strict compliance guidelines, such as healthcare, banking and insurance. This is because the nature of automation means that each step in an IT or business process is fully tracked and documented within the system that is being automated. (Institute for robotic process automation, 2015, p. 12)

Robotic process automation increases efficiency. A software robot never needs time off. It can work 24/7. Typically, a single software robot help allocating work to other more value-adding work for two to five full-time employees. The same volume of work can be done in less time, or more volume can be processed in the same amount of time. (Institute for robotic process automation, 2015, p. 12)

Robotic process automation increases also employee productivity. Since software robots can handle more repetitive, tedious jobs, employees can participate in more value-added activities that require personal interaction, problem solving and decision making. Employees feel their work is valued and worthwhile and that way their productivity increases,

which increases employee retention rates. (Institute for robotic process automation, 2015, p. 12-13)

All humans make mistake. A compelling feature of RPA is its capability to virtually eliminate processing errors. RPA improves accuracy. Software robots won't make mistakes that its employees might. Still there is need for testing, training and governance to optimize the process and its sub-processes. Transitioning to RPA will minimize or eliminate complications with offshore labor by removing time zone differences and cultural and language barriers. (Institute for robotic process automation, 2015, p. 13)

Customer experience is important. Since employees move to more customer-facing roles and automation makes processes more efficient and error-free, customer satisfaction improves as well. (Institute for robotic process automation, 2015, p. 13)

Technologies like presentation-layer automation software are able to consistently carry out prescribed functions and easily scale up or down to meet demand. This technology mimics the steps of a rules-based, non-subjective process without compromising the existing IT architecture. This way process automation can expedite back-office tasks in insurance, finance, procurement, supply chain management, accounting, customer service and human resources. It can also perform duties like data entry, placing purchase orders, creating online access etc. RPA can also improve IT service desk operations. (Institute for robotic process automation, 2015, p. 14)

One of the most powerful benefits of RPA technology is the scope of its usability across various industries and its ability to complete a variety of tasks. Task for RPA must be definable, repeatable and rules-based. (Institute for robotic process automation, 2015, p. 15)

Robotic process automation has the ability to operate within a company and interact with human employees as either independent automation or assisted automation. Independent automation does not require human intervention. Assisted automation, however, still requires human assistance for decision making. One example of assisted automation could be ATM machine. (Institute for robotic process automation 2015, 18)

Robotic process automation has the potential to revolutionize the way we do business. McKinsey & Company have published a report on emerging disruptive technologies that estimates that if the use of disruptive technologies like RPA grows at the rate it is expected to, 110-140 million full time work could be replaced by RPA by the year 2025. This also means that perhaps new jobs will potentially be created for human workers with the advanced skills needed to maintain and improve this technology. Humans will work hand-in-hand with robots in this transformation. (Institute for robotic process automation, 2015, p. 21)

According to Asatiani and Penttinen (2016, p. 68) one potential benefit of RPA is that people employed on routine tasks can be moved to more productive jobs and robotic automation itself can create jobs in robot management, consulting and sophisticated data analytics.

In future RPA will be expanded from transactional processes to more analytical ones to the cognitive side. RPA would then operate just as human brain would. This means ability to adapt and assess as well interact and iterate by possessing the ability to understand contextual element. By using artificial intelligence (AI) and machine learning algorithms, cognitive computing systems are trained, not programmed, to function as the human brain does. Cognitive computers have been developed with the intent not to replace human experts, but to work in tandem with them to support decision making and assist experts in producing more informed and better decisions. (Institute for robotic process automation, 2015, p. 22)

Robotic Process Automation has three distinctive features compared to other automation tools like Business Process Management (BPM), scripting and screen scraping. First RPA is easy to configure, so developers don't need programming skills. RPA interfaces work a lot like Visio by dragging, dropping and linking icons that represent steps in a process. Codes are generated automatically, and no programming skills are needed. Secondly, RPA software is non-invasive. RPA software accesses other computer systems the way a human does, with logon ID and password. It accesses other systems through the presentation layer. RPA products do not store any data. Third, RPA is enterprise-safe. RPA is a robust platform that is designed to meet enterprise IT requirements for security, scalability, auditability and change management. (Lacity & Willcocks, 2015, p. 4-5)

According to PwC (2017) the most important advantages of RPA are cost effectiveness, better quality, better resourcing, timeliness, better controls, short payback time, short implementation time, no need for system changes and scalability for entire group.

#### **4.3 Process automation potential for robotic process automation**

Investigation of process automation potential starts from small and simple processes. The processes to be selected must be such that their automation is of useful for the company. Good candidates for process automation are processes that are annoying and no one wants to do them. Usually these are daily or monthly routines. All processes are not worth automating even if they seem to be suitable for process automation. In some processes human decisions are needed to continue the process or the process reveals to be too complicated and heavy to be defined for process automation and investment in automation is not profitable. (Luukka, 2016)

Organizations need to figure out the best way to design steps in an end-to-end process that would make automation worthwhile. If a human has to intervene at too many points, end-to-end processing time may not be significantly reduced. Some steps might be taken out of the critical path and completed at another time. (Lacity et al., 2016, p. 10-12) Therefore organizations need to begin with an assessment of process landscape to identify opportunity areas to find good candidates for process automation. Criteria for good candidates are described in chapter 4.3. (Lowes et al., 2016, p. 16)

Organizations need to evaluate tasks and processes critically. Does the task really need to be done? Can the work be simplified? (Herbert et al., 2016, p. 23) Is there any need for process development? Is there any bottlenecks or issues in the process? Is there any possibility to make the process more effective by speeding up some parts or process some parts simultaneously? (Luukka, 2016) It is noticed that when process transaction volumes grow in business processes, process transparency weakens. There are usually many manual exceptions in the processes, whereby forming a complete picture of a real process can be difficult. These manual exceptions can multiply the total workload in the process and generate additional costs for the company. (PwC, 2017)

Processes need to be defined in detail level to be able to understand the process. Persons who are involved in the process, should participate in the process definition. Each process has start point and end point. For example, recruitment process starts when there is a need for new recruitment or first advertisement has been published or first interview starts. Process ends when last interview has been held, employee accepts offer or employee starts first working day. As a result of the definition phase, process description document is prepared. If it is decided that the process is not worth automating, process might be better after definitions and development work. (Luukka, 2016)

Important questions for process automation potential also are: Can the task be digitalized to be done remotely or can the task be standardized to be done by someone somewhere else? Also, criteria for automation need to be considered. Can the work be codified into a series of explicit rules? Can the task be done by machine? (Herbert et al., 2016, p. 23)

Organizations should think about other options too. If automation can be done, work can be done with machines. There should be innovative, new ways of working established. Work could be also transferred to customers e.g. by self-service portals or with self-booking travels and hotels. And if automation is not an option, next questions is whether robots could be used? Could a robot work in flexible/reactive ways towards user specific outcomes? Could a robot learn from previous tasks and outcomes? (Herbert et al., 2016, p. 23)

According to Asatiani and Penttinen (2016, p. 69), the task suitability for RPA can be determined based on routine or non-routine task and whether it requires the use of manual or cognitive affordances. In the figure 5. can be seen automation potential of the task. The higher routine degree and the higher manual degree, the better automation potential the task has.

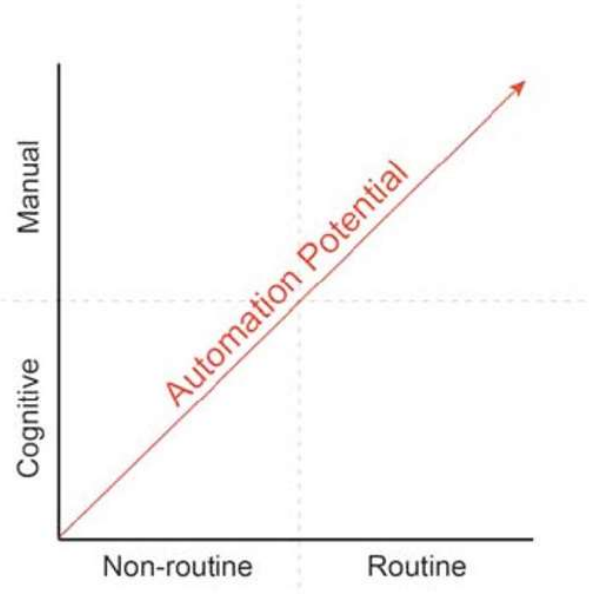


Figure 5. Automation potential of the task. (Asatiani & Penttinen, 2016, p. 69.)

It is important to understand the process automation potential in order to make a business proposal for automating the process. It is needed to estimate the benefits of automation so that is possible to understand the effects of automation on the operating environment. After defining the potential of the processes, the processes are listed. That way can be found first candidates for automation. The more potential the process is, the better business proposition will be made. In determining the potential, processes which are not suitable for automation can be eliminated. (Lacity, Willcocks & Craig, 2015, p. 11)

According to Lacity, Willcocks and Craig (2015, p. 8) RPA is most suitable for processes with high transaction volumes, high levels of standardization, are highly rules-based, and are mature. On the other hand, RPA can deal effectively with complex processes as long as complexity is defined as requiring compound steps and the control of many variables.

According to Lowes et al. (2016, p. 2) good candidate processes are those which are manual, rules-based, consume a significant amount of time and are performed at frequent intervals.



Successful RPA deployment requires tasks that have certain key prerequisites like having digital inputs rather than analog paper or voice inputs, they use structured data and the work to be automated follows clear logical rules rather than allowing discretion and judgement. RPA is suitable for tasks like extracting and entering data, processing and updating forms, merging, consolidating and archiving, tracking, monitoring and archiving, formatting and reporting, downloading, updating and uploading files, conducting periodic analysis, performing calculations and preparing analytics reports. (Dorr et al., 2018, p. 2)

RPA is also effective for automating so-called “swivel chair interfaces”. These are labor-intensive clerical tasks that involve capture and re-entry of data in multiple business applications like e-mail, spreadsheets, ERP or CRM systems or internal and external web applications and portals. (Dorr et al., 2018, p. 2)

It is shown that RPA is one tool along with process elimination, process improvement and business process tools. It is important to sequence these tools so that process elimination and process improvement is done before implementing RPA. (Lacity et al., 2015, p. 11)

#### **4.4 Process automation benefit assessment**

In addition to assess process suitability for RPA, also automation benefits need to be assessed. Benefits can be assessed by calculating workload that can be allocated to more value adding work with RPA. (Lacity & Willcocks, 2015, p. 3) Evaluating the manual workload is determined by defining the frequency of the process over a given time slot. After this, you can find out how long the process will run manually. From these, you can calculate the current full-time work calculation by counting the number of hours worked per week in the process and dividing it by the human weekly hours (37.5 hours).

In addition to operational cost benefits, there are also other benefits that should be assessed. Robots operate with 100% consistency and therefore incidences of errors and inconsistent application of rules are reduced. Also, productivity can be approved due to the fact that RPA allows organizations to operate around the clock. It is also possible to refocus talent on higher-value work, strengthen auditability for tasks subject to rigid compliance regulation and use enhanced task execution data to analyze and improve processes. (Dorr et al., 2018, p. 2)

In addition to cost savings, companies experience many other benefits like decreased cycle times and improved throughput. Software robots can work 24 hours in a day and 7 days a week. Also, flexibility and scalability are known benefits of software robots. They can be scheduled for a particular time and as many robots as required can be quickly deployed to

perform it. Software robots also improve accuracy and programmed to follow rules and robots do not make typos. (Lowes et al., 2016, p. 6)

Software robots also improve employee morale. Those tasks and processes which are most suitable for automation, are typically the most laborious and not interesting. Employees are then relieved of them and can be refocused on more rewarding and higher value activities. (Lowes et al., 2016, p. 6)

Software robots also enable detailed data capture. Tasks can be monitored and recorded at every step. This produces valuable data for audit trail which can help in process improvement and help with regulatory compliance. (Lowes et al., 2016, p. 6)

#### 4.5 RPA implementation

There are few important steps in the successful RPA roadmap. It's important to find out more about RPA and how it can work in certain environments requires a lot of research. White papers are a good source of information, but they may show only one perspective. Information can be found from internet, podcasts, webinars, youtube and videos, but also attending to conferences can assist in moving from the theoretical to contextual. Third-party expert can also consult and bring experience of similar projects. (Institute for robotic process automation, 2015, p. 25-26)

It is important to assess readiness for RPA before going forward with a full strategy and to recruit the most accurate human resources for the establishment and maintenance of RPA. (Institute for robotic process automation, 2015, p. 25-26)

According to Lacity et al. (2016, p. 10-12) there are few good best practices for RPA implementation. It is good that business operations lead RPA implementation. RPA is a tool that is designed to be used by subject matter experts rather than by IT programmers. It is also important to pick the right RPA approach, whether it is screen automation or process automation. These options have different approaches to automation. Some offer quick and cheap solutions that deployed on desktops. These tools are suited for organizations that want to democratize the workforce and allow individuals to control the automation of their own work. Other RPA providers like Redwood, aim to automate enterprise transactions on a platform that is secure, available and controlled. (Lacity et al., 2016, p. 10-12)

It is also important to choose the right implementation partner. Organizations need to pick most suitable RPA tool and an implementation partner, which may not be the same. Choosing the tool is the easy part but picking the right implementation partner might be more difficult. The right partner needs real subject matter expertise and prior experience with the

tool. (Lacity et al. 2016, 10-12) Some providers have more experience in particular industries and some in certain types of processes. Also pricing models should be considered. (Lowe et al., 2016, p. 17.)

It is also important to bring IT on board early. IT has an important role to play in RPA implementation. IT can help validate the RPA software as enterprise-worthy, manage how software robots access existing systems and manage the infrastructure so it is available, secure and scalable. (Lacity et al., 2016, p. 13-15)

Organizations need to determine automation-operating model. Organization need to decide whether to establish a strategic automation capability within organization or just desire an automated outcome with the minimum of effort. Many organizations develop an Automation Center of Excellence to facilitate training and the sharing of knowledge and best practices. (Lowe et al., 2016, p. 16)

Business case need to be built to estimate the benefits of automation on a process-by-process basis. If resources can be relieved of tasks through automation, where will work be allocated? It is also important to think how improved accuracy or increased speed are translated into value? Usually at this stage, some pilot processes are automated to prove the concept. This is to obtain buy-in from stakeholders, improve understanding of both the potential and the limitations of automation. This is also important to identify the key success factors the environment. Good pilot candidates are usually processes which are performed with some frequency. (Lowe et al., 2016, p. 16)

According to Lacity et al. (2016, p. 13-15) there are few important topics from change management point of view to remember. Senior managers and business units need to understand RPA capabilities. It is also important to define what the new organization would look like after robotization. Organizations need to define which tasks will be performed by robots and which tasks by employees. Employees need to be trained on how to work with robots.

Automating routine tasks and applying robotic technology can be successful if adaptive changes are made in the operating environment. There are possibilities for new ways of human working and new business models. The best results are gained when robots and automation are combined. It has been predicted that low-level, repetitive jobs will be automated, and unemployment will occur at the bottom of the labor market, but it might be that the more cognitively demanding, middle-level jobs that are reconfigured into lower level jobs. Robots don't have to be the best, it just must be at least as good as the average, but it can do things cheaper and quicker without holidays. (Herbert et al., 2016, p. 24)

Organizations need to prepare automation roadmap. This means that organizations should create an automation roadmap which look beyond the initial deployment and describes how automation will be expanded within the organization. Communication, training and change management plays a critical role in this transformation. All stakeholders need to understand the what, why and how of automation. (Lowes et al., 2016, p. 18.)

RPA needs to be a part of longer term journey towards lights-out processing, which is first enabled by total digitalization, sensible self-service systems and appropriate standardization. All these may create possibilities for automation to eliminate manual operations, enhance present operations, augment information flows and management decision making capability and provide further options for robotic management and decision making. Robotic computer programs are in position to replace many of the decisions that middle managers use to make. (Herbert et al., 2016, p. 24)

Once RPA is implemented, the next step is to roll out robotic process automation throughout the larger company, but this step should never be considered the end point. Technology changes rapidly and there will be need for continuous improvement. (Institute for robotic process automation, 2015, p. 25-26)

#### **4.6 Robotic process automation in Shared Services**

For GBS organizations, robotic process automation is one possibility for digital service optimization. Also, rationalization and consolidation of legacy platforms, movement of business applications into the cloud and process digitization should be considered. Since RPA requires low initial investment and it has significant and rapid cost-savings potential, it interests many companies today. Typical possibilities for automation include tasks that use structured, high-quality data, access multiple systems, apply a clear set of rules and requires substantial but repetitive manual actions. (Dorr et al., 2016, p. 6)

Although shared service organizations have long-deployed technologies like ERP systems, self-service portals and low-level automation tools, RPA is a new type of software allows enterprise-safe automation of processes. Early adopters have achieved multi-faceted business results from implementing RPA as well as workload savings, increased quality, increased service delivery speed and more satisfied employees. Although these results cannot be gained without proper governance. According to research LSE Outsourcing Unit has done, best practices for achieving business benefits include an executive-sponsored service automation strategy, control by business operations/shared services, talent redevelopment and change management to prepare the organization for changes caused by automation. (Lacity & Willcocks, 2015, p. 3)

Shared services are particularly ripe area for achieving business benefits with RPA. RPA suits best to replace human work for so called “swivel chair” processes. In these processes humans take inputs from one set of systems like email and spreadsheets, proceeds those inputs using rules and then enters the outputs into systems of record like ERP or CRM systems. (Lacity & Willcocks, 2015, p. 3)

The definition of shared services is “the consolidation of support functions (such as human resources, finance, information technology and procurement) from several departments into a standalone organizational entity whose only mission is to provide services as efficiently and effectively as possible.” (Lacity & Willcocks, 2015, p. 6-7)

Mature shared services organizations are stand-alone global business entities with standardized processes, service level agreements, user chargeback and high-performance, front office cultures that service multiple departments. According to survey to 718 shared service centers, most likely finance/accounting (93%) is the functional area most commonly is moved to shared services. Second common is human resources (60%) and after that information technology (48%) and supply chain management (47%). (Lacity & Willcocks, 2015, p. 7)

The Global Financial Crisis in 2008 boosted the creation of shared service centers by offering the promise of lower costs, tighter controls, improved service levels and scalability. Cost reduction is the most important driver of shared services. 90 percent of companies had created shared service entities by 2014. Shared services usually have services for more than one functional area. A recent survey of more than 1,000 shared service centers (SSC) by Deloitte found that SSCs with more than three functions have increased by more than 40 percent over the last two years. (Lacity & Willcocks, 2015, p. 7-8)

Among the biggest shared services trends during the last five years have been Global business services. This trend has been to create global business services with several functional areas serving multiple countries. Typically, GBS leaders report directly to CEO or CFO and are in charge of continuous improvement global process ownership. (Lacity & Willcocks 2015, p. 9-10)

Also, one of the biggest trends has been public sector adaption. Shared services are happening at all levels of government. Shared services also focusing on business outcomes. This trend is running global business services more as a business and less as a cost center concentrating more on business impact. (Lacity & Willcocks, 2015, p. 9-10)

Digital transformation, including Robotic Process Automation is also one of the biggest shared services trends. Global business services

organizations apply digital technologies like Social, Mobile, Analytics and Cloud (SMAC) to deliver simplified, seamless experiences to internal users, employees, suppliers and external customers. Digital technologies, software-as-a-service (SaaS), big data and analytics, cloud and mobile are critical transformers of global shared services. (Lacity & Willcocks, 2015, p. 9-10)

Shared services are supposed to deliver services that are low cost and with excellent service. Shared services are also enabling business, scalable, flexible, secure and compliant. High performing shared services have centralized physical facilities and budgets. They have standardized processes across business units and optimized processes to reduce errors and waste and to simplify the service portfolio. They have relocated from high-cost to low-cost destinations. High performing shared services have technology enable with for example self-service portals and they have adopted automation. (Lacity & Willcocks, 2015, p. 11)

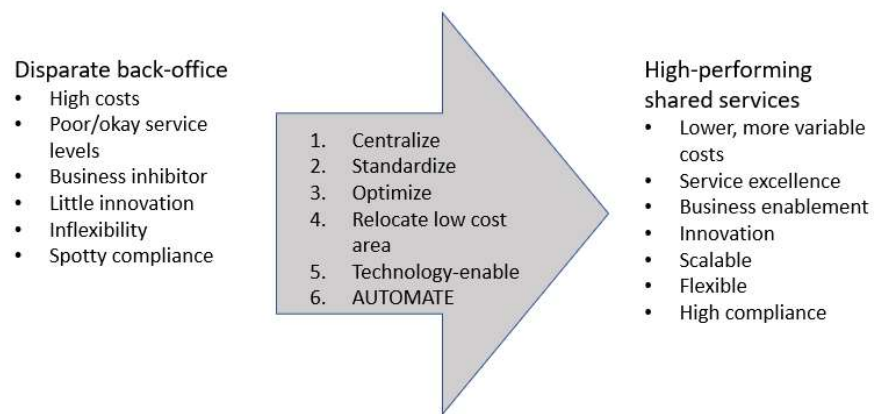


Figure 6. Six Levers for Transforming Shared Services (Lacity & Willcocks, 2015, p. 11)

Many shared service units have adopted the first five transformation levers and are now looking for the next transformation lever which automation is it. (Lacity & Willcocks, 2015, p. 11-12)

When discussing service automation, following terms are usually used: scripting tools, screen scrapers, robotic process automation (RPA), cognitive intelligence (CI), machine intelligence, artificial intelligence, cognitive learning technology, autonomic platforms, cognitive computing and business process management (BPM). RPA is suitable for processes with medium or high-volume transactions and low to medium degree of process complexity. Cognitive intelligence is well suited for highly complex

tasks, typically with low daily volumes. One example could be cancer disease diagnosis task. (Lacity & Willcocks, 2015, p. 12-13)

## 5 FINANCIAL MANAGEMENT PROCESSES

This chapter Financial management processes are presented. Financial management has wider meaning than accounting. Financial management means a system in which an organization monitors financial events so that it can report its activities to its stakeholders. (Lahti & Salminen, 2014, p. 16)

### 5.1 Financial management definition

Financial management can be divided to external accounting and internal accounting. External accounting produces information for external stakeholders, like authorities and internal accounting provides information to company management. From information system point of view, financial administration is a system which consists of components tied together to achieve desired result. These components consist of hardware, software, data input, printout, data, people and procedures. The result of the system can be e.g. monthly sales report or sales invoice sent to customer. (Lahti & Salminen, 2014, p. 16)

### 5.2 Financial management processes

Figure 7 shows that from strategic point of view financial administration can be seen as business process or one of the organization's support functions. Financial administration can be divided to several pieces or processes. Record-to-Report process includes General ledger accounting and close, reporting and master data maintenance. Purchase invoice process is usually called Purchase to Pay or Procure to Pay. This process consists of steps from purchase order to purchase invoice payment. Sales invoice process is also called Order to Cash. This process includes steps from sales order to sales invoice payment transaction. Essential part of the process is accounts receivable and debt collection. (Lahti & Salminen, 2014, p. 16-17)



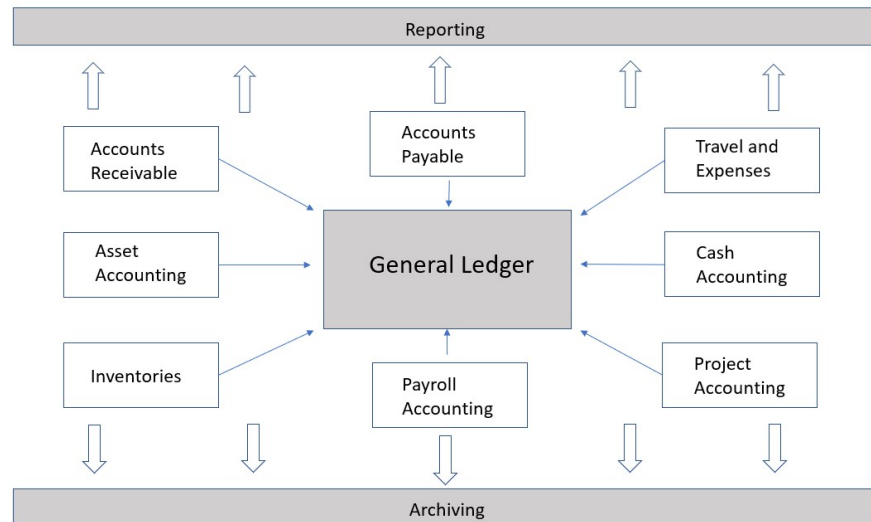


Figure 7. The financial management consists of the general accounting, its pre-processes, reporting and archiving. (Lahti & Salminen, 2014, p. 19)

Travel expense process consists of employee travel expenses and other expenses outside of the purchase invoice process. Money transaction and cash management process includes all payment transaction handling. (Lahti & Salminen, 2014, p. 17)

Fixed assets process follows company's investments and their valuation as well as depreciations and payroll accounting process collect employee working time data. (Lahti & Salminen, 2014, p. 17)

General ledger process collects transactions from sub-processes, makes reconciliations and produces reporting based on transactions. General ledger process includes e.g. interfaces, clearing account and sales and purchase ledger reconciliation, periodization, monthly closing of books, tax handling and reporting. This process is also called Record to Report-process. (Lahti & Salminen, 2014, p. 17)

Reporting process includes creation of reports and delivery. This process utilizes data produced in other processes. This process starts where other processes end. From financial management point of view reporting process includes also operational management with budget and forecast planning. (Lahti & Salminen, 2014, p. 18)

Archiving relates to all processes mentioned above. Organized and reliable electronic archive is very important for digital financial management. (Lahti & Salminen, 2014, p. 18)

Controls are different kind of tasks or functions which ensure process effectiveness and reporting reliability. (Lahti & Salminen, 2014, p. 18)

### 5.2.1 Record-to-Report process

Since this thesis concentrates on automating Record-to-Report process, it is worth take a deeper look at it. Automation of Record-to-Report process has a critical impact on the quality of the reporting, time schedules and in the error-rate. In financial management and ERP systems, there are often significant differences in what accounting functions they contain and how they support automation. (Lahti & Salminen, 2014, p. 150)

Bookings in general ledger consists of memo vouchers, bookings from business processes and sub-ledger transactions. Sources for these bookings are accounts receivable, accounts payable, travel and expense transactions, asset accounting, payroll accounting, cash transactions, stock accounting, project accounting and treasury/loan accounting. Sub-ledger transactions can be different modules of same ERP system than the general ledger. (Lahti & Salminen, 2014, p. 150-151)

There are also transactions which are booked directly to general ledger. These are called memo vouchers. Memo vouchers include calculations or other back up material as a prove the necessity of the memo vouchers. Memo vouchers are used for booking following transactions:

- cost and sales accruals and reversals
- adjustments and corrections
- reconciliation vouchers
- cost and other allocations (Lahti & Salminen, 2014, p. 151)

General Ledger collects transactions from company's all business transactions. In digitalized accounting most of the business transactions are directed to accounting automatically with using certain parameters or interfaces. In general ledger function these parameters are defined and maintained. General ledger accountants need to reconcile the sub-ledgers with interfaces to ensure that all data has been transferred successfully. General ledger accountants are responsible of reconciling the whole accounting and analysis of deviations. General ledger accountants make adjustments, corrections and needed accruals. (Lahti & Salminen, 2014, p. 152)

## 6 EMPIRICAL PART OF THE STUDY

In this chapter Company X Oy RPA model and RPA implementation process are presented. This chapter includes also ideas for RPA usage in Record-to-Report process and evaluation of RPA ideas. In this chapter first implemented RPA cases are described and roadmap for next RPA cases are presented.

### 6.1 Company X Oy RPA Model

Company X Oy has a RPA concept which describes the way of working with RPA. This RPA concept defines multiple areas and RPA models to support and guide usage of RPA. RPA model defines the most important principles, approaches, methodology, processes, tasks, roles, responsibilities, guidelines, templates, handbooks and manuals to support RPA usage at high level. RPA Handbook gives “how-to” practical guidelines. RPA Manual is a general tool, product or version manual including set of instructions, samples etc. RPA Framework top level master document describes the concept, structure and areas for RPA. (Company X Oy, 2018)

#### 6.1.1 Company X Oy RPA Strategy

Company X Oy is planning to be the trendsetter for robotics and process automation in Finland. Company X Oy invests heavily in the exploitation of new technologies and competence development. Due to the size of the company, transactional volumes are high. In service center development unit, there is a Center of Excellence (CoE) team, which develops and innovates new ways of working. In the nearest future, Company X Oy will utilize also analytics, machine learning and artificial intelligence. (Company X Oy, 2018)

#### 6.1.2 Company X Oy RPA Solution

Company X Oy has chosen UiPath for RPA software and creates and develops RPA solutions with this software using Company X Oy systems and tools. RPA partner maintains the technical environment for RPA solution. If there is any updates or technical problems like network problems, RPA Partner is responsible for fixing the problems.

RPA Center of Excellence unit has two main areas, Process Automation Development and Process Automation support. Process Automation Development area includes RPA backlog handling, first evaluation of RPA process ideas and facilitating backlog items. RPA Development-process includes handling of development funnel and ensuring automation performance, compliance, quality and scalability.

Process automation support-process handles operations like robot utilization, robot reporting, automation and monitoring ensuring compliance and quality. Production support and changes are also handled in this process. This includes managing RPA relevant target system changes from automation point of view and automation support.

Company X Oy has chosen to work with a hybrid RPA Center of Excellence (CoE). This means that RPA CoE is responsible for development and RPA services, RPA backlog management, developing domain practices and enabling tools, resources and processes. Business and different functions own the automatized work and are responsible for executing the business analysis and specifying the backlog use cases. Hybrid RPA service model enables fast reallocation of resources on need to basis and sharing and accumulation of knowledge. This service model also enables good insight of RPA solutions created for Company X service center and business units and efficient reuse of components.

### 6.1.3 RPA CoE service model

Business Units have the ownership of business processes and domain for expertise accountable for human and robotic work related to compliance, regulations and polices. They are also responsible for robot work exception management.

RPA CoE provides robotic related services based on the service catalog. It is accountable towards Business and functions for services provided. Governance and Development area includes strategy and service architecture, pipeline governance, development lifecycle services and benefits tracking. This area includes implementation, guidelines, models, frameworks, tools and best practices and training as well.

Robotics Operating Services includes RPA platform, functional monitoring and capacity management, continual improvements and support and maintenance as well. Robotic work support, incident, change, problem and performance management is included as well.

IT services provides all mandatory system and infrastructure services. This includes e.g. ERP services, identity and access management, network services, service desk, workstation services and security services. IT services are providing support processes and tools for support, incident etc. management.

### 6.1.4 Company X Oy RPA Roles and responsibilities

RPA Business Owner from business function makes business decisions, priorities RPA within Business unit and manages RPA in Business Unit level. RPA Business Owner is member of RPA Steering Group.

RPA Owner from business function is responsible for process development, new automation identification and retirement inside own unit/area. RPA Owner is responsible for own unit/area reporting and dashboards review and actions points on findings. RPA Owner also has a coordinator role in cases when robot solution is not available, and work needs to be organized in other way. RPA Owner is responsible for preparing Business Continuity Plan.

RPA Manager, SME from business functions has the knowledge of the process in the current state and knows business exceptions. RPA manager is monitoring the work and handles business exceptions when RPA process is in production. RPA manager is also responsible for improvements in RPA process.

RPA Lead in Center of Excellence unit manages Center of Excellence and has responsibility of overall guidelines and strategy.

RPA Architect in Center of Excellence unit defines the architecture of the RPA solution and RPA Platform. RPA Architect is responsible for development costs and feasibility including reusability.

RPA Analyst in Center of Excellence unit performs and facilitates assessments with business SME's. RPA Analyst prepares the process definitions and process maps used for automation with SME's. RPA Analyst participates in RPA development and needs understanding of operations and business processes.

RPA Developer in Center of Excellence unit designs, develops and tests the automation workflows.

RPA Operator in Center of Excellence unit manages, orchestrates and controls the virtual workforce as part of the operational environment. RPA Operator focus is on continuously improving robotic operational performance and resource allocation, by exploiting the advanced reporting and analytical tools within the RPA solution.

## 6.2 RPA implementation process in Company X Oy

RPA process starts from ideas which are collected through RPA Pre-analysis questionnaire. This questionnaire is a web form in Company X Oy intranet. Any employee can find it and can fill the form. The RPA questionnaire has following questions:

- Task name
- Short description of the task
- Unit and contact information

- Desired benefits (Time, money, quality, customer satisfaction, employee satisfaction, other)
- Task contents – monthly volume and variations, handling time for easy and complex case, persons performing the task, moment of task, format of data, quality of data, activation of task
- Task related systems (eMail, excel, word, web services, SAP etc.)

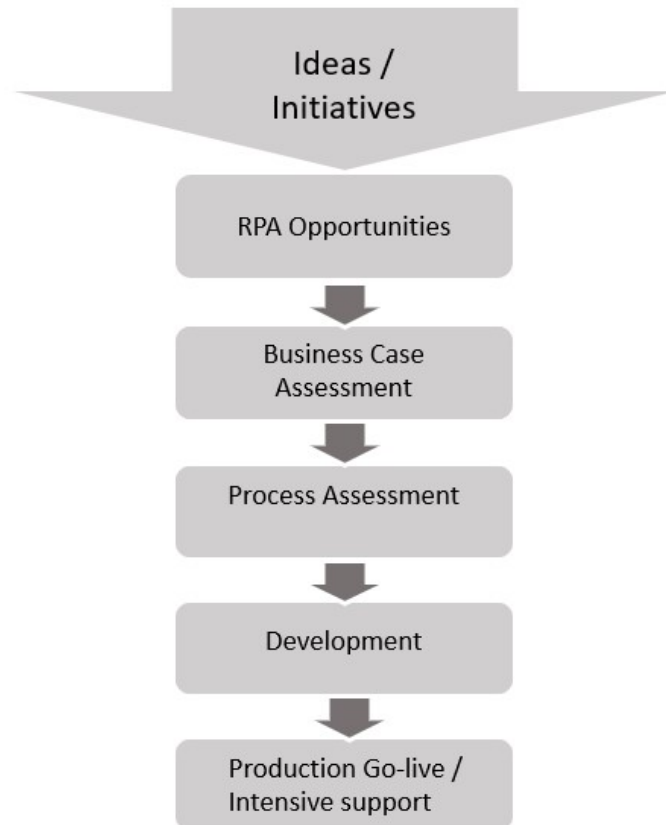


Figure 8. Company X Oy RPA implementation process

RPA implementation process is divided in five phases which are shown in figure 8: RPA Opportunities, Business Case Assessment, Process assessment, Development and Production Go-live / Intensive Support. Proposed RPA idea is evaluated in Business Case phase by having first meeting to go through the idea. Important criteria for evaluation are automation potential according to basic RPA automation prerequisites and preliminary benefit evaluation. If the process is quite easy and straightforward, only one meeting or workshop is enough for moving to next step which is Process assessment phase. If the process is complex, there might be several meetings to go through the process and planning for the RPA solution. During the discussions, RPA team prepares Solution

Description Document (SDD) describing all details for the RPA solution. This is typically done by recording the human work and documented by screen shots of each process step. This phase is wanted to be light and easy so that this phase is as efficient as possible to be able to proceed with RPA solution quite fast. First RPA case was carried out a bit heavier process and after that the process was lightened to have this phase more efficient and agile.

In Business Case Assessment phase also Business case calculation is prepared in order to evaluate the advantages of proposed RPA case. Return on Investment is used as a measure in the calculation. Typically, this evaluation contains evaluation of case complexity, number of transactions, time used and cost per full time employee. Before moving to next step, Business Owner makes decision based on provided facts, whether to continue with the RPA solution or not. There are also other facts than money affecting to the decision like time, quality, customer satisfaction and employee satisfaction. RPA Business Owner also makes prioritization on proposed cases.

In the Process Assessment Phase Solution Description Document is gone through with the team who made the RPA proposal to agree all needed steps RPA automation. Discussions are continued until all parties have common understanding of planned RPA solution. Also, discussion of any obstacles or any changes in the process or in the environment have occurred during the Process Assessment phase. It might be so that team has got new information of future plans concerning e.g. changes in software etc. These changes are then evaluated, and RPA solution might be postponed until changes have been properly evaluated. Also, system environment requirements are evaluated, developed and tested: architecture, user rights and accesses, end-user application and services.

In the Development phase RPA solution is built based on collected information and documentation. This phase includes testing which shows if the development work has been successful. If testing shows any issues, those are fixed, and testing is done as many times as the problem is fixed. Final testing is User acceptance test (UAT). If UAT testing is successful Robot Manager approves RPA solution in production.

Implemented RPA task moves then to Intensive support period. In this phase RPA work is evaluated and work supported intensively. Testing has been done in testing environment and there might be some differences between testing and production environment. Therefore, it is important to have intensive support period to fix possible bugs in production.

In the intensive support period, there is also important to create Business Continuity Plan to plan those cases when robot is unavailable to do those tasks she is planned to do. Business continuity plan should include

evaluation of how critical the task is and how long the robot can be unavailable. Also back up plan for this type situations need to be created.

### 6.3 Company X Oy Record-to-Report process

In figure 9 can be seen Company X Oy Record-to-Report processes:

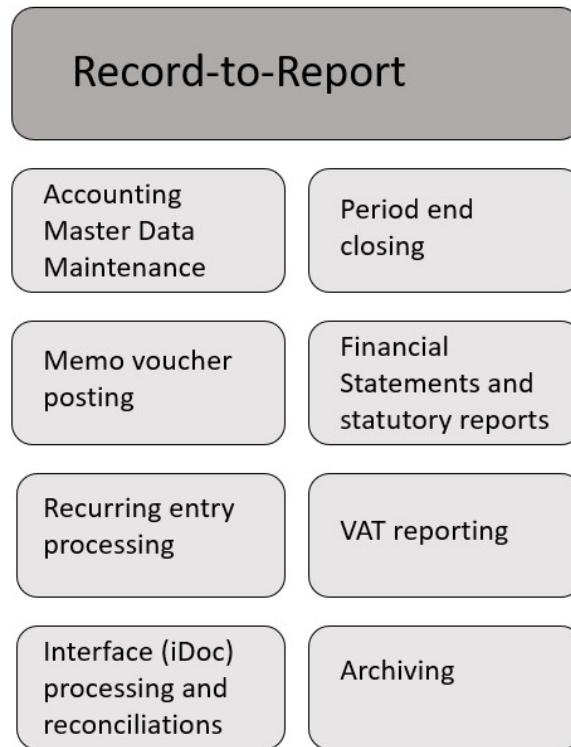


Figure 9. Company X Oy Record-to-Report processes.

Accounting master data maintenance includes creation and maintenance of new accounts, cost centers, profit centers, order numbers, products and VAT codes according to business needs and approval. Accounting master data is maintained in SAP accounting system.

Memo voucher posting includes creation and posting of memo vouchers. Service Center accountants post memo vouchers which are created by controllers and sent to Service Center for posting. Accountants in Service Center can post memo voucher which they have created by themselves. Memo vouchers are prepared in memo voucher template and posted to accounting system SAP with a separate program. This task includes validation of correctness according to group accounting policies.



Recurring entry task means cost allocation to several months based on invoice received in advance. Invoice is booked to one balance sheet account in IWF purchase invoice system. General ledger accountant registers new invoice as new document in SAP accounting system based on the entry in balance sheet with all accounting details. SAP recurring entry run then allocates the cost to following months.

General Ledger accountants also handle Interface monitoring (iDoc) and reconciliations. This task means interface error corrections in SAP accounting system. Typical interface errors are incorrect cost center, incorrect accounting period or incorrect order number.

Period end closing service area includes several tasks. These tasks are done according to group timetable. Each legal company has closing checklist which lists all tasks done in accounting period close starting from -10 working day until +10 working day. Period end closing tasks start from opening next accounting period in SAP and end to Balance sheet specification preparation. Typical period end closing tasks are:

<b>Task name</b>
Opening next month's period in SAP
Reversal of last month's accruals
Accrual bookings
Salary reconciliations and adjustment bookings
Checking of currency exchange rates
Clearing of accounts
Asset transaction accounting, depreciation postings
Manual invoicing between group companies
Allocation runs
Recurring entry (cost allocation to several periods)
VAT code checks
Clearing account checks
Memo voucher postings
Revenue recognition run
Foreign currency valuation
Intercompany reconciliation
Corporate income tax calculation
Income statement and balance sheet analysis
Group reporting
Balance sheet specifications

Table 1. Company X Oy Period end closing tasks

Most of these tasks are done on monthly basis, but some are done quarterly only. Each of these tasks have deadline and need to be performed in certain order. These tasks are done for each legal company, but some of them can be done centrally for all legal companies at once.

In Record-to-Report process also Financial Statements and other statutory reports are prepared. In this task income statement, balance sheet, cash flow statement and notes are prepared according to country specific regulations. This task includes also assisting in audit with external auditing firm.

VAT (value added tax) reporting is also prepared in Record-to-Report process. General Ledger accountant prepares periodic VAT return, submits it in Tax authority system and prepares payment form for VAT payment. General Ledger accountant also makes checks and reconciliations for used VAT codes during the month and during the month end closing to ensure correct VAT reporting. In addition to period VAT return, General Ledger accountant also prepares monthly VAT EU Recapitulative statement to report EU sales to Tax authorities.

Archiving is also part of Record-to-Report process. Accounting material is required to be archived by Accounting law on monthly basis. For example, income statement, balance sheet, daily ledger and general ledger reports are required to be archived on monthly basis. Reports from SAP accounting system are saved by legal company in archive and other accounting material as well.

#### **6.4 Ideas for RPA usage in Record-to-Report process**

Many of Record-to-Report process tasks are done manually by legal company. Each legal company has named Chief accountant and if the company is bigger company, there is also one or two accountants handling the accounting tasks. There are some tasks in this process, which are done with using SAP automation functionalities, like automatic clearing of open items management accounts, but most of the tasks are performed manually. This requires resourcing and takes time from more important value adding work like analyzing work.

General Ledger team had a workshop to collect ideas for RPA usage in General Ledger process. This workshop was held 24<sup>th</sup> April 2018 and it participated 7 General Ledger accountants. Purpose of this workshop was to find ideas for RPA usage and especially those tasks which were manual and had certain rules. Also, tasks which were very time consuming and possible candidates for RPA were listed. In table below can be found results of this workshop.

<b>Task name</b>	<b>Task description</b>	<b>Benefits</b>
Balance sheet specification	Preparation of BS specification excels listing account lines	Time, quality
Master data updates	Updating master data information to different sources when SAP is the source	Time, quality
Revenue recognition run	Booking of current month revenue based on contract – SAP functionality	Time
Salary reconciliation	Reconciliation of salary between Fenix and SAP	Time
iDoc corrections	Interface error corrections	Time
MO run check	Group internal invoice reconciliation	Quality
Group internal item check AR/AP/GL	Intercompany sales and purchases reconciliation	Time
VAT code check	Correct VAT code usage	Time, quality
VAT registration check	EU VAT registration check	Time, quality
Allocation runs	Period end allocation runs in SAP	Time
GL account master data check	GL account master data check periodically	Time, quality
Memo voucher upload to SAP	Memo voucher excel upload to SAP	Time
Approval information check between SAP HR, IWF, Supply Center	Approval information check between SAP HR, IWF, Supply Center	Time, quality
SAP-HFM reconciliation	Reconciliation of data transfer between SAP and HFM	Time
VAT return preparation	VAT return preparation and filling to Omavero	Time, quality

Intrastat reporting	Preparation of intrastat report	Time
Recurring entry	Registration of recurring entry document	Time
Income tax return filling to Tax authorities tool	Income tax return filling to Tax authorities tool based on excel	Time, quality

Table 2. Ideas for RPA usage in Record-to-Report process

### 6.5 Evaluation of RPA ideas in Record-to-Report process

RPA automation potential for each RPA idea was evaluated. RPA automation potential was evaluated based on chapter 4.3. Task repetition rate was determined monthly. Then it was determined how much time it takes to complete the task. This way it was possible to calculate how much time was spent with the task on monthly basis. Task complexity was estimated based on information availability. This was evaluated by listing how many different systems it uses and how many different steps the task includes and how many exceptions it has. Scale for complexity is 1=easy, 2=medium and 3=complex.

Tasks were also linked to processes and subprocesses. Process input and output were defined to get more information about the process and how the task is linked to other process steps and to the end-to-end process.

As it is mentioned earlier in chapter 4.3, it is also good to analyze tasks critically. Therefore, also other possibilities for developing the task than RPA were assessed. This is shown in Other solution-column.

It is also important to assess process or task automation benefits. In addition to time or cost savings, RPA idea benefits were assessed. Topic is presented in chapter 4.4. Time savings are shown in Time saving target-column. This assessment shows how released time with RPA is planned to be used in organization.

Task potential for RPA is defined in separate excel-file. This excel file can be found in attachment 1. In next table 3. is shown excel columns and one example how the excel is filled. Bold text is representing columns.

<b>RPA idea</b>	<b>Process</b>	<b>Subprocess</b>
Group internal item check AR/AP/GL	Intercompany accounting	Intercompany reconciliation

<b>Input</b>	<b>Output</b>	<b>Systems used</b>
Intercompany transactions recorded	Intercompany items reconciled	SAP, excel
<b>Complexity based on information availability</b>	<b>Benefit</b>	<b>Other solution</b>
Medium	Time, cost, accuracy & control	ERP development
<b>Hours/month for workload balancing</b>	<b>Time saving target</b>	
XX	Workload balancing	

Table 3. RPA analysis in Company X Oy.

According to the analysis, the most suitable candidates for RPA are group intercompany AR/AP/GL check (group internal sales and purchases), memo voucher upload to SAP and balance sheet specifications.

Reconciling of group intercompany sales and purchases takes a lot of time during the month end closing. Company has done some automation for it, but the process includes lot of exceptions. End-to-end process assessment should be done to find the bottlenecks in the process before starting the RPA implementation. Since there is a plan to start ERP project during next months, it should be considered as one option for automatizing the intercompany sales and purchases reconciliation. Possibly there could be some part of the reconciliation that could be done by RPA. If ERP project would be postponed, the current process should be reviewed from end-to-end process point of view and some process development work should be done. There could be some process development tools used for that.

MO-run is part of intercompany reconciliation. It is one type of intercompany reconciliation and it would be quite easy to automate with RPA. Although automating this would automate only one part of the process. This should be assessed carefully what would be the benefits of automating the reconciliation of this run.

Memo vouchers are already implemented to RPA, but some development on the RPA solution could be done to optimize the solution. In chapter 6.7.2 implemented solution has been assessed.

Balance sheet specifications are prepared in excel on quarterly basis. There are several legal companies and they all need to prepare the balance sheet specifications. Depending on the size of the company, there can be from 30 to 100 accounts to be reconciled per company. RPA could help

collecting the material in Balance sheet specification excel by running accounting lines from SAP. This would help accountant work minimizing the manual work and would release more time for analyzing the account content and more value adding work. Balance sheet specification could be done on monthly basis with RPA and that way quality and timeliness would be increased by having more up to date information on balance sheet accounts. Balance sheet specifications are evaluated to be quite easy to implement to RPA since there is not many exceptions and all legal companies use already standardized excel.

Next good candidates for RPA are VAT related tasks. These tasks are transactional tasks with high volumes. RPA would increase accuracy and control in addition to workload savings. RPA would help controlling used VAT codes and that way RPA would help analyzing work. There are certain rules based on which RPA could help checking if the used VAT code is correct and give the feedback to accountant. RPA could help preparing monthly vat return since it is done based on rules already.

When considering VAT automation for RPA, also new ERP solution should be taken into discussion. It should be evaluated how VAT could be automated in the ERP solution. This way the whole VAT process can be automated with predefined rules.

Recurring entry is a SAP functionality which allocates costs to correct accounting period. Purchase invoice is booked to Recurring expenditure advances account. In SAP this entry is registered in recurring functionality by giving start and end date, monthly amount and expense account. Separate run will then book this monthly amount to cost accounts from Recurring expenditure advances balance sheet account. RPA could be used for the recurring item registration because all the needed data is available in purchase invoice circulation system. Although there is a plan to implement new purchase invoice circulation tool during next year and it seems that this same functionality is already built in the new tool.

Good candidates for RPA are different kind of reconciliations. On monthly basis salary reconciliation is done between salary data from payroll system and SAP accounting data. In this task accountant checks that data sent from salary system is correctly transferred to accounting. This task is currently done in excels which are not standardized and they include pictures. This task need to be done for all legal companies separately. To be able to automate this task with RPA, excels need to be standardized and they should include only numbers, not pictures. By having standardized excels, this task is quite easy to implement to RPA. Although by standardizing the excel, it might be so that the task is developed so much that it is not worth preparing with RPA.

Other monthly reconciliation is SAP-HFM reconciliation. After closing the accounting period in SAP, data is transferred to HFM for consolidation

purposes. This task is done by comparing income statement and balance sheet account balances in both systems. Sources of data are SAP income statement and balance sheet and HFM income statement and balance sheet. Task was done earlier so that both reports were run, and data was reconciled manually by ticking each account balance. Currently the task is developed so that HFM Smartview functionality is used. HFM Smartview excel is built so that when changing period name, it shows account balances in HFM. On the other sheet of the Smartview excel is saved SAP income statement and balance sheet in excel version. With using excel formulas it is possible to compare account balances in one sheet. This new way of working has saved a lot of time. It seems that it is not worth implementing RPA solution for this task, since it takes only 15 minutes per company with current improved process.

iDoc corrections would also be one possible task for RPA. This means SAP interface corrections between different systems like payroll system, accounts payable, accounts receivable and invoicing systems. There can be several interface errors due to incorrect codes used. This task is very manual, time consuming work. This task is rule-based, so it would be quite easy to implement for RPA.

There were some ideas for automating master data maintenance tasks. Updating access rights was proposed to be automated via RPA and it seems that it is good candidate for RPA. This task is rule based and transaction amount is high. Also, other master data validation and maintenance tasks can be automated via RPA and this are should be investigated more to find other possibilities for RPA. For example, Chart of Accounts maintenance, Cost and Profit center maintenance and interface and transformation management should be taken into deeper analysis.

There were also other RPA ideas listed for accounting, but it seems that there's no valid business case with these tasks and the transaction volumes are very low.

## **6.6 First implemented RPA cases in Record-to-Report process**

Next chapters will describe the implementation process for the first two chosen RPA cases.

First two chosen RPA cases in accounting were Revenue recognition run and Memo voucher upload to SAP. These tasks were chosen to be the first accounting related RPA tasks because there was a need to get help to two very time-consuming tasks and there was a need to get feedback from implementation process. There was no deep process analysis or evaluations made for these two first accounting RPA cases. These tasks were taken to RPA as they were processed currently by accountants.

Revenue recognition was chosen as the first RPA case because the task is very simple, but it is very time consuming. It was a suitable candidate for the first case because there was a wish to get experience from RPA implementation in accounting and it was easy to implement. Memo voucher upload-task is a time-consuming task with high transaction volumes. It has a standard process and therefore it was chosen for the second case for RPA in accounting.

#### 6.6.1 Revenue recognition

Revenue recognition run is a SAP functionality which allocates invoiced revenue to correct accounting period. This run posts revenue according to dates from balance sheet account to revenue account. In SAP, company code, posting period/year and posting date is chosen. This task includes many repetitive steps. After allocating revenue, reconciliation is done to analyze the balance of deferred revenue or unbilled receivables accounts.

This RPA solution starts when invoicing team sends an e-mail to General Ledger common mailbox. This e-mail is in agreed format and includes agreed text. Robot checks if she can find this e-mail and if she finds it, then she starts to proceed this task. Robot is scheduled to check this e-mail regularly. Robot definitions also include legal companies. The weekly run takes approximately 7-8 hours in total and it is scheduled to be done during the night.

Revenue recognition was first RPA case for Company RPA team. There was a RPA partner helping with the documentation and in data collection. RPA partner instructed with questions to accounting team and helped with recording the task.

Quite soon first meeting was agreed. Before the meeting RPA team had some overview of the process and knew that this task is very time-consuming. In the first meeting accountant showed in practice how she does the work in SAP, which selections she makes and what kind of errors there might be and how them should be solved. Meeting was recorded. After meeting RPA team prepared a document with screen shots based on the recording and each mouse clicking was documented. It was noticed that accountant makes automatically some actions without saying it aloud, for example something in key board. All these are important for robot. After preparing the screen shot documentation, RPA team could start planning the solution for robot. According to instructions provided by RPA Partner, RPA team prepared Solution Design Document, which is detailed plan of activities for automation solution. This document was quite heavy to prepare with all the steps included in the automation process, but it was detailed documentation for future purposes to show the automation process if there were any changes needed. This document included 40 lines of each automation steps for robot. This SDD document felt like



double work for RPA team since they had created already the screen shot document based on the recording.

RPA team started to build the automation solution with UiPath. They also learned while doing how the automation solution should be built. When first version of automation solution was ready, it was gone through with the accountant. Communication with accounting team was kept quite tight to make sure that work is proceeding in correct direction. These discussions were very good and RPA team was able to ask more details and continue effectively the work.

When the RPA solution was almost ready, plans for testing and implementation in production was started. Testing was done in SAP test environment and accounting team accepted the RPA solution.

Revenue recognition RPA solution took approximately one month to implement in production. This implementation process includes all the meetings from data collection to testing. This RPA case was quite easy to implement since there's not many systems in use and the steps are quite similar and there's not many different kinds of steps included.

After implementing the RPA solution, some changes were done, e.g. new company codes were included, and some additional control points were added. This type of changes was easy to implement, and RPA team got the information in time. All the changes need to be tested and therefore all changes need to be planned properly.

Implementation process for revenue recognition was quite successful. Task was implemented mainly as as-is task and no changes were needed for robot. New additional task was added for robot to report tasks that robot had done back to accountant. Therefore, robot sends an e-mail to common General Ledger mailbox when task is done. Robot also lists possible errors that accountant need to investigate and correct.

#### 6.6.2 Memo voucher posting

Memo vouchers are prepared on monthly basis to post cost and sales accruals and reversals, to book adjustments and corrections or to allocate e.g. costs. Memo vouchers are prepared by controllers or accountants. On monthly basis there is hundreds of memo vouchers prepared mainly during month end closing days.

Company X has a standard template which is used for posting memo vouchers. This template has two sheets, Document-sheet and Supporting Documents-sheet. This template has mandatory fields which need to be filled with all needed information like accounting period, account number, vat code etc. Entered information is validated against accounting validation rules in SAP during the posting. If the memo voucher is not

compliant with the accounting rules, it is sent back to preparer for correction.

Upload to SAP accounting system is done with separate program. This program has four different scripts for different type of memo vouchers. Correct script is chosen by accountant based on which accounts and on which type of memo voucher posting is meant to be done.

Memo vouchers are sent to service center by e-mail to be posted to SAP accounting system. Service center accountant posts memo voucher and replies to sender with e-mail attaching posted memo voucher. Memo voucher template is attached in SAP after posting to verify full audit trail for the memo voucher.

There were three options for implementing memo vouchers for RPA. First option was to implement current solution with the current program. Second option was to build RPA solution with SAP memo voucher manual entry function. Third option would have been to take new memo voucher excel in use and use SAP memo voucher upload functionality. Quite soon it was decided to choose option two. Option three would have required changes in way of working. This would have required that new template would have been taken in use in a quite short period of time. With the first option program licenses would still have been used and there was not seen any need for that.

There are several different types of memo voucher SAP transactions in use and that has caused complexity in the RPA solution. Work started with a meeting to go through the process and to get overall idea of the task. In the next step process plan was built to get overall picture of process advantages and challenges. Next step was to do recordings of each different type of transactions. Quite soon during the recordings it was noticed that memo voucher upload to SAP is quite complex with all different type of transactions. Three first recordings were done with using current program and four recordings with manual entry functionality. There has been a own screen shot document built for each different type of memo voucher transaction.

RPA solution work started in May to build the solution with UiPath. RPA team had first meeting with accounting team to go through the RPA solution. Discussion about RPA performance were started in this meeting also. There was worries that the robot is not fast enough. There are hundreds of memo vouchers to be posted in SAP in very limited time of period. There were also discussions about feedback and reporting from robot what she has done. This means those e-mails that are sent to memo voucher preparer when memo voucher is posted or when there is any error while posting and something needs to be corrected. During the discussions it was noticed that two new type of memo vouchers need to be included in the RPA solution also.

After solving issues with different type of memo vouchers, work continued with additional task definition which means that robot attaches original memo voucher in SAP. This was not easy for robot, since attaching memo voucher in SAP requires certain type of SAP authority. After few discussions this issue was solved and RPA solution for attaching memo vouchers in SAP was created.

Next step was to start testing. This testing phase included volume testing so that it is possible to see, how robot could work in very tight time schedule. New errors were found and fixed during the testing period.

RPA solution for memo vouchers is mainly built by RPA partner. Work was started in March and it was heavy, expensive and complex to build. The plan was to implement RPA solution by May. Challenge with this process has been that responsible persons have changed during the process and also the responsibilities have not been clear during the process. Since the complexity of the process, many discussions have been needed to ensure the RPA solution correctness. Implementation process has taken quite long time. Usually reasonable time for RPA development is only couple of months.

## 6.7 Lessons learned from the first RPA cases

When starting a RPA implementation, an end-to-end process should be analyzed. Process automation or robotic process automation is about process effectiveness and process development. To take full advantage out of process automation or robotic automation, it is important to review end-to-end process steps. It is also important to evaluate different type of cases, what are the similarities and what are differences, so that several rules for robot could be avoided. In some case it might be reasonable to have majority of the task automated with RPA and exception could be handled by accountants.

It is also important to note other process development and RPA development link to that. RPA implementation should be one part of process development map.

While building the RPA solution to robot, accounting team should update work instructions so that team knows what robot does and what is in accountant responsibility. Team should think what is in their responsibility and what is done by robot, how the robot communicates, and which are the exceptions, accountant should react. This means there might be new tasks for accountant while working with robot.

Business continuity plan is also very important document to be built in case robots are no working. Teams should have back up plan in those cases

when accountant needs to take action and replace the work that has been done by robot.

For next cases it is important to think how accountant wants feedback from robot what she has done. Accountant need to be sure that robot has done all steps successfully. Accounting team should think about control points so that it can be ensured that task is completed as it should be.

During the process assessment phase, tasks should be analyzed critically. There might be some alternative possibility for RPA implementation like ERP automation. While going through the RPA case, SAP managers should be taken into discussion if there is possibility to develop the process or fix issues in SAP instead of automating it with RPA.

Documentation is very important during the RPA solution development phase. All documentation need to be updated and kept up to date while having several discussions. If persons involved in the discussions are changed for some reason, work can be continued based on documentation and there's no need to start work from the beginning once again. Documentation is also important for robot definitions and if there are any changes needed, those can be easily updated in the documentation.

It is also noted that changes to robot need to be planned properly and well in time, so that changes can be tested and documented properly.

#### 6.7.1 Revenue recognition

Revenue recognition task was easy to implement to RPA. This task includes several manual steps and it is very time consuming. RPA has allowed the task to be performed on a weekly basis. Previously, the job was done twice a month. This gives more accurate information to accounting and increases timeliness. RPA has released time to more valuable tasks and increased employee satisfaction.

If we look at the Revenue recognition RPA task from development point of view, there might be also other ways to implement this task to RPA or even other solution than RPA. This task was easy to implement to RPA and it was first RPA case in accounting. There was need to get some experience of implementing RPA and Revenue recognition task was good candidate for it.

Reconciliation is not included in robot tasks, but maybe this could be added and this way robot usage in the process could be increased.

Based on articles written about successful RPA implementation, it is good to evaluate the task or process critically and think if there is another, better way for completing the task. In this case the process could have been reviewed during the RPA assessment and ensured that the task is

completed according to planned process. Also, SAP set up could have been checked if there would have been any technical solution for fixing the manual steps in the process. This evaluation was not done, but even if the task could have been fixed with some technical solution, it might have required some SAP set up work which requires then extra work and money.

### 6.7.2 Memo vouchers

Memo voucher task has been very complicated task to be implemented for RPA. Memo voucher task implementation for RPA took over six months. In usual cases, RPA implementation takes only couple of months including process assessment, business case calculation, testing and implementation to production. There have been many obstacles during the implementation process. Although there was a need to get help from RPA automation to a task which is very manual, time consuming and rule-based. RPA solution was turned out to include several exceptions.

Memo voucher upload to SAP was evaluated in step by step level during the RPA assessment phase. Since this task includes many steps, all steps were tried to be described and documented. It is also good to evaluate the task or process critically and think if there is another, better way for completing the task. There was discussion about those three different options for building the RPA solution. Current program solution was left out, which seems to be good decision. Direct input to SAP was chosen because the other option would have impacted way of working and a new template would have been taken into use. It was evaluated as a risk because RPA implementation was planned to take only two months and there would not have been enough time to learn new way of working. If we now think about the third solution which would have meant new memo voucher template and upload would have been done with SAP basic upload, that would have been also a good option. Nobody could have estimated that the RPA implementation would take this long. Memo voucher preparers would have had enough time to learn to use the new template and new way of working with robot. Also, the RPA implementation could have been easier by using SAP basic functionality.

It seems that RPA solution capability is not that good as it was expected. It was understood that RPA solution is very quick, but there seems to be restrictions due to SAP technical environment and the performance cannot be made better with RPA solution. SAP environment is quite old. There is a plan to start ERP project during next years, so it is not worth to start fixing SAP in this situation.

During the end-to-end process assessment, there could have been discussion about the basic process and exceptions. There are hundreds of memo vouchers posted in SAP monthly. There could have been assessment on how many of those memo vouchers are basic memo

vouchers and how many of them have lot of exceptions. RPA solution could have been built so that easy, basic memo vouchers had been implemented to RPA first and those memo vouchers which have lot of exceptions would have still been uploaded to SAP by accountants. This way probably the RPA implementation time would have been shorter.

## 6.8 Roadmap for next RPA cases in Record-to-Report process

RPA ideas for accounting were evaluated in chapter 6.5. Based on the evaluation, my proposal is that Company X Oy starts to assess group intercompany sales and purchases process from end-to-end process point of view. This process is currently very complex and time-consuming process with high transaction volumes. There is a need for process development before implementing it for RPA. There might be tasks in this process that could be automated with RPA. By automating the reconciliation process or some parts of the process, accountants can concentrate on more value adding tasks during the month end close.

I also suggest that Company X Oy automates Balance sheet specifications with RPA. This is very structured process which is easy to implement, since there are not many exceptions. Task is quite manual with manual copy-paste work done in excel. By automating the manual work, accountants can concentrate on more value adding tasks and analyzing the accounts.

My suggestion is also to automate VAT process with RPA. This process has rule-based data and is quite easy to implement for RPA. In addition to time and cost savings, also accuracy and controls can be seen the most important benefits.

I am also proposing that salary reconciliation would be automated with RPA. Although automating requires some development work to standardize the excel reconciliation template, it would be suitable candidate for RPA. Idoc corrections or interface error corrections should be included in the salary reconciliation RPA solution also.

One interesting area for RPA solution is master data management. Master data validation and maintenance tasks can be automated via RPA. This area should be investigated more to find possibilities for RPA. For example, Chart of Accounts maintenance, Cost and Profit center maintenance and interface and transformation management should be taken into deeper analysis.

## 7 CONCLUSIONS

When this thesis was started, the first idea was to find out which are the opportunities to utilize RPA in Record-to-Report process. Since the RPA implementation in Company X Oy proceeded during the thesis preparation, it was decided to take the RPA implementation process also part of the thesis. The main research questions were: What are company's biggest opportunities for utilizing RPA in Record-to-Report process? What are the steps for implementing RPA in Record-to-Report process? What are the possibilities and challenges for RPA implementation in Record-to-Report process and how to develop the implementation process?

### 7.1 Results of the study

The purpose of this thesis was to find out what are the possibilities for utilizing RPA in Record-to-Report process, how to implement RPA in Record-to-Report process and how to develop RPA implementation process. Also, roadmap for future RPA implementation was planned to be assessed.

As a result of the study, all targets set for this thesis were achieved. There were several good RPA cases found and few of them were already implemented during the study. Based on the implemented RPA cases, also ideas for developing RPA implementation process were given. Since there were recognized several possible RPA cases, also roadmap for future Record-to-Report RPA implementation cases were described.

There were several possible RPA cases found during the study. All these RPA cases are separate tasks. Ideas for entire process implementation were not found. Since the RPA implementation work continues and Company X Oy gets more experience in implementing RPA, there might be also processes that can be automated with RPA. It was noted that it is important to review and assess the process from end-to-end process point of view during the task assessment phase and evaluate the suitability for RPA carefully. Few ideas for developing the implementation process were given to make the RPA process more agile. Furthermore, based on the results of the implemented RPA cases, next candidates for RPA implementation were described. These proposals are in alignment with facts described in theory base.

### 7.2 Self-reflection of the study process

From author's perspective, this thesis process has been interesting and developing. The subject was somehow familiar, but during the thesis process knowledge of RPA has increased a lot. RPA is current topic and there was easy to find written material for the study. This study has already

helped author in her work implementing RPA in Record-to-Report process. Information collected during the study will be utilized in future in RPA development and other process development work.



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