



ROBOTIC PROCESS AUTOMATION FOR BUSINESS CASES – A RE- VIEW

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| <p>Sammandrag:</p> <p>Detta examensarbete är projektbaserat och gjort för företaget Worldsome Oy. De delar som behandlar projektet är sekretessbelagda och är tillsatta som bilaga i detta arbete. Den teoretiska delen av arbetet ger en överblick av vad automatisering av företagsprocesser är samt vad de kan användas till. Examensarbetet beskriver också olika automatiseringstekniker samt en detaljerad beskrivning av Robotic Process Automation (RPA). Automatiseringstekniker som behandlas är: RPA, batch filer, Business Process Management (BPM), Excel automation, macron samt Traditional automation. Beskrivningen av de olika automatiseringstekniker beskriver vad dessa tekniker är, vilka kunskaper som behövs, praktiska exempel på hurdana situationer dessa tekniker används till samt en beskrivning av hur dessa tekniker fungerar. Den detaljerade beskrivningen av RPA behandlar vad RPA är, hur roboten fungerar, RPA-utvecklingsmiljön, kunskaper som behövs samt typiska uppgifter som kan automatiseras. I detta kapitel har beskrivits RPAs historia, var RPA ligger idag samt RPA i framtiden. RPAs historia tar upp årtal när RPA har börjat utvecklas och lanserats samt vilka tekniker som använts före RPA. Rubriken som behandlar var RPA är idag, beskriver i vilka industrier RPA har blivit mer populär samt en kort beskrivning av de mest populära RPA-verktygen på marknaden. Under rubriken RPA i framtiden beskrivs vilka förbättringar som kommer att göras inom RPA samt vad RPA har potential till. En jämförelse av BPA tekniker har gjorts, som beskriver automatiseringsteknikernas för- och nackdelar. I slutet av jämförelsen listas teknikerna samt för- och nackdelar i en tabell som gör det lätt för läsaren att jämföra automatiseringsteknikerna med varandra. Resultatet består av en kort sammanfattning av arbetet, vilka automatiseringsmetoder som används i specifika situationer samt egna tankar och funderingar om hur t.ex. större automatiseringar borde utföras.</p> | |
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| Abstract: | |
| <p>This thesis was commissioned by Worldsome Oy. As an appendence is a classified part which describes a practical use case for RPA, which is based on a practical project. More specifically, the classified part describes how a certain project is developed and a deeper presentation of the activities used for the project in the UiPath developing environment is given. The theoretical part of the thesis gives an overview of automating business processes and what it can be used for. The thesis even describes different automation techniques and a deeper description of Robotic Process Automation (RPA) is given. Automation techniques that has been described is: RPA, batch files, Business Process Management (BPM), Excel automation, macron and Traditional automation. The description of the automation techniques describes what the technique is, what knowledge is required, practical examples of situations the techniques are used for and a description of how the techniques works. The detailed description of RPA describes what RPA is, how the robot works, the RPA developing environment, what knowledge is required and typical tasks that can be automated. In this Chapter RPA history, where RPA is today and RPA in the future been described. The history of RPA describes when the development of RPA was started, when RPA was lounged and what similar techniques was used before RPA. The heading RPA today describes in which industries RPA is becoming more popular and a short description of the most common automating tools on the market. The heading Future/Research trends describes what kind of updates is going to do about RPA and the potential of RPA. A comparison of Business Process Automation (BPA) techniques is given, that describes the advantages and disadvantages of the different automating techniques. At the end of the comparison I have listed the different techniques, the advantages and disadvantages in a table, that makes it easier for the reader to compare the different techniques with each other. The conclusion contains a short summery of the thesis, which techniques should be used in specific circumstances and own thoughts about how bigger automations should be automated for example.</p> | |
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Glossary of terms and abbreviations

| | |
|------|---|
| BPA | Business Process Automation |
| RPA | Robotic Process Automation |
| BPM | Business Process Management |
| BPMS | Business Process Management Software or Suite |
| CMD | Command Prompt |
| IT | Information Technology |
| UI | User Interface |
| AI | Artificial intelligence |
| OCR | Optical character recognition |

1 INTRODUCTION

The thesis provides a critical review of Robotic Process Automation (RPA) for business cases. As an appendice is a classified part which describes a practical use case for RPA, which is based on a practical project. More specifically, the classified part describes how a certain project is developed and a deeper presentation of the activities used for the project in the UiPath developing environment is given.

RPA is a technology that can be used for automating processes/tasks that usually humans are doing. With RPA you can trigger an automation with one click and it can be used for an automated login or formula filling for example. RPA is a technique that is getting more and more used in the business world, mostly in offices but also in other company departments. (Tuominen 2017)

This thesis has been assigned by WorldSome Oy. It is a Finnish IT company established in 2016, and took RPA into their business model in 2018.

The main objective of the thesis is to provide a critical review of RPA. A detailed description of what RPA is and what it can be used for in business cases is given. A deeper description is given of Business Process Automation (BPA) and techniques that can be used for automating business processes. To get a better view of the BPA techniques I have compared them with each other to get an overview of which technique is the best under specific circumstances.

Firstly, a description of BPA is given and what it can be used for, followed by introducing technologies that can be used in BPA like RPA and comparing them with each other. The focus is mainly on which technique is the best under specific circumstances and which technique is the best one to use. Chapter 4 contains a detailed description of RPA, the history of RPA and where RPA is today is given. Research and future trends within RPA domain is also covered. Finally, some conclusions are presented at the end of this thesis.

2 BUSINESS PROCESS AUTOMATION – AN OVERVIEW

BPA is a technology to automate business processes (Johnson n.d.). BPA means that you let the technology do some easy tasks in the office that a human usually is doing, gathering data and making charts of gathered data, filling in forms or sending emails for example. By automating business processes the company lower their costs on key tasks and get more productivity of the employees, because they can focus more on the tasks that matter while the automation is doing those tasks that takes time and are of less importance. The company also removes the risks of human error by automating business processes (What is Business Process Automation n.d.).

Developers often develop tools for BPA in certain programming languages. Typical programming languages to develop BPA tools are Java, C#, PHP, Ruby, JavaScript, BPM and ESB (All About Business Process Automation | Smartsheet n.d). When a developer develops automating tools from scratch the tools are unique and are customized for the organizations or company's need.

3 BPA TECHNOLOGIES

There are many technologies to automate business processes. Some of these technologies are software where you can do the automation for the process needed and some of these you can just write in Notepad for example. This Chapter describes the most usual ones.

3.1 RPA

RPA is a technology for assigning a “robot” for doing technological tasks that humans usually do. A typical task usually automated is repeatable and rule based. RPA is more like a Front-End procedure that can be integrated into a more advanced system (What is Robotic Process Automation? How is RPA different from Traditional Automation? n.d). The automation starts just with a click or a few clicks that saves time of the employees. More details about RPA is presented later in Chapter 4.

3.2 Batch file

Batch files are the type of files that a programmer or an IT supporter/specialist can create for an employee that runs certain commands on the computer with just a double click on the file. To create a batch file the creator needs to have a deep understanding of computers and commands that can be run on a computer.

The batch file includes written commands that usually are written and run in the Command Prompt (CMD) line by line. The easiest way to create a batch file is to write it in Notepad for example. In the Notepad file the IT-specialist can write a list of commands the user wants to run and then save the file as .bat for example test.bat (Pufahl 2018). Exit the Notepad and then run the bat file the user or specialist can see that the CMD is opening and the commands you have given are run. With a batch file you can do almost everything that can be run on a computer such as opening programs, create folders and change computer settings for example.

3.3 Business Process Management

Business Process Management (BPM) is a method used to improve business processes systematically. BPM method is more about to identifying and improving business processes, which are making the business more productive, more analytical and can adapt better under changing conditions. An effective BPM system is more than just an automated workflow (Quirk 2018). BPM is not a task or project management, it creates calculated adjustment for improvement of continued processes.

BPM has tools to help to automate the management of business processes, these are called Business Process Management Software or Suite (BPMS). BPMS is a software tool used to improve a company's business processes, methods the software uses is definition, automation and analytics. (What is BPMS? n.d) Before using the software to automate business processes the user needs to know the business processes and the business idea that the user can automate decisions which a human would have made in certain situations.

3.4 Excel automation

Excel automation means that an Excel user or an employee can automate certain tasks directly in the Microsoft Excel software. The user can create templates for repeatable tasks. For example, a company CEO wants to calculate the average of the company's revenue for the past ten years. In Excel the CEO needs to write the revenues separately in separate cells in an Excel table and then add Average function from the function list in Excel and choose what cells the function shall calculate. This function should be in the cell in which the answer should be shown in the Excel table.

In the example above the calculation calculated can be saved and used as a template for a later use of the same kind of calculation. The user can also add more functions to the template which makes calculations or graphs from the information given.

As a disadvantage in Excel automation is that these actions are not fully automated and need human actions for updating, changing or deleting information in the Excel table. Excel automations are specifically meant for calculations and graphs but can also be used for filtering the data in larger Excel tables.

3.5 Macros

A macro is a series of actions that can be used for repeatable actions in Microsoft Office package. A macro can be recorded and saved, saved macros can be launched with a hot key assigned to a specific macro or manually from the list of macros (Bath 2014). For example, an office worker is writing a monthly report with more than one table that are almost identical. The office worker can record the actions he/she does while creating the first table and assign it to a hot key. The office worker comes to a point where a new table needs to be inserted, the office worker can use the hot key for creating the new table.

Recording macros save a lot of time doing repeatable actions in Microsoft Office package.

3.6 Traditional automation

Traditional automation is a technique that is highly concentrated in programming and uses APIs and other methods to integrate several systems on a business platform. This technique requires high coding skills and understanding how the APIs work for getting out the information wanted. (Bhatt n.d)

The disadvantage with traditional automation is that any customization of applications or software are restricted because the developer has no source code for the applications or software (Robotic Process Automation(RPA) vs Traditional Automation 2017). The developer can also have difficulties in integrating different systems into the automation because of the API limitations. It can be very difficult to make any changes or updates in traditional automations. Traditional automation makes it easier to move large blocks of data between different systems in the business (What is Robotic Process Automation? How is RPA different from Traditional Automation? n.d).

4 ROBOTIC PROCESS AUTOMATION

RPA is a technology to automate IT-based human actions or processes directly from a user interface. RPA automations so called lightweight IT and automating with RPA is not disturbing the other underlying IT systems (Willcocks et al. 2015). The meaning with RPA is to configure a “robot” to run repeatable and rule-based IT-tasks automatically which humans used to do manually.

The configured robot works at the user level just like a human, login to system with the assigned credentials and only carry out the tasks the robot is assigned to do. Typical automations are for example Logins, form filling, gathering specific information from text files like pdf-files and sending e-mails.

For using RPA-tools the user or developer does not need earlier experience in programming or in RPA. RPA is easy to learn, because the software uses inbuilt activities and they can be used by drag and drop into the created workflow or sequence. Earlier experience in some program languages is a plus, because the processes used in RPA follows the syntax in some program languages. For example, some experience in java or other programming languages help in the beginning. Also, some experience in .Net language is an advantage because string manipulation in RPA is using .Net coding. (Ylönen, 2018)

The best advantage is to understand the business processes and to have a good logical problem-solving capability. Also, good deduction helps picturing the processes, creating work chains and building error controls.

4.1 History

RPA is a kind of new technology. The term RPA was launched in the early 2000.

Before RPA was known as a term there were a hand full of technologies that was practicing BPAs, the three popular ones that also have been used for developing RPA is:

- **Screen scraping.** Screen Scraping was used for scanning sets of information and visual representations on web sites for example.
- **Workflow automation tools.** These tools were used to capture certain information fields in a document, translate the data into company's database for example.
- **Artificial intelligence.** Artificial intelligence is the technology that has been used and is used today to help doing tasks that was earlier dependent on human judgement and decision-making ability.

The development of RPA technology and tools were started in the early 1990s: RPA tools contain Screen scraping, Workflow automation tools and Artificial intelligence. (Ostdick n.db)

4.2 Where RPA is today

RPA is a fast-growing technology. The RPA software today are also containing optical character recognition (OCR) technology that means a technology for recognizing texts and characters on a website, text document or an image. This technology makes it possible, for example, to change websites in the automation without requiring actions from a human. Today mainly 70-80% of the basic IT-tasks can be automated with RPA.

RPA technology is growing in different company sections. In these industries/departments RPA has been growing these last years: Insurance, healthcare, human resources and finance (Ostdick n.db).

RPA is today a very large complex that automates and simplifies more and more new tasks in existing business contexts. Email automations has been more popular today. RPA

has a great ability and activities for automating email sorting, data mining and even responding to email.

Today there are a many RPA tools on the market. For example, Automation Anywhere, BluePrism, Kofax, UiPath and WorkFusion. The three leaders in RPA-tools are Blue Prism, UiPath and Automation Anywhere. These RPA-tools are used by big companies like Accenture, Deloitte and IBM. (Kappagantula 2019)

For learning RPA UiPath has its own academy with online courses that contain the basics of developing RPA in the UiPath environment (UiPath RPA Academy n.d). UiPath has also a free version of the software and a great User interface with drag and drop activities and it is very user friendly. Blue prism has also a user interface and it is very user friendly but BluePrism has no free version of the software, so the company or developer need to pay a fee for starting to develop with BluePrism. When it comes to Automation Anywhere, they have only a 30-day free trial and when the trial expires the company or developer needs to pay a fee for continuing use of the software.

RPA fits in for both desktop automations and server automations. Almost every RPA software has today support for automating in Citrix systems.

4.3 Future/Research trends

The industry analysts have come up with combining RPA solutions with intelligent technologies and has potential to grow across all industries. By adding machine learning and cognitive computing into RPA systems make it possible that the automations can make decisions like humans would do in similar actions. This makes it possible to reduce even more errors and exceptions and the system will learn and adapt from previous experience and actions done. (Ostdick n.da)

The meaning is to increase speed and provide support for process automation, adding machine learning and by developing more intelligent technology are becoming more and more popular which means the RPA usage is only growing. The software robots in RPA are in the future starting to improve their own performance and make bigger decisions with a little programming or human action as possible.

5 COMPARING THE BPA TECHNIQUES

This Chapter provides a comparison of popular BPA techniques including RPA, Batch files, Excel automations, Business process management, macros and Traditional automations. All these techniques have the same goal to reduce costs, increase productivity, save time and reduce human errors in business processes.

RPA is a good technique to use when larger tasks shall be automated. RPA has an easy user interface with drag and drop function to add activities and sequences that means that RPA software is easy and fast to learn and there is no need for programming skills. RPA tools have also, a very large compatibility with office software like Microsoft Office, Email software and internet browsers. RPA software UiPath Studio for example, has a great Academy with online courses to get started. With the RPA software you can easily gather data from text documents, web pages and emails and save it in an Excel table for further actions. The RPA software also have the ability to save gathered information directly to a database if the user has given the credentials for that. When the user has given the RPA software the credentials logins, auto send emails and connections between computer systems can be automated. By automating with RPA tool, the user can integrate Excel automations and macros in the automation. RPA automations can be automated to open and close applications after the automation has done the specific actions been assigned to be automated.

Using Excel automations and macros is good way to automate tasks concentrated in Excel and Microsoft Office software. The actions can just be used in the Microsoft Office and nowhere else. To update and change the Excel automations or the calculations is easy but changing the information to be calculated must be done manually by the user. The table or file with the calculating functions and macros can be used as a template which saves time, but this kind of automations is not fully automated. For Excel automations and macros, no programming skills are needed. The automations and macros can be created directly in the Microsoft Office software. A best way to get out most of the document automations is to combine them with RPA for example. This automation requires a good understanding of the Microsoft Office software and theirs functions. It is easy to record

the macro, but the user needs to know what he/she wants to do, the best way is to “practice” the actions the user want the macro to do before recording it.

The batch file automation is a great way to automate actions like changing system settings, opening ports and connections in the operating system. Creating batch files require high knowledge of commands that can be run in the operating systems command prompt or terminal. This is a very old technique and it is not so popular anymore, but it is still used in IT support.

Traditional automation is an old technique and very slow because it is connected to APIs and communicates with them. Traditional Automation is still a very common technique even if it requires very good programming skills and understanding of how APIs work. With this technique human errors are very common and very difficult to update and do changes because of the API limitations.

BPM using BPMS is a great way to get information of business task and automate the managing system for the tasks. BPM is more like end-end system to manage the business processes and to help BPM systems, the company should integrate RPA for the front-end tasks in the BPM.

As on overview of the comparison the most effective automation is to combine RPA, Excel automation/document automation and BPM/BPMS. By combining these automations, the business gets a very large automation that reduces costs and human errors on repeatable tasks and increase the productivity of the employees.

Regarding the comparison of the BPA techniques in this Chapter, I have summarized advantages and disadvantages in Table 1.

Table 1. Advantages and disadvantages of the compared techniques

| Technique | Advantage | Disadvantage |
|-------------------------|---|---|
| RPA | <ul style="list-style-type: none"> - Easy to learn - No programming skills needed - Not disturbing other underlying systems - good data scraping ability - Citrix automation - OCR - Email, database and Excel support - Browser Plugins - Less human errors | <ul style="list-style-type: none"> - very slow while moving large data sets - Need high performance of the computer with larger automations |
| BATCH FILE | <ul style="list-style-type: none"> - System settings - Creating, deleting, updating folders | <ul style="list-style-type: none"> - No data scraping - Can disturb underlying systems - High knowledge of system commandos - More human errors |
| BPM | <ul style="list-style-type: none"> - Managing business processes - Get information about business tasks | <ul style="list-style-type: none"> - End – End system - Not a “complete” system |
| EXCEL AUTOMATION | <ul style="list-style-type: none"> - Good calculation opportunities - Table creation - Macro support | <ul style="list-style-type: none"> - Not fully automated |

| | | |
|-------------------------------|---|---|
| | <ul style="list-style-type: none"> - Easy to find the functions - Less human errors | <ul style="list-style-type: none"> - Just Microsoft Office support |
| MACROS | <ul style="list-style-type: none"> - Repeatable tasks in Microsoft Office package - Easy to record and use - Less human errors | <ul style="list-style-type: none"> - Working in the file that is open - Not supported in other systems |
| TRADITIONAL AUTOMATION | <ul style="list-style-type: none"> - Fast to move large datasets between systems | <ul style="list-style-type: none"> - API limitations - High programming skill needed - More human errors |

6 CONCLUSION

In this part of the thesis was to give an overview of BPA and a review of techniques used to automate business processes is given. More specifically, an overview of batch files, Excel automation, macros, BPM, traditional automation, a deeper description about RPA and a comparison with each other is given.

Automating with batch files are a good technique to automate system setup changes on a server, network connections and remote accesses. The disadvantage with batch files is that the automation can only handle actions in the operating systems and servers or connection actions. In business IT-support this is a great technique to fix a connection problem for example.

In an office the Excel automation and the usage of macros is an effective technique to do calculations. Disadvantages with the Excel automation and macros is that these

automation techniques can only be done in Microsoft Office software and all the data to be calculated need human actions for data updates, changes or removal. The most effective way using these techniques is by combining them with RPA. Combining Excel automation with RPA makes it possible to gather data from pdf documents or other text files to add data to be calculated or graphed.

Traditional automation is an old but popular automation technique. This technique is often connected to an API and this can cause problems because APIs has their limitations. Developing a traditional automation high skill in programming is needed. RPA technique is easy to learn, and no knowledge of programming needed, and RPA is not disturbing underlying systems which the traditional automation can do.

Using the RPA software, you need no programming skills, but a knowledge of it is an advantage. RPA is capable to automate both desktop automations and server automations. By combining RPA with AI and machine learning the user can automate very large automations, almost everything can be automated.

Businesses should integrate RPA to their systems to do the routine and repeatable tasks, so that the employees do not waste their time on simple tasks which a robot could do for them. If the company just uses RPA, it should then focus on automating smaller tasks because, automating larger automations makes them slow. If the company wants larger automations just using RPA they should run it on a server with higher performance than a desktop computer or laptop.

Automating smaller tasks and running them separately is more effective and saves more cost than a larger automation. The robot can be running 24/7, do the repeatable tasks that makes the employee more effective, when the employee can carry out other tasks while the robot is doing its assigned tasks.

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APPENDICES

Robotic Process Automation - A Business Case