Exploring Robotic Process Automation

BATAKIS NIKOS – Master in Innovation & Technology Management

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Abstract

The objective of this Master Thesis is to discover the criteria required for a successful RPA assessment and, therefore, raise the chances for a successful implementation. This research intends to give organisations a tool to assess potential processes for automation effectively. The literature reviewed for this study is previous research of RPA as well as successful case studies. The theoretical part of the study was completed by interviewing six experts in the field. The result of this thesis is the creation of two tools that assist organisations with the selection, assessment, and prioritisation of processes for automation.

The research suggests that it is crucial to conduct a process assessment before development since many RPA projects fail due to poor choice of processes. The results suggest that there are ten main criteria when evaluating a process for RPA and three criteria which in combination with some of the main criteria have an impact on the prioritisation.

The Process Assessment Model is a simple but effective tool for organisations to quickly remove processes that are not ideal for automation with RPA. The Process Assessment Formula is a tool which calculates the complexity of the process as well as the value it will provide if automated to decide whether the process should be automated and categorise it in the priority table.

These tools can assist organisations in deciding effectively which processes can be automated, and which are suitable for automation. Furthermore, the Process Assessment Formula can prioritise the full list of processes in order to discover which processes will provide the highest value to the organisation.

Keywords: RPA, Robotic Process Automation, Process Assessment

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Nikos Batakis

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Abbreviations

API	Application Programming Interface
BPA	Business Process Automation
BPMS	Business Process Management System
CEO	Chief Executive Officer
CoE	Centre of Excellence
CRM	Customer Relationship Management
ERP	Enterprise Resource Planning
FSS	Financial Shared Services
FTE	Full Time Equivalent
GUI	Graphic User Interface
HR	Human Resources
IEEE	Institute of Electrical and Electronics Engineers
IPA	Initial Process Analysis
IRPAAI	Institute for Robotic Process Automation & Artificial Intelligence
IT	Information Technology
ITPA	Information Technology Process Automation
LPAN	London Premium Advice Notes
ML	Machine Learning
NLP	Natural Language Processing
OCR	Optical Character Recognition
ODI	Object Design Instruction
PAF	Process Assessment Formula
PAM	Process Assessment Model
PDD	Process Definition Document
PDI	Process Design Instruction
ROI	Return On Investment

RPA	Robotic Process Automation
SAP	Systems, Applications and Products (German Software Company)
SDD	Solution Design Document
SIM	Subscriber Identification Module
SME	Subject Matter Expert
UI	User Interface
VM	Virtual Machine
XML	eXtensible Markup Language

1. Introduction

According to the historian Jan de Vries, human jobs have changed radically over the last few centuries due to several industrial revolutions (DeVries, 1994). Each of these revolutions changed the industries and created fear of human job replacement. Today, technology changes so fast that it is leading to the next revolution of automation. The fear of job replacement might not be necessary. According to a study made by McKinsey, less than 5% of jobs can be fully automated. However, almost every occupation can be partially automated. In the same research conducted by McKinsey Global Institute (Chui, Manyika, & Miremadi, 2016), an interesting example of automation suggested that approximately 17% of work consists of data collection, and 16% of data processing, all of which are tasks carried out by human workers. In the same study, they found that the potential for automating tasks is 64% in data collection and 69% in data processing. These numbers are for tasks that are usually mundane, repetitive, can be automated and do not involve any physical work.

The origin of RPA can be found back in the 1990s when screen scraping software was introduced. Since then, as technology progressed further rapidly, simple RPA was developed but remained relatively unknown for some time. It was not until 2015 when RPA became mainstream, and since then, Robotic Process Automation continues to be an emerging topic with more companies wanting to use or be part of this technology trend. Today, new RPA software is released regularly with Automation Anywhere, Blue Prism, and UiPath being the leaders in the market.

A theoretical approach to RPA could be described as the ability to remove the robot out of us and let us focus on the tasks that cannot be done by robots. On a more practical approach, Robotic Process Automation, as described by Fersht and Slaby, is the technological imitation of human workers for the purpose of automating structured tasks quickly and cost-efficiently (Fersht & Slaby, 2012).

RPA's primary purpose is to interact with software in order to automate it. A significant advantage RPA offers is that there is no need to change anything on the software that RPA is interacting with. With the assistance of RPA technologies, systems that are difficult to integrate could now be automated quickly and easily. RPA, compared to other automation solutions, is quick and easy to run, which makes this technology the next big thing in automating repetitive and mundane tasks.

While all this sounds promising, RPA comes with some risks, like every automation technology. RPA helps complete routine tasks faster and at a higher quality, but it can also make mistakes faster. Insufficient definition of business rules and poor data quality can result in never achieving the wanted benefits RPA can offer (Shishkov, 2019).

RPA works well with almost any environment with few exceptions. The most common issue occurs with virtual desktops, which require the RPA software to use image recognition. A virtual desktop is stored remotely on an external server and is presented as a snapshot

via an application to the user's monitor (Taulli, 2019). Due to this remote connection via another application, RPA tools cannot select specific items from the desktop but see it as one object. Image recognition is unreliable since any minor change in colour or resolution could deem the robot ineffective. RPA has a highly competitive market, so this problem will hopefully be eliminated soon by more than one vendor.

According to Blue Prism's Delivery Roadmap (Blue Prism), there are five stages to pass when delivering a process solution into production.

- Process Management: During which processes considered for automation are refined based on priority and the benefits they can provide. Blue Prism provides multiple documents to its users, and one of them is the IPA (Initial Process Analysis) document. This document provides a high-level description of the Process Analysis, how much of the process can be automated and the effort involved in developing it.

- Define: During this stage; the client provides a document with the steps required to create the automation. In case the documentation provided is lacking in detail, Blue Prism provides a PDD (Process Definition Document) which is used to assist the client in providing the necessary details. A robot can only follow a predefined set of logical steps. Since the developers are usually not acquainted with the applications with which they have to work, the PDD includes a low level of detail, step-by-step diagrams and screenshots as the more detailed the document is, the higher the chance of successful delivery.

- Design: In this stage, the development and design of the solution begin. An SDD (Solution Design Document) is created by the developers to convey the solution design to the client and give them more information on how the process is automated and how it will work. The development will begin as soon as the client goes through the SDD and approves the solution.

- Build: During this phase, the developers follow the PDI (Process Design Instruction) and ODI (Object Design Instruction) documents that are created with the PDD to develop the solution. A review with the client at regular intervals ensures a high-quality solution.

- Test: There are three phases in testing a solution. First, testing of all possible scenarios one-by-one is carried out in the test environment to ensure the robot will work as expected. Second, the same tests are completed in the production environment to observe differences that might be caused by the environment. Last, testing in volumes is conducted in the test environment to ensure the process will be able to handle large volumes of data. Once all the scenarios have been completed successfully, and all test phases have passed, the process can be deployed to the production environment.

In conclusion, the goal of this thesis is to answer a simple yet essential question at the first stage of an RPA life cycle, "What should and could be automated?". An inaccurate

assessment of the processes could lead to increased development costs that could also result in the termination of a project. A study conducted by Ernst & Young (Ernst & Young, 2016) says that as many as 30 to 50% of initial RPA projects fail due to poor choice of process. Because of this, it is crucial to conduct a process assessment before development, as this would reveal challenges that might not be easy to overcome.

1.1 Research Questions

This research is divided into two parts. The first part of this research aims to identify the criteria currently used to conduct an RPA process analysis**.** While the second part aims through interviews and analysis to answer the question of what the criteria should be.

- What are the current criteria for assessing a process for RPA?

- What should the criteria be, and how should they be used to evaluate a process for RPA?

To answer the main research question, it was decided that the current methods of evaluating a process should be researched. It was also considered crucial to find the characteristics of processes that are not ideal for RPA implementation since that would help determine criteria used in an RPA process assessment. Also, research on RPA technology was done since an in-depth research would help with finding information essential to answering the research questions.

The questions defined are critical, since finding processes that have high viability for RPA would have a significant impact on an organisation. Wrongly defined criteria could set a process for automation that might not be a good match for RPA. The cost of trying to automate and develop that process could end up being much higher than the benefits it would give. In order to be successful at the beginning of RPA implementation, it is vital to choose the right processes.

1.2 Research Scope

The researcher wanted not only to identify what should be automated but also what can be automated.

Any organisation that is interested in automating part of their business will have reached a stage where multiple processes are taking precious time from their workforce. All of which could be automated at least partially. The process of selecting processes could result in a long list. The problem is that many of those processes are not suitable

candidates for automation and should be removed from consideration in the initial phase of analysis.

This research includes notes from six interviews that discuss different parts of the RPA process evaluation. The questions were designed to be appropriate to the position of each interviewee. The questions asked during the interviews of the RPA client and the in-house RPA Project Manager helped with the identification of the criteria used to create a list of processes that clients are interested in automating. The interviews of the two CEOs of RPA consultancies assisted in identifying the processes that are not ideal for RPA before the development phase and gave some insight into what a client should automate. Finally, the interviews of the RPA developers gave some insights into why some processes fail in the development phase even though they pass the initial analysis phase. All interviews assisted in finding the criteria that should be considered when evaluating a process for RPA. With the use of coding, the most important criteria were discovered. Afterwards, with the use of UTA algorithm (Sakellaris, 2017), the weights of criteria were determined and used in one of the tools created.

This research endeavours to create a mechanism that assists in the selection of processes that should and could be automated. This should assist in conducting a successful RPA process implementation.

2. Research Methodology

There are two types of research, quantitative and qualitative. Quantitative research is based on the measurement of quantity or amount, whereas qualitative is concerned with the qualitative phenomenon (Kothari, 2004). The method used in this research is qualitative. Qualitative research, broadly defined, means "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" (Corbin & Strauss, 1990). The process used is based on the research process delivered by Kothari (Kothari, 2004), which can be seen in Figure 1 below. The research begins by defining the research problem; this was done by talking to experts in the field and by examining available literature. Based on the available literature, the researcher presents the criteria a process should have and later compares it to the results of the data derived by the interviews. Then the researcher posits a hypothesis.

In this thesis, the hypothesis is that there are a set of criteria which can be defined and measured objectively and quantifiably, which will allow for the identification and ranking of processes suitable for RPA.

After that, the researcher prepared the research design. The data was collected through interviews and unstructured questionnaires, while the analysis of the data was done through Coding. Coding is an analytical process in which data are categorised to facilitate analysis (Sharp, 2018). Finally, the report was completed based on the analysed data and by the comparison to the conclusions based on the available literature.

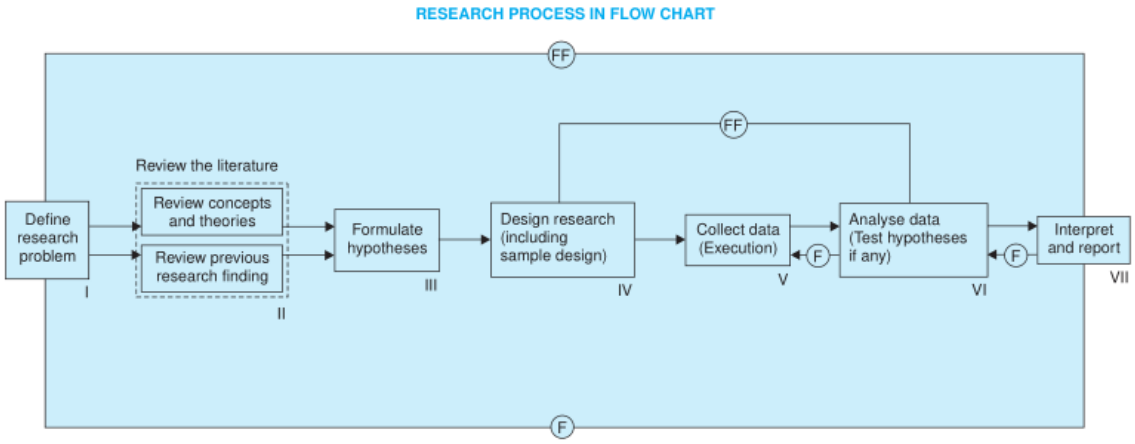


Figure 1: Research Process by Kothari (Kothari, 2004)

2.1 Literature Review

The empirical part of this thesis was conducted via a literature review on what is known about RPA, which can be found in Chapter 3 as well as a research of successful case studies done in Chapter 4. The case studies were analysed to find the criteria enterprises used to assess the processes and to determine the goals they endeavoured to achieve.

The conceptual part of this thesis was formed through the analysis and coding of the data received from the interviews and questionnaires.

2.2 Data Collection

Primary data can be collected while doing experiments in experimental research or in case of a descriptive type of research by performing surveys. The primary data can be obtained either through observation or through direct communication with respondents in one form or another, or through personal interviews (Kothari, 2004). Kothari's research suggests that there are several methods of collecting data; the methods used in this research are interviews and questionnaires.

Interviews are conducted in order to gain knowledge, ideas, and experience of a specific subject. For this research, the interviewees had been given the questions ahead of time, and later, a discussion and a further explanation of those questions was made. For some of the interviewees, a meeting was not possible, so their answers were taken from the questionnaire sent.

A total of six interviewees were part of this research. The roles and current working location of each interviewee can be seen in Table 1.

INTERVIEWEES	**ROLES**
Interviewee 1	RPA Healthcare Client (EN)
Interviewee 2	RPA Project Manager (CH)
Interviewee 3	CEO of RPA Consultancy (GR)
Interviewee 4	CEO of RPA Consultancy (EN)
Interviewee 5	Senior RPA Developer (EN)
Interviewee 6	RPA Developer (GR)

Table 1: Interviewees and their roles

The objective of the interviews was to learn from the experts what criteria they use and how they evaluate an RPA process. According to D. Wilkinson and P. Birmingham (Birmingham & Wilkinson, 2003), there are several stages in developing and effectively using interviews which can be seen in Figure 2.

The development of the interview begins by deciding the questions which should be asked. Usually, interviews are less structured than other research instruments, such as questionnaires. Nevertheless, for the interviews carried out for this research, the model of the structured interview was used. To design the structure of the interview, the researcher spent considerable time reading literature on RPA, implementation methods, and case studies.

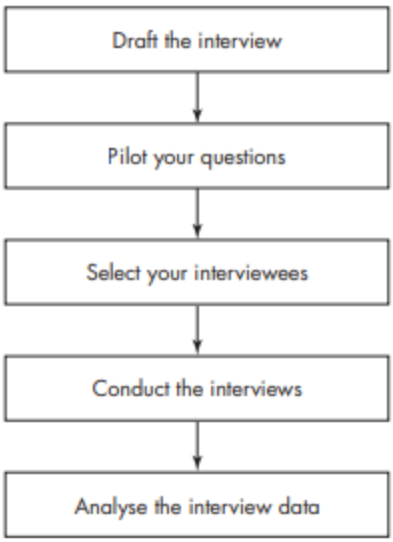


Figure 2: Stages of an effective interview. D. Wilkinson & P. Birmingham (Birmingham & Wilkinson, 2003)

All questions were discussed and reviewed afterwards with an expert in the field in order to eliminate ambiguous questions and make them easy to understand.

Every interview conducted takes much time to organise, transcribe, set up, and analyse, so the sample of interviewees must be representative. At the beginning of the research, there were three interviewees selected. However, while conducting this study, the researcher decided to expand the research, and another three interviewees joined to assist.

According to D. Wilkinson and P. Birmingham (Birmingham & Wilkinson, 2003), the interviewer should provide a relaxing and comfortable atmosphere for the interviewee, which helps to provide more information and fuller answers. Before ending the interview, the researcher has an additional opportunity to correct and interpret the collected information by asking for clarification on topics that were left vague or by asking follow-up questions.

The last stage of the interview process is done by structuring the data in such a way as to make them ready for analysis. This will be further explained in the next chapter.

2.3 Analysis

According to D. Wilkinson and P. Birmingham (Birmingham & Wilkinson, 2003), this stage involves grouping the responses to each question from all interviewees to make a comparison between respondents easy. Using this approach allows categories, issues, and concerns to be easily identified and quantified. For this research, the coding was carried out on paper and not with any tools, as most of the tools in the market rely on a coding structure that has to be developed by the researcher before any meaningful analysis can take place. Therefore, the researcher decided that this step could be omitted as the number of interviews was not high enough to require a tool to assist the procedure.

In order to get results from a qualitative analysis, a step-by-step process must be followed (Löfgren, 2013). First, the researcher reads the transcripts and takes notes. After that, relevant words, phrases, sentences, or sections are labelled. Labels can be for any concept the researcher thinks is relevant to the research. A concept can be a candidate to code for several reasons; it is repeated in several places; the interviewee states that it is important; or the researcher has read about something similar in reports. Next, the researcher decides which codes are the most important and creates categories by combining several codes. In this step, many of the initial codes can be dropped since more essential and relevant codes are created. The categories are labelled, and the researcher can now decide which are the most relevant and how they are connected. According to Löfgren (Löfgren, 2013), the categories and their connections are the main results of a research. These are new knowledge about the topic, from the perspective of the participants in the study. Finally, before writing the results, the researcher can decide if there is a hierarchy among the categories and draw a figure to summarise the results.

For this research, two tools were created.

- The Process Assessment Model, which is a simple flow with both technical and business-related criteria the project and the process must satisfy in order to move to the next phase. The next phase could be either a PoC or a later stage of finding key processes to continue the journey of automation for the enterprise.

- The Process Assessment Formula (PAF), which is a tool made in Excel that the user must populate and gets as results the value the process provides, and the complexity of the process. With the help of some of the interviewees, the researcher got a table with processes with information on all the criteria and a score for both complexity and value. With the use of that table and the UTA algorithm (Sakellaris, 2017), the researcher was able to create this tool that can calculate whether a process should be considered for automation with RPA. What is more, the PAF prioritises the processes submitted to further assist organisations with their RPA journey.

3. Robotic Process Automation

In this chapter, Robotic Process Automation is introduced. The definition of the term, the technology, the difference between traditional automation and RPA, the benefits, and the limitations will be discussed. The goal of this chapter is to gain a better understanding of RPA.

3.1 Definition

The meaning, as defined by IRPAAI (Institute for Robotic Process Automation & Artificial Intelligence):

> *"Robotic process automation (RPA) is the application of technology that allows employees in a company to configure computer software or a "robot" to capture and interpret existing applications for processing a transaction, manipulating data, triggering responses, and communicating with other digital systems."*

This definition gives some information about the type of processes that RPA can automate since it refers to the processing of transactions and data manipulation. We can also see that RPA can work in more than one digital system. Furthermore, IRPAAI puts the term "robot" in quotations since we are not talking about robotics but software robots: Software robots that automate work by imitating tasks executed by humans.

On the other hand, the IEEE Standards Association gives RPA the following definition (IEEE Standards Association, 2017):

> *"A preconfigured software instance that uses business rules and predefined activity choreography to complete the autonomous execution of a combination of processes, activities, transactions, and tasks in one or more unrelated software systems to deliver a result or service with human exception management".*

As seen, both definitions characterize RPA as software that can be used to understand and automatically implement transactions, processes, and multiple other tasks between one or more systems.

3.2 Behind the Technology

According to Kaya, Turkyimaz, and Birol, RPA is a combination of technologies such as autonomic systems, machine learning, AI, and robotics. These technologies shaped the

structure of RPA solutions and became a framework for RPA (Kaya, Turkyilmaz, & Birol, 2019).

RPA is described as a non-invasive technology; RPA should be thought of as an extra layer on top of the existing technology (Bayrak, 2017). RPA sits on the top of existing systems and accesses these platforms through the presentation layer, so no underlying systems programming logic is needed (Willcocks & Lacity, 2016).

The reason RPA is often referred to as non-invasive technology is that it is made to behave just like a human being would. It works by clearly replicating the activities the workforce undertakes using existing applications (EY FS Insights, 2017). One key advantage RPA offers organisations is the ability to keep their existing information systems while trying RPA on their processes. Another advantage provided is technology independence. Employees will not need to wait for solutions from the IT department if they can set up their own automation flows (Behrens, 2014). The way RPA operates saves organisations money by automating processes in their already established systems; no matter how outdated the system might be as long as it can support the RPA software required.

3.3 RPA Tools

Many RPA tools have appeared due to the extensive marketing of RPA in the last few years. A research paper (Le Clair, The Forrester Wave™: Robotic Process Automation, Q2 2018, 2018) published by the research firm Forrester in June 2018 counted 32 RPA product vendors, of which a small amount are new initiatives. However, most of them are transitioning from similar automation products such as automated testing tools. The Forrester Wave™: Robotic Process Automation review is accepted by all vendors participating in it. The evaluation is conducted based on the materials each vendor has provided Forrester by a specific date and afterwards, each vendor is requested to review the findings before publishing to check for accuracy. This report is, therefore, the most appropriate source to compare the tools. In the most recent report (Le Clair, The Forrester Wave™: Robotic Process Automation, Q4 2019, 2019), Forrester identified and evaluated the 15 most significant vendors and analysed and scored them. These 15 vendors were evaluated on 25 different criteria that are part of three categories (current offering, vendor strategy, market presence). From that research, the 3 RPA tools that are leading the RPA market are briefly discussed. An example of copying a text from a PDF file to an Excel spreadsheet was done to compare differences in the way each tool works, and the time required to run the process.

3.3.1 UiPath

Figure 3: UiPath Logo

UiPath was founded in 2005 in Romania and is one of the fastest-growing RPA vendors. UiPath provides multiple methods to organise activities and tasks while their platform can handle unattended robots as well as attended robots developed by employees. UiPath has multiple partners that use technologies like NLP, OCR, ML, and chatbots, which are directly integrated within the Orchestrator, its central control point. Having multiple partners is an advantage that cannot be found easily on other platforms. At present, UiPath is the most popular RPA platform. It provides multiple solutions for various types of organisations and individuals.

The example for UiPath was created using the Community Edition. Figure 4 shows a UiPath workflow that reads a text of 227 lines from a PDF file, adds it into a table and then writes it to the Excel spreadsheet. An interesting observation is that UiPath does not require opening the PDF file to copy the text, so it takes less time to complete the process.

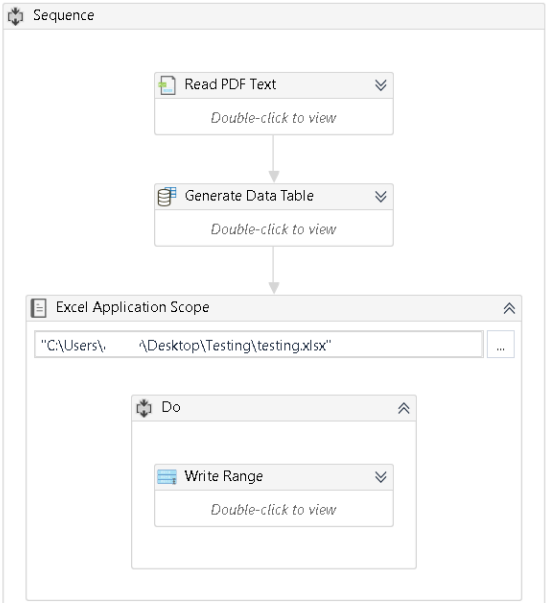


Figure 4: UiPath Process Example

However, it does create an instance of Excel to write the text copied. For the specific example, the time required to start developing after the installation was 3 minutes in order to download the packages required for PDF and Excel. The time required to develop this simple process was 10 minutes, and the robot took 5 seconds to run it, as seen in Figure 5 below.

12:57:46.3835 Info {"message":"PDFtoExcel execution started","level":"Information","logType":"Default",
"timeStamp":"2020-01-23T12:57:46.3816354+02:00","fingerprint":"
",
"windowsIdentity":"I
","machineName":"
","processName":"PDFtoExcel",
"processVersion":"1.0.0","jobId":"59a55238-f6df-4dcb-a374-16c7f18c6d2e","robotName":"
","machineId":0,"fileName":"Main"}

12:57:52.1711 Info {"message":"PDFtoExcel execution ended","level":"Information","logType":"Default",
"timeStamp":"2020-01-23T12:57:52.1700954+02:00","fingerprint":"
",
"windowsIdentity":"I
","machineName":"
","processName":"PDFtoExcel",
"processVersion":"1.0.0","jobId":"59a55238-f6df-4dcb-a374-16c7f18c6d2e","robotName":"
","machineId":0,
"totalExecutionTimeInSeconds":5,"totalExecutionTime":"00:00:05","fileName":"Main"}

Figure 5: UiPath Process Runtime Details

3.3.2 Automation Anywhere

Figure 6: Automation Anywhere Logo

Automation Anywhere was founded in 2003 and has evolved from desktop integration solutions, providing a strong RPA foundation. Basic robots are easy to build and require strict enterprise control. On the other hand, more advanced use cases require programming skills such as XML or C#. Automation Anywhere states that their customers select their product for overall ease, duration, and cost of development. As stated above, Automation Anywhere requires coding to automate tasks which can be seen in Figure 7 below.

The same process was created in Automation Anywhere's Community Cloud. What can be seen in Figure 7 is that the robot copies the text from the PDF file to a text file first and then from that it is placed in a table. After that, an instance of Excel is created, and the data are copied and written on the open worksheet. For the specific example, the time required before starting the development was 5 minutes in order to download the bot

manager, which connects the local machine to the cloud control room. The time required to develop the process was 20 minutes due to the slightly unorthodox method it processes the PDF by copying it to a text file.

Figure 7: Automation Anywhere Process Example

As seen in Figure 8, the robot required 18 seconds to complete the process.

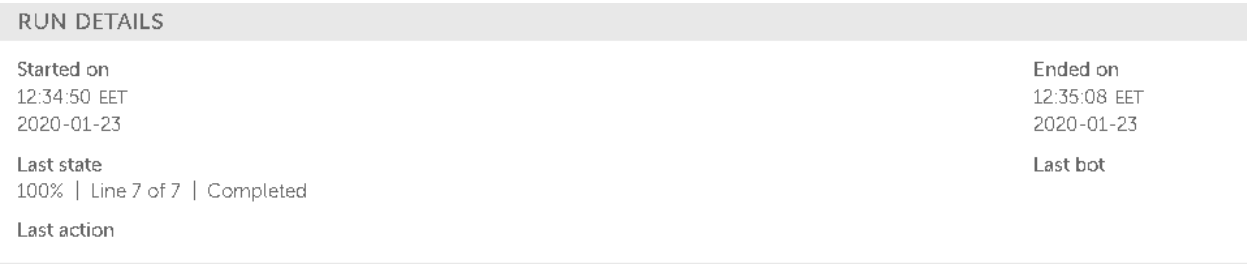


Figure 8: Automation Anywhere Process Runtime Details

3.3.3 Blue Prism

Figure 9: Blue Prism Logo

A group of process automation experts formed Blue Prism in 2001. Their first commercial product, Automate, was launched in 2003 and since then they have been automating manual processes in customer services. In 2017 their business grew from 124 customers to 448, with high upsell percentages. Their design studio, like many others, depends on the programming skills of the user, but an improved drag-and-drop design shows promise for the future versions. Even though Blue Prism does not offer features like record-and-play, it continues to be one of the top platforms.

In Figure 10, the Process Studio of BluePrism can be seen. The example of Figure 10, opens the PDF file via MS Word, selects all the text and adds it to the clipboard and from there it is added in a collection. After that, Excel is opened, and the collection is pasted in the worksheet. For the specific example, the time required to start developing after the installation was 2 minutes in order to download the VBO packages for Word and Excel. The time required to develop the process was 10 minutes.

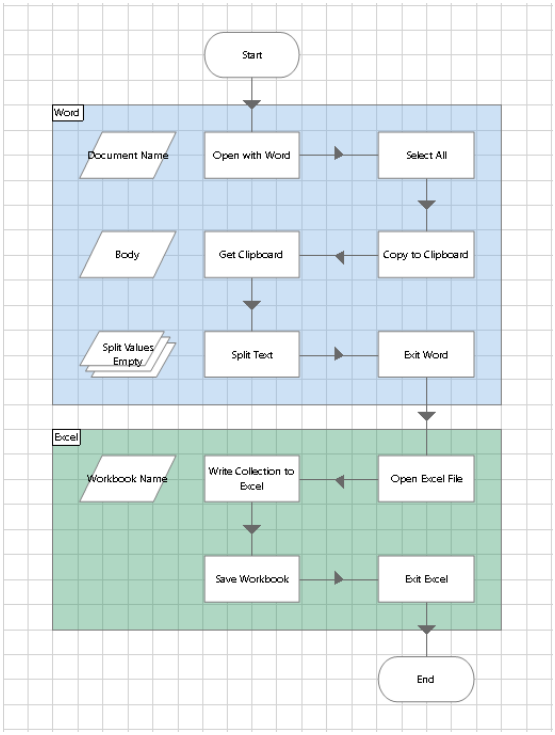


Figure 10: Blue Prism Process Example

What is interesting in the example created with Blue Prism is that both Word and Excel instances are created but are not opened, which also helps to lower the required time to execute the process. The time the robot took for this process was 7 seconds, as seen in Figure 11.

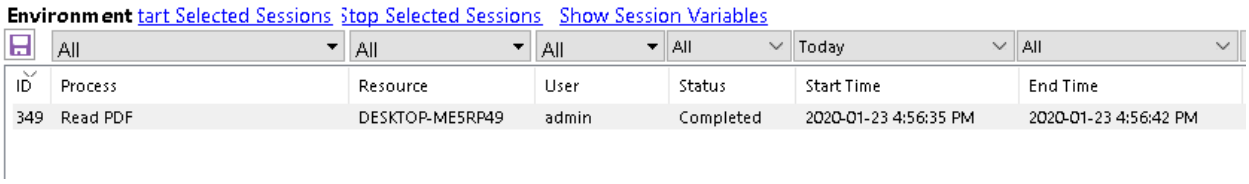


Figure 11: Blue Prism Process Runtime Details

3.3.4 Comparison

A comparison of the above information can be seen in Table 2. After using all three tools, the researcher shows preference to Blue Prism even though UiPath was faster. With a simple example as used above, not much can be determined other than the personal preference of tool use. To find which tool is better overall or determine which tool is better at what kind of processes further examination is needed. What is more, in the comparison made, for the tools of UiPath and Automation Anywhere, a free version was used while for the tool of Blue Prism a paid license was required to make the example.

	Automation Anywhere	Blue Prism	UiPath
Time required to start developing (minutes)	5	2	3
Time to develop example process (minutes)	20	10	10
Time required by the robot to run example process (seconds)	18	7	5

Table 2: Researcher Tool Comparison

As explained in the previous chapter, these three vendors were the top among the 15 vendors that Forrester Research evaluated on 25 criteria (Le Clair, The Forrester Wave™: Robotic Process Automation, Q4 2019, 2019). From the 25 evaluation criteria, only the 12 key criteria were displayed on the report. The criteria were also grouped into three categories. "Current Offering", critical criteria for these solutions include bot development features, support for attended or unattended robots, deployment efficiency, analytics, scalability, and governance. Each vendor's position on the vertical axis of Figure 12 indicates the strength of its current offering. "Strategy", each vendor was evaluated on the partnership, innovation and market approach, and product road map. The strength of the vendors' strategies is indicated on the horizontal axis of Figure 12. The "Market Presence" is represented by the size of the markers in Figure 12. The "Market Presence" is calculated by each vendor's enterprise RPA customers, enterprise customers, and product revenue.

Current Offering	Forrester's Weighting 50%	Automation Anywhere **4.15**	Blue Prism **3.55**	UiPath **4.18**
Bot development/core UI/desktop functions	17%	5.00	3.00	5.00
Attended and unattended robot support	17%	3.80	2.60	3.80
Management/insight and deployment efficiency	17%	3.90	3.50	4.10
RPA analytics	17%	4.20	5.00	4.20
Scale factors	17%	4.33	5.00	4.33
Governance, SaaS, and community	17%	3.67	5.00	3.67

Table 3: RPA Vendors, The Forrester Wave Review, Current Offering Comparison

Strategy	Forrester's Weighting 50%	Automation Anywhere **4.60**	Blue Prism **4.20**	UiPath **4.70**
Partnership, marketplace, and community	40%	5.00	5.00	5.00
Innovation/market approach/access to capital	40%	5.00	3.00	3.00
Product road map and differentiation	20%	3.00	5.00	5.00

Table 4: RPA Vendors, The Forrester Wave Review, Strategy Comparison

Market Presence	Forrester's Weighting 0%	Automation Anywhere **5.00**	Blue Prism **5.00**	UiPath **5.00**
Enterprise RPA customers	33%	5.00	5.00	5.00
Enterprise customers	33%	5.00	5.00	5.00
Product revenue	33%	5.00	5.00	5.00

Table 5: RPA Vendors, The Forrester Wave Review, Market Presence Comparison

The results of this comparison can be seen in Figure 12, as explained above. As seen, UiPath is the leader of the RPA market, followed by Automation Anywhere and Blue Prism.

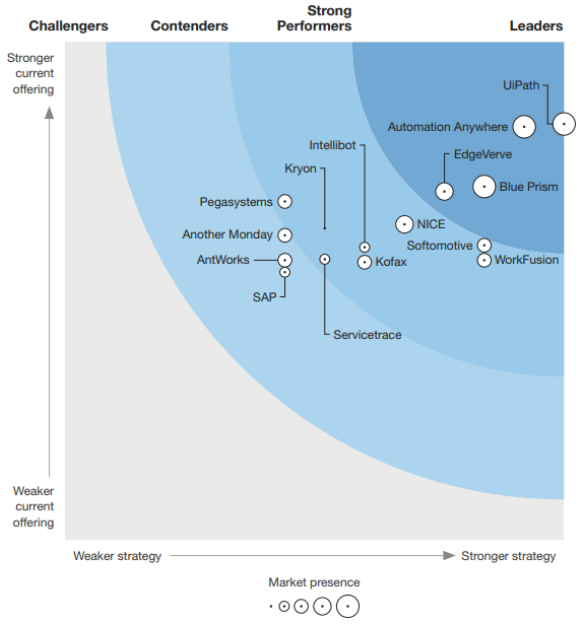


Figure 12: RPA Vendors, The Forrester Wave: Robotic Process Automation, Q4 2019

3.4 RPA Benefits & Limitations

Some benefits of RPA have already been discussed; RPA is a non-invasive technology that can be easily implemented due to the compatibility it provides with existing systems. However, that is just the beginning. RPA can provide many benefits not only to the organisation overall but also to customers, Human Resources (HR), Information Technology (IT), and even analytics of business. Staff will be able to focus on high-value tasks since the robots will free them from repetitive activities such as copying data from different systems to complete one customer's request. Maybe the most important benefit for some is the decrease in costs. Savings of 40 - 70% can be achieved when a software robot replaces a process done by a Full-Time Equivalent (FTE) (KPMG, 2018). Robots make virtually zero mistakes when provided with structured data (Inbar, 2016). By avoiding human mistakes and ensuring that tasks are always handled the same way, operational risks can be reduced for organisations. Another benefit that might not seem obvious is the reduction of paper use. RPA forces digitisation: Work that used to be done on paper can now be in electronic form and reduce the costs of consumables. On the HR side, passing data between systems is a common job, and most employees would prefer spending their days doing more important tasks. Automating those mundane, and repetitive tasks can result in higher employee satisfaction and better employee retention (Forrester Consulting, 2018). IT can also benefit from RPA since business users will be able to automate their processes themselves, the IT department will get fewer requests for small automation processes, which will allow them to focus on more critical tasks (Willcocks L., 2017). From the data perspective, faster processing time and a reduction in manual errors will lead to higher quality data that will result in more reliable and accurate analyses.

Conversely, RPA can be seen as a threat to the labour market, employees whose tasks are built around mundane, repetitive tasks that can be automated could face job loss, so there may be resistance from employees of all grades. According to a McKinsey study (Manyika, et al., 2017), by 2030, as many as 375 million workers will need to switch occupational categories and learn new skills. Regarding technology, RPA has four limitations that should be stated (Khalaf, 2017). First, RPA can only read data that is in a structured electronic format. Second, for a robot to be able to run a specific process that analyses documents, all documents must be in the same format with the same fields. The developer could train the robot to read specific fields on an exception or read from a different document format. However, an organisation should consider whether RPA might not be an economical solution when there are so many variables that need to be added to the process. Third, RPA cannot learn from experience: As the business processes evolve, RPA might become redundant and require updates. Therefore, organisations should examine their processes and automate those that will not have significant changes in the near future. Finally, RPA is not a Business Process Management solution; trying to fix a broken process with RPA will not fix it. In the same context, applying RPA to out of data infrastructure will only veil the issues.

3.5 Summary

Botsourcing, Software Robotics, Artificial Intelligence Workers, and more are all names given to RPA with a small difference in their meaning. However, they all point to the same thing: RPA automates simple IT tasks with the use of external software.

RPA will have the best results with processes that have high volume, with explicit business rules, and have no human interaction requirements. Based on the tool comparison made in Chapter 3.3, UiPath is the market leader, but that does not necessarily make it the best option for a company. In order to select a vendor, a company should first understand the automation they need and do further research to find the best option for them. All RPA tools have features that assist in doing the work faster, more comfortably, and more securely both in development and in business.

Most organisations working with RPA calculate benefits in cost-reduction or the number of reduced FTEs. However, they will first have to overcome initial challenges that might occur, such as the selection of the best processes to automate and employee resistance. Only then will a company be able to conduct an RPA solution successfully. It is also essential to understand that RPA has one of the fastest-growing markets with forecasts showing a $3 billion market share by 2022 when in 2016, it was at 270$ million, and today it is close to $1.5 billion (Liu, 2019). What this means for organisations is that RPA will be changing rapidly. There are things that we will be able to do a year from now that cannot be done today, and we would not have even thought possible six months ago.

4. RPA Implementation Case Studies

In this chapter, three case study reports will be reviewed to find the different key criteria that each company used to select the processes to automate as well as the benefits acquired from the success of their RPA implementation. Some of the case studies were based on projects implemented by RPA consultancies for the client companies, while others used an internal CoE (Center of Excellence). In the report "Keys to RPA success" (Hindle, Mary, & Willcocks, 2019), a CoE was determined to be the preferred governance mechanism for evaluating, designing, developing, and maintaining and operating RPA amongst leading organisations. In the same report, it was determined that as many as 37% of leading organisations use a CoE for process selection. The definition Wikipedia gives for the CoE is: A Center of Excellence (CoE) is a team, a shared facility, or an entity that provides leadership, best practices, research, support, and/or training for a focus area (Wikipedia, 2019). According to UiPath, a CoE is a way to embed RPA profoundly and effectively into an organisation and to redistribute accumulated knowledge and resources across future deployments (UiPath, 2019). They suggest that an organisation should first set-up their Robotic Operating Team; create a scalable, functional, and technical environment; create a useful governance model; and then enable the CoE and be prepared for scaling (UiPath, 2019). The final part of the chapter examines the results of each case study and the research done on RPA to determine the criteria used currently to assess RPA candidate processes.

The case study reports were all found in scholar.google.com and were selected based on the availability of information on both processes and results of the RPA implementation. All working papers are part of a research project conducted by Lacity, Willcocks, and Craig.

Case Study: Telefonica O2 (Lacity, Willcocks, & Craig, Paper 15/02 Robotic Process Automation at Telefonica O2, 2015)

Case Study: Xchanging (Lacity, Willcocks, & Craig, Paper 15/03 Robotic Process Automation at Xchanging, 2015)

Case Study: Royal DSM (Lacity, Willcocks, & Craig, Paper 16/02 Robotizing Global Financial Shared Services at Royal DSM, 2017)

4.1 Case Study: Telefonica O2

Telefonica O2 is the second-largest mobile telecommunications provider in the United Kingdom. As with most large organisations during growth, Telefonica O2 transferred most of its back-office work offshore. From 2004 till 2009, the FTEs working in India increased from 200 to 375 while the headcount in the UK was reduced from 95 to 50 FTEs. As the volume of offshore work grew so did cost, which prompted Telefonica to start searching

for ways to do more work with less money. In 2010, Telefonica O2 decided to launch an RPA trial on two high-volume, low-complexity processes. The first process was a Subscriber Identification Module (SIM) card swap, which replaced a customer's current SIM with a new one but keeping their existing number. The other process was the application of a pre-calculated credit to a customer's account. For both processes, the robots logged in to various software systems, changed some details into customers' accounts, and then logged off. Telefonica O2 also tested whether Business Process Management System (BPMS) could achieve the same results as RPA. Even though the processes created with BPMS were comparable, the financials were not. Automating ten processes with RPA would pay back in 10 months, while BPMS would require three years. As seen in Figure 13, by the end of the first quarter of 2015, Telefonica O2 had automated 15 core processes which represented about 35% of all their back-office transactions and saved or redeployed hundreds of FTEs.

Table 1: Telefónica O2's 2015 RPA Capabilities at a Glance

Number of processes automated	Number of RPA transactions per month	Number of Robots	Number of FTEs saved or redeployed	Payback Period	3-Year ROI
15 core processes	400,000 to 500,000	>160 and growing	Hundreds	12 months	Between 650 and 800%

Figure 13: Telefonica O2 RPA Capabilities (Lacity, Willcocks, & Craig, Paper 15/02 Robotic Process Automation at Telefonica O2, 2015)

According to Telefonica O2, processes should be mature and rules-based while also having identifiable beginnings and endings. Telefonica O2, being a large organisation, developed a simple process to decide whether a process should be considered for automation. A process is automatable, provided automation can save at least three FTEs. In order to find which processes can save three FTEs, they use the volume of transactions and process complexity as guides. The complexity of a process is also calculated in a fast way as they use the time it takes to complete it to decide whether the process is complicated or not. A complex process would require a human worker around 30 minutes or more to complete. Telefonica also provided an example of when human judgement is necessary. A problem occurred when customers pre-ordered a phone. Some customers would pre-order a phone multiple times by mistake, and where a human would see the mistake and would contact the client to confirm before shipping, the robot was unable to understand the issue and would send multiple phones to them.

To summarise this case study, the benefits achieved were:

- Hundreds of FTEs saved or redeployed

- 35% of back-office transactions automated
- A 3-Year Return on Investment (ROI) of 650 – 800%

Furthermore, to conclude this case study, the characteristics of the processes were:

- High volume
- Mature
- Rules-based
- Time-consuming (complex process)
- Multiple FTEs can be saved

4.2 Case Study: Xchanging

Xchanging is an international business technology and services provider. In 2014, Xchanging started their RPA journey in the insurance business. As with Telefonica O2, Xchanging found RPA more suitable where the degree of process standardisation, volume, and maturity were high, and the process was also rules-based. Xchanging has many back-office, high volume, repetitive, data collecting and processing tasks, from which many are manual. The information is extracted from Excel or PDFs and is then added into other systems or used to generate reports. A team of 20 was created to be involved in their RPA initiative in which the beginning was made by identifying ten candidate processes. One of the processes selected was the validation and creation of London Premium Advice Notes (LPANs), which insurance brokers use to submit premiums to Xchanging for processing. The process involved the customer sending an unstructured data file to Xchanging. The file was then opened and validated by an operator who also collected additional data from another system. Next, the operator manually created and uploaded the LPAN to the central repository. This was a high-volume process which Xchanging's workforce did not like doing. Xchanging, with the use of RPA, decided to change the role of their workforce who now takes the unstructured data, puts it into a standardised template before handling it to the robot. The robot reads the request and completes the task. In the case of an exception, the exception is given to humans to check and complete. What is more, a 500 LPAN process took days to complete, but now with the assistance of the robot, it takes 30 minutes without errors.

Xchanging encountered problems in the starting phase of identifying processes. Multiple processes were rejected because they were unstable. Xchanging said that a process should first be stabilised and then automated since an unstable automated process will do more harm than good. The results Xchanging was seeing in June of 2015 can be seen in Figure 14 below.

Table 1: Xchangings' June 2015 RPA Capabilities at a Glance					
Number of processes automated	**Number of RPA transactions per month**	**Number of Robots**	**Number of FTEs replaced**	**Typical cost savings per process**	**Other benefits**
14 core processes	120,000 cases	27	Automation not about replacing people with technology but about continuous improvement	30%	• Improved service quality • High accuracy, low error/ • exception rates • Faster turnaround time • Multi-tasking • Scalability • Increased compliance • Strategic positioning

Figure 14: Xchanging RPA Capabilities (Lacity, Willcocks, & Craig, Paper 15/03 Robotic Process Automation at Xchanging, 2015)

To summarise this case study, the benefits achieved were:

- Multiple of FTEs saved or redeployed since robots took more than 120,000 tasks from the work the human workforce was doing
- A 30% cost saving per process
- Improved service quality
- Reduced Errors
- Fast turnaround time
- Scalability

Furthermore, to conclude this case study, the characteristics of the processes were:

- High volume
- Mature
- Rules-based
- Stable
- Standardised Input (see below)

What can be seen with Xchanging is that even though the process had unstructured data as input, Xchanging created a standardised template were the human workforce added the data so the robot can read it. So, a process can be considered even when it has unstructured input but needs re-engineering before it should be automated.

4.3 Case Study: Royal DSM

Royal DSM is a Dutch multinational company active in the fields of health, nutrition, and materials. In 2011, Royal DSM's CEO announced an adjustment of their organisational and operating model. Part of that change included the expansion of their shared business services which added financial services to their portfolio. In 2012, Royal DSM's Financial Shared Services (FSS) journey began with having five regional business service offices and one sizeable captive centre in India. The FSS plan would require all business units to be migrated to the FSS within five years. The main challenge that would cause the migration to take so long was standardisation. For that, FSS decided to build a seamless gateway on top of the legacy systems than bore the expense of implementing a new global ERP platform. Even though this quickened the process, Royal DSM was taking 15 days for the financial close process while other performers took only 3,28 days. That is when FSS began their RPA journey.

They began with the period-end close process as a PoC. There were more than 450.000 manual activities per month in the financial close process. Royal DSM's workforce not only did the transactions but also had to pause to document each step to ensure compliance. This was a manual, time-consuming and repetitive process, and FSS estimated they could automate 60% of the manual tasks, while also improving quality as the robots follow all the rules. After the success of the PoC, FSS launched a two-phased RPA implementation plan.

In Phase I, FSS aimed to automate the financial close process for three business groups. Before the automation could be created, the RPA team had to redesign the process for automation so that robots could understand every step while also re-sequencing some of the activities so humans and robots would not need to pass steps to one another. By the end of Phase I, FSS had exceeded their business case by automating 89% of their manual task and quality had improved. De Haas, a Senior Business Partner of FSS, gives an example: Before robotization, journal entries came in spreadsheets or emailed to be processed by human workers. After automation, journal entries are input into the software robots, the robots evaluate the entry, post it, and send it back to the business units without any human intervention. In Phase II, more business groups were brought onto the RPA platform.

The results of Royal DSM's RPA journey can be seen in Figure 15 below.

Table 1: Royal DSM's RPA Capabilities at a Glance					
	Time frame	**% of manual tasks automated**	**# of automated processes**	**Scale**	**Results**
Phase I	July to November 2015	89%	19	Migrated 3 business groups, comprising 60 company codes	• Faster financial close-from over 2 weeks to just 3 days • Increased accuracy and compliance • 45 FTEs freed up for more valuable work • ROI in 9 months
Phase II	February to August 2016	89%	25	Migrated 6 business groups, comprising 130 company codes	

Figure 15: Royal DSM RPA Capabilities (Lacity, Willcocks, & Craig, Paper 16/02 Robotizing Global Financial Shared Services at Royal DSM, 2017)

To summarise this case study, the benefits achieved were:

- 45 FTEs redeployed to more valuable work
- Reduced the time to complete the financial close by 80%
- 89% of manual tasks automated
- Increased accuracy and compliance
- ROI in 9 months

Furthermore, to conclude with this case study, the characteristics of the process Royal DSM automated were:

- High volume
- Manual
- Time-consuming
- Repetitive
- Multiple FTEs saved
- Rules-based
- No human intervention

4.4 Summary

RPA can offer multiple benefits to a company when its RPA implementation is successful. As seen with the case studies, automating processes that are suitable candidates delivers benefits such as:

- FTE saving – cost reduction
- Reduced errors – improved service quality
- Increased Staff satisfaction – FTE redeployment – ability to focus on more critical tasks
- ROI in a few months or multiplied in a few years
- Re-investment in RPA – scale RPA team – increase the number of processes automated

Trying to automate a process that is not the right candidate will not only get someone further away from those benefits but could also be a painful and expensive step that will push a company away from RPA. From the case studies and the previous research on RPA, an identification of the characteristics of suitable candidates for automation was derived. Below are the characteristics:

- Highly manual and Repetitive
    - These are processes running frequently or taking much time that involve much manual work. Usually, an excellent source for saving multiple FTEs.
- Rule-based
    - These are processes with decision making based on standardised and predictive rules
- Stable and Mature
    - These are processes that are stable, predictable, and mature
- High volume
    - These are processes with high transaction volumes
- Standard electronic input
    - Readable inputs like Excel, Word, email, PDF
- No human intervention
    - This is not a necessity but removing human intervention reduces errors and the time required to complete the process.

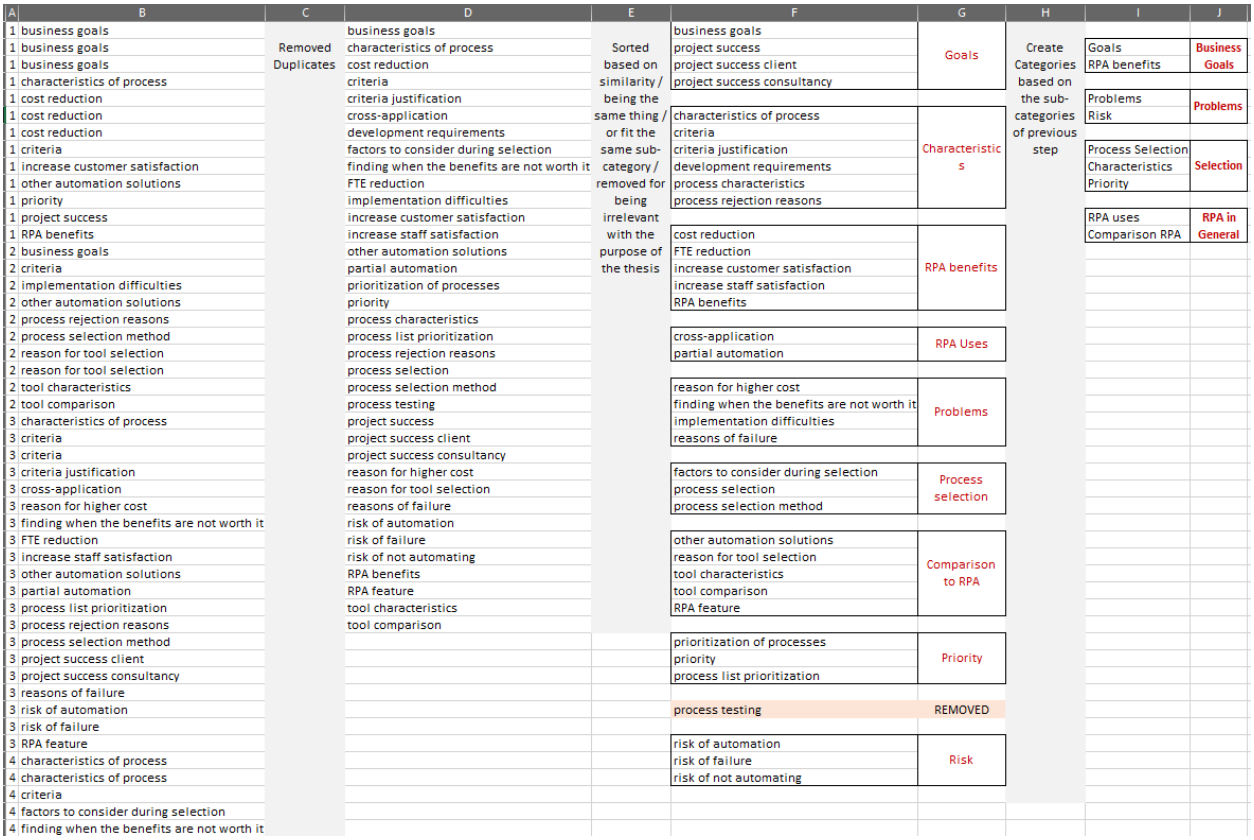
By selecting processes with these characteristics, companies will increase their chances of having a successful RPA implementation.

5. RPA Assessment

The main research question of this thesis, as already mentioned in Chapter 1.1, is "*What should the criteria be and how should they be used to evaluate a process for RPA?*". By questioning the practitioners of RPA and answering the sub-question of "What is the experience of practitioners with RPA?", we will be able to gather the necessary data to answer the main research question. Each interviewee was questioned based on their role and experience. Main findings on how each interviewee successfully evaluates an RPA process are presented in this chapter. At the end of the chapter, a table including all criteria found to be required in an RPA process evaluation is presented. The questions created during the research are then used at the end of this chapter for the creation of the Process Assessment Model and the Process Assessment Formula that can offer organisations a clear starting point in the selection and prioritisation of processes that should be automated.

This chapter is broken into five parts based on the four categories that were developed during the coding of the interviews, and the last section will further analyse the criteria found and will present a table and the opinions of some interviewees on the metrics.

During stages 1 and 2 of coding, the researcher read, made notes, labelled the text with codes, and highlighted keywords which can be found on the scanned transcripts at the appendices. During the 3rd stage of coding, the researcher reviewed the codes and eliminated repetitions and similar codes. Next, categorisation of the codes was made based on what the coded texts of the transcripts are about until the four categories that are analysed below were created. In Figure 16 can be seen the process of creating the four categories. In column A, the number of the interviewee is placed. In column B, the codes are sorted in alphabetical order for each interviewee. In column D, all duplicate codes are removed. In column F, the codes are grouped based on being the same thing (e.g. "priority" and "prioritisation of processes"), being similar, combining codes can create a sub-category (e.g. "cross-application", "partial automation") or are removed since they do not assist with this thesis. In column G, the sub-categories are created. In column J, the four categories are created by the combinations of the sub-categories.



A	B	C	D	E	F	G	H	I	J
1	business goals		business goals		business goals				
1	business goals	Removed	characteristics of process	Sorted	project success	Goals	Create	Goals	Business
1	business goals	Duplicates	cost reduction	based on	project success client		Categories	RPA benefits	Goals
1	characteristics of process		criteria	similarity /	project success consultancy		based on		
1	cost reduction		criteria justification	being the			the sub-	Problems	Problems
1	cost reduction		cross-application	same thing /	characteristics of process	Characteristics	categories	Risk	
1	cost reduction		development requirements	or fit the	criteria		of previous		
1	criteria		factors to consider during selection	same sub-	criteria justification		step	Process Selection	Selection
1	increase customer satisfaction		finding when the benefits are not worth it	category /	development requirements			Characteristics	
1	other automation solutions		FTE reduction	removed for	process characteristics			Priority	
1	priority		implementation difficulties	being	process rejection reasons				
1	project success		increase customer satisfaction	irrelevant				RPA uses	RPA in
1	RPA benefits		increase staff satisfaction	with the	cost reduction	RPA benefits		Comparison RPA	General
2	business goals		other automation solutions	purpose of	FTE reduction				
2	criteria		partial automation	the thesis	increase customer satisfaction				
2	implementation difficulties		prioritization of processes		increase staff satisfaction				
2	other automation solutions		priority		RPA benefits				
2	process rejection reasons		process characteristics						
2	process selection method		process list prioritization		cross-application	RPA Uses			
2	reason for tool selection		process rejection reasons		partial automation				
2	reason for tool selection		process selection						
2	tool characteristics		process selection method		reason for higher cost	Problems			
2	tool comparison		process testing		finding when the benefits are not worth it				
3	characteristics of process		project success		implementation difficulties				
3	criteria		project success client		reasons of failure				
3	criteria		project success consultancy						
3	criteria justification		reason for higher cost		factors to consider during selection	Process selection			
3	cross-application		reason for tool selection		process selection				
3	reason for higher cost		reasons of failure		process selection method				
3	finding when the benefits are not worth it		risk of automation						
3	FTE reduction		risk of failure		other automation solutions	Comparison to RPA			
3	increase staff satisfaction		risk of not automating		reason for tool selection				
3	other automation solutions		RPA benefits		tool characteristics				
3	partial automation		RPA feature		tool comparison				
3	process list prioritization		tool characteristics		RPA feature				
3	process rejection reasons		tool comparison						
3	process selection method				prioritization of processes	Priority			
3	project success client				priority				
3	project success consultancy				process list prioritization				
3	reasons of failure								
3	risk of automation				process testing	REMOVED			
3	risk of failure								
3	RPA feature				risk of automation	Risk			
4	characteristics of process				risk of failure				
4	characteristics of process				risk of not automating				
4	criteria								
4	factors to consider during selection								
4	finding when the benefits are not worth it								

Figure 16: Reviewing of Codes and Creation of Categories

The first chapter analyses the interviewees' answers on RPA and their views on tools. The second chapter reviews the answers on business goals and benefits. The third chapter analyses the problems that might occur before or during the process development as well as risks. Finally, in the fourth chapter, RPA process selection, the procedure used to select the processes, and the characteristics of a good candidate are presented.

5.1 RPA and Automation

For this phase, interviewees shared their experience with RPA tools, RPA technology, and other automation solutions.

Interviewee 2 stated that an organisation should keep "automation" as the key objective and not offer only RPA solutions.

> *"…, the business users are interested in having their problem solved regardless of the type of the solution/technology used (RP, Excel Macros, Powershell scripts, extensions to existing IT applications etc) As a result, one shall keep "automation" as the key objective of the*

initiative and not be narrow minded to offer only RPA solutions." – Interviewee 2

When Interviewee 3 was asked about other automation solutions, they explained the availability of other simpler solutions and noted how an organisation should first determine if RPA is the best solution to automate their processes.

"We would always advise a business to consider the most appropriate and cost-effective approach to use for their automation. RPA is very powerful and has the benefit of supporting architecture to allow the capture and reporting of defects, but other more "tactical" solutions may also be valid. This is especially true when the automation is using only one application and isn't transferring data between applications. Examples here might be things like using Excel macros or PowerShell scripts to automate part of a process." – Interviewee 3

On the same subject, Interviewee 1 wrote that RPA is a step their organisation is taking towards more robust automation solutions.

"Investing in integration between systems and traditional automation is time consuming and consume a lot of key resources for a long period of time. RPA is a quick way of replacing a manual process and create efficiency. Once the value of automation has been proven with a bot and when time permit, we will then invest in more robust solutions" – Interviewee 1

The answers of Interviewee 2 and 3, raise a question an organisation should ask itself before committing to RPA technologies, "Is RPA the right automation tool?". To answer this question, an organisation must first decide what the objectives of the automation are and what type of processes they want to automate. In case tools like Macros or Powershell scripts are enough, a company should not commit to RPA as the cost would be far higher. On the other hand, in case the objective is to enhance existing systems or make changes to the IT architecture, traditional ITPA might be a better fit.

Multiple Interviewees talked about partial automation. Interviewee 5 said that an organisation will never automate 100% of a process but can still benefit from automation while also discussing the possibility of partially automating unsuitable processes.

"You will never automate 100%, but if you find a 10 FTE process and you can automate 80% and leave 2 FTE to manage business exceptions, you would then have released 8 FTE which can be deployed in more value-added activities" – Interviewee 5

"The advantage of RPA is that you can take a "broken" process and instead of fixing the process you can "put a plaster on it" In other words, you just use RPA to automate a bad process instead of fixing the process. This can bring great advantages in some situations as you wouldn't have to go through a large transformation process, you would

> *just use RPA as a tactical solution to solve small sections of the process and let the Human workforce do the rest." – Interviewee 5*

Interviewee 4 discussed the possibility of breaking a process into smaller parts and identifying the ones that can benefit from RPA. While also discussing characteristics of a process that is better left to the human workforce.

> *"Often an end to end business process is complex, and it is necessary to break the process down into simpler process steps to identify the areas that would benefit from RPA" – Interviewee 4*

> *"It is possible to consider such business processes whereby part of the process is repetitive and non-judgemental, and part is subjective and cognitive, such, that you automate the parts that can be automated and hand-off to the human workforce to undertake the work that a robot can't do" – Interviewee 4*

Interviewee 3, on a question on process characteristics, added that there are cases when, due to many exceptions, a part of the process is left to be done manually, and the rest is automated.

> *"For the 4th criteria, the "limited exceptions" clause, we may consider a subset of all possible process uses. For example, we may consider automating an appointment booking process for existing patients but not for new ones" – Interviewee 3*

As interviewee 4 stated, some processes might be complex and could be better if broken into simpler processes. The reasons why a process might not be able to be fully automated can be both technical and business-related. In case a scenario of that kind appears, the question of "Can the process be partially automated?" should be asked.

Interviewee 3 commented that RPA is a great tool to fill the gap between different systems. At the same time, Interviewee 6 also added that the number of systems the robot uses plays a role in the prioritisation of the processes for automation.

> *"We find that organisations often bridge the gap between different systems with a human being, and RPA is really good to fill that gap instead." – Interviewee 3*

> *"Last, even though these two do not have an impact on whether the process should be automated, they are crucial in deciding which process should be automated first. First is the number of systems the process will run on. The more systems a process runs on, the more time a human worker needs to complete the task. On the other hand, a robot can complete the task much faster." – Interviewee 6*

Through these, a simple question of "Does the process go through multiple systems/applications?" is made to raise the priority of the process reviewed in the list of processes for automation.

All interviewees are currently working with Blue Prism, but some of them either have prior experience with UiPath or would consider it if they were to start today.

> *"When I began with RPA about 1.5 years ago, I started with UiPath. It is a great tool with a friendly UI [User Interface], but it was missing something. About 9 months ago, I started working with Blue Prism as that was required from the company and immediately found what UiPath was missing. Structure. Blue Prism is a tool made for businesses, and that difference can be seen when someone has worked with both the tools" – Interviewee 6*

> *"We have been using Blue Prism since the beginning of the project as it was the most mature tool back in 2015 when we kicked off this initiative. If we were to do the evaluation today, we would have a closer look at UiPath as colleagues that use it mention that it offers significantly improved developer productivity" – Interviewee 2*

Interviewee 2 also gave the features Blue Prism provides that made their organisation select it and stay with it for over four years.

> *"The key criteria were the license model (i.e. pay only for concurrent licenses in PROD), the ease to integrate in an enterprise environment (e.g. SSO, authorization via AD groups etc.), the unattended automation capabilities via the LoginAgent and the CredentialsManager, the flexibility to inject arbitrary C# or VB.NET code into the robots via the so called CodeObjects" – Interviewee 2*

Which RPA tool should be selected by an organisation was never meant to be part of this research, and as such, the questions asked cannot determine it.

To conclude, in this chapter, three questions were raised, "Is RPA the right automation tool?", "Can the process be partially automated?" and "Does the process go through multiple systems/applications?". The first, if answered with a "no" then other automation tools should be looked at. The second is only applicable if other reasons make the process not wholly suitable for RPA, if this is also a "no" then RPA is not suitable. Last, in case multiple systems are used, the organisation should consider if the process should be put higher in the list of processes for automation.

5.2 Business Goals and RPA Benefits

In this chapter, the interviewees discussed the benefits they hope to realise or have already gained. They also talked about business goals and when they consider a project to be successful.

A full-time equivalent (FTE) is a unit used to measure employed persons in a way that makes them comparable, although they may work a different number of hours per week.

The unit is obtained by comparing an employee's average number of hours worked to the average number of hours of a full-time worker. A full-time person is therefore counted as one FTE, while a part-time worker gets a score in proportion to the hours he or she works (Eurostat). By automating a process partially or fully, the robot immediately saves the employees valuable time that can be used in more important tasks.

Interviewees 1, 3, and 5 talked about FTE saving in the previous chapter, either by how to replace a manual process, how to fill the gap between systems, or how partial automation can still save multiple FTEs. FTE saving is one of the most critical criteria that organisations consider when choosing RPA as it is related to cost reduction.

> *"RPA is a quick way of replacing a manual process and create efficiency" – Interviewee 1*

> *"Organisations often bridge the gap between different systems with a human being, and RPA is really good to fill that gap instead" – Interviewee 3*

> *"… if you find a 10 FTE process and you can automate 80% and leave 2 FTE to manage business exceptions, you would then have released 8 FTE which can be deployed in more value-added activities" – Interviewee 5*

The researcher, while reading the transcripts made comments. On the questionnaire of Interviewee 1, one thing that was seen repeated a lot and was also stated by them that was important was the reduction of FTE or in other words, the cost reduction.

> *"How important is a reduction of FTE?" – Interviewer*

> *"Very important" – Interviewee 1*

> *"How will your goals be accomplished by RPA?" – Interviewer*

> *"Replace backend admin staff with bot" – Interviewee 1*

Interviewee 1 also wrote about increasing customer satisfaction by devoting more of their resources to patient care.

> *"We hope to be able to replace some of our admin backend resources with clinical staff who can spend time with our patients" – Interviewee 1*

Interviewee 3 spoke about increasing the level of staff satisfaction by automating processes the business users hate doing while Interviewee 5 discussed the possibility of automating processes that might not usually be fit for automation but should still be considered because of the intangible benefits they will provide to the human workforce.

> *"A process should be really boring. When we speak to users about processes and automation, we always find they have things they would love to have us automate as they hate doing the work" – Interviewee 3*

> *"Other factors to consider are tasks that humans do not like doing, a process that would not be normally fit for automation may still be undertook because it has intangible benefits for the workforce, such task might include double data entry, data migration or as I mentioned before could include reporting processes." – Interviewee 5*

On project success, there are different views based on the discussions with Interviewees 3 and 4. Interviewee 3 stated that there are two possible answers, and they depend on who is asked. In the case of the consultancy, a project is considered successful when the robot is running in the production environment, while for the client, it depends on the goals they have set. Conversely, Interviewee 4 says that the project should only be considered successful when the metrics being measured show improvement based on the metrics captured before automation.

> *"From our perspective, when we have delivered a fully functioning robot that is processing in a production environment. From the client's perspective, it will depend on their goal, whether to reduce processing errors, raise team morale by reducing tedious tasks and general workload or reduce headcount" – Interviewee 3*

> *"Some might say a project is considered successful when a process automation goes live and has been running successfully for a short period of time. This would be wrong. A project should only be considered successful when the benefits defined at the outset are understood, and the automation has been running for a period of time with metrics being measured showing that there is a positive time, financial or quality improvement versus the previous way of working" – Interviewee 4*

On the same topic, Interviewee 1 as already stated, is after cost savings, so they will consider a project successful when the savings have been achieved.

> *"When is a project considered successful?" – Interviewer*

> *"Once the savings have been realised" – Interviewee 1*

When asked about business goals and why they decided to start working with RPA technologies, Interviewee 1 and 2 wrote about cost reduction and efficiency. Interviewee 1 also stated that error reduction is a good added benefit.

> *"Automate business processes at a fraction of a cost of a traditional IT project, quick time to market for urgent deliverables, bridge the gap between strategic projects that would take time to implement and immediate needs" – Interviewee 2*

> *"Staff cost-saving and efficiency" – Interviewee 1*

> *"It's [elimination of human errors] not the main objective for us, but of course a good added benefit" – Interviewee 1*

In summary, we can see that each organisation might have different goals but are after the same things: Savings and efficiency. Efficiency can be accomplished by reducing errors, raising staff and customer satisfaction, or by using staff time in more important tasks. Summarising the responses of the interviewees, we can see that the goals organisations are after are:

- Savings (cost reduction, FTE reduction)
- Error reduction
- Greater staff satisfaction
- Greater customer satisfaction

5.3 Project and Process Issues

In this chapter, the interviewees were asked about problems and difficulties that might occur before, during, or after the development of a process. Some interviewees also made comments on the risk that comes with automation and the risk that exists if an organisation does not automate.

When Interviewee 2 was asked about implementation difficulties, he wrote that large companies have policies that could become a problem at the beginning of the project. He also mentioned that the configuration and development of all exceptions could take a lot of time and effort.

> *"Of course, all robotics initiatives face implementation challenges. This is particularly the case in large organizations with strict policies (as one needs to find the most appropriate way to integrate the technology in the respective computing landscape) What is more, recovering from exceptions is not trivial. Every RPA developer can learn to configure the "happy path" of a process rather easily but it takes a lot of effort (and a few failures) to learn how to configure in a robust fashion all possible exceptions and alternative execution paths" – Interviewee 2*

Interviewee 3 talked about issues that might occur after the development and the responsibility of the client on some of those issues while also giving them the ability to be assisted by the consultancy for issues they cannot handle.

> *"There are multiple things that can cause an automation to fail, failure of the architecture the robot is running on, an incident on one of the systems the robot is running, an unplanned change to one of the systems, and these ought to be the responsibility of the client. If there is a genuine problem or a planned change to one of the systems, then we should resolve these via an incident management or change request process." – Interviewee 3*

Most of the reasons stated by Interviewee 3 cannot be predicted but could still be avoided. An unstable system will not be ideal for automation, and as such, the question of "Is the system/application the process runs on stable?".

Multiple interviewees talked about finding when the benefits are not worth the extra work or money. Interviewee 6 discussed how an organisation must decide if automating a process is worth the extra work and cost, while also mentioning the minimum time a process they create should be unchanged to be considered for automation.

> *"A change in the process during or after the development can easily add extra cost for the development and the support of such a process. A business should not decide to automate processes that might change in the next few months unless the benefits acquired from it are far more than the extra cost that will occur in a scenario of this kind. Usually, the processes selected and the infrastructure of the system used should not be subject to a change for at least the next six months" – Interviewee 6*

In another part of the conversation, Interviewee 6 talked about the additional cost that can be added if the document acquired with the process steps is unclear or missing important information.

> *"A document with unclear steps or missing things delays the project. To avoid things like that, Blue Prism has created a template Process Definition Document that can be used by companies to create clear step by step navigation for the robots and the developers." – Interviewee 6*

Interviewee 3 talked about the reasoning they provide to the client when a process should not be automated. During this discussion, they talked about the evaluation required and whether the effort of the coding is worth the saving created by automating the process.

> *"There is a grey area where semi-structured data or multiple process paths can be used with some extra coding. What we have to do there is evaluate whether the effort of the coding and the subsequent capturing of failed processes is worth the saving created by automating the process." – Interviewee 3*

Interviewee 4 spoke in two different parts of the interview about the importance of having a rough estimate of development time needed and, therefore, the cost before starting as that could potentially make the process not worth the cost to create it.

> *"If the process is complex with multiple if-then steps, the development time could be excessive. Therefore it is important to roughly estimate development cost as part of the initial review to understand if a process should be considered for automation" – Interviewee 4*

> *"… a process may require significant process automation development, which may be far more costly than continuing to perform the process manually" – Interviewee 4*

Another topic interviewees talked about was risk. As they stated, there are two types of risk to consider, risk of automating and the risk of not automating.

> *"There is a grey area where semi-structured data or multiple process paths can be used with some extra coding. What we have to do there is evaluate whether the effort of the coding and the subsequent capturing of failed processes is worth the saving created by automating the process. Often it isn't, or the risk of failure is so high it makes more sense for a human to complete the task." – Interviewee 3*

> *"Risk should always also be considered when going through automation. The highest risk being the robots fail, what happens, and what is the impact on the business. Many companies, for example, prefer for robot account to never send email externally, it should always be check by the "robots" human counterpart first." – Interviewee 5*

Interviewee 4 said that is necessary to consider several factors, and one of the options is the risk of not automating.

> *"It is also necessary to consider a number of factors including but not limited to:*
>
> *(interviewee lists several factors mentioned in the next chapter)*
>
> - *The risk of not automating because the process is reliant on a single individual with specific knowledge and skills" – Interviewee 4*

In conclusion, by summarising the answers of the interviewees, the researcher has decided that another question should be asked when reviewing a process for automation. As most interviewees noted, it is common to underestimate the time and effort needed to complete a process. In the event this happens, the organisation should have enough resources to be able to complete the project rather than abandoning it half-way due to higher than expected costs. As interviewee 6 stated, a process should not change frequently and should remain almost entirely unchanged for at least six months. This raises the question "Is the process subject to change in the near future?" which will be further reviewed in Chapter 5.5, where the criteria metrics are viewed.

5.4 Process Selection and Process Characteristics

In this chapter, interviewees discussed the way they select a process, the reasons a process is rejected, and what the characteristics of a good process are.

First, the process selection category is viewed. Interviewee 2 and 3 discussed the ways they conduct the process selection. Interviewee 2 uses a combination between a top-down and a bottom-up approach to find the processes to be automated.

> *"A combination between a top down and a bottom up approach was used (where senior management provided areas of focus and normal employees identified opportunities for automation) An automaton challenge was also organized as well as an internal roadshow/expo in order to create awareness about the capabilities of this new technology. The ideas submitted/collected were then evaluated on technical feasibility and business case potential." – Interviewee 2*

Interviewee 3 discussed the way they work with clients to find suitable processes and their preference to work with a person who knows both the business and the technology used.

> *"Generally, we advise the client on how to select and prioritise the processes and then work with them to identify suitable candidates. We have an initial session with whoever will be looking for processes and explain the capability of the tool and the criteria we use. They seem to understand quite quickly what the criteria is and why we have it. We then talk about suitable processes and consider if they fit the criteria. The key for us is to have someone who understands both the business processes and the constraints of the technology." – Interviewee 3*

Interviewee 4 talked about how the selection of a process is not as straightforward as it seems and named multiple factors that an organisation should consider when selecting.

> *"It is also necessary to consider a number of factors including but not limited to:*
>
> - *The volume of repetitive work*
> - *The variability of choices within a process*
> - *The number of systems the business process will need to interact with*
> - *The complexity of the data and the potential for data transformation in the process*
> - *The human labour cost of the process not being automated versus the cost to automate and maintain*
> - *The risk of not automating because the process is reliant on a single individual with specific knowledge and skills*
> - *The operational benefit to the business of automating the process*
>
> *" – Interviewee 4*

Second, the priority sub-category is viewed. Interviewee 1 responded that they use two factors to prioritise the processes for automation.

> *"Automation difficulty and FTE reduction. Automation difficulty include all aspects, technical difficulty, process complexity, change management and implementation challenge" – Interviewee 1*

Interviewees 3 and 4 both discussed how they review a process to conduct proper prioritisation.

> *"We would suggest to the client that they prioritise based on three things: how often the process is run, whether it is a cross-system process, and how likely the process is to change in the near future. For the first, the reasoning is that the more the process is used, the more time and effort can be freed up by automating it. The second criteria is there because we see RPA being most effective when integrating systems, as there is often a means to integrate data flow within a system anyway. The last is really about cost-effectiveness. If a process is likely to change a lot, then the robot will need to be reworked." – Interviewee 3*

> *"It is not possible to simply prioritise a list of processes with little information. Each process needs to be reviewed for volume, complexity, human judgement, and manual time required to perform [them]. Only then you consider prioritising the list" – Interviewee 4*

Interviewee 6 also talked about two things that should be considered when prioritising processes.

> *"Last, even though these two do not have an impact on whether the process should be automated, they are crucial in deciding which process should be automated first. First is the number of systems the process will run on. The more systems a process runs on, the more time a human worker needs to complete the task. On the other hand, a robot can complete the task much faster. Second, the time a process takes. As with the first, a robot can complete the same task a human can much faster. For example, we completed a process that was run every week for a client which took their employee three days to complete, that is 24 hours out of the 40 hours they work in a week. The robot completed the same task with minor differences in two hours, and the employee was required to work on that for another two hours." – Interviewee 6*

Last, the sub-category of characteristics is viewed, and some interviewees even gave some insights into the criteria they use when evaluating a process. Part of the conversations made with some interviewees was about why a process might be rejected. Interviewee 2 wrote that processes that were selected were rejected at a later stage due to the complexity of the process or the business case being weaker than expected.

> *"… some [processes] have proven more complicated or tricky to implement while for others the business case was weaker than originally anticipated" – Interviewee 2*

Interviewee 4 talked about the characteristics a process unfit for automation would have.

> *"A number of characteristics have to be considered. Some examples would be:*
>
> *Where the process is reliant on paper or handwritten notes. Whilst scan and OCR technology could be utilised to convert data to be digital; it may be more cost-effective to digitally transform the process prior to considering automation. In such cases, a combination of digital transformation and RPA can be successful.*
>
> *Where the number of exceptions to the repeatable process is significant, such a process may require significant process automation development, which may be far more costly than continuing to perform the process manually, especially when a very small number of part-time workforce is in place to complete such work.*
>
> *Where human judgement and decision making is required. RPA, in its simplest form, has no cognitive capability; therefore, any process that requires someone to think and make a decision before proceeding is simply not appropriate for RPA." – Interviewee 4*

In another part of the discussion, Interviewee 4 added that there is no intelligence capability in an automated process.

> *"In the world of RPA in its true sense, that being that there is no intelligence capability within the process, any process that requires human judgement to make a decision should not be chosen. That being said, It is possible to consider such business processes whereby part of the process is repetitive and non-judgemental, and part is subjective and cognitive, such, that you automate the parts that can be automated and hand-off to the human workforce to undertake the work that a robot can't do" – Interviewee 4*

Interviewee 5 also gave a thorough explanation of the characteristics that make a process unsuitable for automation.

> *"If there is too much human decision making involved. Where on the outset, the process looked like it was simple rules-based but actually required the cognitive ability to decide on the next tasks to be undertaken with that data.*
>
> *Where the time to automate would not be comparable to the time saved. For example, a 4-6 week development cycle to automate a report that is run weekly and takes 1 hour of human time to run would not be ideal for automation because that equates to 0.025 FTE over a 40 hour week. Having a developer work for four weeks, it would take two years to get the time saving back, assuming there was no support work to be done on the process.*
>
> *Where the process is likely to change dramatically in the near future, other solutions should be looked at.*

Where inputs can be unstructured data, normally some process re-engineering would suffice here to create a structured way of presenting the data to the robot" – Interviewee 5

Interviewee 1 discussed the beginning of their RPA venture, the next stages, and the criteria they use.

"The first process is something easy for us to implement because it is completed centrally and with a limited number of resources. This process was selected because the sponsor was very supportive to the initiative and prepare to move fast. The next tranche of processes we believe are the most time consuming and repetitive. We anticipate very significant saving in each of our hospitals." – Interviewee 1

"The criteria we use to evaluate processes are:

- *technical difficulty, the number of platforms to be used by the bot,*
- *process complexity,*
- *change management and*
- *implementation challenge." – Interviewee 1*

Interviewee 2 also pointed out the use of savings potential when evaluating a process.

"Technical feasibility, structured input, technologies on which underlying systems are built.

Process complexity, number of steps, number of different systems, number of exceptions.

Savings potential, how often will the robot run, how much time will it save in each run." – Interviewee 2

Interviewee 3 talked about the criteria they use to select a process and the reasons behind them.

"The criteria we use for selecting automated processes are

- Rules-based, no human judgement

- Interpretable to the robot, data presented does not require human analysis

- Structured data, data is in a known format, like a form

- Exceptions limited, more or less, the same thing happens each time.

Although the software is more capable than most automation tools, it still requires data to be predictable to be truly usable.

The first three criteria are firmly fixed. A "no" to any question means we don't consider it a candidate. For the 4th criteria, the "limited

> *exceptions" clause, we may consider a subset of all possible process uses. For example, we may consider automating an appointment booking process for existing patients but not for new ones.*
>
> *For the "rules-based" and "interpretable data" criteria, the justification is the robot will not be able to carry out its task. So, for example, we would not recommend a robot to analyze medical images and present a diagnosis. The capability is simply beyond what it can do.*
>
> *For the "structured data" and "limited exceptions" criteria, there is sometimes more conversation needed. There is a grey area where semi-structured data or multiple process paths can be used with some extra coding." – Interviewee 3*

Interviewee 3 also added how processes that business employees hate doing most often pass all the criteria.

> *"A good process should be really boring. When we speak to users about processes and automation, we always find they have things they would love to have us automate as they hate doing the work. These processes always pass our four tests as they are simple to do, simple to understand, have basic data inputs and outputs, and are very repetitive." – Interviewee 3*

Interviewee 4 talked about the characteristics of an ideal process and other criteria that an organisation should also consider when selecting a process for automation.

> *" The ideal process to automate is one that requires one or more people to complete every day, has very few variations to complete, 1 or 2, and is prone to human error because the task is boring for the human to undertake and not considered a high priority by the individuals performing the task.*
>
> *Key factors might include:*
>
> *- Volume of transactions*
>
> *- Time to complete transactions*
>
> *- Number of systems/data sources the RPA solution will need to interact with*
>
> *- The complexity of the process*
>
> *- Timeliness of process execution. For example, is it business-critical there are no delays?*
>
> *- Number of people doing the work prior to automation*
>
> *- Process variability in terms of exception handling*

- Data quality. Although a process may be undertaken to validate / test data quality as a precursor and alert DQ issues for resolution prior to further processing

- Availability of human resources to do the work

And sometimes there may be factors that are quite specific and only present themselves when a business process evaluation is completed." – Interviewee 4

Interviewee 5 talked about the characteristics a process should have and gave some examples of processes that, even though they are not ideal, should be given a better examination as they provide intangible benefits to the workforce.

"A good process should be simple, rules-based, have high volume, structured data, and be on a stable system." – Interviewee 5

Interviewee 6 talked about the things they are looking for in a process and further analysed each criteria they use. They also discussed the necessity of a clear robot walkthrough as well as things that affect the prioritisation of the process list.

"All processes that are automated usually follow a specific set of rules. High transaction volume, highly manual and repetitive, low number of variation scenarios, structured data, need of 0 to limited human intervention. On the development side, we are looking for robot friendly steps, standard electronic inputs, and decision making based on predictive rules. There are some things that might be red flags but can only be found while working on the process. An example of that; I was working on a process that should select a date on an SAP calendar. The problem here was that UiPath could not identify the date of the calendar but was only able to select the whole calendar as one item. That made it impossible to go further through this specific SAP transaction code as we couldn't select the date required.

Another really important thing for us is a thorough and clear robot walkthrough. A document with unclear steps or missing things delays the project. To avoid things like that, Blue Prism has created a template Process Definition Document that can be used by companies to create clear step-by-step navigation for the robots and the developers." – Interviewee 6

This concludes the analysis of this chapter and the interviews made. By summarising the replies of each section, we obtain the criteria below.

Priority

- High Volume
- Multiple FTEs can be saved
- No change in the near future
- The process uses multiple systems

- The time required to complete the process manually is long

Characteristics

- High volume
- Highly manual
- Low number of exceptions
- Low to zero human intervention
- No change in the near future
- No human judgement
- Reliant to one individual
- Repetitive
- Rules-based
- Stable system
- Standard Electronic Input (Not reliant on OCR technologies)
- Structured data
- The process uses multiple systems
- Time saved is greater than the time required to automate the process
- Time-consuming

Some of these criteria are not conclusive, and some play a more significant role in the priority than the decision of whether the process can be automated or not. For example, a process could still be considered for automation when the process does not have "Standard Electronic Input", "Structured data" and the "Time saved is not greater than the time required to automate". The process can still be considered if there are benefits to absorbing the cost or if it is possible to digitally transform the data or re-engineer the process.

5.5 Criteria Metrics

In this chapter, the criteria will be further reviewed. After the interviews were completed and analysed, the researcher decided to contact the interviewees again to gain their opinions on the metrics of the criteria they use.

First, the questions and criteria derived will be viewed for each section.

5.5.1 RPA and automation

'Is RPA the right automation tool?'

As stated in Chapter 5.1, an organisation must first decide what the objectives of the automation are and what type of processes they want to automate. There are

automation tools that have a much lower cost than RPA tools which could complete the processes.

'Can the process be partially automated?'

This question comes up in the case that part of the candidate process is not automatable. Reasons this could happen are most of the criteria found in Chapter 5.4.

'Does the process go through multiple systems/apps?'

This question will be reviewed in Chapter 5.5.4 with the criteria.

5.5.2 Business Goals and RPA Benefits

The business goals discussed with the interviewees were:

- Savings (cost reduction, FTE reduction)
- Error reduction
- Greater staff satisfaction
- Greater customer satisfaction

While the business goals and benefits that organisations acquired in the case studies were:

- FTE saving – cost reduction
- Reduced errors – improved service quality
- Greater Staff satisfaction – FTE redeployment – ability to focus on more critical tasks
- ROI in a few months or a multiple of it in a few years
- Re-investment in RPA – scale RPA team – increase the number of processes automated

Both interviewees and the case studies discussed savings which can be considered to be going hand-in-hand with the ROI. As, without savings, in almost all cases, there could not be any return on the investment made. Error reduction was also mentioned in both as was the increase of staff satisfaction. Furthermore, a re-investment in RPA was seen in the case studies. A possible reason why re-investment was not discussed in the interviews is that it is something considered as an obvious move. When the organisation sees that the PoC is successful and the first few processes automated gives their organisation the benefits that they were after, it is the logical move to go further and automate more processes.

5.5.3 Project and Process Issues

"Is the system/application the process runs on stable?"

As Interviewee 3 stated, automation can fail for multiple reasons. Failure of the architecture the robot is running on, an incident on one of the systems the robot is running, or an unplanned change to one of the systems. An organisation can minimise or even eliminate the possibility of failure in case the systems and applications the process uses are stable.

"Is the process subject to change in the near future?"

This question will be reviewed in Chapter 5.5.4 with the criteria.

5.5.4 Process Selection and Process Characteristics

For the prioritisation of the processes, the following criteria were viewed:

- High Volume
- Multiple FTEs can be saved
- No change in the near future
- The process uses multiple systems
- The time required to complete the process manually is long

For the characteristics of the processes, the following criteria were found:

- High volume
- Highly manual
- Low number of exceptions
- Low to zero human intervention
- No change in the near future
- No human judgement
- Reliant to one individual
- Repetitive
- Rules-based
- Stable system
- Standard Electronic Input (Not reliant on OCR technologies)
- Structured data
- The process uses multiple systems
- Time saved is greater than the time required to automate the process
- Time-consuming

Some of the criteria are mentioned in both lists, which means that the process should first be reviewed in the selection process and then can be further reviewed to raise its priority

in the list. The criteria found are sorted based on similarity; being the same thing or fitting the same category.

'High volume', 'The time required to complete the process manually is high', 'Time-consuming', 'Multiple FTEs can be saved', are all related to the time that is required, and the time that can be saved if the process is automated. Volume is mentioned in both priority and characteristics lists. When Interviewees were asked for metrics, they are calculating Volume in FTEs. The higher the number of FTEs required to complete a process, the higher the return. Interviewee 5 was asked about metrics on multiple criteria, but they explained that an organisation should not be looking at specific metrics but should focus on the ROI. They also gave the following example to explain the importance of ROI further.

> *"Invoicing process that has 25 FTE carrying out the process. You automate that process in 6 weeks to do the 20% (The most common invoices.) So you have a saving of 5 people.*
>
> *5 X (Average salary of admin worker) = Cost saving.*
>
> *So let us say it takes ten weeks to get the process live, so £12,500 costs for the developers time. Let us say you need 5 Digital workers (£8,000 X 5) to run the process and let us say £7,500 a year to maintain the process, so in year 1 it costs £60K and saves 5 x £20,000 (Admin worker) = £100K*
>
> *So the ROI in year 1 is 166%*
>
> *Year 2*
>
> *Costs 5 Digital workers (£40,000) plus £7,500 maintenance = £47,500 and saves £100K*
>
> *ROI in year 2 is 186% (Total Saved/Total cost X100) (£200,000/£107,500 X100) 186%" – Interviewee 5*

On the other hand, Interviewees 2,3,4 and 6 gave actual metrics as seen in the table below.

	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5	Interviewee 6
Volume	0.5 FTE	0.5 FTE	2 FTE	-	0.5 FTE

Table 6: Interviewees - Volume Metrics

Interviewee 4 also added that usually, a headcount reduction is only possible when over 5 FTEs are working on a process.

> *"2 FTE can be considered a financial break-even threshold IF the headcount is removed, however, headcount reduction is usually only possible when 5+ FTE's are working the process as human knowledge and*

> *expertise must be retained to support the business process and handle exception cases." – Interviewee 4*

Interviewee 2 stated that they look for two things to decide whether the process should be considered: Cost of automation compared to expected benefits and if the process requires more than 0.5 FTE.

> *"Usually, we select to automate a complex business process if the cost of automation (even if it is high) is smaller than the potential savings. In terms of volume, we usually find that it is not worth automating anything that consumes less than 0.5 FTE" (translated from Greek) – Interviewee 2*

Based on the views of the interviewees, the process must have a minimum volume of 0.5 FTE to be considered for automation. In case the process does not fulfil the minimum volume, as Interviewee 4 stated in an email conversation, there are other criteria that add strategic value to the organisation if automated and should be considered before completely removing the process from the list.

> *"Perhaps the process is wholly mechanistic and is reliant on the knowledge of a single individual in a business and the process has a completion deadline for compliance purposes that could incur financial penalty if not completed in good time." – Interviewee 4*

Talking only about prioritisation, in case the process is time-consuming, and there is a chance to save FTEs, an organisation should consider the case of raising the priority of the specific process.

'Highly manual' and 'Highly repetitive' are two criteria the process must satisfy in order to be automated. A process can be in any of the following states:

- Manual and Repetitive: A process performed by a user and most of the steps are the same for all cases.
- Semi Manual & Repetitive: A process performed by a user and involves automations like Macro, and plug-ins.
- Manual but not Repetitive: A process performed by a user and process steps for each case most of the times is not the same.

In case the process is 'Manual but not repetitive', the process is not suitable for automation.

Interviewees 3, 4 and 6 seem to agree that a process must be at least 70% manual to be considered for automation.

	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5	Interviewee 6
Manual & Repetitive	-	80% of steps are by the user and 50% is data entry	70%	-	80%

Table 7: Interviewees - Manual and Repetitive Metrics

'Low number of exceptions': For this, Interviewees measure the percentage of exceptions. There are two types of exceptions:

- Normal exceptions, for which extra coding is required to create the steps for the robot to be able to handle a small percentage of the volume which is not part of the "happy path"
- Unknown exceptions which are those that cannot be processed without an external factor (query/approval). For unknown exceptions, there are no next actions defined and they are marked by the robot so human workers will take and complete them.

Interviewees 2, 3, 4, and 6 gave the following metrics on what percentage of the volume can be exceptions.

	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5	Interviewee 6
%age of exceptions	< 20%	< 10%	< 30%	-	< 15%

Table 8: Interviewees - Percentage of Exceptions Metrics

As seen in Table 8, Interviewee 4's answer is on the high end and allows as much as 30% of the volume to be exceptions. In the follow-up email conversation, they stated that even if a process has multiple different paths to be completed, it could be considered for automation of a part of it.

> *"A process that has a number of different paths to complete execution may not be wholly suitable, but potentially in part should be automated. A guiding rule here is if 70%+ of the transactions follow a distinct path to completion and the remainder require human intervention then this may be a good candidate notwithstanding other factors. i.e. give most of the work to the robot and give the people the more complex work that requires 'thinking' time." – Interviewee 4*

With the information collected from the interviewees, a maximum of 30% exception is allowed, but the average value from them is at around 20%. In case the amount exceeds the 20% of exceptions, the organisation should look at whether the value gained is worth the cost of automating the specific process.

'Human judgement', 'Low to zero human intervention', 'Rules-based' are all related to humans making decisions. Interviewee 3 made a note that "Human Judgement" is answered if there is any qualitative assessment involved while "Rules-based" requires that all decisions can be expressed as a logical rule. Interviewee 4 stated that any process that requires human intelligence is immediately excluded.

> *"If the process to be automated requires any cognitive thinking then it is immediately excluded as a candidate for RPA. But that is not to say*

> *RPA in addition to a form of artificial intelligence such as natural language processing or pattern matching would not be considered." – Interviewee 4*

Interviewee 6 added all the above criteria to the same box and stated that if the user is required to use their experience to make decisions, then the process is not suitable.

> *"If the user is required to use their experience to make any decisions or take any judgement calls while processing a case then the candidate process should be removed" – Interviewee 6*

'Standard electronic input' and 'Structured data' are both related to the input the process requires to operate. The ideal input data for RPA are data from electronic files like Excel and, PDFs that have a structured view. For input to be structured, the data is taken from fields that are always at the same spot, and the only thing that changes is the alphanumerical data that the robot needs to extract. There are times that OCR might be required to read structured data from files like PDF. Using OCR does not mean that the process should be abandoned, but it makes the development more complicated and the chances that it will not run successfully 100% of the time increase. For structured data, as interviewee 5 stated, process re-engineering might be a good way to create a structured way of presenting the data to the robot. For standard electronic input, as seen in Chapter 3.5, RPA forces digitisation: work that used to be done on paper can now be in electronic form and this reduces the costs of consumables. So, an organisation could first investigate digitising their data and then move into automating their processes.

'No change in the near future' and 'Stable system' are both related to the IT and the systems the organisation is using. Where applications and systems change, RPA processes require re-development to ensure they continue to work. Frequent changes can raise the cost of maintenance with the possibility of never achieving the desired financial returns. Interviewees 3, 4 and 6 gave a different allowed variation over six months.

	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5	Interviewee 6
Change allowed	-	< 10% in 6months	< 20% in 6months	-	0% in 6months

Table 9: Interviewees - Process Change Metrics

In case the process passes the criteria of "percentage of process change in the near future" it can be considered as a candidate. Next, based on the ROI it provides, the process should be compared to the list of processes to decide whether the process should be put higher on the list. Similarly, an unstable system will cause the robot to fail, will require multiple runs of a case to get the results needed and will raise the time required to complete a successful case. An unstable system does not mean that RPA tools will not work, but multiple cases might be marked as exceptions and will need to be

completed by human workers, negating the benefit of RPA. An organisation should first consider stabilising its systems and applications before RPA.

'Reliant to one individual', there are processes in businesses that are reliant to one individual to complete it. Several organisations take the risk of having only one individual with a specific skill set to complete some of their business processes. RPA is there to minimise the risk organisations need to take as the robot will be the primary worker of the process and the individual will now have a supporting role to work the cases the robot has marked as exceptions. As with other criteria, a process which relies on one individual to complete it does not have an impact on whether the process should be automated, but it could potentially raise its position in the prioritisation list.

'Process uses multiple systems or applications', almost every interviewee asked about this had a slightly different opinion. Interviewee 2 stated that they prefer to automate complex processes whose cost of automation is lower than the potential savings.

> *(translated from Greek) "Usually, we select to automate a complex business process if the cost of automation (even if it is high) is smaller than the potential savings. As a rule of thumb, a process is considered complex when:*
>
> *It engages 5 or more systems*
>
> *has more than 100 steps (happy path)" – Interviewee 2*

Interviewee 3, in a previous statement, said that RPA is a great tool to fill the gap between two systems while Interviewee 6 stated that transferring data between systems is time-consuming and the more systems are required, the higher the time required to complete the process. Interviewee 3, on the other hand, stated that the number of systems depends on multiple factors.

> *"Depends on the volume of transactions to process/time-sensitive nature to complete work/compliance factor/risk avoidance factor." – Interviewee 3*

The number of processes does not play a role in the selection of processes for any interviewee, except for Interviewee 2, who prefers processes that engage more than five systems as they are complicated and hard to complete. Most interviewees use the number of systems as guidance to easily find time-consuming processes and raise their position in the list of prioritisation.

'Time saved is greater than the time required to automate the process', while this may seem obvious it is a question an organisation must make each time there is a change in the process. A decision to partially automate the process might make the time saved much less than what was estimated in the start. A digitisation of the data needed, a re-engineering of the process or a change in the near future are all things that can raise the time required to automate the process and consequently raise the cost. What can be added about the specific criteria is that it is not always the only objective as Interviewee 4 states.

> *"A low volume, infrequent process, say monthly, that can be completed by a single individual in a day or two would not be cost effective to automation. However, in this scenario other factors might be considered. Perhaps the process is wholly mechanistic and is reliant on the knowledge of a single individual in a business and the process has a completion deadline for compliance purposes that could incur financial penalty if not completed in good time. Providing no human cognitive thinking is required the complex process may now be a good candidate for automation." – Interviewee 4*

The explanation Interviewee 4 gives suggests that organisations, as seen in previous chapters, are not only looking to lower their costs. Because of this, we should add the question, "Is the value gained worth the cost of automation?"

5.6 Summary

Multiple business and technical criteria should be used to evaluate whether a process is suitable for RPA, and after that, whether it is a promising candidate. In Table 10, the criteria and their ideal answers can be seen.

RPA Process Assessment Criteria	
CRITERIA	**IDEAL ANSWER**
Is RPA the right automation tool?	Yes
High Volume?	Yes
Manual & Repetitive?	Yes
Rules-based?	Yes
Human judgement?	No
Systems/Applications stable?	Yes
Standard Electronic Input?	Yes
Structured Input?	Yes
Change in the near future?	No
Limited Exceptions?	Yes
PRIORITY CRITERIA	**"IDEAL" ANSWER**
Reliant to one individual?	Yes
Time-consuming?	Yes
Use of multiple systems/applications?	Yes
SUB-QUESTIONS	**IDEAL ANSWER**
Can the process be partially automated?	Yes
Is the value gained worth the cost of automation?	Yes

Table 10: RPA Process Assessment Criteria

Two mechanisms were created to assist an organisation in determining whether a process is suitable for automation. First, the Process Assessment Model, a simplified flow which determines if a process can be automated. Second, the Process Assessment Formula which determines whether a process is suitable for automation and assists organisations with prioritising suitable processes.

5.6.1 Process Assessment Model

Figure 17 shows the Process Assessment Model that was created based on the ten main criteria that were derived from the interviews and the research made on RPA and the case studies.

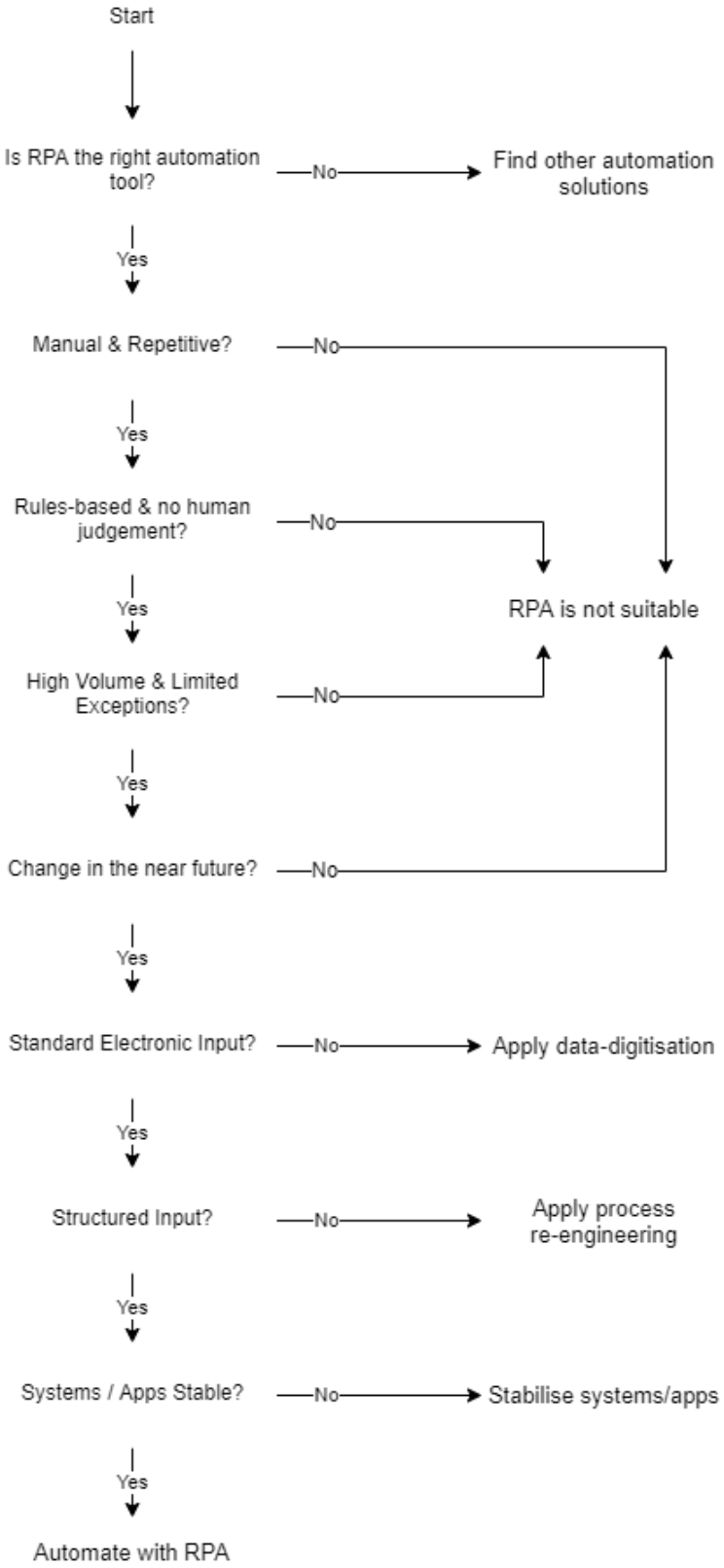


Figure 17: Process Assessment Model

5.6.2 Process Assessment Formula (PAF)

The PAF is a tool organisations can use to determine whether a process is automatable and then prioritise all their processes. The formula has been created in an Excel document with five tabs.

- Formula
- Submissions
- Information
- CriteriaCalculations
- Variables

Each of the tabs will be explained below.

Variables tab: Excel allows the addition of data validation in cells. In this tab are the Variables used by some of the cells in the Formula tab. For example, the cell C3 "Is the process manual & repetitive?" in Formula tab allows only three specific values to be added, which can be found in cells A1:A3 of the Variables tab.

	A	B	C
1	Manual & Repetitive	Yes	MS Office Files
2	Semi Manual & Repetitive	No	Text Files
3	Manual but not Repetitive		Searchable PDFs
4			Emails
5			Non Searchable PDFs
6			Other
7			

Figure 18: Variables Tab, Process Assessment Formula

Submissions tab: After pressing the submit button in Formula tab, the information of the process is added in the next available free row in the Submissions tab. This procedure allows an organisation to add all the processes they consider for automation and based on the results shown in columns S to X to prioritise them. The most effective way to automate them is first by column S if they are fully automatable without any issues, and secondly through Priority shown in column V. Then it depends on the company itself if they prioritise value over lower complexity or the opposite.

Process Name	No. of FTEs (Volum	Process manual & repetitive	Rules-based	Human Judgement require	Systems/Apps Stable	Standard Electronic Input	Structured Input	Input type	% of change in the near future	% of exceptions	Reliant to one individ	Time-consuming	No. of systems/ apps	Strategic Importance	No. of Steps
Process 1	10	Manual & Repetitive	Yes	No	Yes	Yes	Yes	MS Office Files	0%	10%	Yes	Yes	2	Yes	5
Process 2	6	Manual & Repetitive	Yes	No	Yes	No	No	Non Searchable PDF	15%	25%	No	Yes	2	No	75
Process 3	6	Manual & Repetitive	Yes	No	Yes	Yes	No	Non Searchable PDF	20%	20%	No	Yes	2	No	120
Process 4	5	Manual & Repetitive	Yes	No	Yes	Yes	Yes	MS Office Files	0%	10%	No	No	5	Yes	20
Process 5	4	Manual & Repetitive	Yes	No	Yes	Yes	Yes	MS Office Files	0%	20%	No	No	3	Yes	50
Process 6	3	Manual & Repetitive	Yes	No	Yes	Yes	Yes	MS Office Files	0%	10%	No	No	1	No	25
Process 7	3	Manual & Repetitive	Yes	No	Yes	Yes	Yes	MS Office Files	0%	33%	No	Yes	4	No	20
Process 8	3	Manual & Repetitive	Yes	No	Yes	Yes	Yes	MS Office Files	10%	25%	No	Yes	10	Yes	100
Process 9	2	Manual & Repetitive	Yes	No	Yes	Yes	Yes	MS Office Files	33%	10%	Yes	Yes	5	No	10
Process 10	2	Manual & Repetitive	Yes	No	Yes	Yes	Yes	Text Files	0%	10%	No	No	6	No	10

Figure 19: Submissions Tab, Process Assessment Formula (columns A – P)

Process Name	Status	Complexity	Value	Priority	Complexity %	Value %
Process 1	Can automate	Low	High	1	15%	96%
Process 2	Can automate but should consider data digitisation before automation	High	High	6	78%	63%
Process 3	Can automate but should consider process re-engineering before automation	High	High	6	89%	60%
Process 4	Can automate	Low	High	1	30%	81%
Process 5	Can automate	Medium	High	3	44%	70%
Process 6	Can automate	Low	Medium	2	22%	46%
Process 7	Can automate	Medium	Medium	4	34%	59%
Process 8	Can automate	High	High	6	77%	66%
Process 9	Can automate	Low	Medium	2	25%	49%
Process 10	Can automate	Low	Medium	2	25%	43%

Figure 20: Submissions Tab, Process Assessment Formula (columns R – W)

Information tab: There are two tables in this tab. First, is a table showing how Complexity and Value take the values of "High", "Medium" and "Low" based on the percentage they accumulate from the criteria. For both, a percentage of 60% and higher would deem them as "High", a percentage of 30% - 60% would take a value of "Medium" and under 30% would make it "Low". Second is the priority table, the priority of each process is determined on the complexity and the value it has for the organisation. Processes that have "Low" complexity and a "High" value are the quick wins as they are easy to complete and have the highest impact on the business. The purpose of this table is to help organisations prioritise their processes. The positioning of each category was based on Blue Prism's Opportunity Identification tool, which calculates the benefit a process provides based on the potential hours that it can save in a year.

	Complexity (H/M/L)	High	>=	60%	Medium	>=	30%	Low	<	30%
	Value (H/M/L)	High	>=	60%	Medium	>=	30%	Low	<	30%

PRIORITY TABLE					
	Complexity	Low	5	2	1*
		Medium	7	4	3
		High	9	8	6
			Low	Medium	High
			Value		

Figure 21: Information Tab, Process Assessment Formula

Formula tab: This is the tab the user interacts with. The user is required to add values to 16 cells. A small description for each cell is given below in the form of "Criteria *(the type of value)*: description".

- Process Name *(text)*: The name of the process
- No. of FTEs (Volume) *(decimal)*: The volume of the process is counted in FTEs (decimals are allowed)
- Is the process manual & repetitive? *(text)*: 3 different options can be selected:
    - Manual & Repetitive: A process performed by a user and most of the steps are the same for all cases.
    - Semi Manual & Repetitive: A process performed by a user and involves automation like Macro and plug-ins.
    - Manual but not Repetitive: A process performed by a user and process steps for each case most of the time are not the same.
- Rules-based? *(Yes/No)*: If the user uses their experience to make decisions while processing a case. Processes that are not rules-based are not suitable for automation with RPA.
- Human judgement required? *(Yes/No)*: If any qualitative assessment is required. Processes that require human judgement are not suitable for automation with RPA.
- Systems/Apps Stable? *(Yes/No)*: If the systems/applications the robot will interact with are stable. Unstable systems could be caused by disconnects, glitches, crashes, and similar issues. In case of an unstable system, an organisation should first fix their systems or applications before considering automation with RPA.
- Standard Electronic Input? *(Yes/No)*: Input is received in an electronic format. In case the input is not in an electronic format, the process could be automated with the use of OCR, but data digitisation is suggested as OCR technologies are more prone to errors.
- Structured Input? *(Yes/No)*: The data received are in a predictable form or table. Even when the input is not structured, the process could be automated but is not

ideal as the development would require a lot more to create the automation. Organisations should consider re-engineering the process to convert the input it receives to a structured form or a table.

- Input type *(text)*: There are six different types of input based on the difficulty there is to automate with them.
    - MS Office Files (easy to automate)
    - Text Files (easy to automate)
    - Searchable PDFs (easy to automate)
    - Emails (medium effort to automate)
    - Non-Searchable PDFs (hard to automate)
    - Other (unknown but considered hard to automate)
- % of change in the near future? *(percentage)*: The percentage of the business process that is going to change in the next six months.
- % of exceptions *(percentage)*: The percentage of the process that is not following the happy path.
- Reliant to one individual? *(Yes/No)*: Find whether the business is reliant on one individual to complete the specific process.
- Time-consuming *(Yes/No)*: Find whether the process is time-consuming. This cannot be calculated as a number as it depends a lot in what the organisation considers as time-consuming.
- Use of multiple systems/apps? *(integer)*: The number of the systems and apps the robot will require to interact with to complete the process.
- Strategic Importance? *(Yes/No)*: There are multiple reasons why an organisation might automate a process that might not have been the best process to automate. Some of these are:
    - Higher positioned individuals in the company requested the automation of the process
    - The business wants to run the process more frequently than it does now
    - The process has a completion deadline, e.g. legislative requirement
    - The business wants to reduce the number of human errors currently made
    - The business wants to raise customer or staff satisfaction
    - Re-onboarding offshore work
- No. of Steps *(integer)*: The number of steps the robot requires to complete the process. Each click is considered as one step.

After all the cells have been filled the results on whether the process can be automated, its complexity, value and priority are presented in the cells R3:W3.

- Automatable: Depending on the values added, the process can take the following states:
    - Fill all empty cells
    - RPA is not suitable
    - Fix systems/apps before automation
    - Can automate but should consider data digitisation before automation

  - Can automate but should consider process re-engineering before automation
  - Can automate
- Complexity: Based on the Complexity %, it can take the values of "High", "Medium" or "Low" as described in the Information tab.
- Value: Based on the Value %, it can take the values of "High", "Medium" or "Low" as described in the Information tab.
- Priority: Calculated based on the table seen in the Information tab.
- Complexity %: Calculated based on the values given by the user in the CriteriaCalculations tab.
- Value %: Calculated based on the values given by the user in the CriteriaCalculations tab.

Process Name	No. of FTEs (Volume)	Process manual & repetitive	Rules-based	Human Judgement required	Systems /Apps Stable	Standard Electronic Input	Structured Input	Input type	% of change in the near future	% of exceptions	Reliant to one individual	Time-consuming	No. of systems/apps	Strategic Importance	No. of Steps

SUBMIT DATA

Figure 22: Formula Tab, Process Assessment Formula (columns A - P)

Status	Complexity	Value	Priority	Compexity %	Value %

Figure 23: Formula Tab, Process Assessment Formula (columns R - W)

CriteriaCalculations tab: In this tab, all the calculations are made to find the percentages on value and the complexity of the process.

After the criteria were found, the criteria that influence the Value and the Complexity were derived with the assistance of Interviewees 3 and 6. The next step was to calculate the weights of the criteria with the use of a UTA algorithm. UTA methods refer to the philosophy of assessing a set of value or utility functions, assuming the axiomatic basis of multiattribute utility theory and adopting the preference disaggregation principle. UTA methodology uses linear programming techniques in order to optimally infer additive value/utility functions so that these functions are as consistent as possible with the global decision-maker's preferences (inference principle) (Siskos, Grigoroudis, & Matsatsinis, 2016). With the UTA algorithm scripts created by Alkaios Sakellaris for Matlab, the necessary calculations were done. For the correct use of UTA, two tables must be created. One with the data and one with the metadata. The table with the data was

provided by Interviewees 3 and 6 who provided information of 35 processes they have completed and ranked them from best to worst for both complexity and value as seen in Figure 24: Processes provided by Interviewee 3Figure 24 and Figure 25 below.

Process Name	No. of FTEs (Volume)	Process manual & repetitive	Rules-based	Human Judgement required	Systems/ Apps Stable	Standard Electronic Input	Structured Input	Input type	% of change in the near future	% of exceptions	Reliant to one individual	Time-consuming	No. of systems/ apps	Strategic Importance	No. of Steps	Complexity %	Value %
J1	5	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	10	No	No	5	Yes	20	25%	80%
J2	6	M & R	Yes	No	Yes	No	No	Non Searchable PDF	15	25	No	Yes	2	No	75	80%	65%
J3	2	M & R	Yes	No	Yes	Yes	Yes	Searchable PDF	0	20	No	Yes	5	Yes	70	55%	65%
J4	1	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	0	Yes	Yes	3	Yes	60	40%	65%
J5	6	M & R	Yes	No	Yes	Yes	No	Non Searchable PDF	20	20	No	Yes	2	No	120	90%	60%
J6	1	SM & R	Yes	No	Yes	No	Yes	Other	0	10	Yes	Yes	2	Yes	30	35%	60%
J7	1	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	0	No	Yes	3	Yes	80	50%	55%
J8	1	M & R	Yes	No	Yes	Yes	Yes	Emails	10	20	Yes	Yes	5	Yes	50	50%	55%
J9	0.65	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	25	Yes	Yes	2	No	100	65%	50%
J10	0.5	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	10	No	Yes	3	Yes	70	45%	50%
J11	2	M & R	Yes	No	Yes	Yes	Yes	Text Files	0	10	No	No	6	No	10	20%	45%
J12	1.5	M & R	Yes	No	Yes	Yes	No	Searchable PDF	0	20	Yes	No	3	No	40	50%	45%
J13	1	M & R	Yes	No	Yes	Yes	No	Other	10	30	Yes	Yes	7	No	100	90%	45%
J14	0.2	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	0	No	No	3	Yes	30	25%	40%
J15	0.1	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	25	No	No	4	Yes	40	40%	40%
J16	1	M & R	Yes	No	Yes	No	Yes	MS Office Files	0	0	No	No	3	No	40	40%	35%
J17	0.5	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	0	No	No	2	No	30	20%	30%
J18	0.5	M & R	Yes	No	Yes	No	Yes	MS Office Files	0	20	No	No	2	No	50	50%	30%

Figure 24: Processes provided by Interviewee 3

Process Name	No. of FTEs (Volume)	Process manual & repetitive	Rules-based	Human Judgement required	Systems/ Apps Stable	Standard Electronic Input	Structured Input	Input type	% of change in the near future	% of exceptions	Reliant to one individual	Time-consuming	No. of systems/ apps	Strategic Importance	No. of Steps	Complexity %	Value %
B1	10	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	10	Yes	Yes	2	Yes	5	15%	90%
B2	4	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	20	No	No	3	Yes	50	40%	70%
B3	3	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	10	25	No	Yes	10	Yes	100	70%	65%
B4	2	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	20	No	Yes	5	Yes	50	45%	65%
B5	1	M & R	Yes	No	Yes	Yes	Yes	Emails	0	0	Yes	Yes	5	Yes	50	45%	65%
B6	3	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	33	No	Yes	4	No	20	30%	60%
B7	0.7	M & R	Yes	No	Yes	No	Yes	Other	0	33	Yes	Yes	1	Yes	55	55%	60%
B8	1	M & R	Yes	No	Yes	Yes	No	Emails	0	0	Yes	Yes	5	No	60	65%	55%
B9	2	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	33	10	Yes	Yes	5	No	10	20%	50%
B10	0.1	M & R	Yes	No	Yes	Yes	Yes	Text Files	0	0	Yes	No	2	Yes	25	20%	50%
B11	3	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	10	No	No	1	No	25	20%	45%
B12	2	M & R	Yes	No	Yes	No	Yes	Other	0	10	No	No	3	No	40	40%	40%
B13	0.33	M & R	Yes	No	Yes	Yes	Yes	Emails	0	20	No	No	4	Yes	80	65%	40%
B14	2	M & R	Yes	No	Yes	Yes	Yes	Emails	10	25	No	No	2	No	80	60%	35%
B15	1	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	0	No	No	3	No	50	35%	35%
B16	0.5	M & R	Yes	No	Yes	No	Yes	MS Office Files	0	0	No	No	2	No	35	35%	30%
B17	0.1	M & R	Yes	No	Yes	Yes	Yes	MS Office Files	0	15	No	No	3	No	25	25%	30%

Figure 25: Processes provided by Interviewee 6

The interviewees were given an excel file with all the criteria seen in the first row and were requested to fill the cells and provide the percentage on Complexity and Value. The table was afterwards split into two tables, one for Complexity and one for Value. Afterwards, each of the tables was modified in numerical values so the UTA algorithm will be able to understand the information as seen in the tables below.

As Interviewees 3 and 6 suggested, Complexity is influenced by

- Standard Electronic Input
- Structured Input
- % of Exceptions

- No. of systems/apps
- No. of steps

and Value is influenced by

- No. of FTEs (Volume)
- % of change in the near future
- Reliant to one individual
- Time-consuming
- No. of systems/apps
- Strategic Importance

The following tables were then created for UTA.

alt/cri	Volume	Change	Reliant	TimeCons	StratImp	Systems	Ranking	
J1	5	0	0	0	1	5	1	80%
J2	6	15	0	1	0	2	2	65%
J3	2	0	0	1	1	5	2	65%
J4	1	0	1	1	1	3	2	65%
J5	6	20	0	1	0	2	3	60%
J6	1	0	1	1	1	2	3	60%
J7	1	0	0	1	1	3	4	55%
J8	1	10	1	1	1	5	4	55%
J9	0.65	0	1	1	0	2	5	50%
J10	0.5	0	0	1	1	3	5	50%
J11	2	0	0	0	0	6	6	45%
J12	1.5	0	1	0	0	3	6	45%
J13	1	10	1	1	0	7	6	45%
J14	0.2	0	0	0	1	3	7	40%
J15	0.1	0	0	0	1	4	7	40%
J16	1	0	0	0	0	3	8	35%
J17	0.5	0	0	0	0	2	9	30%
J18	0.5	0	0	0	0	2	9	30%

Table 11: UTA data table for Value by Interviewee 3

alt/cri	Volume	Change	Reliant	TimeCons	StratImp	Systems	Ranking	
B1	10	0	1	1	1	2	1	90%
B2	4	0	0	0	1	3	2	70%
B3	3	10	0	1	1	10	3	65%
B4	2	0	0	1	1	5	3	65%
B5	1	0	1	1	1	5	3	65%
B6	3	0	0	1	0	4	4	60%
B7	0.7	0	1	1	1	1	4	60%
B8	1	0	1	1	0	5	5	55%
B9	2	33	1	1	0	5	6	50%
B10	0.1	0	1	0	1	2	6	50%
B11	3	0	0	0	0	1	7	45%
B12	2	0	0	0	0	3	8	40%
B13	0.33	0	0	0	1	4	8	40%
B14	2	10	0	0	0	2	9	35%
B15	1	0	0	0	0	3	9	35%
B16	0.5	0	0	0	0	2	10	30%
B17	0.1	0	0	0	0	3	10	30%

Table 12: UTA data table for Value by Interviewee 6

alt/cri	Systems	StandInp	StructInp	Exceptions	Steps	Ranking	
J11	6	0	1	10	10	1	20%
J17	2	0	1	0	30	1	20%
J1	5	0	1	10	20	2	25%
J14	3	0	1	0	30	2	25%
J6	2	2	1	10	30	3	35%
J4	3	0	1	0	60	4	40%
J15	4	0	1	25	40	4	40%
J16	3	2	1	0	40	4	40%
J10	3	0	1	10	70	5	45%
J7	3	0	1	0	80	6	50%
J8	5	1	1	20	50	6	50%
J12	3	0	0	20	40	6	50%
J18	2	2	1	20	50	6	50%
J3	5	0	1	20	70	7	55%
J9	2	0	1	25	100	8	65%
J2	2	2	0	25	75	9	80%
J5	2	0	0	20	120	10	90%
J13	7	2	0	30	100	10	90%

Table 13: UTA data table for Complexity by Interviewee 3

alt/cri	Systems	StandInp	StructInp	Exceptions	Steps	Ranking	
B1	2	0	1	10	5	1	15%
B9	5	0	1	10	10	2	20%
B10	2	0	1	0	25	2	20%
B11	1	0	1	10	25	2	20%
B17	3	0	1	15	25	3	25%
B6	4	0	1	33	20	4	30%
B15	3	0	1	0	50	5	35%
B16	2	2	1	0	35	5	35%
B2	3	0	1	20	50	6	40%
B12	3	2	1	10	40	6	40%
B5	5	1	1	0	50	7	45%
B4	5	0	1	20	50	7	45%
B7	1	2	1	33	55	8	55%
B14	2	1	1	25	80	9	60%
B13	4	1	1	20	80	10	65%
B8	5	1	0	0	60	10	65%
B3	10	0	1	25	100	11	70%

Table 14: UTA data table for Complexity by Interviewee 6

For all the tables above, the processes were sorted based on the percentage given by the interviewees and then ranked. The last column with the percentages is not required for UTA but is added to show how the ranking was done.

cri/attrib	Monotonicity	type	worst	best	a
Systems	1	0	7	2	4
StandInp	1	1	2	0	3
StructInp	0	1	0	1	2
Exceptions	1	0	30	0	4
Steps	1	0	120	10	4

Table 15: UTA metaprocess table for Complexity for Interviewee 3

cri/attrib	Monotonicity	type	worst	best	a
Systems	1	0	10	1	4
StandInp	1	1	2	0	3
StructInp	0	1	0	1	2
Exceptions	1	0	33	0	4
Steps	1	0	100	5	4

Table 16: UTA metaprocess table for Complexity for Interviewee 6

cri/attrib	Monotonicity	type	worst	best	a
Volume	0	0	0.1	6	4
Change	1	0	20	0	4
Reliant	0	1	0	1	2
TimeCons	0	1	0	1	2
StratImp	0	1	0	1	2
Systems	0	0	2	7	4

Table 17: UTA metaprocess table for Value for Interviewee 3

cri/attrib	Monotonicity	type	worst	best	a
Volume	0	0	0.1	10	4
Change	1	0	33	0	4
Reliant	0	1	0	1	2
TimeCons	0	1	0	1	2
StratImp	0	1	0	1	2
Systems	0	0	1	10	4

Table 18: UTA metaprocess table for Value for Interviewee 6

Table 15 to Table 18 above show the metadata required for UTA to work.

- Monotonicity
  - 0: Gets better as the number increases
  - 1: Gets better as the number declines
- Type
  - 0: Quantitative data
  - 1: Qualitative data
- Worst
  - The worst value it can take
- Best
  - The best value it can take
- a
  - The number of different points taken on Marginal Utilities.

The results on the weights of the UTA algorithm for Complexity and Value can be seen in Figure 26 and Figure 28 below.

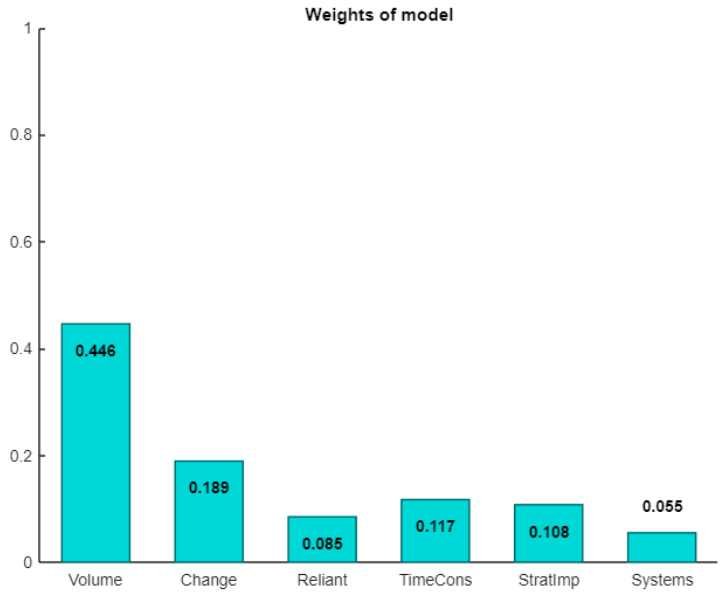


Figure 26: UTA weights for Value for Interviewee 3

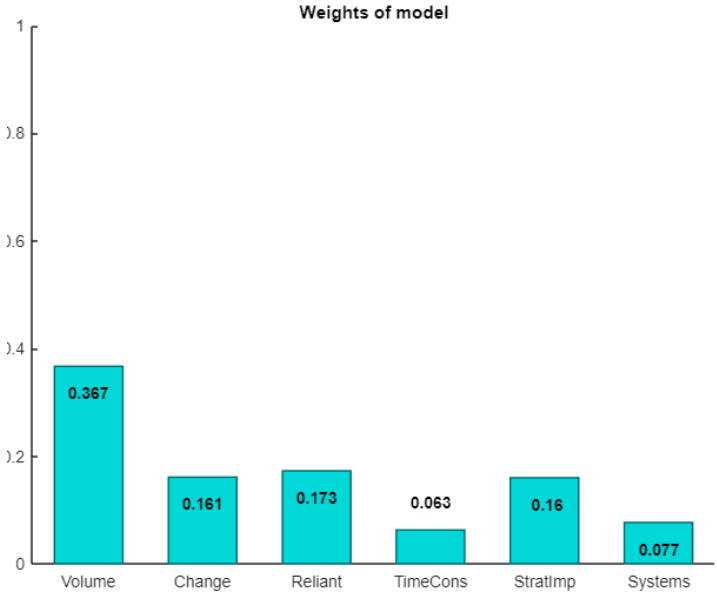


Figure 27: UTA weights for Value for Interviewee 6

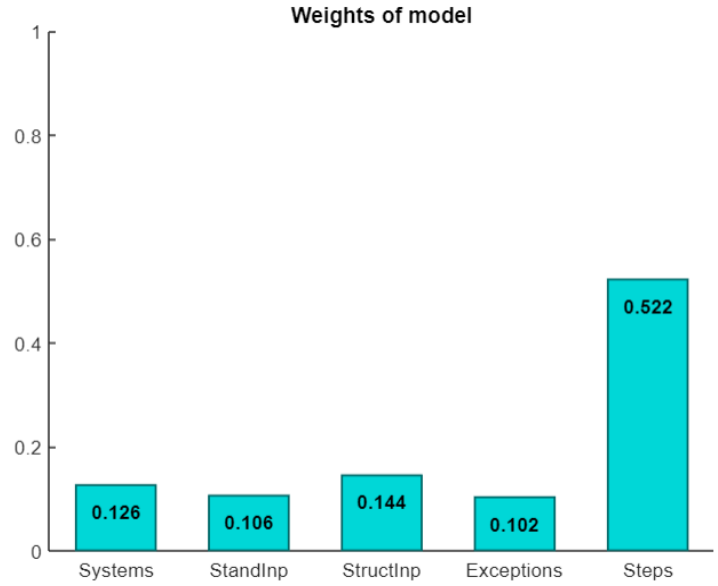


Figure 28: UTA weights for Complexity for Interviewee 3

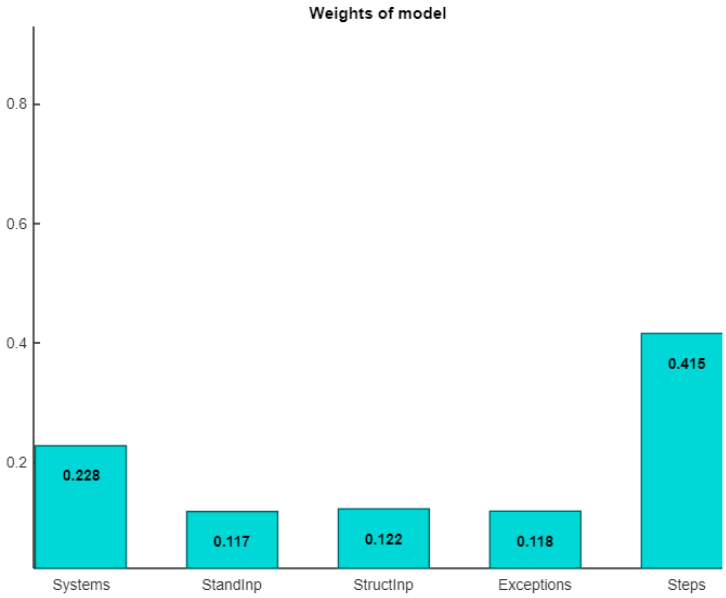


Figure 29: UTA weights for Complexity for Interviewee 6

The mean value between the weights for each Interviewee will be used in the Processes Assessment Formula.

For Value the weights are:

- Volume = 40,6%
- Change in the near future = 17,5%
- Reliant to one individual = 12,9%
- Time-consuming = 9%
- Strategic importance = 13,4%
- No. of systems = 6,6%

For complexity the weights are:

- No. of systems = 14,2%
- Standard Electronic Input = 10,85%
- Structured Input = 12,3%
- % of Exceptions = 9,95%
- No. of steps = 52,7%

Complexity is calculated based on the sum of the following:

- Standard Electronic Input (weight: 10,85%)

  $= IF\big((UserValue1 =$ "_" THEN $0) * 10{,}85\%\big)$

  $ELSE\ IF\big((UserValue1 = No\ THEN\ 1) * 10{,}85\%\big)$

  $ELSE\ IF\big((UserValue2 =$ MS Office Files $OR\ UserValue2 = TextFiles\ OR\ UserValue2 = Searchable\ PDFs\ THEN\ 0{,}33) * 10{,}85\%\big)$

  $ELSE\ IF\big((UserValue2 = Emails\ THEN\ 0{,}66) * 10{,}85\%\big)$

  $ELSE\ (1 * 10{,}8\%)$

- Structured Input (weight: 12,3%)

  $= IF(UserValue = No\ THEN\ 1\ ELSE\ 0) * 12{,}3\%$

- % of exceptions (weight: 9,95%)

  $= IF\left(UserValue > 30\%\ THEN\ 1\ ELSE\ \left(\frac{UserValue}{30}\%\right)\right) * 9{,}95\%$

- No. of systems (weight: 14,2%)

$$= IF\left(UserValue > 5\ THEN\ 1\ ELSE\ \left(\frac{UserValue}{5}\right)\right) * 14{,}2\%$$

- No. of steps (weight: 52,7%)

$$= IF\left(UserValue > 100\ THEN\ 1\ ELSE\ \left(\frac{UserValue}{100}\right)\right) * 52{,}7\%$$

Value is calculated based on the sum of the below:

- Volume (weight: 40,6%)

$$= IF(UserValue > 5\ THEN\ 40{,}6\%)$$
$$ELSE\ IF(UserValue =\ 0\ THEN\ 0)$$
$$ELSE\ IF(UserValue < 0{,}5\ THEN\ 40{,}6\% * 0{,}2)$$
$$ELSE\ \left((40{,}6\% - 40{,}6\% * 0{,}2) * \frac{UserValue - 0{,}5}{5 - 0{,}5}\right) + 40{,}6\% * 0{,}2$$

- Change in the near future (weight: 17,5%)

$$= IF(UserValue = "\_"\ \ THEN\ 1 * 17{,}5\%)$$
$$ELSE\ IF(UserValue > 20\%\ THEN\ 0)$$
$$ELSE\ IF(UserValue = 0\%\ THEN\ 1 * 17{,}5\%$$
$$ELSE(17{,}5\% - \left(\left(\frac{UserValue}{20}\%\right) * 17{,}5\%\right))$$

- Reliant to one individual (weight: 12,9%)

$$= IF(UserValue = \text{Yes}\ THEN\ 1\ ELSE\ 0) * 12{,}9\%$$

- Time-consuming (weight: 9,0%)

$$= IF(UserValue = Yes\ THEN\ 1\ ELSE\ 0) * 9\%$$

- No. of systems (weight: 6,6%)

$$= IF\left(UserValue > 5\ THEN\ 1\ ELSE\ \frac{UserValue}{5}\right) * 6{,}6\%$$

- Strategic Importance (weight: 13,4%)

$$= IF(UserValue = Yes\ THEN\ 1\ ELSE\ 0) * 13{,}4\%$$

VALUE	100%																								Final
Volume	40.6%	By percentage			0.5	<	8.1%	5	>	40.6%															0.0%
Change	17.5%	By percentage			0%	1	17.5%	20%	0	0.0%															17.5%
Reliant_to_1	12.9%	Yes	1	12.9%	No	0	0.0%																		0.0%
TimeConsum	9.0%	Yes	1	9.0%	No	0	0.0%																		0.0%
Systems	6.6%	By percentage			5	1	6.6%																		0.0%
StratImp	13.4%	Yes	1	13.4%	No	0	0.0%																		0.0%
																								TOTAL	18%
COMPLEXITY	100%																								Final
StandInput	10.9%	No	1	10.9%	MS Office Files	0.3	3.6%	Text Files	0.3	3.6%	Searchable PDFs	0.3	3.6%	Emails	0.66	7.2%	Non Searchable PDFs	1	10.9%						0.0%
StructInput	12.3%	No	1	12.3%	Yes	0	0.0%																		0.0%
Exceptions	10.0%	By percentage			30%	1	10.0%																		0.0%
Systems	14.2%	By percentage			5	1	14.2%																		0.0%
Steps	52.7%	By percentage			100	1	52.7%																		0.0%
																								TOTAL	0%

Figure 30: CriteriaCalculations, Process Assessment Formula

To summarise, the formula works by the following steps below, as seen in the two example processes in the figures below.

- The user fills the cells A3:P3 in the Formula tab
- The formula makes the necessary calculations in the background, which can be found in the CriteriaCalculations tab, based on the weights created by the UTA algorithm and the calculations created for each criteria.
- The formula shows the results on the formula tab cells R3:W3
- The user presses the submit button, and the process characteristics are added to the Submissions tab.
- The user can now compare the processes submitted and can begin automating the process based on the Priority column found in the Submissions tab.

Process Name	No. of FTEs (Volume)	Process manual & repetitive	Rules-based	Human Judgement required	Systems/ Apps Stable	Standard Electronic Input	Structured Input	Input type
Process A	5.0	Manual & Repetitive	Yes	No	Yes	Yes	Yes	MS Office Files

Figure 31: Example Process A Characteristics (columns A - I)

% of change in the near future	% of exceptions	Reliant to one individual	Time-consuming	No. of systems/ apps	Strategic Importance	No. of Steps
0%	10%	No	No	5	Yes	20

Figure 32: Example Process A Characteristics (columns J - P)

Status	Complexity	Value	Priority	Compexity %	Value %
Can automate	Medium	High	3	32%	78%

Figure 33: Example Process A Results

VALUE	100%											
Volume	40.6%		**By percentage**			0.5	<	8.1%	5	>	40.6%	
Change	17.5%		**By percentage**			0%	1	17.5%	20%	0	0.0%	
Reliant_to_1	12.9%		Yes	1	12.9%	No	0	0.0%				
TimeConsum	9.0%		Yes	1	9.0%	No	0	0.0%				
Systems	6.6%		**By percentage**			5	1	6.6%				
StratImp	13.4%		Yes	1	13.4%	No	0	0.0%				
COMPLEXITY	**100%**											
StandInput	10.9%		No	1	10.9%	MS Office Files	0.3	3.6%	Text Files	0.3	3.6%	
StructInput	12.3%		No	1	12.3%	Yes	0	0.0%				
Exceptions	10.0%		**By percentage**			30%	1	10.0%				
Systems	14.2%		**By percentage**			5	1	14.2%				
Steps	52.7%		**By percentage**			100	1	52.7%				

Figure 34: Example Process A Calculations (columns A – L)

										Final
										40.6%
										17.5%
										0.0%
										0.0%
										6.6%
										13.4%
									TOTAL	**78%**
										Final
Searchable PDFs	0.3	3.6%	Emails	0.66	7.2%	Non Searchable PDFs	1	10.9%		3.6%
										0.0%
										3.3%
										14.2%
										10.5%
									TOTAL	**32%**

Figure 35: Example Process A Calculations (columns M – W)

Process Name	No. of FTEs (Volume)	Process manual & repetitive	Rules-based	Human Judgement required	Systems/ Apps Stable	Standard Electronic Input	Structured Input	Input type
Process 5	0.5	Manual & Repetitive	Yes	No	Yes	Yes	Yes	Emails

Figure 36: Example Process B Characteristics (columns A – I)

% of change in the near future	% of exceptions	Reliant to one individual	Time-consuming	No. of systems/ apps	Strategic Importance	No. of Steps
15%	30%	Yes	Yes	2	No	85

Figure 37: Example Process B Characteristics (columns J – P)

Status	Complexity	Value	Priority	Compexity %	Value %
Can automate	High	Medium	8	68%	37%

Figure 38: Example Process B Results

VALUE	100%											
Volume	40.6%	By percentage			0.5	<	8.1%	5	>	40.6%
Change	17.5%	By percentage			0%	1	17.5%	20%	0	0.0%
Reliant_to_1	12.9%	Yes	1	12.9%	No	0	0.0%			
TimeConsum	9.0%	Yes	1	9.0%	No	0	0.0%			
Systems	6.6%	By percentage			5	1	6.6%			
StratImp	13.4%	Yes	1	13.4%	No	0	0.0%			
COMPLEXITY	**100%**									
StandInput	10.9%	No	1	10.9%	MS Office Files	0.3	3.6%	Text Files	0.3	3.6%
StructInput	12.3%	No	1	12.3%	Yes	0	0.0%			
Exceptions	10.0%	By percentage			30%	1	10.0%			
Systems	14.2%	By percentage			5	1	14.2%			
Steps	52.7%	By percentage			100	1	52.7%			

Figure 39: Example Process B Calculations (columns A – L)

										Final
										8.1%
										4.4%
										12.9%
										9.0%
										2.6%
										0.0%
									TOTAL	**37%**
										Final
Searchable PDFs	0.3	3.6%	Emails	0.66	7.2%	Non Searchable PDFs	1	10.9%		7.2%
										0.0%
										10.0%
										5.7%
										44.8%
									TOTAL	**68%**

Figure 40: Example Process B Calculations (columns M – W)

6 Discussion

This chapter will explain the findings from the RPA Assessment chapter. Furthermore, this chapter will compare the findings to the literature, discuss the importance of process evaluation, and finally provide suggestions for further research.

6.1 Findings on Process Assessment

The findings are based on both literature and interviews. For this thesis, the researcher studied the current knowledge on RPA and interviewed practitioners on different roles. It was deemed essential to learn how each role evaluates a process and further discuss their experience with RPA. Although the interviewees have different roles in different companies and countries, the viewpoints each provided for this research were broadly aligned, hence reinforcing the results.

The results are further reinforced through the comparison of literature and interviews as all criteria found through literature are part of the criteria most of the experts interviewed are using for a process evaluation. The interviewees suggested additional criteria that are believed essential in a process evaluation. In Chapter 1, it is mentioned that as many as 30 to 50% of initial RPA projects fail due to poor choice of process. This suggests that a thorough evaluation raises the possibility of a process that passes this stage to be automatable. The main goal of organisations automating processes is efficiency, and the only way to get it in RPA is through successful evaluation and automation. Most of the findings can also be seen in the literature, and none of them refutes it. As suggested in Chapter 5, some criteria help prioritise processes. At the start of an RPA undertaking, this might not play a huge role, but when the number of processes increases, RPA can become complicated. That is why Willcocks, Hindle, and Lacity (Hindle, Mary, & Willcocks, 2019) suggest that every enterprise reaching this stage should create an internal Center of Excellence. The CoE will handle the selection, prioritisation, design, development, maintenance, and operation of RPA. The researcher deduced that by following the PAM seen in Figure 17, a quick selection of processes could be made. However, proper selection and prioritisation can be accomplished with ease by completing the PAF described in Chapter 5.6.2.

6.2 Further Research

This research provides much information about RPA, the way it works, and how to start working with RPA tools. However, it must be accepted that every research has its limitations. Thus, this research should be viewed as a tool that can assist organisations today but can potentially be improved with further research on the subject.

A potential limitation could be that the number of interviewees is rather small. Most of them are engaged in either an employer/employee or a consultancy/client relationship, which may influence their views. Additionally, because the companies and employees interviewed are either selling or using these services, the views of the interviewees might be reserved or excessively optimistic regarding the results and benefits they might gain.

Lastly, even though a tool comparison was made in Chapter 3.4 and the opinions of the experts were taken on tools and the technology behind them; this research cannot assist in determining which tool an organisation should select. A more in-depth analysis of the tool features and the options each gives could further assist an organisation in selecting the most beneficial tool for them.

7 Conclusions

This research presents observations and information on Robotic Process Automation. The interest in RPA from numerous high-profile companies is growing fast. Therefore, the researcher decided to carry out this research. A literature review on RPA was done to find what is known about RPA and to examine the (current) criteria used to evaluate processes for automation and RPA tools. After the literature review, the researcher designed and conducted interviews with experts on the field to answer the main research question. The research questions chosen were:

- What are the current criteria for assessing a process for RPA?
- What should the criteria be and how should they be used to evaluate a process for RPA?

In Chapters 3 and 4, the first research question was answered. In Chapter 3, RPA, the technology behind it, and several tools were analysed. From that analysis, it was determined that Robotic Process Automation tools are software robots that are used on information systems to complete tasks the same way as humans. There are more than 30 different RPA vendors from which UiPath, Automation Anywhere, and Blue Prism are the leaders in the market. RPA, when used correctly, can help an organisation achieve multiple benefits such as cost savings, staff and customer satisfaction, and error reduction. In Chapter 4, three different case studies were examined. Through coding, the case studies were analysed, and the following characteristics were determined as essential for a process to be considered for automation with RPA: A process should be highly manual and repetitive, rules-based, stable, have high volume, and be provided standard electronic input.

In Chapter 5, by conducting interviews with six experts in the field of RPA, the main research question was answered. Through the interviews, it was determined that organisations use RPA technology to provide efficiency. As with Chapter 4, it was found that a process should be highly manual and repetitive, have high process volumes, be rules-based, have standard electronic inputs. It was also found that the process should have structured data, a low number of exceptions, should not change radically in the near future, and should not require human judgement.

To conclude, RPA tools, when used correctly, can provide multiple benefits to an organisation. However, as many as 50% of initial RPA projects fail due to poor choice of process. For an organisation to implement its projects successfully, a thorough evaluation of each of the processes for automation must be done. This procedure can be done either by following the criteria found during the interviews or by using the Process Assessment tools found in Chapter 5.6.

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Appendices

Appendix 1

Below are all the questions (in alphabetical order) that were created before the interviews. During the interviews, more questions were added to clarify or to analyse a topic further.

- Did you have any difficulties on the implementation of RPA in your company?
- Do you, or the client select the processes?
- During process assessment, how do you identify processes that should not be chosen for RPA?
- From the processes selected, were there any that were later rejected? If so, why? What did you learn from that experience?
- How do you handle maintenance of the project?
- How do you justify to the client that a process should not be automated?
- How do you prioritize a list of processes?
- How do you select a process?
- How do you test a process?
- How important is a 24/7 workforce?
- How important is a reduction of FTEs?
- How important is the elimination of human errors?
- How long did it take to break even? How many processes were required?
- How long have you been using RPA?
- How will your goals be accomplished by RPA?
- If the client suggests a process, what are the characteristics that the process cannot or should not be automated?
- If you encounter a problem, when do you code around it and when do you suggest a change to the process?
- What are signs that the process on hand should be abandoned? (not automated)
- What are the benefits you believe RPA usage will provide?
- What are the characteristics of a good process?
- What are the reasons you selected RPA?
- What factors do you use to evaluate an RPA process?
- What RPA tools have you used in the past and what are you using now?
- What were the characteristics/features of this tool that made you select and stay with it?
- What were/are your goals by using RPA?
- When is a project considered successful?
- Would you mind starting with a small introduction about yourself and your position?
- Would you mind starting with a small introduction about yourself, your company and how did you get involved with RPA?

Appendix 2

INTERVIEWEES	ROLES
Interviewee 1	RPA Healthcare Client (EN)
Interviewee 2	RPA Project Manager (CH)
Interviewee 3	CEO of RPA Consultancy (GR)
Interviewee 4	CEO of RPA Consultancy (EN)
Interviewee 5	Senior RPA Developer (EN)
Interviewee 6	RPA Developer (GR)

Interviewee 1 - Questionnaire

Q: What are the reasons you selected RPA?

A: Investing in integration between systems and traditional automation is time consuming and consume a lot of key resources for a long period of time. RPA is a quick way of replacing a manual process and create efficiency. Once the value of automation has been proven with a bot and when time permit, we will then invest in more robust solutions.

Q: What are the benefits you believe RPA usage will provide?

A: We hope to be able to replace some of our admin backend resources with clinical staff who can spend time with our patients.

Q: What are your goals?

A: Staff cost-saving and efficiency

Q: How will your goals be accomplished by RPA?

A: Replace backend admin staff with Bot.

Q: How important is the elimination of human errors?

A: It's not the main objective for us, but of course a good added benefit

Q: How important is a 24/7 workforce?

A: Not important for the specific process we selected, but might be for others

Q: How important is a reduction of FTEs?

A: Very important

Q: What are the characteristics of the processes you want to automate?

A: The first process is something easy for us to implement because it is completed centrally and with a limited number of resources. This process was selected because the sponsor was very supportive to the initiative and prepare to move fast. The next tranche of processes we believe are the most time consuming and repetitive. We anticipate very significant saving in each of our hospitals

Q: How do you select them?

A: Automation difficulty and FTE reduction

Automation difficulty include all aspects, technical difficulty, process complexity, change management and implementation challenge

Q: How do you prioritize a list of processes?

A: Automation difficulty and FTE reduction

Q: When is a project considered successful?

A: Once the savings have been realized

Q: What factors do you use to evaluate an RPA process?

A: The criteria we use to evaluate processes are:

- technical difficulty, the number of platforms to be used by the bot,
- process complexity,
- change management and
- implementation challenge.

Interviewee 2 – Questionnaire

Q: How long have you been using RPA?

A: Since 2015

Q: What RPA tools have you used in the past and what are you using now?

A: We have been using Blue Prism since the beginning of the project as it was the most mature tool back in 2015 when we kicked off this initiative. If we were to do the evaluation today, we would have a closer look at UiPath as colleagues that use it mention that it offers significantly improved developer productivity.

Q: What were the characteristics/features of this tool that made you select and stay with it?

A: The key criteria were the license model (i.e. pay only for concurrent licenses in PROD), the ease to integrate in an enterprise environment (e.g. SSO, authorization via AD groups etc), the unattended automation capabilities via the LoginAgent and the CredentialsManager, the flexibility to inject arbitrary C# or VB.NET code into the robots via the so called CodeObjects

Q: Did you have any difficulties on the implementation of RPA in your company?

A: Of course, all robotics initiatives face implementation challenges. This is particularly the case in large organizations with strict policies (as one needs to find the most appropriate way to integrate the technology in the respective computing landscape) What is more, recovering from exceptions is not trivial. Every RPA developer can learn to configure the "happy path" of a process rather easily but it takes a lot of effort (and a few failures) to learn how to configure in a robust fashion all possible exceptions and alternative execution paths

Q: How long did it take to break even?

A: About 2 years, given the initial investment required for integrating the tool into the heavily regulated corporate IT landscape in a compliant fashion

Q: How many processes were required to break even?

A: The break-even point is not related to the seer number of processes (as every process has a development cost) but to the savings per process. In other words, one can decide to automate many small processes with little savings each or a few more complex processes with higher savings each

Q: What were/are your goals by using RPA?

A: Automate business processes at a fraction of a cost of a traditional IT project, quick time to market for urgent deliverables, bridge the gap between strategic projects that would take time to implement and immediate needs

Q: How do you select a process?

A: A combination between a top down and a bottom up approach was used (where senior management provided areas of focus and normal employees identified opportunities for automation) An automaton challenge was also organized as well as an internal roadshow/expo in order to create awareness about the capabilities of this new technology. The ideas submitted/collected were then evaluated on technical feasibility and business case potential

Q: From the processes selected, were there any that were later rejected? If so, why?

A: Yes, some have proven more complicated or tricky to implement while for others the business case was weaker than originally anticipated

Q: What did you learn from that experience?

A: With time we learned to evaluate very quickly whether a process is a good candidate for automation via RPA. What is more, the business users are interested in having their problem solved regardless of the type of the solution/technology used (RP, Excel Macros, Powershell scripts, extensions to existing IT applications etc) As a result, one shall keep "automation" as the key objective of the initiative and not be narrow minded to offer only RPA solutions

Q: What factors do you use to evaluate an RPA process?

A: Technical feasibility, structured input, technologies on which underlying systems are built.

Process complexity, number of steps, number of different systems, number of exceptions.

Savings potential, how often will the robot run, how much time will it save in each run.

Interviewee 3 – Interview

Q: Thank you for finding the time for this interview. Would you mind starting with a small introduction about yourself, your company and how did you get involved with RPA?

A: My name is Paul Jennings. I have around 25 years experience as a consultant with 18 of those focused on automating testing. I am the owner of a boutique near-shore consultancy based in Chania, Crete. We have chosen to get involved with RPA as it was a natural pivot from automating testing into an interesting and growing market. We rapidly found customers and partners within our network and were able to build an RPA practice.

Q: Having an experience with other automation. How would RPA tools compare to other automation tools?

A: We would always advise a business to consider the most appropriate and cost-effective approach to use for their automation. RPA is very powerful and has the benefit of supporting architecture to allow the capture and reporting of defects, but other more "tactical" solutions may also be valid. This is especially true when the automation is using only one application and isn't transferring data between applications. Examples here might be things like using Excel macros or PowerShell scripts to automate part of a process.

Q: Do you, or the client select the processes?

A: Generally, we advise the client on how to select and prioritise the processes and then work with them to identify suitable candidates. We have an initial session with whoever will be looking for processes and explain the capability of the tool and the criteria we use. They seem to understand quite quickly what the criteria is and why we have it. We then talk about suitable processes and consider if they fit the criteria. The key for us is to have someone who understands both the business processes and the constraints of the technology.

Q: When you are requested by the client to select the processes. How do you select them?

A: The criteria we use for selecting automated processes are

- Rules-based, no human judgement

- Interpretable to the robot, data presented does not require human analysis

- Structured data, data is in a known format, like a form

- Exceptions limited, more or less, the same thing happens each time

Although the software is more capable than most automation tools, it still requires data to be "predictable" to be truly usable.

Q: If the client suggests a process, what are the characteristics that the process cannot or should not be automated?

A: The first three criteria are firmly fixed. A "no" to any question means we don't consider it a candidate. For the 4th criteria, the "limited exceptions" clause, we may consider a subset of all possible process uses. For example, we may consider automating an appointment booking process for existing patients but not for new ones.

Q: How do you justify to the client that a process should not be automated?

A: For the "rules-based" and "interpretable data" criteria, the justification is the robot will not be able to carry out its task. So, for example, we would not recommend a robot to analyze medical images and present a diagnosis. The capability is simply beyond what it can do.

For the "structured data" and "limited exceptions" criteria, there is sometimes more conversation needed. There is a grey area where semi-structured data or multiple process paths can be used with some extra coding. What we have to do there is evaluate whether the effort of the coding and the subsequent capturing of failed processes is worth the saving created by automating the process. Often it isn't, or the risk of failure is so high it makes more sense for a human to complete the task.

Q: What are the characteristics of a good process?

A: A good process should be really boring. When we speak to users about processes and automation, we always find they have things they would love to have us automate as they hate doing the work. These processes always pass our four tests as they are simple to do, simple to understand, have basic data inputs and outputs, and are very repetitive.

Ideally, a process should cut across two or more systems as well. We find that organisations often bridge the gap between different systems with a human being, and RPA is really good to fill that gap instead.

Q: When is a project considered successful?

A: From our perspective, when we have delivered a fully functioning robot that is processing in a production environment. From the client's perspective, it will depend on their goal, whether to reduce processing errors, raise team morale by reducing tedious tasks and general workload or reduce headcount.

Q: How do you handle maintenance of the project?

A: Ideally, we function as a third-line support. There are multiple things that can cause an automation to fail, failure of the architecture the robot is running on, an incident on one of the systems the robot is running, an unplanned change to one of the systems, and these ought to be the responsibility of the client. If there is

a genuine problem or a planned change to one of the systems, then we should resolve these via an incident management or change request process.

Q: How do you prioritize a list of processes?

A: We would suggest to the client that they prioritise based on three things: how often the process is run, whether it is a cross-system process, and how likely the process is to change in the near future. For the first, the reasoning is that the more the process is used, the more time and effort can be freed up by automating it. The second criteria is there because we see RPA being most effective when integrating systems, as there is often a means to integrate data flow within a system anyway. The last is really about cost-effectiveness. If a process is likely to change a lot, then the robot will need to be reworked.

Q: What factors do you use to evaluate an RPA process?

A: It's mostly as mentioned before, for whether it's valid as a process:

- Rules-based

- Interpretable to robot

- Structured Data

- Exceptions limited

For the priority:

- How often the process is run

- Whether it is a cross-system process

- How likely the process is to change in the near future

In terms of success, what percentage of activity of the process can we automate. For example, if we are trying to automate a process that needs a PDF to be run, and the robot successfully extracts and processes that data 75% of the time, then we would think that was 75% successful. So although we don't have the process working all the time we have still saved 75% of the effort.

Interviewee 4 – Interview

Q: Thank you for finding the time for this interview. Would you mind starting with a small introduction about yourself, your company, and how did you get involved with RPA?

A: My pleasure. I am the founding director of a niche consulting organisation focused on intelligent Robotic Process Automation with a specialist knowledge of its use in the healthcare industry. I started my career some 25 years ago working in IT operations for a major global oil business which outsourced its IT operations to a major consulting and systems integrator. During this time, I developed many skills and acquired significant knowledge in IT until 15 years ago when my focus shifted to delivering IT services into the NHS. Approximately 5 years ago my career channelled to Process Automation, and during this time I developed deep knowledge of the Blue Prism RPA solution and supported organisations to help them understand where RPA can be of use to them and importantly what they need to put in place to ensure automation benefit can be realised, well managed and sustainable.

Q: How do you select a process? What is the process you use in the process selection?

A: The selection of a process is not straightforward, although it may seem quite simple. Often an end to end business process is complex, and it is necessary to break the process down into simpler process steps to identify the areas that would benefit from RPA. In addition, you may inadvertently move the roadblock of a process from one stage to another, for example through automating a repetitive manual admin process at the start of a business process to improve turnaround time may result in higher volume of work further down the process which cant be automated, causing a problem elsewhere in a business.

It is also necessary to consider a number of factors including but not limited to:

- The volume of repetitive work
- The variability of choices within a process
- The number of systems the business process will need to interact with
- The complexity of the data and the potential for data transformation in the process
- The human labour cost of the process not being automated versus the cost to automate and maintain
- The risk of not automating because the process is reliant on a single individual with specific knowledge and skills
- The operational benefit to the business of automating the process

Q: What are the characteristics of a good process?

A: The ideal process to automate is one that requires one or more people to complete every day, has very few variations to complete, 1 or 2, and is prone to human error because the task is boring for the human to undertake and not considered a high priority by the individuals performing the task.

Q: During process assessment, how do you identify processes that should not be chosen for RPA?

A: In the world of RPA in its true sense, that being that there is no intelligence capability within the process, any process that requires human judgement to make a decision should not be chosen. That being said, It is possible to consider such business processes whereby part of the process is repetitive and non-judgemental, and part is subjective and cognitive, such, that you automate the parts that can be automated and hand-off to the human workforce to undertake the work that a robot can't do. An example of this could be a call center with an automated telephone system that initially collects data from the caller, the digital workflow then passes data to RPA to fetch data while the caller is held in a queue, when the data and agent are available the caller is connected with the call center agent and the agent has information available collected from multiple systems into a single view ready to access.

Q: How do you prioritize a list of processes?

A: It is not possible to simply prioritise a list of processes with little information. Each process needs to be reviewed for volume, complexity, human judgement, and manual time required to perform [them]. Only then you consider prioritising the list.

Q: If the client suggests a process, what are the characteristics that the process cannot or should not be automated?

A: A number of characteristics have to be considered. Some examples would be:

Where the process is reliant on paper or handwritten notes. Whilst scan and OCR technology could be utilised to convert data to be digital; it may be more cost-effective to digitally transform the process prior to considering automation. In such cases, a combination of digital transformation and RPA can be successful.

Where the number of exceptions to the repeatable process is significant, such a process may require significant process automation development, which may be far more costly than continuing to perform the process manually, especially when a very small number of part-time workforce is in place to complete such work.

Where human judgement and decision making is required. RPA, in its simplest form, has no cognitive capability; therefore, any process that requires someone to think and make a decision before proceeding is simply not appropriate for RPA.

Q: How do you justify to the client that a process should not be automated?

A: This will depend on the process being considered. If it is clear that human judgement and decision making is in place, it's a relatively simple conversation, albeit it could open the door to consider cognitive-based AI solutions in addition to RPA, but this would depend on volume and complexity. If the process is complex with multiple if-then steps, the development time could be excessive. Therefore it is important to roughly estimate development cost as part of the initial review to understand if a process should be considered for automation and a more detailed exercise to understand the process and automation requirements is considered.

Q: When is a project considered successful?

A: Some might say a project is considered successful when a process automation goes live and has been running successfully for a short period of time. This would be wrong. A project should only be considered successful when the benefits defined at the outset are understood, and the automation has been running for a period of time with metrics being measured showing that there is a positive time, financial or quality improvement versus the previous way of working. To be able to measure such "value" it is critical the as-is manual process is measured to capture metrics that can be measured against post automation.

Q: What factors do you use to evaluate an RPA process?

A: Key factors might include:

- Volume of transactions

- Time to complete transactions

- Number of systems/data sources the RPA solution will need to interact with

- The complexity of the process

- Timeliness of process execution. For example, is it business-critical there are no delays?

- Number of people doing the work prior to automation

- Process variability in terms of exception handling

- Data quality. Although a process may be undertaken to validate / test data quality as a precursor and alert DQ issues for resolution prior to further processing

- Availability of human resources to do the work

And sometimes there may be factors that are quite specific and only present themselves when a business process evaluation is completed.

Interviewee 5 – Interview

Q: Thank you for finding the time for this interview. Would you mind starting with a small introduction about yourself and your position?

A: Yes, no problem, I am Connor, I used to work in the manufacturing industry until I found out about RPA. I initially started learning Blue Prism in my bedroom on weekends, I then went on a formal training course and upon completing that I took and passed my Blue Prism Developer exam. After this I got a position as an Associate Consultant with PwC in Singapore, my role was to deliver the full lifecycle of automation, using Agile development methodology, for their biggest client that was undertaking digital transformation using RPA as an enabler. After a year of this, I moved back to the UK for personal reasons and worked as a contractor for a small consultancy based in London, where I was a Blue Prism Consultant. I have since taken my Blue Prism Solution Designer exam and now work as a Solution Consultant for Blue Prism. My role is to assist current and potential customers of Blue Prism in any technical aspect of how they deliver a robust RPA platform into their business.

Q: As a developer, how do you test a process?

A: In stages. Initially, you are just testing the functionality of the objects you have created, launch, login, navigate, extract.

Once all the objects are complete, you would start building from a process level where you would unit test with test data. Once the process is complete, you can start to test with the client SME (Subject Matter Expert) who will review the output of the process and provide feedback. This could include a full walkthrough of the process in Debug mode so the client can understand all actions that are being carried out by the robot.

Once the SME is satisfied with the actions that are carried out by the robot, we need to develop a test plan. The test plan would have data that would lead to different scenarios in the process. This would ideally test every "Happy" and "Unhappy" path when the 'Robot' is working. This would be developed and agreed between the Developer, Tester and SME.

Once this has been signed off, you would then test from the Control room with test data, and the output would be verified by the SME. Any issues arising would result in more development and further testing.

The process would then be exported to a Test environment for UAT (User Acceptance Testing). Where nobody would have access to change the process, it would only be allowed to be executed. This is the first time the process would be exposed to live data. The process would be run and results verified by SME and Tester. Any issues with the process that arises from this testing would need to be worked on in the Development environment and tested again. Once the SME has signed off the process, it would get exported to live.

As part of Go-Live, it would be expected that the SME would periodically check the results of the process to ensure that there are not anomalies, which could have arisen from an environment change. For example, you could be extracting data from a live website where there might be slight differences when developing against the test website.

Q: What are signs that the process on hand should be abandoned?

A: If there is too much human decision making involved. Where on the outset, the process looked like it was simple rules-based but actually required the cognitive ability to decide on the next tasks to be undertaken with that data.

Where the time to automate would not be comparable to the time saved. For example, a 4-6 week development cycle to automate a report that is run weekly and takes 1 hour of human time to run would not be ideal for automation because that equates to 0.025 FTE over a 40 hour week. Having a developer work for four weeks, it would take two years to get the time saving back, assuming there was no support work to be done on the process.

Where the process is likely to change dramatically in the near future, other solutions should be looked at.

Where inputs can be unstructured data, normally some process re-engineering would suffice here to create a structured way of presenting the data to the robot.

Q: What are the characteristics of a good process?

A: A good process should be simple, rules-based, have high volume, structured data, and be on a stable system.

Other factors to consider are tasks that humans do not like doing, a process that would not be normally fit for automation may still be undertook because it has intangible benefits for the workforce, such task might include double data entry, data migration or as I mentioned before could include reporting processes.

Q: What factors do you use to evaluate an RPA process?

A: As with the characteristics. Particularly paying attention to high volume processes. As with all RPA, you will never automate 100%, but if you find a 10 FTE process and you can automate 80% and leave 2 FTE to manage business exceptions, you would then have released 8 FTE which can be deployed in more value-added activities.

Q: If you encounter a problem, when do you code around it and when do you suggest a change to the process?

A: Usually, if we can identify an issue in the Process Analysis, we would talk to the business about changing the process. Once the process has been defined and signed off, any other issues we come across, we would usually code around the problem instead of going back to the business to re-define the process. Other factors could include the timeline and expense of the change. RPA can sometimes be used in a tactical way to "plaster" a process rather than going through an operational change to improve the process.

Q: Would you mind explaining what do you mean by "plaster a process"?

A: Keeping in mind the use of RPA in a business is quite a new thing. The normal way a business would improve a process would be to go through a transformation project where the whole process is documented and potentially using a methodology, such as LEAN, they could make improvements to the process. This process usually takes a great deal of time and requires a lot of external resources. The advantage of RPA is that you can take a "broken" process and instead of fixing the process you can "put a plaster on it" In other words, you just use RPA to automate a bad process instead of fixing the process. This can bring great advantages in some situations as you wouldn't have to go through a large transformation process, you would just use RPA as a tactical solution to solve small sections of the process and let the human workforce do the rest.

Q: Do you think I should be asking anything else on process assessment?

A: Risk should always also be considered when going through automation. The highest risk being the robots fail, what happens, and what is the impact on the business. Many companies, for example, prefer for robot account to never send email externally, it should always be check by the "robots" human counterpart first.

Interviewee 6 – Interview

Q: Thank you for finding the time for this interview. Would you mind starting with a small introduction about yourself and your position?

A: No problem. I have been working for the past 2.5 years in a consultancy based in Greece that works with clients in Europe. For the first year and something extra, I worked as an SAP Performance Consultant. Part of the job was creating and adding virtual users to test the limits of systems. When the consultancy decided to expand its services into RPA, I agreed to move into the new department and be the first RPA developer. On August 2018, I started working with RPA, for the first 9 months, I used UiPath, and for the last 9 months, I have been working with BluePrism. Since then, I have created multiple Proof of Concept bots as well as a few complete automations.

Q: Would you mind expanding on the change from UiPath to Blue Prism?

A: The change of tool was a request of our client. Though it was a good change. As I said, when I began with RPA about 1.5 years ago, I started with UiPath. It is a great tool with a friendly UI [User Interface], but it was missing something. About 9 months ago, I started working with Blue Prism as that was required from the company and immediately found what UiPath was missing. Structure. Blue Prism is a tool made for businesses, and that difference can be seen when someone has worked with both the tools.

Q: How do you test a process?

A: There are 5 testing phases a process goes through to get to the production environment. First 3 are done by the developers on their own while the next 3 are done with the subject matter expert or the business representatives.

Unit Testing, this will reveal if the robot can recognize all elements in all automation-relevant applications.

Integration Testing, in this test, the developer tests if single pages function as expected and ensures that the process can process entire cases from start to finish.

System Testing, the developer tests that the process works when run at the actual, designed speed. The solution created must handle all the cases with which it is defined to cope in order to pass this testing phase.

Validation Phase, this is the final test phase in the test application environment, here the robot performs the actions step-by-step and its performance is evaluated before it enters the production environment.

Live Proofing Phase, again the process is run in a step-by-step manner so that the testing team can verify that the process can perform in the production applications. After all individual steps have been run through, the complete process will be run for confirmation.

User Acceptance Test, in this phase, the business is accepting the solution into the production phase, a series of production runs is done until the required consequent successful cases have been run.

Q: What are signs that the process on hand should be abandoned?

A: Well, there are not many things that can determine if a process should not be automated on the development side. All processes that are automated usually follow a specific set of rules. High transaction volume, highly manual and repetitive, low number of variation scenarios, structured data, need of 0 to limited human intervention. On the development side, we are looking for robot friendly steps, standard electronic inputs, and decision making based on predictive rules. There are some things that might be red flags but can only be found while working on the process. An example of that: I was working on a process that should select a date on an SAP calendar. The problem here was that UiPath could not identify the date of the calendar but was only able to select the whole calendar as one item. That made it impossible to go further through this specific SAP transaction code as we couldn't select the date required.

Another really important thing for us is a thorough and clear robot walkthrough. A document with unclear steps or missing things delays the project. To avoid things like that, Blue Prism has created a template Process Definition Document that can be used by companies to create clear step-by-step navigation for the robots and the developers.

Last, even though these two do not have an impact on whether the process should be automated, they are crucial in deciding which process should be automated first. First is the number of systems the process will run on. The more systems a process runs on, the more time a human worker needs to complete the task. On the other hand, a robot can complete the task much faster. Second, the time a process takes. As with the first, a robot can complete the same task a human can much faster. For example, we completed a process that was run every week for a client which took their employee three days to complete, that is 24 hours out of the 40 hours they work in a week. The robot completed the same task with minor differences in 2 hours, and the employee was required to work on that for another 2 hours.

Q: What are the characteristics of a good process?

A: Talking only on the development side, that would be a robot friendly walkthrough, standard electronic inputs, and decision making based on predictive rules. To further analyze those:

- Robot friendly walkthrough means that the process has a path that the robot can follow to complete its task with ease. if there was a choice between a calendar to select a date and a field to add a date, it is far more easy for a robot to fill them later.

- Standard electronic inputs would be data from files like Excel, XML, PPT, PDFs that have a standard view like invoices of a specific company, all fields are always at the same spot and the only thing that changes is the alphanumerical data that we need to extract.

- Decision making based on predictive rules, well this answers for itself, the path the robot should follow and the next steps it should take have been identified and have been created based on specific rules.

Q: If you encounter a problem, when do you code around it and when do you suggest a change to the process?

A: Depends on the problem at hand. For example, few days ago I was working on a project that I was given a set of folders with files in them. Each folder had a different structure as it was produced by different individuals. One folder might had a sub-folder and the files in that, the other would have the files immediately while others had a zip file with the files inside. The logical solution would be to advise the client to have a proper structure in their folders, but we decided it was more time-efficient to create a solution rather than ask each employee creating each folder to follow a specific structure. On the same project we were supposed to be using the folder names, cities, and use them in a specific Excel file that had the list of cities

already, the problem was that the list had some differences like “New York” with “New_York” which would confuse the robot. Since the Excel file is only one, and for a specific use, we requested that the names would change to match the folder names. As a developer, I think it all depends on the complexity and the time required to code around a problem.

Q: What factors do you use to evaluate an RPA process?

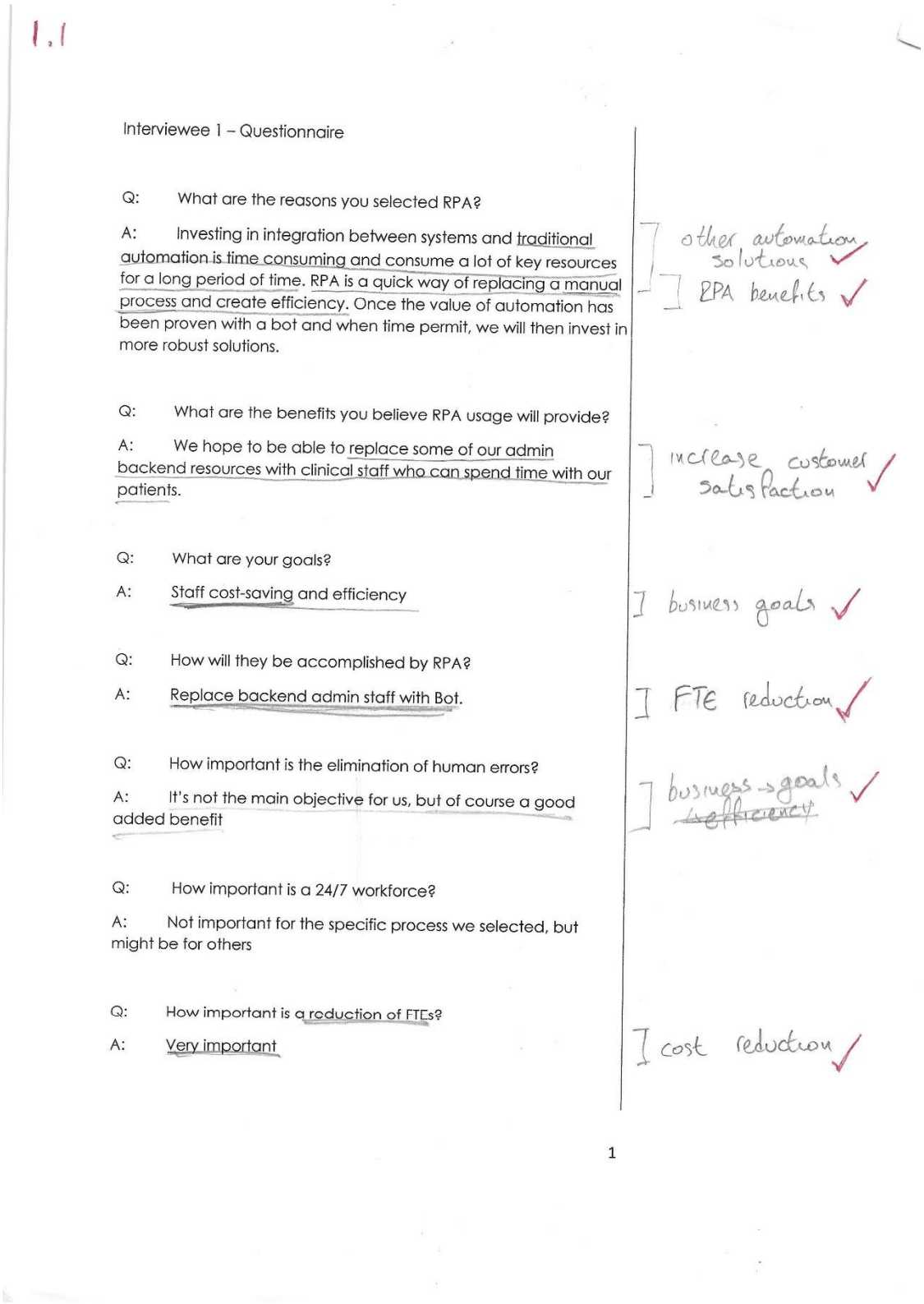
A: There are many things that should be considered but let’s assume that the process has passed all business factors that could make it a bad candidate. Then we would get a list of:

- Structured Data. Like the example with the folders
- Rule-based steps
- A thorough and clear robot walkthrough

Q: Do you think I should be asking anything else?

A: A change in the process during or after the development can easily add extra cost for the development and the support of such a process. A business should not decide to automate processes that might change in the next few months unless the benefits acquired from it are far more than the extra cost that will occur in a scenario of this kind. Usually, the processes selected and the infrastructure of the system used should not be subject to a change for at least the next six months.

Appendix 3



1.1

Interviewee 1 – Questionnaire

Q: What are the reasons you selected RPA?

A: Investing in integration between systems and traditional automation is time consuming and consume a lot of key resources for a long period of time. RPA is a quick way of replacing a manual process and create efficiency. Once the value of automation has been proven with a bot and when time permit, we will then invest in more robust solutions.

] other automation solutions ✓
] RPA benefits ✓

Q: What are the benefits you believe RPA usage will provide?

A: We hope to be able to replace some of our admin backend resources with clinical staff who can spend time with our patients.

] increase customer satisfaction ✓

Q: What are your goals?

A: Staff cost-saving and efficiency

] business goals ✓

Q: How will they be accomplished by RPA?

A: Replace backend admin staff with Bot.

] FTE reduction ✓

Q: How important is the elimination of human errors?

A: It's not the main objective for us, but of course a good added benefit

] business goals ✓ ~~efficiency~~

Q: How important is a 24/7 workforce?

A: Not important for the specific process we selected, but might be for others

Q: How important is a reduction of FTEs?

A: Very important

] cost reduction ✓

1

1.2

Q: What are the characteristics of the processes you want to automate?

A: The first process is something easy for us to implement because it is completed centrally and with a limited number of resources. This process was selected because the sponsor was very supportive to the initiative and prepare to move fast. The next tranche of processes we believe are the most time consuming and repetitive. We anticipate very significant saving in each of our hospitals

] characteristics of process ✓

] characteristics of process ✓

] business goals ✓

Q: How do you select them?

A: Automation difficulty and FTE reduction

] cost reduction ✓

Automation difficulty include all aspects, technical difficulty, process complexity, change management and implementation challenge (repeated in factors)

Q: How do you prioritize a list of processes?

A: Automation difficulty and FTE reduction

] priority ✓

Q: When is a project considered successful?

A: Once the savings have been realized

] project success ✓

Q: What factors do you use to evaluate an RPA process?

A: The criteria we use to evaluate processes are:

- technical difficulty, the number of platforms to be used by the bot,
- process complexity,
- change management and
- implementation challenge.

] criteria ✓

Interviewee repeats a lot FTE Reduction & cost saving.
Most answers are short with little info

"change management: is a term for all approaches to prepare, support, and help individuals, teams, and orgs in making organizational change" 2

Not necessary to write all cost-reduction, FTE reduction but mention there are more.

2.1

Interviewee 2 – Questionnaire

Q: How long have you been using RPA?

A: Since 2015

Q: What RPA tools have you used in the past and what are you using now?

A: We have been using Blue Prism since the beginning of the project as it was the most mature tool back in 2015 when we kicked off this initiative. If we were to do the evaluation today, we would have a closer look at UiPath as colleagues that use it mention that it offers significantly improved developer productivity.

reason for tool selection ✓

tool comparison ✓

Q: What were the characteristics/features of this tool that made you select and stay with it?

A: The key criteria were the license model (i.e pay only for concurrent licenses in PROD), the ease to integrate in an enterprise environment (e.g SSO, authorization via AD groups etc), the unattended automation capabilities via the LoginAgent and the CredentialsManager, the flexibility to inject arbitrary C# or VB.NET code into the robots via the so called CodeObjects

tool characteristics or reasons for tool selection ✓

Q: Did you have any difficulties on the implementation of RPA in your company?

A: Of course, all robotics initiatives face implementation challenges. This is particularly the case in large organizations with strict policies (as one needs to find the most appropriate way to integrate the technology in the respective computing landscape) What is more, recovering from exceptions is not trivial. Every RPA developer can learn to configure the "happy path" of a process rather easily but it takes a lot of effort (and a few failures) to learn how to configure in a robust fashion all possible exceptions and alternative execution paths

implementation difficulties ✓

3

2.2

Q: How long did it take to break even? how to use?

A: About 2 years, given the initial investment required for integrating the tool into the heavily regulated corporate IT landscape in a compliant fashion

Q: How many processes were required to break even? how to use?

A: The break-even point is not related to the seer number of processes (as every process has a development cost) but to the savings per process. In other words, one can decide to automate many small processes with little savings each or a few more complex processes with higher savings each

Q: What were/are your goals by using RPA?

A: Automate business processes at a fraction of a cost of a traditional IT project, quick time to market for urgent deliverables, bridge the gap between strategic projects that would take time to implement and immediate needs

business goals ✓

Q: How do you select a process?

A: A combination between a top down and a bottom up approach was used (where senior management provided areas of focus and normal employees identified opportunities for automation) An automaton challenge was also organized as well as an internal roadshow/expo in order to create awareness about the capabilities of this new technology. The ideas submitted/collected were then evaluated on technical feasibility and business case potential

process selection method ✓

Q: From the processes selected, were there any that were later rejected? If so, why?

A: Yes, some have proven more complicated or tricky to implement while for others the business case was weaker than originally anticipated

process rejection reasons ✓

Q: What did you learn from that experience?

A: With time we learned to evaluate very quickly whether a process is a good candidate for automation via RPA. What is more,

4

2.3

the business users are interested in having their problem solved regardless of the type of the solution/technology used (RP, Excel Macros, Powershell scripts, extensions to existing IT applications etc) As a result, one shall keep "automation" as the key objective of the initiative and not be narrow minded to offer only RPA solutions

other automation solutions ✓

Q: What factors do you use to evaluate an RPA process?

A: Technical feasibility, structured input, technologies on which underlying systems are built.

Process complexity, number of steps, number of different systems, number of exceptions.

Savings potential, how often will the robot run, how much time will it save in each run.

criteria ✓

Interesting way to find processes.

3.1

Interviewee 3 – Interview

Q: Thank you for finding the time for this interview. Would you mind starting with a small introduction about yourself, your company and how did you get involved with RPA?

A: My name is Paul Jennings. I have around 25 years experience as a consultant with 18 of those focused on automating testing. I am the owner of a boutique near-shore consultancy based in Chania, Crete. We have chosen to get involved with RPA as it was a natural pivot from automating testing into an interesting and growing market. We rapidly found customers and partners within our network and were able to build an RPA practice.

Q: Having an experience with other automation. How would RPA tools compare to other automation tools?

A: We would always advise a business to consider the most appropriate and cost-effective approach to use for their automation. RPA is very powerful and has the benefit of supporting architecture to allow the capture and reporting of defects, but other more "tactical" solutions may also be valid. This is especially true when the automation is using only one application and isn't transferring data between applications. Examples here might be things like using Excel macros or PowerShell scripts to automate part of a process.

other automation solutions ✓

RPA feature ✗

Q: Do you, or the client select the processes?

A: Generally, we advise the client on how to select and prioritise the processes and then work with them to identify suitable candidates. We have an initial session with whoever will be looking for processes and explain the capability of the tool and the criteria we use. They seem to understand quite quickly what the criteria is and why we have it. We then talk about suitable processes and consider if they fit the criteria. The key for us is to have someone who understands both the business processes and the constraints of the technology.

process selection method ✓

6

3.2

Q: When you are requested by the client to select the processes. How do you select them?

A: The criteria we use for selecting automated processes are

1 - Rules-based, no human judgement

2 - Interpretable to the robot, data presented does not require human analysis

3 - Structured data, data is in a known format, like a form

4 - Exceptions limited, more or less, the same thing happens each time

Although the software is more capable than most automation tools, it still requires data to be "predictable" to be truly usable.

criteria ✓

Q: If the client suggests a process, what are the characteristics that the process cannot or should not be automated?

A: The first three criteria are firmly fixed. A "no" to any question means we don't consider it a candidate. For the 4th criteria, the "limited exceptions" clause, we may consider a subset of all possible process uses. For example, we may consider automating an appointment booking process for existing patients but not for new ones.

(used later)
process rejection reasons ✓
partial automation ✓

Q: How do you justify to the client that a process should not be automated?

A: For the "rules-based" and "interpretable data" criteria, the justification is the robot will not be able to carry out its task. So, for example, we would not recommend a robot to analyze medical images and present a diagnosis. The capability is simply beyond what it can do.

criteria justification ✓

For the "structured data" and "limited exceptions" criteria, there is sometimes more conversation needed. There is a grey area where semi-structured data or multiple process paths can be used with some extra coding. What we have to do there is evaluate whether the effort of the coding and the subsequent capturing of failed processes is worth the saving created by automating the process. Often it isn't, or the risk of failure is so high it makes more sense for a human to complete the task.

criteria justification ✓
reason for higher cost
finding when the benefits are not worth it ✓
risk of failure ✓
↳ automating

7

3.3

Q: What are the characteristics of a good process?

A: A good process should be really boring. When we speak to users about processes and automation, we always find they have things they would love to have us automate as they hate doing the work. These processes always pass our four tests as they are simple to do, simple to understand, have basic data inputs and outputs, and are very repetitive.

Ideally, a process should cut across two or more systems as well. We find that organisations often bridge the gap between different systems with a human being, and RPA is really good to fill that gap instead.

increase staff ~~rotate~~/satisfaction ✓

characteristics of process ✓

cross-app ✓

FTE - reduction ✓

Q: When is a project considered successful?

A: From our perspective, when we have delivered a fully functioning robot that is processing in a production environment. From the client's perspective, it will depend on their goal, whether to reduce processing errors, raise team morale by reducing tedious tasks and general workload or reduce headcount.

project success cons. ✓

project success client ✓

Q: How do you handle maintenance of the project?

A: Ideally, we function as a third-line support. There are multiple things that can cause an automation to fail, failure of the architecture the robot is running on, an incident on one of the systems the robot is running, an unplanned change to one of the systems, and these ought to be the responsibility of the client. If there is a genuine problem or a planned change to one of the systems, then we should resolve these via an incident management or change request process.

reasons of failure ✓

Q: How do you prioritize a list of processes?

A: We would suggest to the client that they prioritise based on three things: how often the process is run, whether it is a cross-system process, and how likely the process is to change in the near future. For the first, the reasoning is that the more the process is used, the more time and effort can be freed up by automating it. The second criteria is there because we see RPA being most effective when integrating systems, as there is often a means to integrate data flow within a system anyway. The last is really about cost-effectiveness. If

process list prioritization ✓

3.4

a process is likely to change a lot, then the robot will need to be reworked.

Q: What factors do you use to evaluate an RPA process?

A: It's mostly as mentioned before, for whether it's valid as a process:

- Rules-based
- Interpretable to robot
- Structured Data
- Exceptions limited

For the priority:

- How often the process is run
- Whether it is a cross-system process
- How likely the process is to change in the near future

In terms of success, what percentage of activity of the process can we automate. For example, if we are trying to automate a process that needs a PDF to be run, and the robot successfully extracts and processes that data 75% of the time, then we would think that was 75% successful. So although we don't have the process working all the time we have still saved 75% of the effort.

process list prioritization ✓

criteria (already discussed) ✓

process list prioritization (already discussed) ✓

4.1

Interviewee 4 – Interview

Q: Thank you for finding the time for this interview. Would you mind starting with a small introduction about yourself, your company, and how did you get involved with RPA?

A: My pleasure. I am the founding director of a niche consulting organisation focused on intelligent Robotic Process Automation with a specialist knowledge of its use in the healthcare industry. I started my career some 25 years ago working in IT operations for a major global oil business which outsourced its IT operations to a major consulting and systems integrator. During this time, I developed many skills and acquired significant knowledge in IT until 15 years ago when my focus shifted to delivering IT services into the NHS. Approximately 5 years ago my career channelled to Process Automation, and during this time I developed deep knowledge of the Blue Prism RPA solution and supported organisations to help them understand where RPA can be of use to them and importantly what they need to put in place to ensure automation benefit can be realised, well managed and sustainable.

Q: How do you select a process? What is the process you use in the process selection?

A: The selection of a process is not straightforward, although it may seem quite simple. Often an end to end business process is complex, and it is necessary to break the process down into simpler process steps to identify the areas that would benefit from RPA. In addition, you may inadvertently move the roadblock of a process from one stage to another, for example through automating a repetitive manual admin process at the start of a business process to improve turnaround time may result in higher volume of work further down the process which cant be automated, causing a problem elsewhere in a business.

process selection ✓
partial automation ✓

It is also necessary to consider a number of factors including but not limited to:

- The volume of repetitive work
- The variability of choices within a process (exceptions)
- The number of systems the business process will need to interact with

Factors to consider during selection ✓

4.2

- The complexity of the data and the potential for data transformation in the process
- The human labour cost of the process not being automated versus the cost to automate and maintain
- The risk of not automating because the process is reliant on a single individual with specific knowledge and skills
- The operational benefit to the business of automating the process

* factors to consider during selection ✓

risk of not automating ✓

Q: What are the characteristics of a good process?

A: The ideal process to automate is one that requires one or more people to complete every day, has very few variations to complete, 1 or 2, and is prone to human error because the task is boring for the human to undertake and not considered a high priority by the individuals performing the task.

characteristics of process ✓

Q: During process assessment, how do you identify processes that should not be chosen for RPA?

A: In the world of RPA in its true sense, that being that there is no intelligence capability within the process, any process that requires human judgement to make a decision should not be chosen. That being said, It is possible to consider such business processes whereby part of the process is repetitive and non-judgemental, and part is subjective and cognitive, such, that you automate the parts that can be automated and hand-off to the human workforce to undertake the work that a robot can't do. An example of this could be a call center with an automated telephone system that initially collects data from the caller, the digital workflow then passes data to RPA to fetch data while the caller is held in a queue, when the data and agent are available the caller is connected with the call center agent and the agent has information available collected from multiple systems into a single view ready to access.

process rejection reasons ✓

partial automation ✓

Q: How do you prioritize a list of processes?

A: It is not possible to simply prioritise a list of processes with little information. Each process needs to be reviewed for volume,

priority ✓

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4.3

complexity, human judgement, and manual time required to perform [them]. Only then you consider prioritising the list.

Q: If the client suggests a process, what are the characteristics that the process cannot or should not be automated?

A: A number of characteristics have to be considered. Some examples would be:

Where the process is reliant on paper or handwritten notes. Whilst scan and OCR technology could be utilised to convert data to be digital; it may be more cost-effective to digitally transform the process prior to considering automation. In such cases, a combination of digital transformation and RPA can be successful.

Where the number of exceptions to the repeatable process is significant, such a process may require significant process automation development, which may be far more costly than continuing to perform the process manually, especially when a very small number of part-time workforce is in place to complete such work.

Where human judgement and decision making is required. RPA, in its simplest form, has no cognitive capability; therefore, any process that requires someone to think and make a decision before proceeding is simply not appropriate for RPA.

Q: How do you justify to the client that a process should not be automated?

A: This will depend on the process being considered. If it is clear that human judgement and decision making is in place, it's a relatively simple conversation, albeit it could open the door to consider cognitive-based AI solutions in addition to RPA, but this would depend on volume and complexity. If the process is complex with multiple if-then steps, the development time could be excessive. Therefore it is important to roughly estimate development cost as part of the initial review to understand if a process should be considered for automation and a more detailed exercise to understand the process and automation requirements is considered.

Q: When is a project considered successful?

A: Some might say a project is considered successful when a process automation goes live and has been running successfully for a short period of time. This would be wrong. A project should only be

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4.4

considered successful when the benefits defined at the outset are understood, and the automation has been running for a period of time with metrics being measured showing that there is a positive time, financial or quality improvement versus the previous way of working. To be able to measure such "value" it is critical the as-is manual process is measured to capture metrics that can be measured against post automation.

project success ✓

Q: What factors do you use to evaluate an RPA process?

A: Key factors might include:

- Volume of transactions
- Time to complete transactions
- Number of systems / data sources the RPA solution will need to interact with
- The complexity of the process
- Timeliness of process execution. For example, is it business-critical there are no delays?
- Number of people doing the work prior to automation
- Process variability in terms of exception handling
- Data quality. Although a process may be undertaken to validate / test data quality as a precursor and alert DQ issues for resolution prior to further processing
- Availability of human resources to do the work

And sometimes there may be factors that are quite specific and only present themselves when a business process evaluation is completed.

criteria ✓

5.1

Interviewee 5 – Interview

Q: Thank you for finding the time for this interview. Would you mind starting with a small introduction about yourself and your position?

A: Yes, no problem, I am Connor, I used to work in the manufacturing industry until I found out about RPA. I initially started learning Blue Prism in my bedroom on weekends, I then went on a formal training course and upon completing that I took and passed my Blue Prism Developer exam. After this I got a position as an Associate Consultant with PwC in Singapore, my role was to deliver the full lifecycle of automation, using Agile development methodology, for their biggest client that was undertaking digital transformation using RPA as an enabler. After a year of this, I moved back to the UK for personal reasons and worked as a contractor for a small consultancy based in London, where I was a Blue Prism Consultant. I have since taken my Blue Prism Solution Designer exam and now work as a Solution Consultant for Blue Prism. My role is to assist current and potential customers of Blue Prism in any technical aspect of how they deliver a robust RPA platform into their business.

Q: As a developer, how do you test a process?

A: In stages. Initially, you are just testing the functionality of the objects you have created, launch, login, navigate, extract.

process testing X

Once all the objects are complete, you would start building from a process level where you would unit test with test data. Once the process is complete, you can start to test with the client SME (Subject Matter Expert) who will review the output of the process and provide feedback. This could include a full walkthrough of the process in Debug mode so the client can understand all actions that are being carried out by the robot.

Once the SME is satisfied with the actions that are carried out by the robot, we need to develop a test plan. The test plan would have data that would lead to different scenarios in the process. This would ideally test every "Happy" and "Unhappy" path when the 'Robot' is working. This would be developed and agreed between the Developer, Tester and SME.

Once this has been signed off, you would then test from the Control room with test data, and the output would be verified by the SME. Any issues arising would result in more development and further testing.

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5.2

The process would then be exported to a Test environment for UAT (User Acceptance Testing). Where nobody would have access to change the process, it would only be allowed to be executed. This is the first time the process would be exposed to live data. The process would be run and results verified by SME and Tester. Any issues with the process that arises from this testing would need to be worked on in the Development environment and tested again. Once the SME has signed off the process, it would get exported to live.

As part of Go-Live, it would be expected that the SME would periodically check the results of the process to ensure that there are not anomalies, which could have arisen from an environment change. For example, you could be extracting data from a live website where there might be slight differences when developing against the test website.

* process testing ✗

Q: What are signs that the process on hand should be abandoned?

A: If there is too much human decision making involved. Where on the outset, the process looked like it was simple rules-based but actually required the cognitive ability to decide on the next tasks to be undertaken with that data.

] process rejection reasons ✓

Where the time to automate would not be comparable to the time saved. For example, a 4-6 week development cycle to automate a report that is run weekly and takes 1 hour of human time to run would not be ideal for automation because that equates to 0.025 FTE over a 40 hour week. Having a developer work for four weeks, it would take two years to get the time saving back, assuming there was no support work to be done on the process.

] process rejection reasons ✓

Where the process is likely to change dramatically in the near future, other solutions should be looked at.

] process rejection reasons ✓

Where inputs can be unstructured data, normally some process re-engineering would suffice here to create a structured way of presenting the data to the robot.

] process rejection reasons ✓

Q: What are the characteristics of a good process?

A: A good process should be simple, rules-based, have high volume, structured data, and be on a stable system.

] characteristics of process ✓

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5.3

Other factors to consider are tasks that humans do not like doing, a process that would not be normally fit for automation may still be undertook because it has intangible benefits for the workforce, such task might include double data entry, data migration or as I mentioned before could include reporting processes.

increase staff satisfaction ✓

Q: What factors do you use to evaluate an RPA process?

A: As with the characteristics. Particularly paying attention to high volume processes. As with all RPA, you will never automate 100%, but if you find a 10 FTE process and you can automate 80% and leave 2 FTE to manage business exceptions, you would then have released 8 FTE which can be deployed in more value-added activities.

partial automation ✓

Q: If you encounter a problem, when do you code around it and when do you suggest a change to the process?

A: Usually, if we can identify an issue in the Process Analysis, we would talk to the business about changing the process. Once the process has been defined and signed off, any other issues we come across, we would usually code around the problem instead of going back to the business to re-define the process. Other factors could include the timeline and expense of the change. RPA can sometimes be used in a tactical way to "plaster" a process rather than going through an operational change to improve the process.

Q: Would you mind explaining what do you mean by "plaster a process"?

A: Keeping in mind the use of RPA in a business is quite a new thing. The normal way a business would improve a process would be to go through a transformation project where the whole process is documented and potentially using a methodology, such as LEAN, they could make improvements to the process. This process usually takes a great deal of time and requires a lot of external resources. The advantage of RPA is that you can take a "broken" process and instead of fixing the process you can "put a plaster on it" In other words, you just use RPA to automate a bad process instead of fixing the process. This can bring great advantages in some situations as you wouldn't have to go through a large transformation process, you would just use RPA as a tactical solution to solve small sections of the process and let the human workforce do the rest.

partial automation ✓

5.4

Q: Do you think I should be asking anything else on process assessment?

A: Risk should always also be considered when going through automation. The highest risk being the robots fail, what happens, and what is the impact on the business. Many companies, for example, prefer for robot account to never send email externally, it should always be check by the "robots" human counterpart first.

Risk of automation ✓

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6.1

Interviewee 6 – Interview

Q: Thank you for finding the time for this interview. Would you mind starting with a small introduction about yourself and your position?

A: No problem. I have been working for the past 2.5 years in a consultancy based in Greece that works with clients in Europe. For the first year and something extra, I worked as an SAP Performance Consultant. Part of the job was creating and adding virtual users to test the limits of systems. When the consultancy decided to expand its services into RPA, I agreed to move into the new department and be the first RPA developer. On August 2018, I started working with RPA, for the first 9 months, I used UiPath, and for the last 9 months, I have been working with BluePrism. Since then, I have created multiple Proof of Concept bots as well as a few complete automations.

Q: Would you mind expanding on the change from UiPath to Blue Prism?

A: The change of tool was a request of our client. Though it was a good change. As I said, when I began with RPA about 1.5 years ago, I started with UiPath. It is a great tool with a friendly UI [User Interface], but it was missing something. About 9 months ago, I started working with Blue Prism as that was required from the company and immediately found what UiPath was missing. Structure. Blue Prism is a tool made for businesses, and that difference can be seen when someone has worked with both the tools.

tool comparison ✓

Q: How do you test a process?

A: There are 5 testing phases a process goes through to get to the production environment. First 3 are done by the developers on their own while the next 3 are done with the subject matter expert or the business representatives.

Unit Testing, this will reveal if the robot can recognize all elements in all automation-relevant applications.

Integration Testing, in this test, the developer tests if single pages function as expected and ensures that the process can process entire cases from start to finish.

process testing ✗

6.2

System Testing, the developer tests that the process works when run at the actual, designed speed. The solution created must handle all the cases with which it is defined to cope in order to pass this testing phase.

Validation Phase, this is the final test phase in the test application environment, here the robot performs the actions step-by-step and its performance is evaluated before it enters the production environment.

Live Proofing Phase, again the process is run in a step-by-step manner so that the testing team can verify that the process can perform in the production applications. After all individual steps have been run through, the complete process will be run for confirmation.

User Acceptance Test, in this phase, the business is accepting the solution into the production phase, a series of production runs is done until the required consequent successful cases have been run.

Q: What are signs that the process on hand should be abandoned?

A: Well, there are not many things that can determine if a process should not be automated on the development side. All processes that are automated usually follow a specific set of rules. High transaction volume, highly manual and repetitive, low number of variation scenarios, structured data, need of 0 to limited human intervention. On the development side, we are looking for robot friendly steps, standard electronic inputs, and decision making based on predictive rules. There are some things that might be red flags but can only be found while working on the process. An example of that: I was working on a process that should select a date on an SAP calendar. The problem here was that UiPath could not identify the date of the calendar but was only able to select the whole calendar as one item. That made it impossible to go further through this specific SAP transaction code as we couldn't select the date required.

Another really important thing for us is a thorough and clear robot walkthrough. A document with unclear steps or missing things delays the project. To avoid things like that, Blue Prism has created a template Process Definition Document that can be used by companies to create clear step-by-step navigation for the robots and the developers.

Last, even though these two do not have an impact on whether the process should be automated, they are crucial in deciding which

6.3

process should be automated first. First is the number of systems the process will run on. The more systems a process runs on, the more time a human worker needs to complete the task. On the other hand, a robot can complete the task much faster. Second, the time a process takes. As with the first, a robot can complete the same task a human can much faster. For example, we completed a process that was run every week for a client which took their employee three days to complete, that is 24 hours out of the 40 hours they work in a week. The robot completed the same task with minor differences in 2 hours, and the employee was required to work on that for another 2 hours.

cross-application ✓
priority ✓

Q: What are the characteristics of a good process?

A: Talking only on the development side, that would be a robot friendly walkthrough, standard electronic inputs, and decision making based on predictive rules. To further analyze those:

characteristics of process ✓
(discussed earlier)

- Robot friendly walkthrough means that the process has a path that the robot can follow to complete its task with ease. if there was a choice between a calendar to select a date and a field to add a date, it is far more easy for a robot to fill the later.

- Standard electronic inputs would be data from files like Excel, XML, PPT, PDFs that have a standard view like invoices of a specific company, all fields are always at the same spot and the only thing that changes is the alphanumerical data that we need to extract.

- Decision making based on predictive rules, well this answers for itself, the path the robot should follow and the next steps it should take have been identified and have been created based on specific rules.

Q: If you encounter a problem, when do you code around it and when do you suggest a change to the process?

A: Depends on the problem at hand. For example, few days ago I was working on a project that I was given a set of folders with files in them. Each folder had a different structure as it was produced by different individuals. One folder might had a sub-folder and the files in that, the other would have the files immediately while others had a zip file with the files inside. The logical solution would be to advise the client to have a proper structure in their folders, but we decided it was more time-efficient to create a solution rather than ask each employee creating each folder to follow a specific

6.4

structure. On the same project we were supposed to be using the folder names, cities, and use them in a specific Excel file that had the list of cities already, the problem was that the list had some differences like "New York" with "New_York" which would confuse the robot. Since the Excel file is only one, and for a specific use, we requested that the names would change to match the folder names. As a developer, I think it all depends on the complexity and the time required to code around a problem.

finding when the benefits are not worth it
not the same with others

Q: What factors do you use to evaluate an RPA process?

A: There are many things that should be considered but let's assume that the process has passed all business factors that could make it a bad candidate. Then we would get a list of:

- Structured Data. Like the example with the folders
- Rule-based steps
- A thorough and clear robot walkthrough

criteria (discussed earlier) ✓

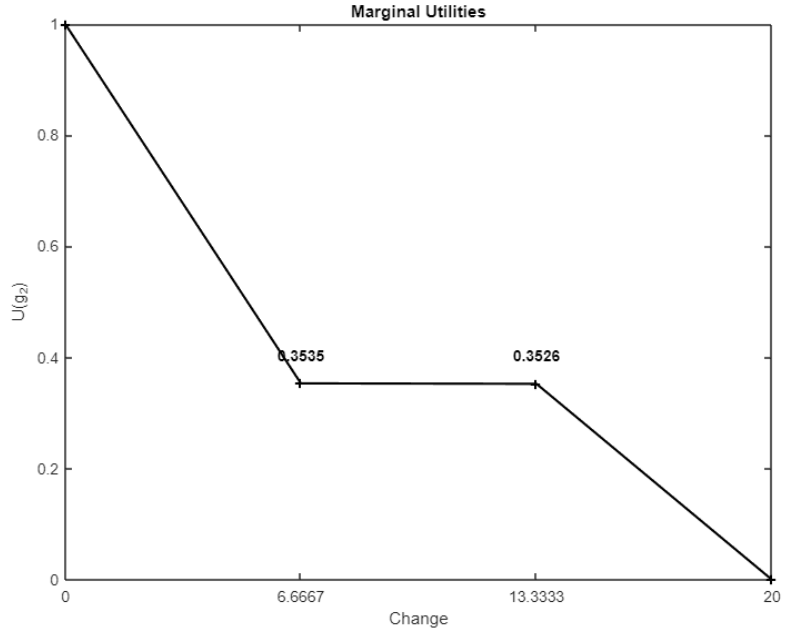
Q: Do you think I should be asking anything else?

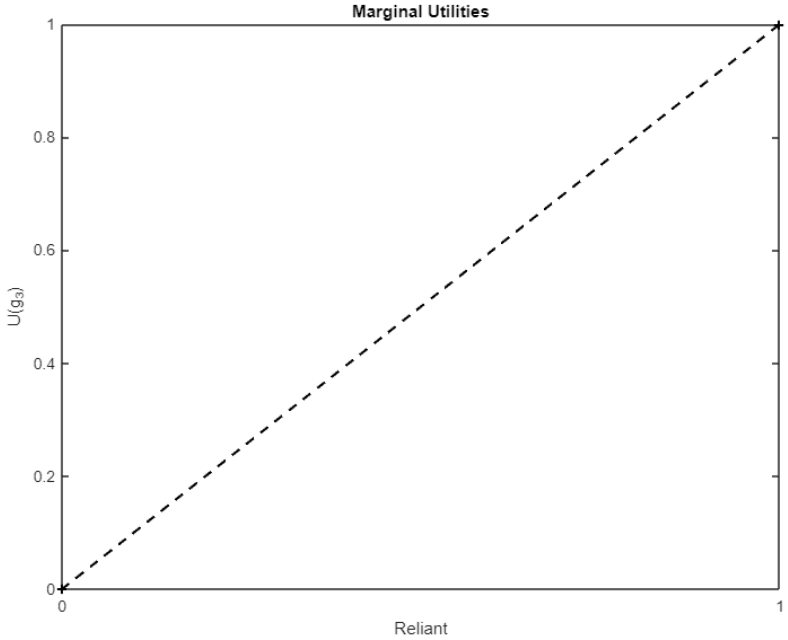
A: A change in the process during or after the development can easily add extra cost for the development and the support of such a process. A business should not decide to automate processes that might change in the next few months unless the benefits acquired from it are far more than the extra cost that will occur in a scenario of this kind. Usually, the processes selected and the infrastructure of the system used should not be subject to a change for at least the next six months

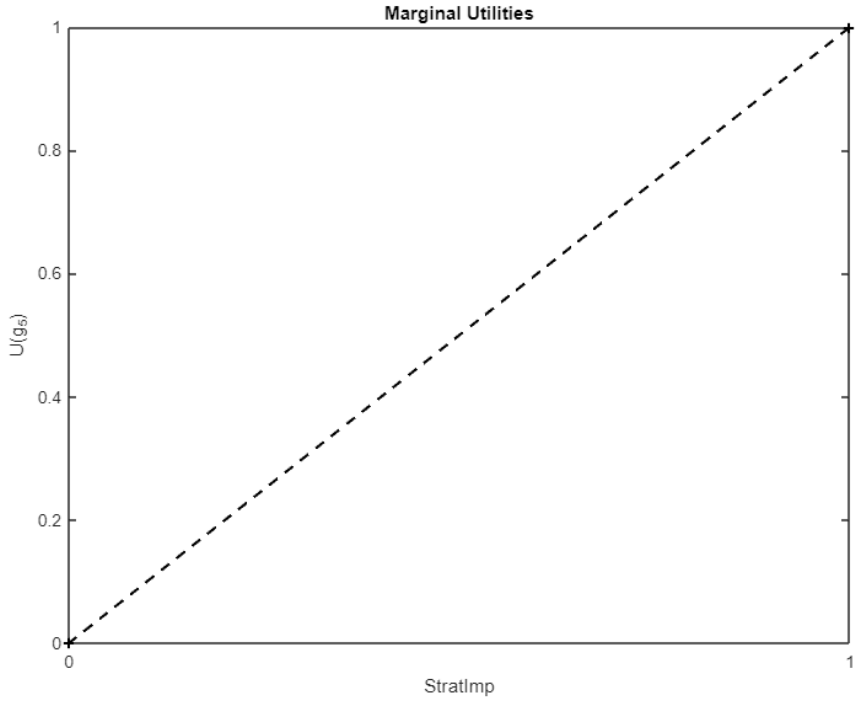
finding when the benefits are not worth it ✓

Appendix 4

Interviewee 3 – UTA – Value



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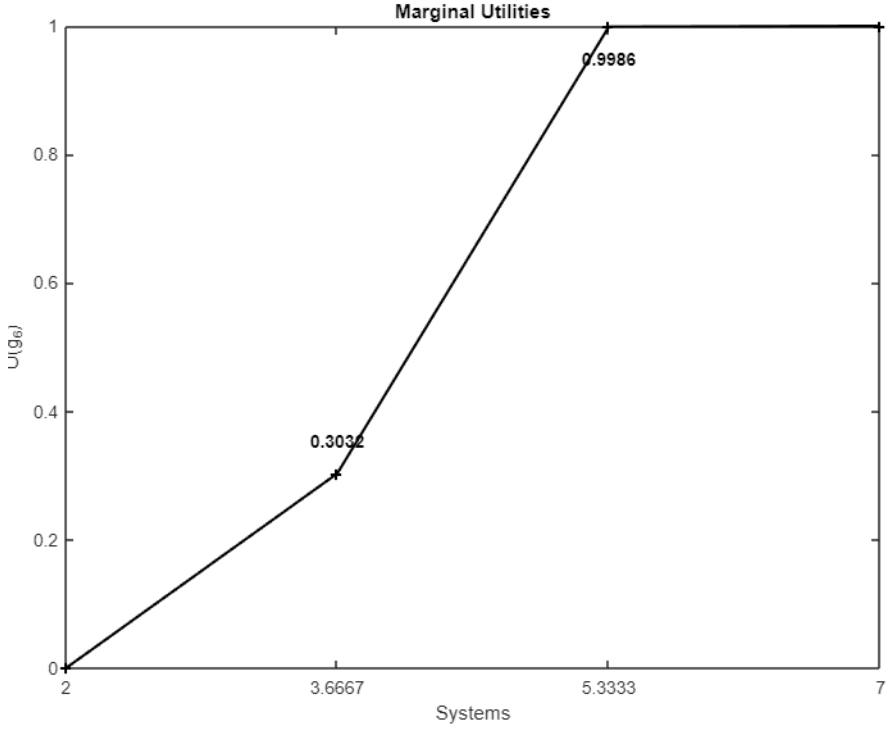
StratImp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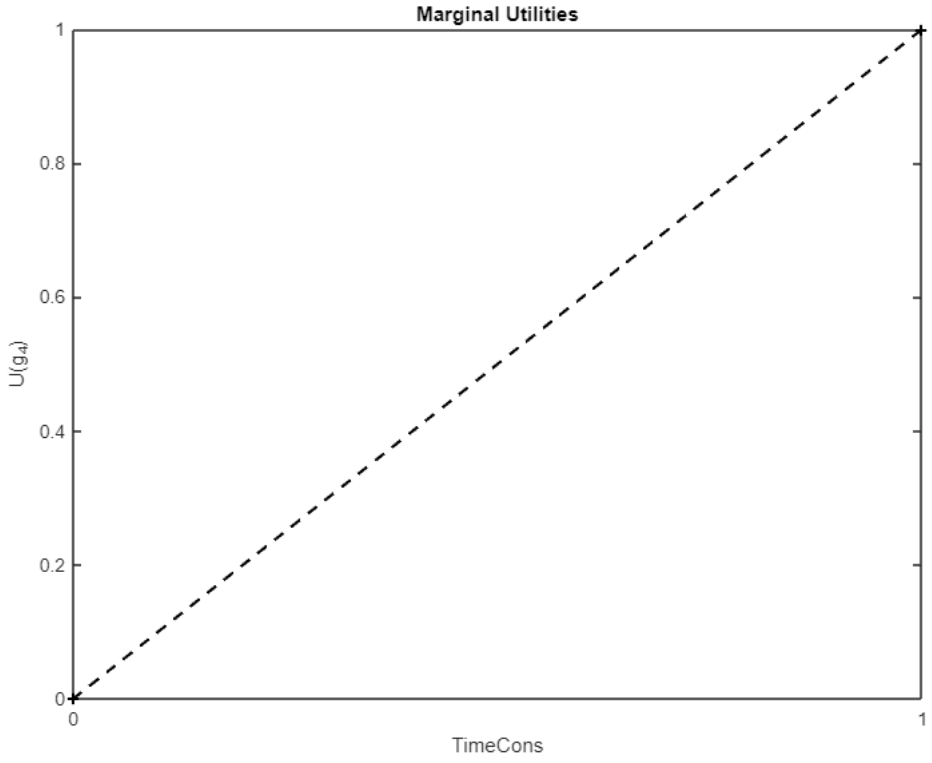
Systems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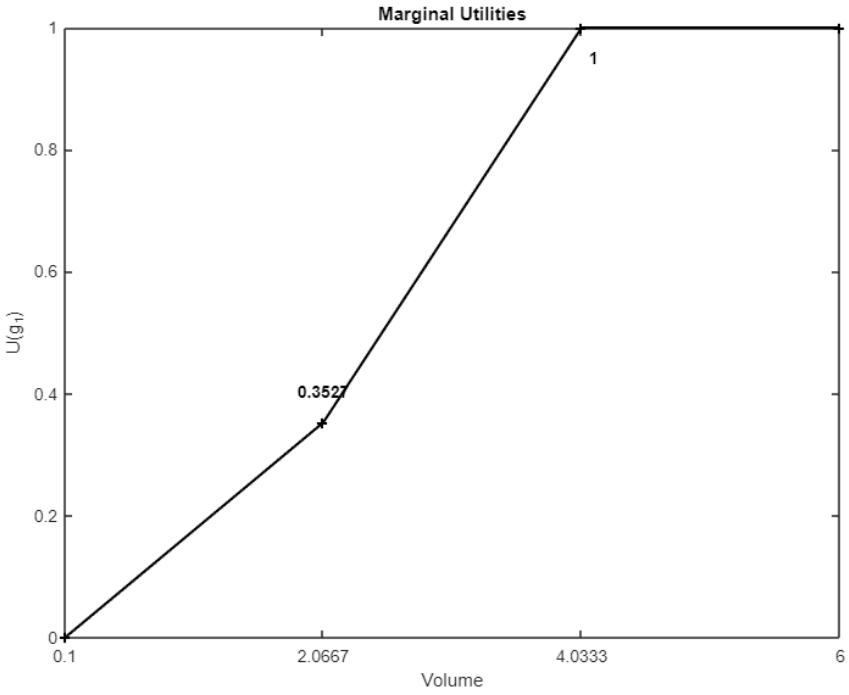
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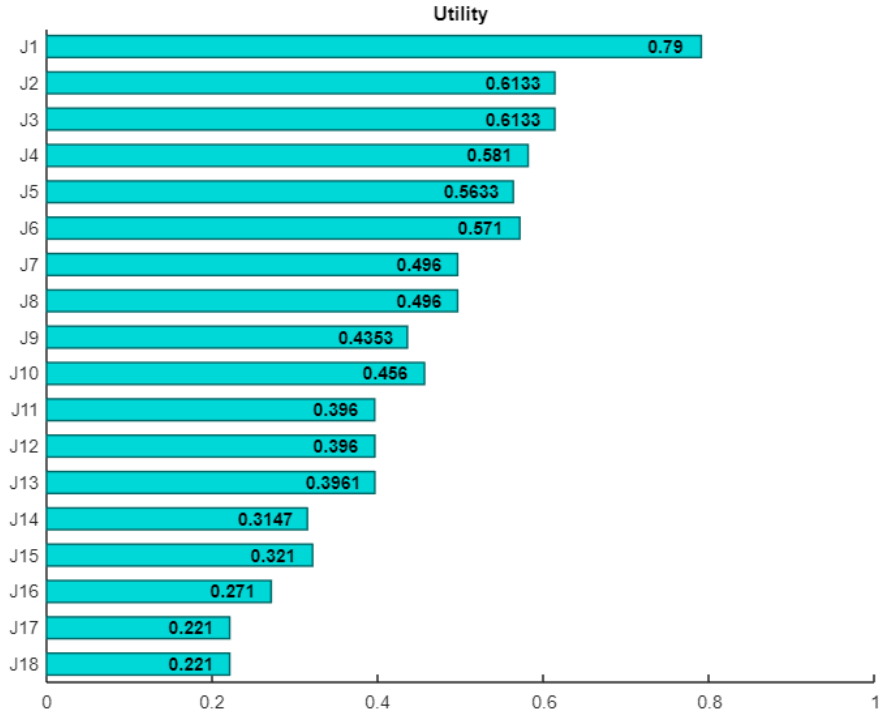
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J3
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J5
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J7
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J9
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J12
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J15
J16
J17
J18
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0.581
0.5633
0.571
0.496
0.496
0.4353
0.456
0.396
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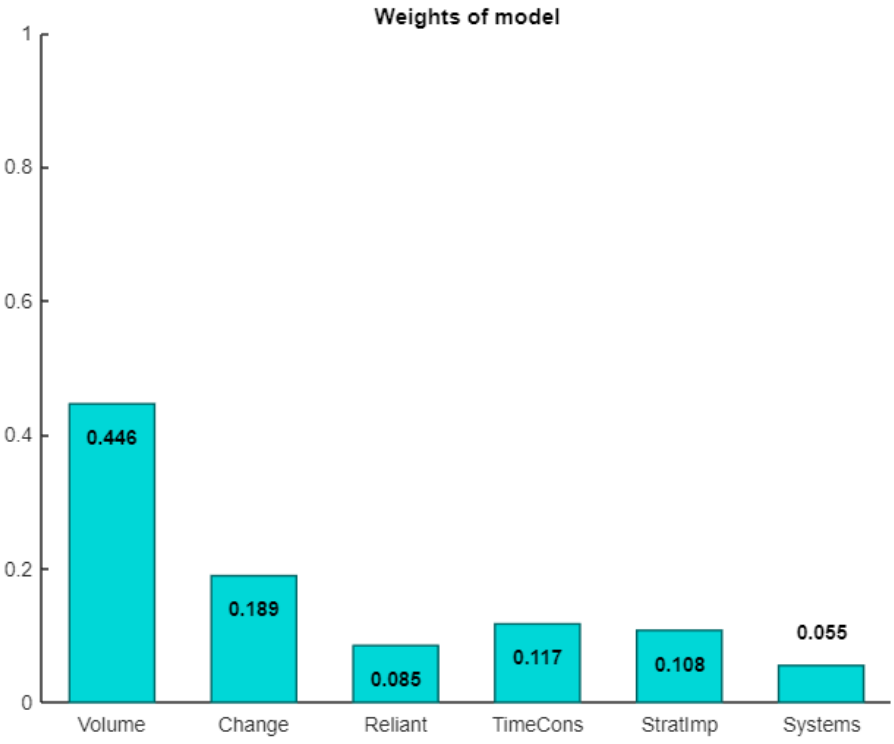
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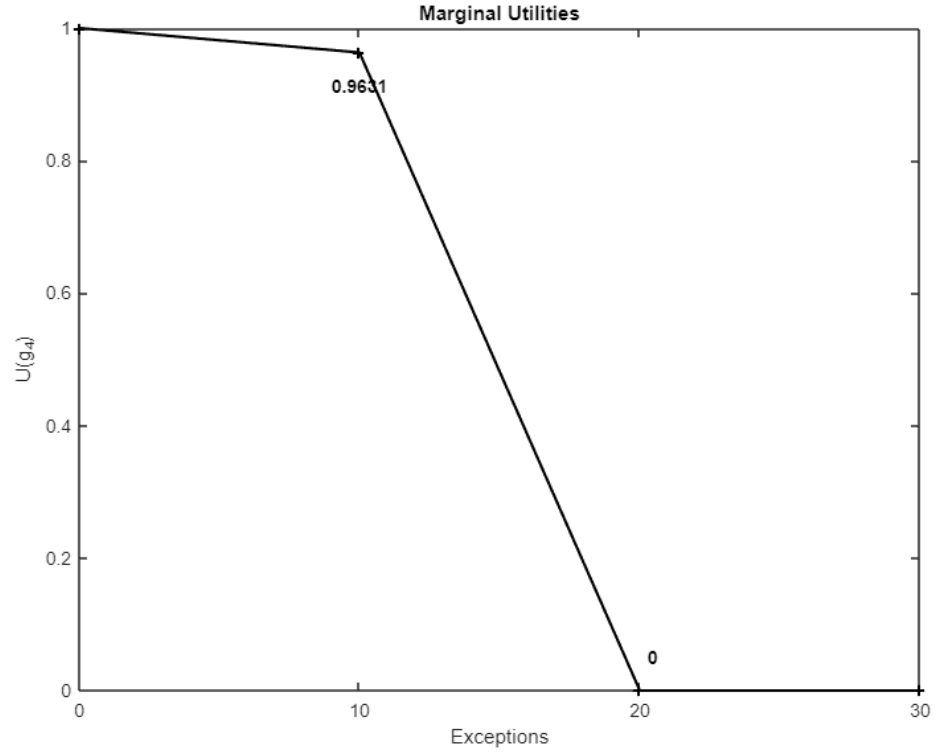
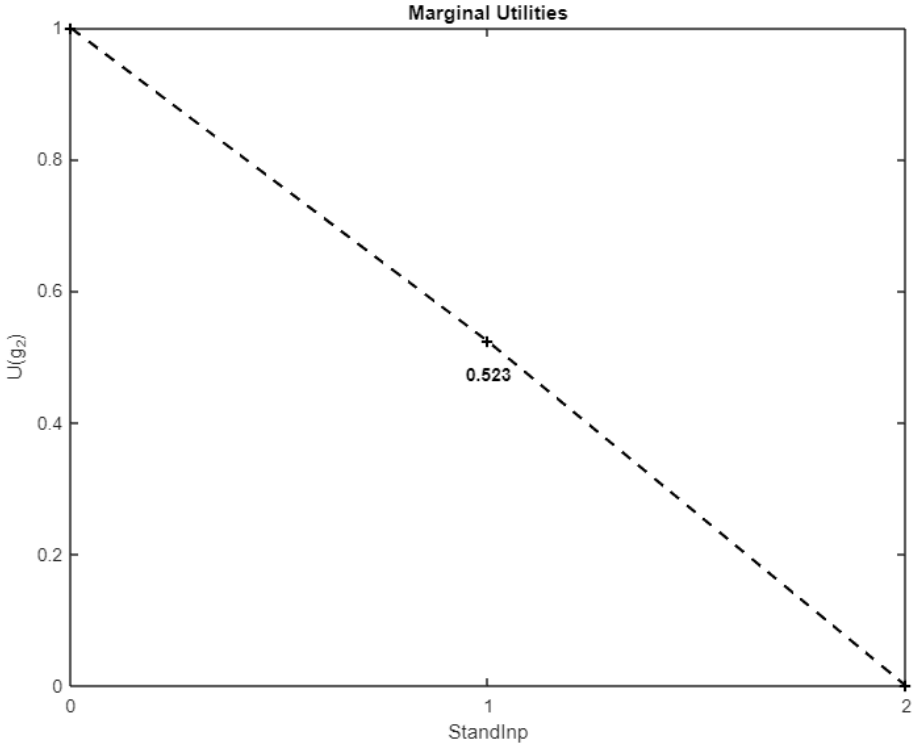
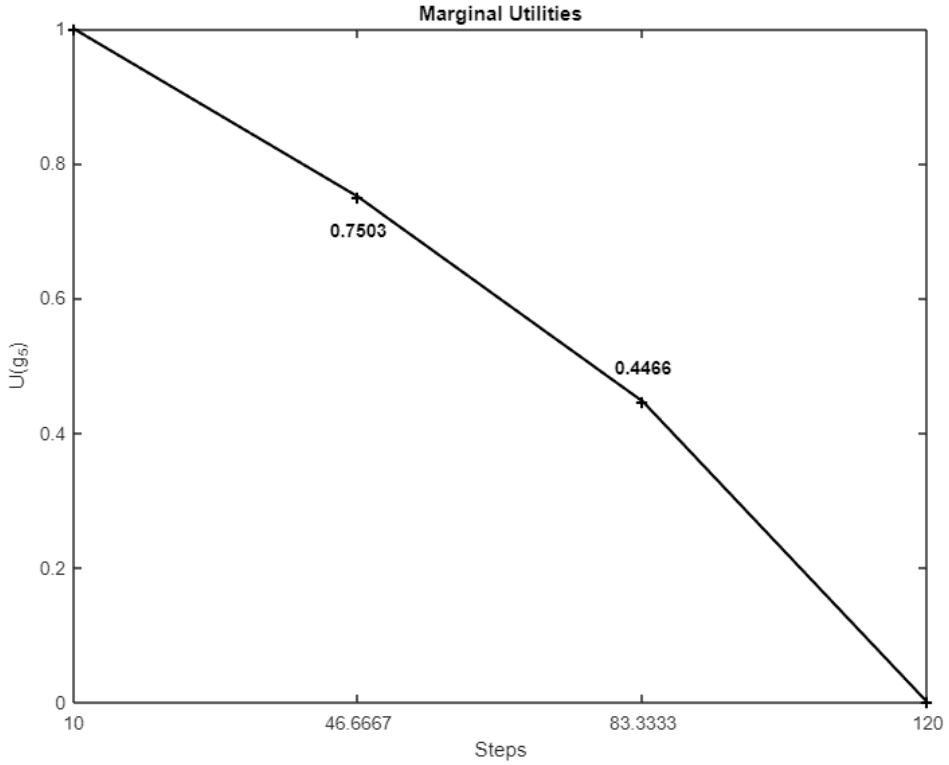
Volume
Change
Reliant
TimeCons
StratImp
Systems

Interviewee 3 – UTA – Complexity



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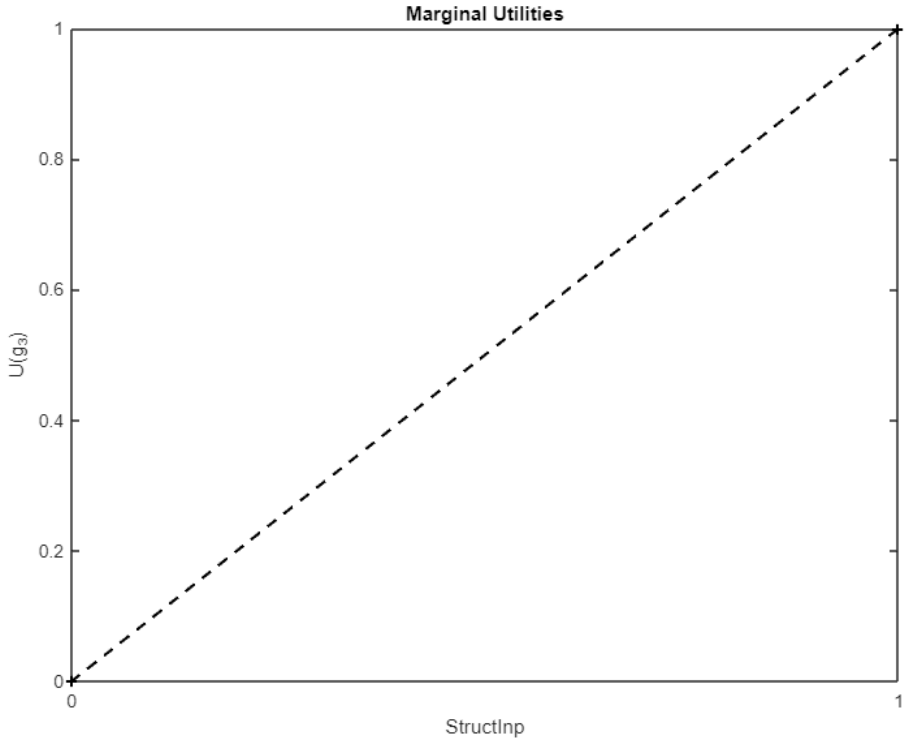
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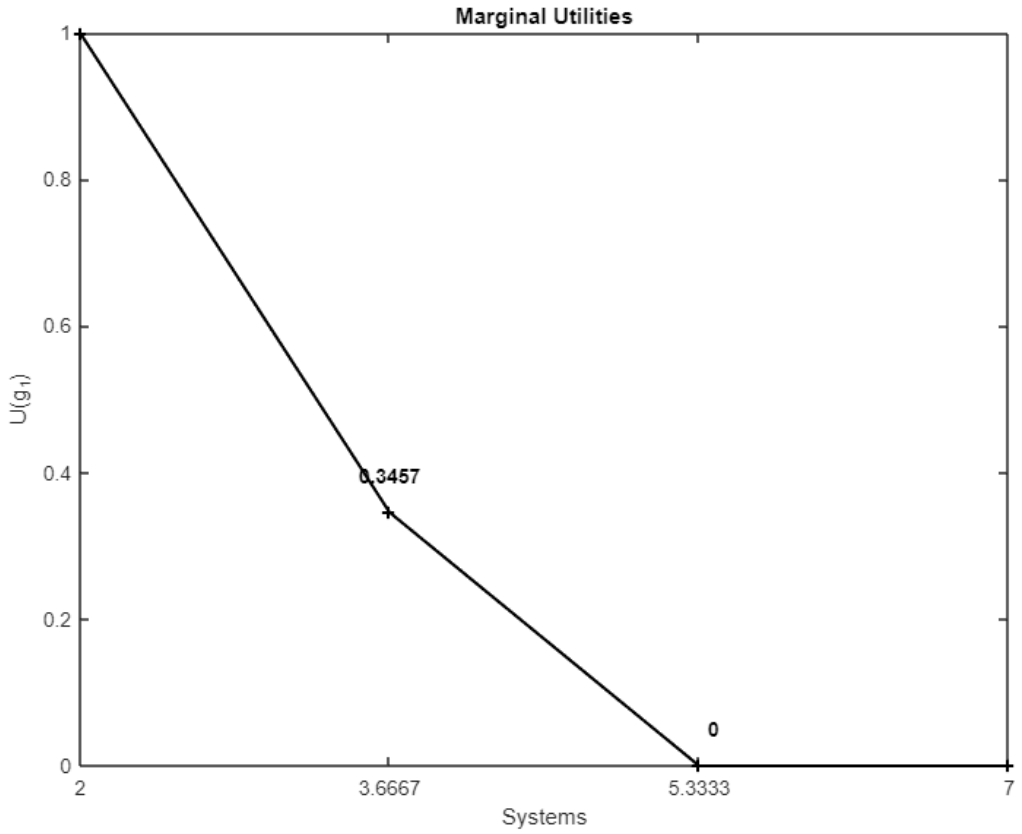
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2
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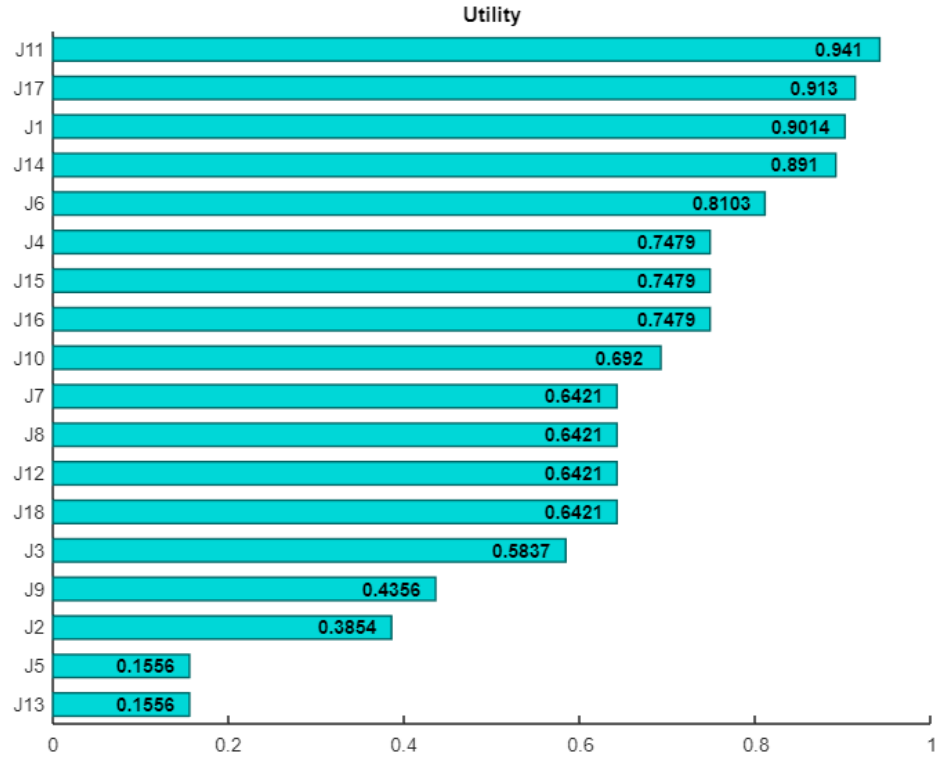
7
Systems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J8
J12
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J9
J2
J5
J13
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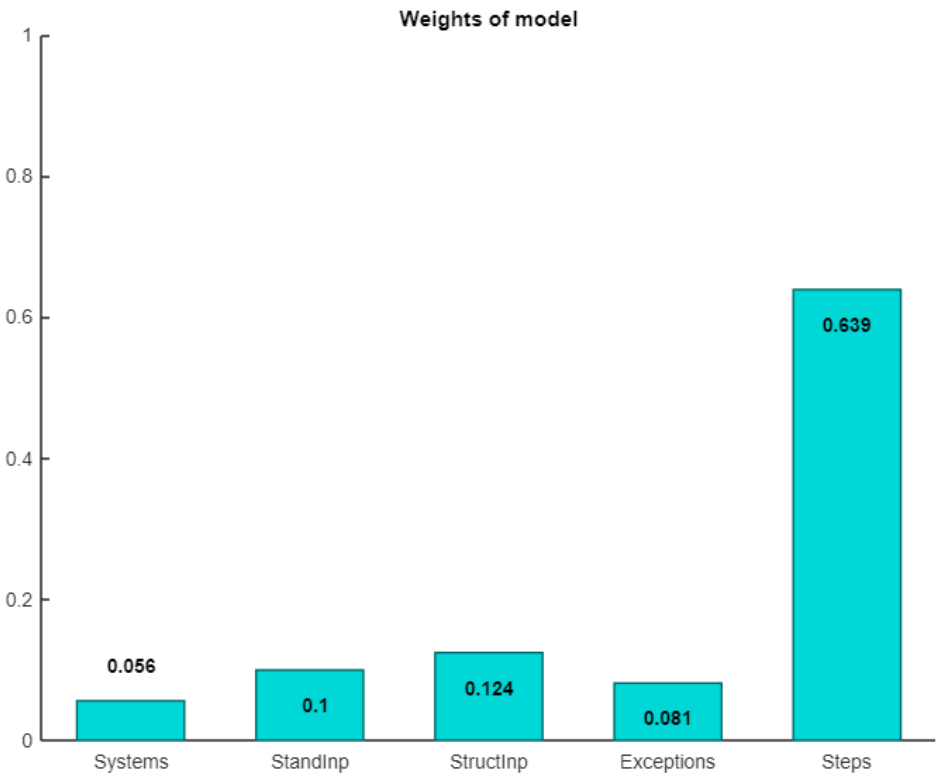
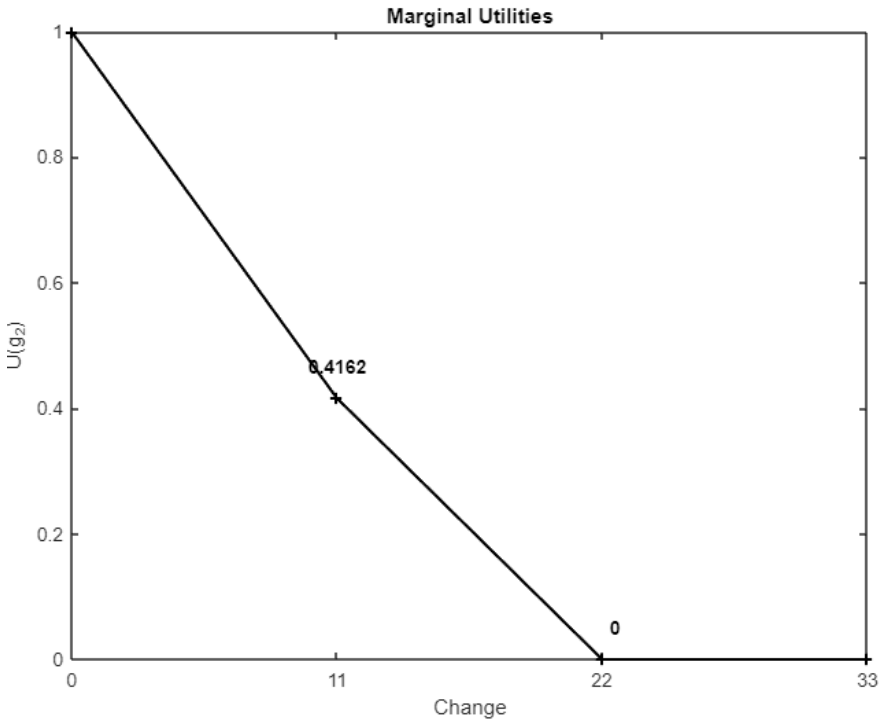
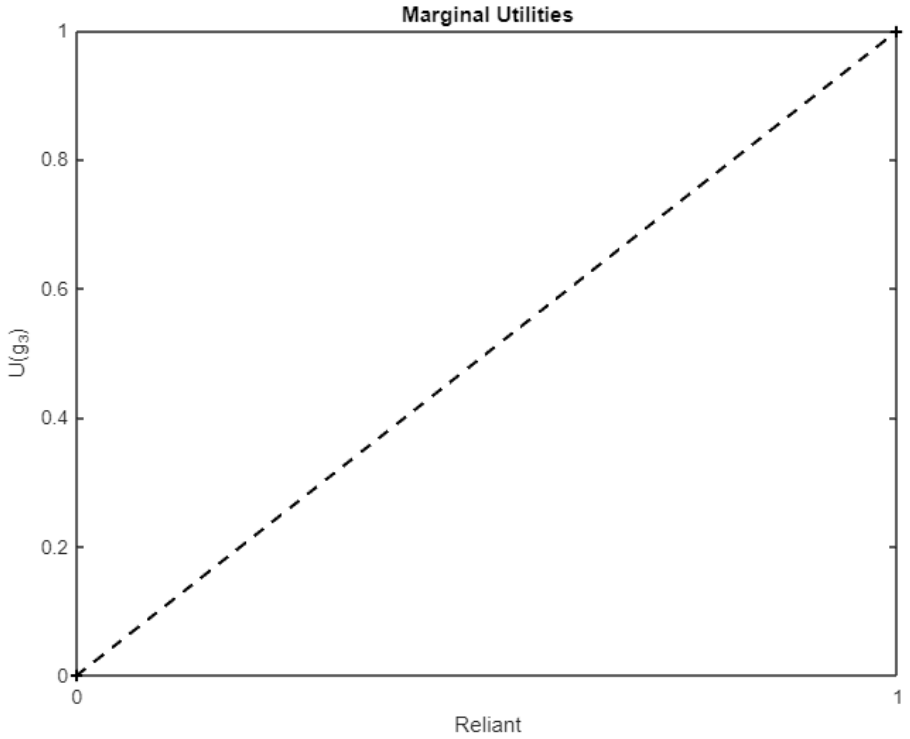


Interviewee 6 – UTA – Value

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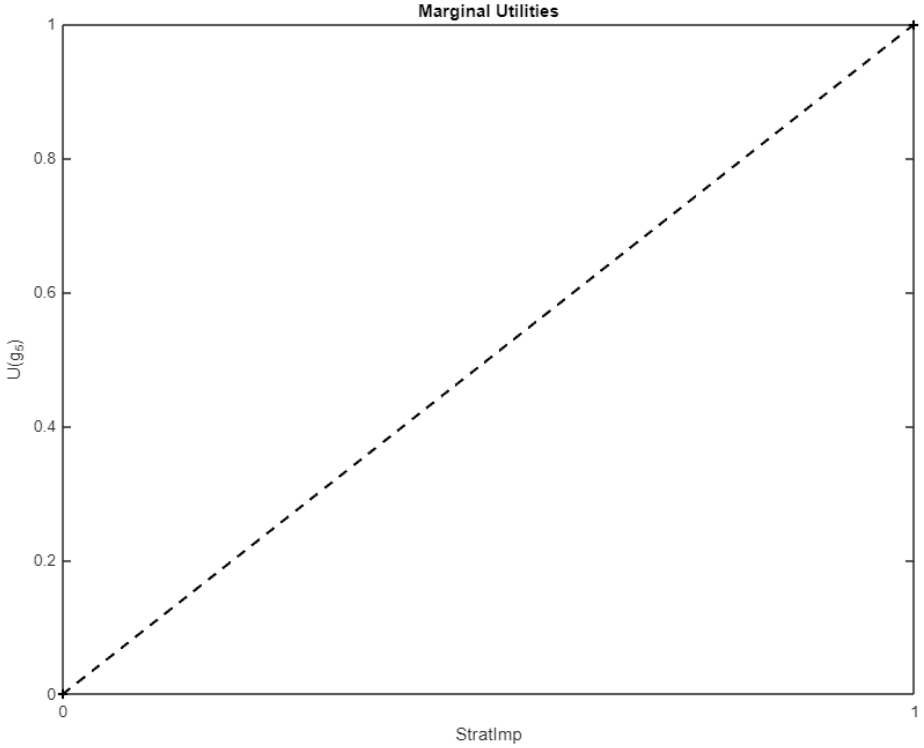
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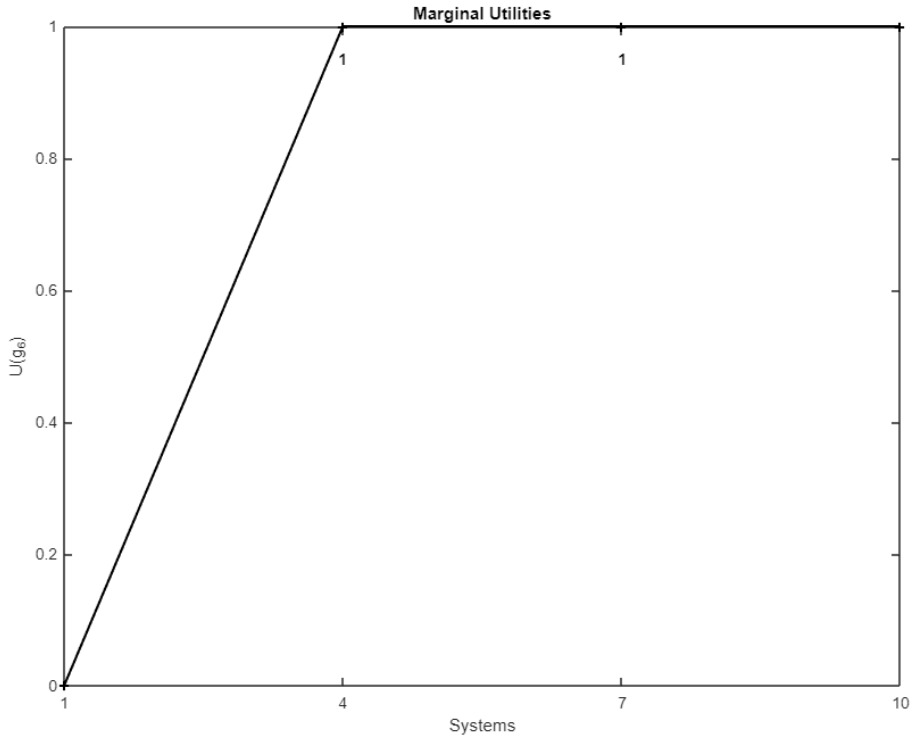
StratImp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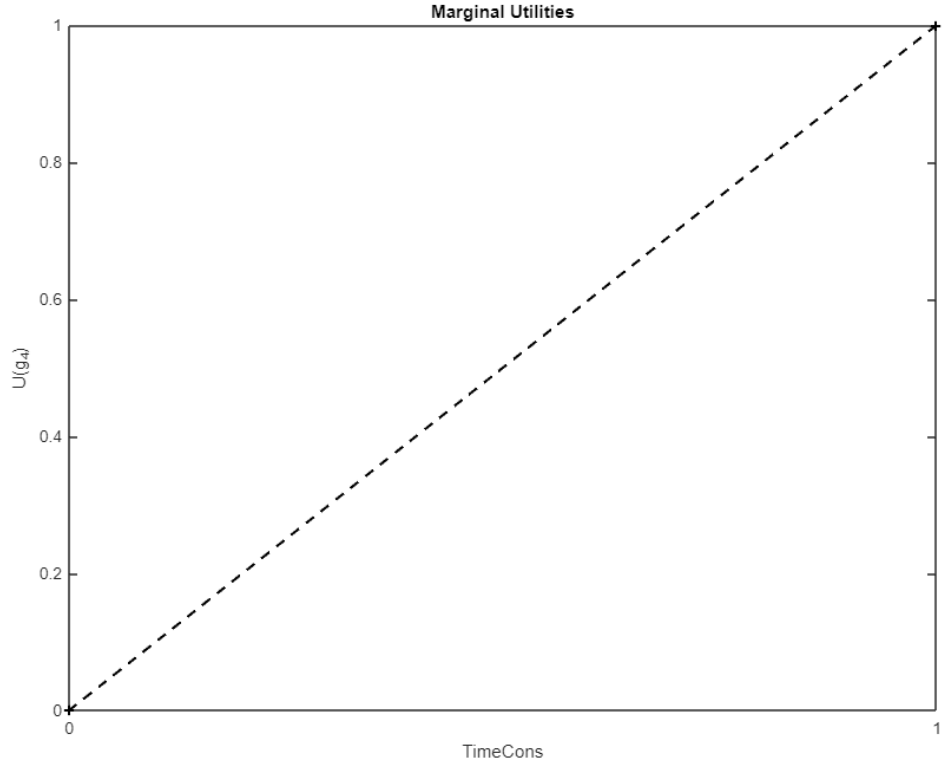
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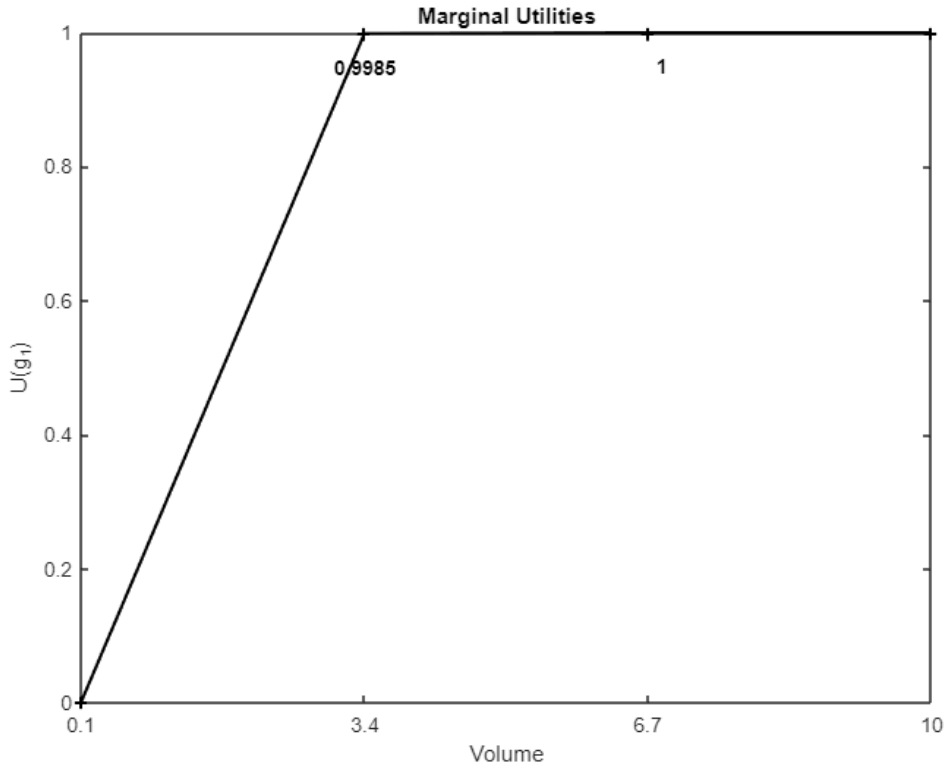
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6.7
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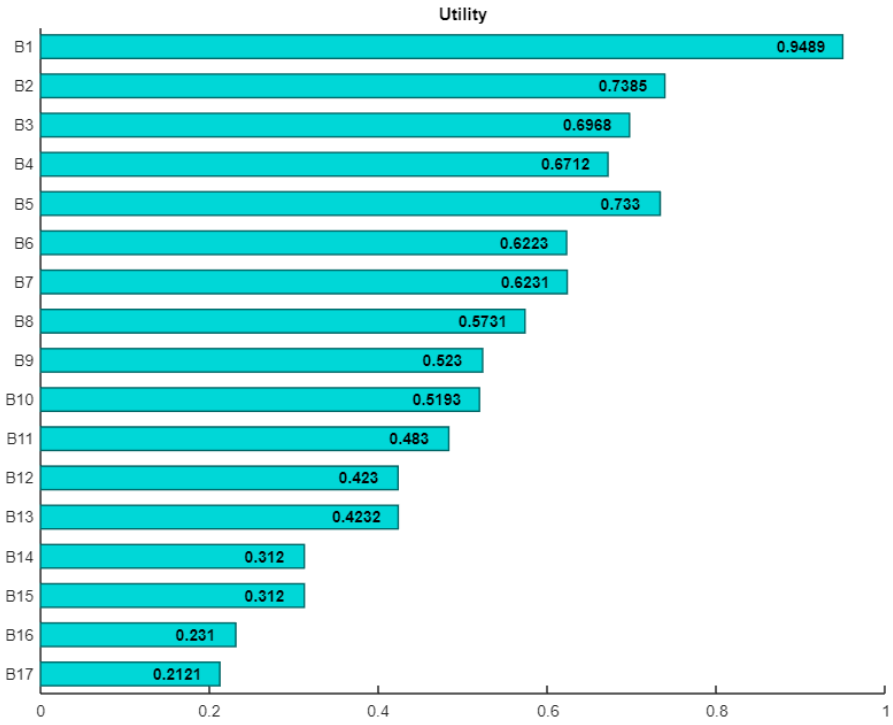
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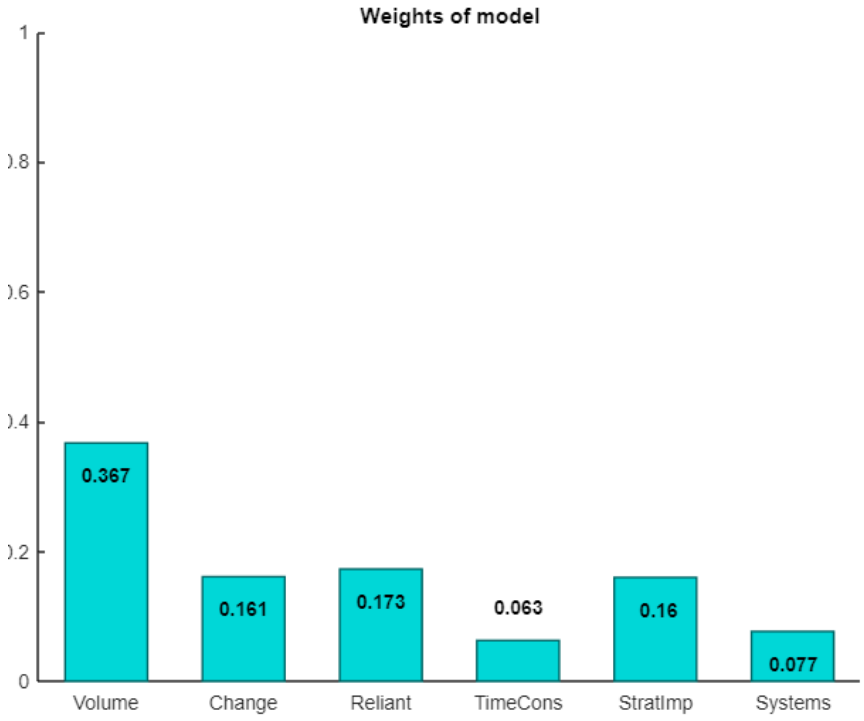
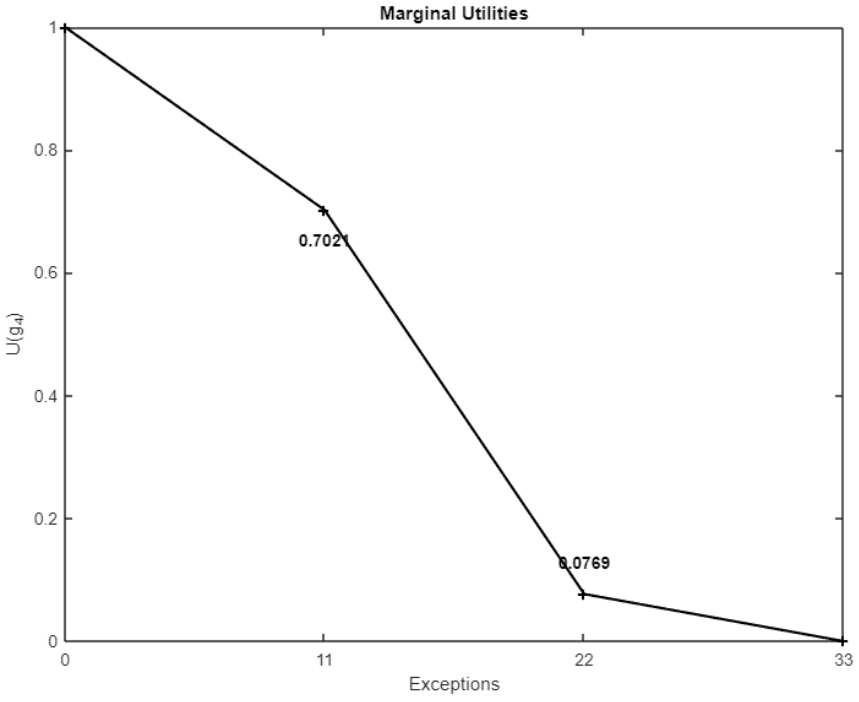
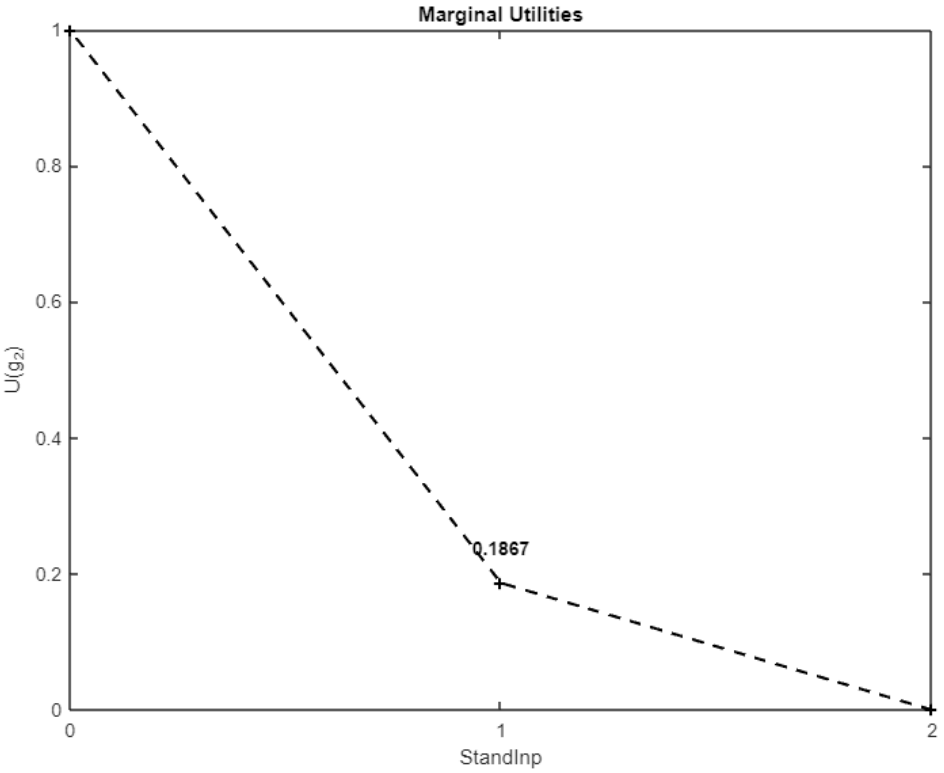


Interviewee 6 – UTA – Complexity

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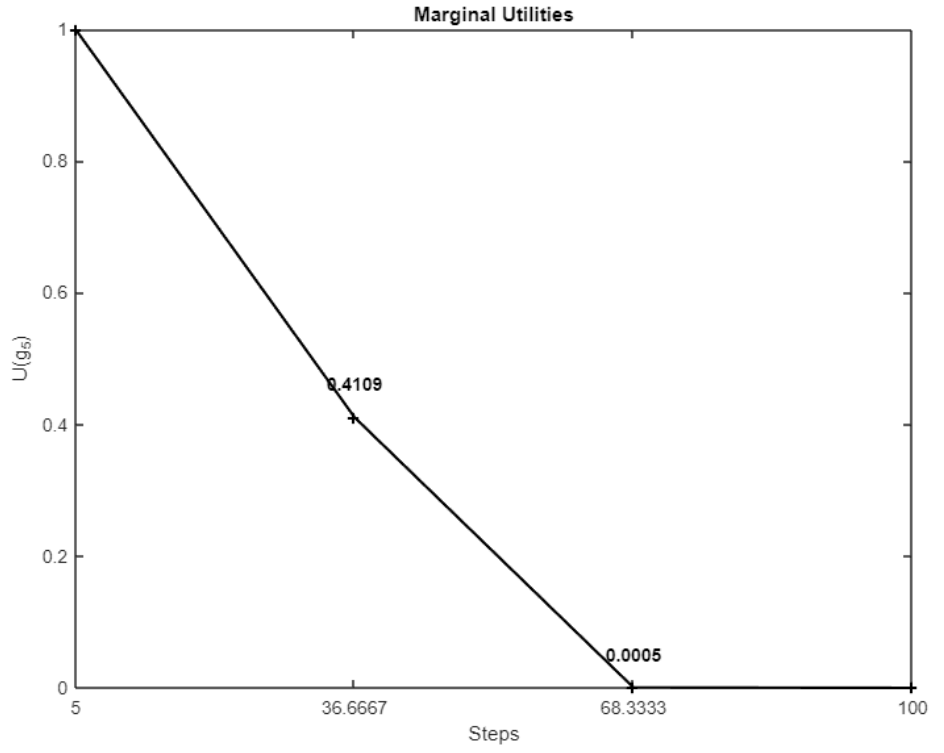
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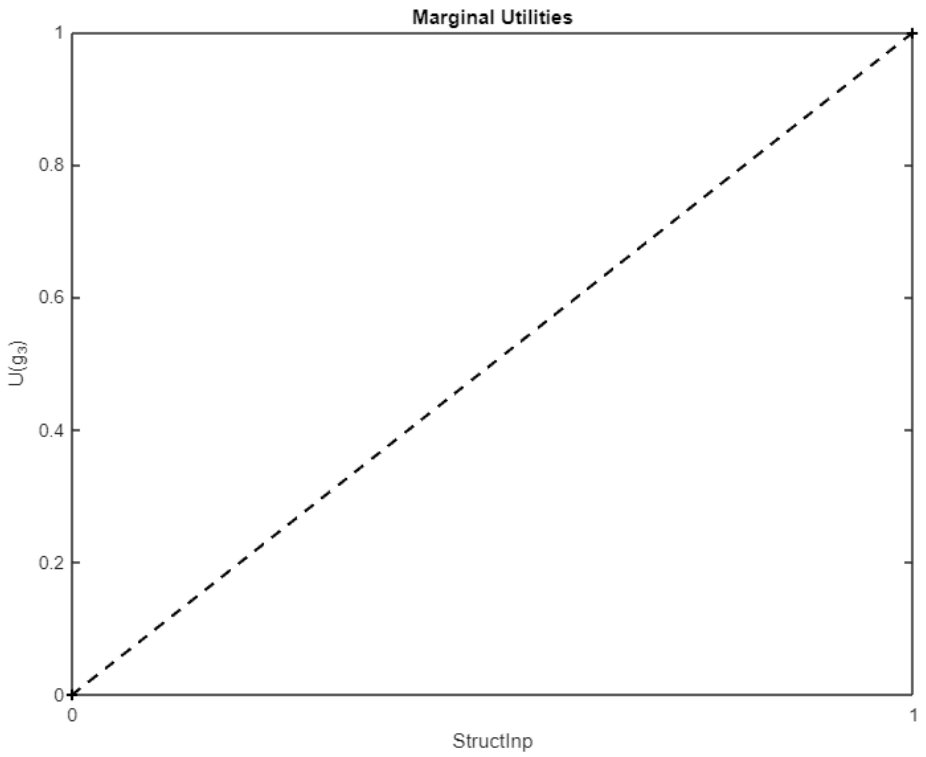
Steps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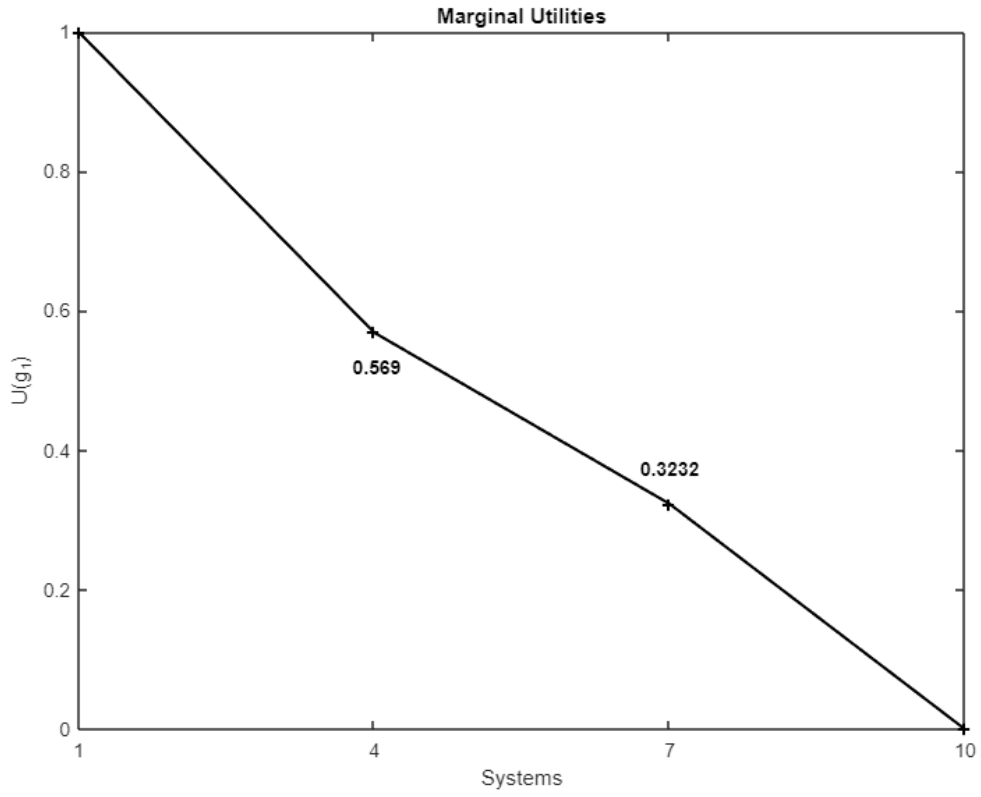
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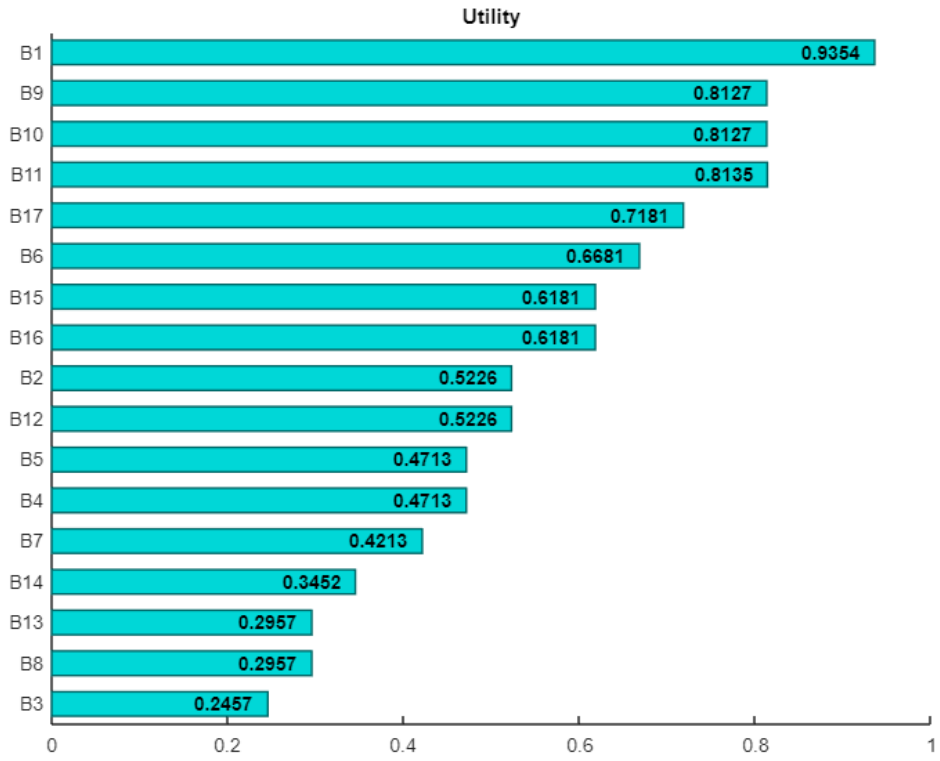
Systems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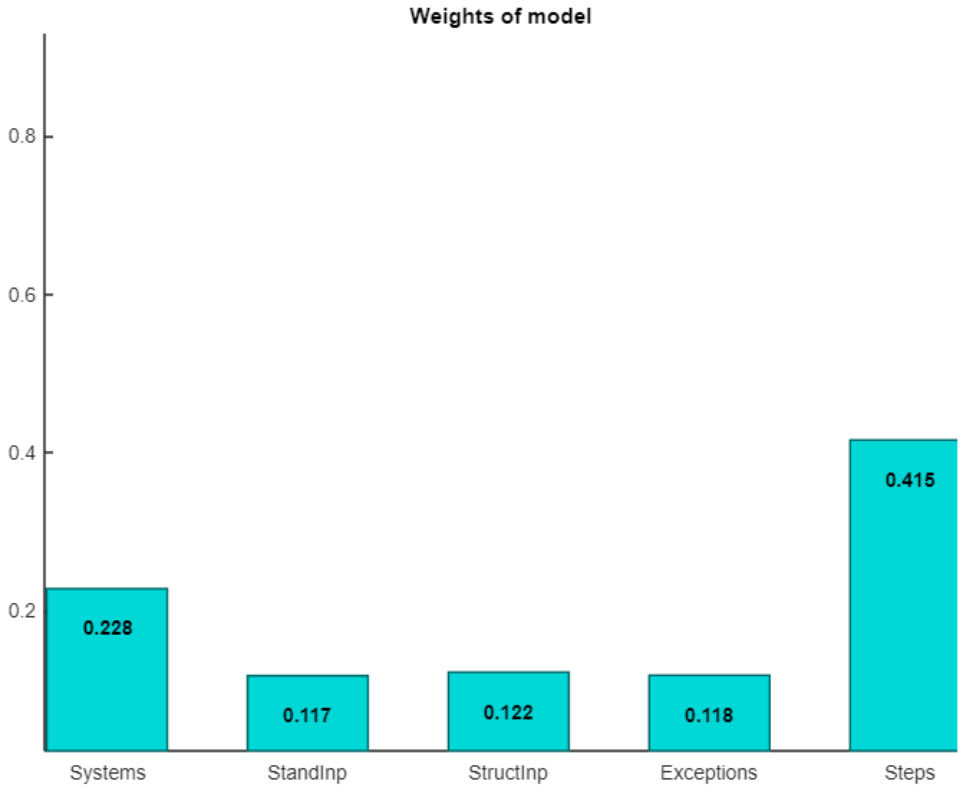
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Systems
StandInp
StructInp
Exceptions
Steps