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# Chapter 21
# Robot Process Automation (RPA) and Its Future

**Ozge Doguc**
*Medipol University, Turkey*

## ABSTRACT

*Many software automation techniques have been developed in the last decade to cut down cost, improve customer satisfaction, and reduce errors. Robotic process automation (RPA) has become increasingly popular recently. RPA offers software robots (bots) that can mimic human behavior. Attended robots work in tandem with humans and can operate while the human agent is active on the computer. On the other hand, unattended robots operate behind locked screens and are designed to execute automations that don't require any human intervention. RPA robots are equipped with artificial intelligence engines such as computer vision and machine learning, and both robot types can learn automations by recording human actions.*

## INTRODUCTION

Robotic Process Automation (RPA) is the new technology that aims to create software robots (bots) that mimic human behavior. Transitioning to RPA, enterprises aim to reduce labor costs, increase productivity, reduce error rates and improve customer satisfaction. Increasing average cost of worker around the globe (The Biggest Cost Of Doing Business: A Closer Look At Labor Costs, 2018) (United States Nonfarm Unit Labour Cost, 2018) enterprises adapt the RPA technology very fast in the past few years. RPA has become one of the most trending technologies in many industries. This chapter will introduce the RPA technology and discuss its social implications.

In general, RPA is a system aimed at automating business processes through business logic and user inputs. RPA applications provide tools for users to define robots (or bots) that can mimic their interactions with applications processing a transaction, manipulating data, triggering responses and communicating with other digital systems. (Boulton, 2018) According to a Trecent report automation technology such as RPA are predicted to have a potential economic impact of $6.7 trillion by the year 2025. According to the same report, the automation market will have the second largest economic impact only behind the mobile

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Internet (Ostdick, 2018) In a recent survey of 500 senior decision makers, 77 percent of respondents believe RPA will drive productivity, through the automation of mundane, transactional tasks. In the same survey, 56 percent of respondents indicated they are planning to use RPA to free up staff, allowing them to focus on higher value work. (What is RPA?, n.d.) Given these statistics, RPA is expected to grow into one of the leading technological platforms and will become a standard for performance. (Ostdick, 2018)

The term RPA can be dated as early as mid-2000s, although the underlying technologies such as computer vision and workflow automation has been developing for some time before. While RPA is still considered as a developing technology, it still relies on the technologies artificial intelligence (AI), screen scraping, and workflow automation and elevates these technologies to a new level, advancing their capabilities in a significantly improved way. Rather than being dependent on code as is required for screen scraping, RPA software provides tools for users to build workflows in a visual way that can be entirely independent of coding knowledge. Also, unlike many web scraping tools, some RPA software makes use of optical character recognition (OCR) technology to adapt to changing websites without requiring intervention from a human employee.

Deloitte suggests that RPA is the combination of AI and automation: "RPA, a synonym to AI, is the application of technology allowing employees in a company to configure computer software or a 'robot' to reason, collect and extract knowledge, recognize patterns, learn and adapt to new situations or environments." (Laurent, Patrick; Chollet, Thibault; Herzberg, Elsa, 2018) In addition, collaboration between RPA and AI allows for complex capabilities to emerge. While automation mainly aims to restructure and organize rule-based and repetitive processes; defining and handling exception cases are still highly manual tasks. At this point, AI can help the automation software for processes that do not require complex decision-making and analysis, such as natural language processing, (NLP) or online customer support. Future of RPA is seen as the coordination between these technologies.

It's recognized that AI technologies will have a significant impact on our society. What happened in the 19th century with Industrial Revolution, a similar social change is likely to take place in the 21st century with AI. We know from history and from what AI does that the first jobs to go are the ones that are simple and repeatable jobs and tasks that are currently performed by people. We can be confident that the jobs being replaced are only one very small side of what AI is really going to change for the society. The short-term job losses and lack of laws and regulations should be a big concern to all and be addressed at the same pace as technology is advancing. Between the job creation, reallocation of skills, and the improved quality of life that much of society will experience as a side effect of AI, long-term benefits to society will lift up all of society across the globe. (Kelemen, 2018)

This chapter will introduce the technologies used in RPA applications and discuss the future of RPA.

## BACKGROUND

Automation is a system that functions without direct human interaction. Many automated systems have the following in common: taking the human factor out and thus improving precision, quality, and accuracy. The first idea of how to automate processes using software came in 1935, when the computer scientist Alan Turing described how a systematical algorithm could work processes more effectively. His ideas on algorithms and automation had a lasting impact (Middelburg, 2017) In 1965 the first Robotics Institute was opened (Willcocks P. L., 2016), and service automation was the next wave of improvement in automation (Middelburg, 2017).

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(Willcocks P. L., 2016) define RPA as service automation, but other terms apply to service automation. For example, a scripting tool, artificial intelligence, cognitive computing, BPM, etc. RPA addresses the part of service automation that automates structured processes (Willcocks P. L., 2016). Robotic Process Automation is defined by the IEEE Standards Association as:

*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. (IEEE Std 2755-2017, 2017)*

The term Robotic Process Automation (RPA) was first used in 2012 (Hindle, 2018). It began to gain popularity in 2014 and 2015 when companies started to announce considerable savings due to automation. The market for RPA back-office automation was becoming more significant by early 2016, but it was still relatively small-scale during this time (Willcocks P. L., 2016). According to Horses for Sources Research (Fersht, 2017) and Everest Group research (Robotic Process Automation (RPA): Technology Vendor State of the Market Report, 2017), the global RPA market which includes both RPA services and RPA software increased by about 64% from 2016 to 2017 (Fersht, 2017) (Robotic Process Automation (RPA): Technology Vendor State of the Market Report, 2017). HfS Research (Fersht, 2017) reported a 42% increase in the market from 2017 to 2018 and an expected increase around 94% from 2018 to 2021 (Fersht, 2017).

Just like with all automation, RPA means replacing processes previously done by humans, but this time done by configuring a robotic software to perform the tasks, interacting between different systems such as spreadsheets, Customer Relationship Management (CRM) systems or Enterprise Resource Planning (ERP) software (Willcocks P. L., 2016). In short, RPA provides the tools to automate rule-based, logical processes involving well-defined and structured data with a deterministic set of output values (Willcocks P. L., 2016). In addition, the tasks are often repetitive and highly manual (Willcocks P. L., 2016). Such tasks can be labelled "swivel chair", referring to moving inputs from one side to outputs on the other side without much need for consideration (Willcocks, Lacity, & A, 2015). However, the robot should, if given a suitable process and well-defined working logic, outperform humans in terms of quality, time and cost (Willcocks, Lacity, & A, 2015).

The goal of RPA is not to simply assist humans in automating the processes; instead, it aims to replace humans entirely (Willcocks, Lacity, & A, 2015). While applications such as Excel assist humans in calculations, they still require human involvement. In RPA, calculations are mostly done behind the scenes by the robot, with only input and output by a human.

Of the benefits that RPA provide, the most interesting one is that RPA does not disturb the underlying system (Willcocks P. L., 2016). Every action a robot takes can be easily logged and audited; and thus the risk of non-compliance is minimal (Willcocks, Lacity, & A, 2015). This is different to most classic business process automations, which can manipulate data directly in a database.

RPA applications have been reported over the last 5 years in business process like accounts payable, accounts receivable, travel expenses, fixed asset accounting, master data management, billing, keeping employee records, among others (Willcocks P. L., 2016) (Asatiani, 2016) (Willcocks, Lacity, & A, 2015). Most of these processes are back office or support processes for services where the costumer is not directly involved.

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Case studies for application of RPA include the finance industry (Seasongood, 2016), energy and BPO (Willcocks P. L., 2016). In addition, several studies list the main areas of RPA implementation as accounts payable, accounts receivable, travel and expenses, fixed assets and human resource administration. (Deloitte: The robots are coming, 2015) (Capgemini Consulting: Robotic Process Automation-Robots conquer business processes in back offices, 2016). The Capgemini study (Capgemini Consulting: Robotic Process Automation-Robots conquer business processes in back offices, 2016) also revealed that the main measures for RPA success are: cost reduction, increasing process speed, error reduction and increasing compliance.

In the last decades, revolutions in technology have led to fear of job loss and alterations of current labor (Autor, 2015). This debate on the fear of job loss continuous due to the research of Frey & Osborne (2017), they state that almost half of the jobs in the USA are at high risk of being replaced by computerization in the coming decades. However, Arntz, Gregory & Zierahn (2017) stress the overestimation of the research of Frey and Osbourne (2017), due to their consideration of the computerization on occupation-level. Arntz et al. (2017) repeat the same analysis, but use a job-level approach where several tasks within a job are taken into account, and find an automation risk of jobs within the USA of 9%. They also state that the possibility of automation does not imply that automation will indeed take place.

Argote and Goodman (1985) address the influence of robotics on individuals and factory companies. They focus on the displacement of employees and alterations for retained staff. In their research, they find likewise opposing effects. Modifications of current jobs, accompanied by in-house training programs, omit some of the potential loss of jobs for current employees. These retained jobs result in positive effects on the employee by learning more skills, performing more significant tasks, and more interaction with colleagues. However, they find adverse effects for employees who got partly replaced by robots but retained a part of their former job. These employees perform less significant tasks and experience lesser control, and they also experience a decrease in interaction with others.

RPA is generally considered as an uncomplicated form of AI (Anagnoste, 2017). This form of automation is considered revolutionary due to the ease of use, the low price and the fast implementation. Where RPA is being defined as a software-based solution for the automation of rules-based processes that consists of repetitive manual tasks with structured data and pre-determined outcomes (Aguirre & Rodriguez, 2017). Moreover, RPA is a software application used to interpret and capture existing applications with the goal of communication across multiple IT platforms, data manipulation and transaction processing (Suri, Elia, & Van Hillegersberg, 2017). In this paper, RPA is defined as the latter definition. Additionally, although the possibility of the application of AI on RPA exists, it is not included in this paper, since the integration of AI on RPA is uncommon (Le Clair et al., 2017).

There are two main differences between the implementation of RPA and classic business automation (Lacity & Willcocks, 2015a). Firstly, programming of RPA can be learned with a few weeks of training; hence no extensive programming experience is needed. Which results in a cheap form of automation with a quick way to achieve a high return on investment (van der Aalst, Bichler, & Heinzl, 2018). Secondly, RPA automates a process with an "outside-in" approach; therefore it controls the computer on the user interface level, which does not disturb the underlying computer systems (van der Aalst et al., 2018). These main differences provide a significant benefit over traditional business automation, which is done according to an "inside-out" approach. Besides the quick achievement of high return on investment, the primary goals of the implementation of RPA are; cost reduction, quality increase and faster processes (Anagnoste, 2017). Additionally, the implementation time of RPA has an average of eight weeks from

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the high-level process design until the delivered benefits. Due to the fast implementation, the low cost, and the rapid increase in productivity, RPA tends to be less susceptible to the IT paradox.

The current literature on automation in general provides different insights into the benefits and threats of automation on employment. Since a growth of the automation market is expected, the effects of automation on the current workforce become increasingly important. Especially, the prediction of Frey and Osbourne (2017) that 47 per cent of jobs are susceptible to the computerization and therefore emphasize the importance to explore the effects of automation on the current workforce.

Within the field of automation, RPA is a rapidly growing software tool within the growing market of automation. Also, due to the novelty of RPA, there is uncertainty about the effects of RPA on involved jobs and the affected processes. The literature indicates that the implementation of robotics in the workforce can influence the employees both positively and negatively. Although plenty of research is conducted on AI in general, RPA is a more straightforward version and therefore different form of automation. Since this is a different type of automation, further research is needed to determine the effects of RPA on the quality and the quantity of labor (Lacity & Willcocks, 2015b). Implementations of RPA within large companies are researched to provide an answer to the following research question:

*What are the effects of the implementation of Robotic Process Automation on FTE effort and the impact on the job design of involved jobs within large companies?*

This research question is formulated to explore the phenomenon of RPA and therefore contribute to the current literature on the field of automation and the influence of robotic automation on employees. Additionally, this exploratory study gains managerial insights into the overall effects of robotic automation on employees in practice, which is supportive of managerial decisions whether or not to apply robotic automation within a business process.

## PROPERTIES OF RPA

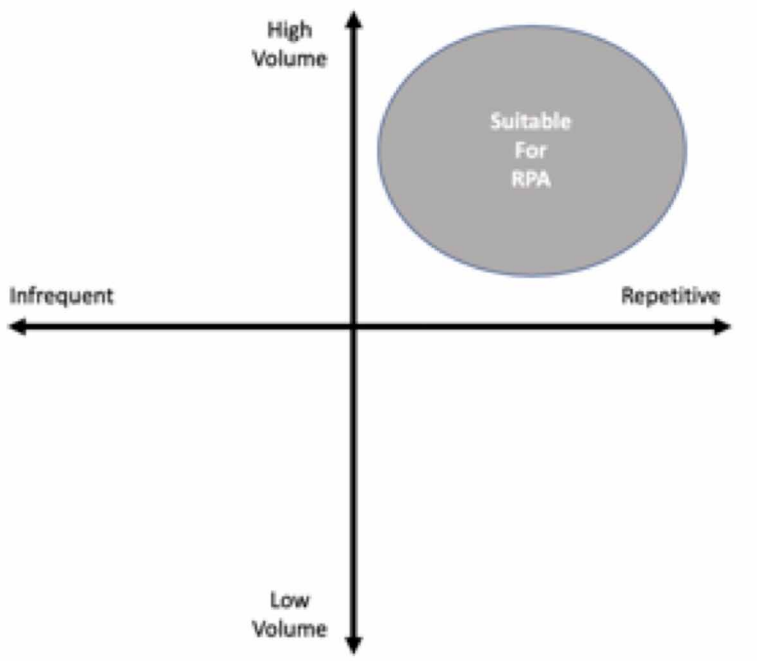
The first question about RPA that comes to mind is where and when it is applicable. Similar to programming, RPA robots have to be given explicit rules to follow. This doesn't necessarily mean that non rule-based processes are not suitable for RPA; they will be covered later in the RPA and AI section. That being said, the best-suited processes for RPA have high transaction volume, high level of standardization, well-defined implicit logic, and high maturity. Automating high volume and repetitive tasks can bring high savings in working time (FTE), while maturity secures the automated processes' presence in the environment. Figure 2 shows the 'automatable region' for the processes based on their volume and frequency Lacity et al. (2015). The region encapsulates the tasks that have the highest potential of savings, either through high-volume less frequent processes or high-frequency low volume ones, or a combination of both ends. The automatable region applies to all automation tools and methods, RPA being only one of them.

Many analysts see RPA and BPM as similar tools that serve for the same purpose. However, RPA and BPM are different in many aspects. The goal for BPM is to redesign processes for better efficiency and effectiveness. Alternatively, for RPA the main goal is to automate what already exists with a process, i.e. to model the existing process as is and then execute it using a robot. This makes RPA a non-invasive technology, as no changes in the infrastructure or to the existing ecosystem is needed. On the other hand,

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*Figure 1. Types of processes that are suitable for RPA*




BPM usually requires and introduces new software and has deeper access to the backend systems. As a result, BPM users usually need to have programming skills and abilities to create software and tools for end-users. RPA developers often only need to possess basic knowledge of programming design concepts. Most RPA software provide tools for the RPA developers to easily design workflows and implement them with no or minimal coding. Figure 2 shows the differences between the processes that are suitable for BPM and RPA and skillsets that are required (Willcocks et al. 2015B)) RPA is fitted for processes that require less resources and focus more on process expertise. The chart also shows how RPA and BPM can work together in the same environment, instead of replacing each other. Therefore, instead of focusing on only part of the automation, BPM and RPA can be used to supplement each other. It is more important to look at the overall automation strategy of a company and treat BPM and RPA as part of that strategy (Willcocks et al., 2015A).

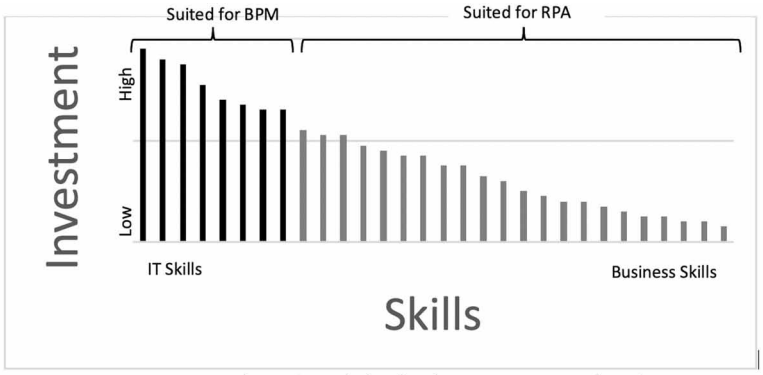
## Required Skills

A notable aspect of RPA is the ease of developing and modelling processes. RP developers do not require programming skills but should possess knowledge about business processes (Lacity & Willcocks, 2015). They are expected the *teach* the robots the processes they would be automated, instead of programming them. As this job doesn't require the traditional software development skillset, RPA can be managed by the business and operations teams, instead of IT and Engineering. That being said, an RPA project as a whole would require assistance from different teams, including IT, digital operations and backend.

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*Figure 2. Distinction between BPM and RPA processes*




It should be noted that roles within the RPA management team must be well-defined and all members should receive appropriate training aligned with their roles. Operational responsibilities include exception handling, testing, system support, process support and product support.

## Process Selection Criteria

The first step of automation should not be automation itself; rather, care should be taken to select suitable processes. To this end, the implementation should begin with questions such as should this process exist in the first place. Process elimination, optimizing and simplifying should be the first steps; this is done to avoid automating redundant tasks and allow focusing on the tasks that benefit most from RPA.

Lately, there have been significant advances in artificial intelligence (AI), which in long-term can further revolutionize business process automation, and change the selection criteria for which process to target with RPA. This is especially true with unstructured, shapeless data or processes without implicit logic for the robots to follow. (Willcocks et al., 2015B)

## Scalability

An important aspect of RPA is its scalability. RPA is easy to develop compared to traditional BPM tools, but on top of that, it is more easily scalable. This is crucial for BPO providers, who already in their business are seeking similar strategies in their business processes – the ability to define a process and reuse it for multiple customers (Slaby, 2012). To enable scalability, it must be included in the implementation and development strategy (Willcocks et al., 2015B). To get the maximum out of the robots, they must be multi-skilled (Willcocks et al., 2015A). Internal infrastructure must grow in pace with automation, to keep up with the demand in terms of resources, and the internal technical architecture must make this possible (Lacity et al., 2015; Willcocks et al., 2015B). This way, the software can be easily scaled up and down to meet changes in workload (Lacity & Willcocks, 2016). The scalability must be a culture and should be adopted throughout the organization (Willcocks et al., 2015A).

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## SOLUTIONS AND RECOMMENDATIONS

Generally, terms like "Digital Transformation" have been too broad and confusing, and as a result, companies do not know where to begin, which leads to frustration and failure. However, the truth is that a complete Digital Transformation will require more than one technology; hence the term Intelligent Automation, which is basically the automation of the company's processes (including general corporate-level processes using BPM and specific task-level processes using RPA), supported by analytics and decisions made by Artificial Intelligence.

Intelligent Automation is a term that describes a holistic solution for digital transformation, mainly based on process management (BPM) to orchestrate users, tasks, systems and robots (RPA) depending on the business needs at each moment. On the other hand, it also contemplates the use of analytics and AI (especially Machine learning) to make automated and intelligent decisions, and case management to provide processes with enough flexibility for end-to-end case management success. Finally, it is worth mentioning that another key feature of this trend is the integration between the different systems used in the company. Integration will prevent the duplication of data in the systems and users will need only work on one platform.

### Robotic Process Automation (RPA)

Robotic Process Automation is a technology which aims to reduce human intervention in computer applications, especially in repetitive tasks that vary very little in each iteration.

RPA works primarily by interacting with "high level" applications, which are the software layers at the graphic interface level, as oppose to machine language or programming code. Put more simply, it is a type of software that emulates the real interaction that a human would have with conventional computer applications.

This technology is suitable to replace simple and repetitive manual tasks such as data entry in applications. This means that employees have more time to focus on other branches of value for the company such as decision-making or improving customer relations.

It is a relatively fast technology to implement and can therefore bring immediate benefits to a company through time and cost savings, especially if it can be applied in the bottlenecks of certain processes.

### Artificial Intelligence

Artificial Intelligence is the simulation of human intelligence by machines.

In other words, it is the discipline that tries to create systems capable of learning and reasoning like a human being.

Artificial Intelligence encompasses other concepts such as Machine Learning, Deep Learning, Natural Language Processing (NLP), Visual Recognition, Big Data, etc.

Although it is a very broad concept and covers many levels (from simple automations to complex virtual assistants), it is worth highlighting the following virtues in the current business environment:

- Deciphering patterns from previous experience.
- Intelligent decision making.
- Prescriptive and predictive analytics.

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- Improving the user experience.

## RPA and BPM

Intelligent Automation proposes concrete solutions; in short, it consists of a successful and interconnected implementation of technologies, so let's break them down and explain the role each one plays:

## Business Process Management (BPM)

BPM is a process automation technology that includes the efficient coordination of people, systems and data.

The objective of BPM is to ensure that the operational and business process infrastructure is solid. Therefore, it acts as a base layer in the organization, automating the behavior of complex processes that require people to intervene in data entry and decision making, the use of systems at specific moments such as calculations or integrations, control of actions and data generation and storage.

In other words, BPM plays the role of "orchestra conductor" in the organization, assigning which employee, external user or system should act at each moment, and ensuring the complete tracking and storage of all the information that is exchanged and generated during the process, from beginning to end.

## Integrations

The connection and integration between systems is one of the biggest headaches for a company, since each system or software has its own peculiarities.

They generally offer an Application Programming Interface (API) to interact with, which is usually based on some standard such as SOAP (applied in Web Services) or REST (based on HTTP protocol), for example. Integrations usually require code, but with a platform, in addition to managing BPM processes, you can have native connectors (for example, with SAP or Dynamics CRM) and make connections based on SOAP or REST without using code and in a fast and simple way. For cases in which it is not possible to integrate via API, we would opt for RPA to undertake a superficial integration at the graphic interface level.

The main objective of intelligent automation is to improve the customer and employee experience and boost productivity. In addition, it generates time and costs savings, significantly reducing human intervention in the process cycle, which allows employees to have more time to focus on creative improvements, strategy, making decisions, etc. Another objective is the reduction of errors in the processes, as well as a reduction in paper usage, since this trend is completely oriented towards purely digital management.

In short, intelligent automation was born as a term related to digital transformation, but with the advantage of being better defined and proposes a real solution by combining four branches of technology: BPM, RPA, Artificial Intelligence and Integration. An ideal case would be a company with a backbone orchestrated by workflows (using BPM) that involve users, systems, data and documents; uses RPA in specific moments and tasks (to tackle bottlenecks in previously manual tasks); with hybrid decision making between managers and automations based on Artificial Intelligence. Finally, we complete the picture if we connect all the systems used by our company through integrations (API level when possible, and with RPA when not) and centralize the information generated by the processes in a main database. The data will be analyzed and feed the AI machine learning, to ensure better documented decisions.

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The main objectives of Intelligent Automation are the same as always (and at the same time so difficult to achieve): to improve end-to-end customer experience and improve the productivity of our employees, getting rid of repetitive tasks and enabling employees to focus on tasks that add value for the company (creative improvements, new strategies and solutions, decision making, etc.) and of course savings in time and costs.

## Comparison With BPM

Although Business Process Management (BPM) and Robotic Process Automation (RPA) operate with a similar process logic based on events, actions, conditions and loops, the context for their application is vastly different. BPM ensures a solid operational and business process infrastructure, whereas RPA is used to tackle tasks just as a person would, but at a much higher speed; therefore, it operates at a more superficial level. Both are relatively quick to implement and allow a very agile adjustment to possible changes in the processes.

BPM can be considered as the foundation for company operations, orchestrating a coordinated and efficient workflow that integrates users, systems and data. RPA, for its part, allows certain tasks within the company workflow to be undertaken in record time, notably improving the times for repetitive tasks that may have caused bottlenecks.

In short, RPA and BPM are not in conflict with each other. Although both seek process optimization, their area of influence is different, and each case will require greater presence of one or the other. Indeed, in most circumstances, the best solution will be to implement both solutions Although RPA can have a greater initial impact, what companies often need is to establish an efficient workflow between its departments and employees, instead of optimizing a specific repetitive task.

## How to Combine BPM and RPA

In general, the best strategy is to start by establishing an optimal workflow throughout the enterprise and detecting all bottlenecks. BPM is the ideal tool for this, using statistical simulation to estimate times and resources and then in production to ensure continuous improvement. Detecting the bottlenecks and optimizing the processes with BPM is often sufficient, and if needed, RPA can be implemented to expedite specific tasks.

## How to Choose Between BPM and RPA

RPA makes sense when we speak of simple processes, with a high volume of repetitive transactions, and a type of process in which human participation is not necessary. This means that there is no decision process in the transaction itself that can condition it, or that this decision process is very simple.

With this in mind, it is a good idea to consider the use of RPA when we want to:

- Eliminate repetitive tasks
- Reduce those small errors, that can come at a high cost for the proper functioning of the company
- Perform simple but repetitive calculations

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To choose an RPA, the Forrester analyst Craig Le Clair recommends the following rule of 5 (Le Clair, 2018):

- The first rule is based on the limited rules capacity of RPA: No more than 5 decisions per robot. RPA does not have an effective decision rules management; decisions would need to be coded in each robot, and if the rule changes each one would need reprogramming. Hence, it is better to use another system for decisions that can connect with the robot.
- The second rule comes about because robots are sensitive when apps change: No more than 5 connected applications. RPA does not connect with other applications via API, instead it mimics the behavior of a human.
- The final rule: No more than 500 clicks, is important because RPA tasks need structure. Thousands of keystrokes, clicks and mouse movements point to a less structured Process.

In the case of a BPM, or DPA, this allows process automation, in many cases with little code, and in some cases without code. BPM orchestrates the different processes in a company by automating automatic tasks; either using integrations with the other systems, or through integration with other tools, such as RPA; and other tasks which require human participation. This automation also provides the business user with the information necessary for decision-making, on a macro level, with information for "complex event processing" (CEP) and "Business activity monitoring" (BAM) and allow business users to continuously improve their business processes in a fast and agile way, with little or no involvement from IT departments.

Implementing a BPM is therefore meaningful when we speak of process automation, which requires participation from people and machines, and in which there is decision-making, and a workflow based on the process decisions. BPM can automate processes of high-value and high volume but is not necessarily the best option for highly repetitive tasks which don't require human participation.

BPM allows the rapid adaptation of the company's processes with minimal involvement of IT departments, overcoming the classic division between business users and the team in charge of technology development and implementation. Furthermore, it can break down existing silos in any organization.

## BENEFITS OF RPA

### Improved Customer Satisfaction

Capturing new customers is five times more expensive than retaining current ones. Therefore, all sales strategies should take customer satisfaction into account and leverage intelligent automation to boost satisfaction and increase the retention ratio. For customers to be satisfied, we have to offer them positive experiences at all points of contact with the company before, during and after the purchase of the product or service. The customer's overall experience is a journey (customer journey), which can start when a potential client does not even know the brand, through to buying the service and requiring after-sales attention.

Each and every one of these touchpoints are unique opportunities for recruitment, loyalty and recommendation. A high recommendation rate (Net Promoter Score, NPS) means that customers recommend you because they are happy with your company.

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According to a 2016 Accenture report, 52% of the companies surveyed had changed providers in the last year due to poor customer service. Seventy-three percent of them wanted a service more suited to their needs, while 61% most valued speed when checking data and response to queries and incidents.

Financial services is one of the sectors that has evolved the most in recent years, digitizing their services by implementing online banking and mobile banking. Even so, there are many manual tasks that create inaccuracies, inefficiencies and long waiting times. Intelligent automation technologies can record conversations between customers and banking staff and then automate all subsequent management. The necessary documentation will be processed automatically so that it complies with the current legislation.

Knowledge is also created by analyzing data, spotting patterns and trends and creating algorithms that can predict future behavior. The chatbot with voice recognition and Machine Learning will help both telephone and online customer service. This automation and digitalization of the back office will generate more time and resources for personalized attention.

According to a study by Capgemini, 63% of organizations have improved customer satisfaction thanks to intelligent automation. (Connatty, 2018) It has resulted in improved response times with direct processing, personalized service, 24/7 availability and customized products designed by customers. And all thanks to the implementation of BPMS, RPA, IA and integration systems. It should be emphasized that each customer touchpoint is important for overall satisfaction and, that using intelligent automation technologies, will make it easier to gain customer loyalty and recommendations.

## Efficient Management of Digital Processes

In the digital era, it is a race to adapt to the new market needs for organizations that must redefine their work processes to be agile and competitive. The needs of digital organizations involve harnessing abundant amounts of information to feed their processes and optimize response times, thus improving the quality of the services they offer their customers.

During recent years we have seen how organizations undertake their transformation projects in line with the new digital philosophy; agile and flexible. But the need to incorporate new tools that provide a holistic view necessary to make automated decisions and directly impact on digital positioning has also become evident. Process analysis must conclude which existing processes must be redefined, maintained or eliminated and recreated from scratch.

Many organizations are skeptical when it comes to addressing the redefinition of their processes, since for years they have given more than effective results. The new digital era puts strategies, past performance and the way of working to the test, to get the best out of organizations and elevate them towards new, more efficient, flexible and faster processes. New digital processes should facilitate the cohesion of technological accelerators with new customer-centric scenarios

The correct redefinition of processes in the digital era implies starting from a position capable of providing a global and centralized view. Organizations should work on the concept of "a business platform" as a homogeneous element capable of integrating any data layer in a modular and transparent way. This is the only way to build the intelligent scenario necessary to tackle a first phase of vision and redefinition of processes, to later define and implement the digital strategy.

According to IDC, in 2023, 35% of workers will start working with bots or other forms of AI, which will require company leaders to redesign operational processes, performance metrics and recruitment strategies. (Murray, 2018) Organizations must have new solutions that help consolidate the "digital

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business platform". These business platforms must facilitate process visibility and streamline their optimization; in a simple and visual way they must:

- Consolidate the information in business systems.
- Homogenize processes and work methodologies.
- Monitor all digital processes from a single point.
- Facilitate employee access to the processes.
- Automate decision making and help business agility.
- Establish new KPIs (key performance indicators) and KBIs (key behavior indicators) apt for the digital age.
- Facilitate integration of new applications and data sources consolidating everything in the business platform.
- Drive agility and flexibility with great capacity for customization.

## RPA Applied to the Digital Process

The adoption of a digital business platform is just the first step in the redesign of processes. Next, it is necessary to endow that platform with automation capacity, which allows the consolidation and management of the large amount of information coming from different sources. Finally, it will be necessary to integrate an intelligence layer that facilitates automated decision making and recommendations to impact the market as quickly as possible. These platforms must also update the interfaces to improve employee collaboration and help increase efficiency, productivity and improve response times.

According to IDC, by 2023, 95% of organizations will have incorporated new sets of digital KPIs, focused on product and service innovation rates, data capitalization and employee experience, to navigate the digital economy. (Nicastro, 2019) These new KPIs should be defined, managed and reviewed autonomously by digital business platforms based on the impact of the digital strategy.

- Process Automation used by management teams to transform the chaos in their departments into productivity. They need only define the process flow diagrams with the procedures that they want their teams to follow.
- Dynamic Case Management to make the right decisions fast by automating procedures and using real-time information. Gathering all necessary information to perform accurate work throughout the case lifecycle.
- User Interface (UI) that allows you to adapt to the faster, smarter and hyperconnected digital world, surprising its users with attractive portals adaptable to multiple devices and responding immediately to their needs with agility and zero-code changes on the fly.
- Mobility to face the daily challenge of working faster and better. The real-time digital business in a 100% web environment eliminates bottlenecks and drives instant knowledge and innovation.
- Analysis and Smart Decision leveraging a wide range of sophisticated functionalities including Native Reporting, Deep BI, Impact Identification, Workload Distribution, Business Rules, Analytics, BAM.
- Document Management to enjoy the immediate benefits of accelerated business transactions and processes leveraging the most complete systems to manage your documents and digital content.

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- Business Rules and Data to keep your information under control and seamlessly manage documents, digital content, dictionaries and more, combined with a powerful Business Rules Engine.
- Integrated Artificial Intelligence for systems that learn, adapt and potentially act autonomously.
- Connectivity and API to facilitate integration with external systems and applications to empower a centralized management.

Technological leaders that want tackle a company's digital transformation with guaranteed success need to execute their digital strategy based on new intelligent business processes. To ensure efficient management of their digital processes, a holistic approach must be considered; the organization is a living organism in which all the functions are related and work together. According to the latest KPMG report, 83% of Spanish organizations are exploring several intelligent automation technologies, but only 15% apply an integral approach. (Easing the pressure points: The state of intelligent automation, 2019) This integrated coordination and mindset is what is needed to achieve a successful transformation.

If we approach business digitalization with this philosophy, all business processes will have to be rethought and redefined, seeking agility, efficiency and productivity. It is important to understand that digital transformation does not just implicate the technology department. On the contrary, it involves the total reinvention of the company at all levels. Managers must redesign operational processes and digital KPIs as by 2023, 35% of workers will use different forms of Artificial Intelligence. (Murray, 2018) This will even affect the human resources department as they develop recruitment strategies to capture digital talent.

## Digital Evolution

Some speak of digital evolution rather than transformation because the improvement and adaptation process to the new business reality is constant. To redesign an organization's processes, we must first start by adopting a digital business platform, and then empower it with automation capacity. The final step is to implement an intelligence layer that will complete the process. The coordination and synergy achieved recognizes that the true value is an effective 'business as a whole', not just certain sections or departments. The work methodology and processes become homogeneous, favoring the consolidation of the information from diverse business systems. Furthermore, the intelligence applied to the data combined with employee access to the processes, will allow companies to offer customers better products, services and attention to their needs.

Business process management platforms will help you transform your entire business and achieve your digital goals. Intelligent process automation, designed through flowcharts, without programming a single line of code, will result in increased productivity. Rapid and accurate decisions can be made thanks to dynamic case management, while integrated Artificial Intelligence with learning capacity will optimize effectiveness. In the digital age, these new integrated digital processes will be a company's main asset to achieve success.

## Evaluating Benefits of RPA

Robotic process automation (RPA) integrates automation with artificial intelligence (AI) to automate processes through the deployment of custom applications. The use of AI is about leveraging intelligent algorithms to resolve inefficiencies and drive enhanced customer experience at every point of interaction.

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An RPA solution emulates human actions to automate the tasks that require human intelligence, without necessitating changes to the underlying systems and processes. RPA is about employing software robots with the ability to replicate human actions to eliminate inefficiencies in processing of information or data. Simply put, RPA envisages a virtual workforce with skills comparable to that of human beings.

The commoditization of financial services has spurred banks to improve front-end services and customer experience. Backend operations, however, have not received as much attention, and offer tremendous scope for improvement. Backend processing typically involves high volume, rule-driven, repetitive tasks that are labor-intensive, and therefore, prone to errors. When automated using RPA, these tasks will not require the constant intervention of skilled human resources who can thereby focus on higher value-adding activities. The investment is minimal as RPA does not entail any changes to the underlying legacy IT infrastructure. At the same time, it speeds up core processes, significantly enhances productivity and accuracy, lowers costs, and cuts time-to-market for new offerings.

## Measuring RPA Success

Perhaps it is the implied simplicity, or its general acceptance in the industry, but ROI (return on investment) is the ubiquitous approach to evaluating success of an investment. To establish a consistent understanding of ROI, let's define it as follows:

As for automation, the prevailing measure of "Gain from Investment" is cost reduction. While FTE arbitrage is seemingly the easiest gain to derive, and gaining the most traction in headlines about RPA, our point of view is that there are more meaningful interpretation of ROI when it comes to automation and RPA.

## Establish a Baseline

When evaluating automation, think of the robotic process as a digital employee. How do we evaluate our human employees? Baseline metrics and comparison to others. We've all undoubtedly undergone a performance review at least once during our career. Common employee evaluation techniques include speed, accuracy, and monetary contribution to the company.

## A Holistic View of RPA Benefits

Intrinsically, there are two categories of RPA benefits at a company: primary and secondary. Primary benefits include those that are directly related to the implementation of RPA. Examples include improved efficiency, increased accuracy, and headcount reduction. Secondary benefits are those benefits made possible indirectly by RPA implementation. These benefits, while harder to quantify, can lead to tremendous gains to the company, both in top line revenue growth and bottom line cost savings.

*Figure 3. ROI calculation formula*

$$ROI = \frac{(Gain\ from\ Investment - Cost\ of\ Investment)}{Cost\ of\ Investment}$$

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Primary Benefits:

- **Increased Efficiency:** Perhaps the most frequently referenced (and most easily grasped) benefit of automation, increased efficiency is realized through higher workload capacity and increased speed, both resulting in increased throughput rate. In a bank, this might mean that a loan closing and booking team can address more loans each day, improving the customer experience and reducing the need to hire as volume increases.
- **Increased Accuracy:** Any process that requires manual data entry or data transformation introduces the opportunity for error. While humans experience fatigue and distraction, an automated process can run 24-7-365 and utilizes computer memory and programmable rules to ensure consistency and accuracy. In a bank, data entry and transcription errors can result in increased rework, decisioning based on inaccurate data, and negative financial impacts and fines.
- **FTE Reduction:** Headcount reduction may be the most difficult benefit to discuss but is also widely misunderstood. Workload redistribution and reduced future hiring needs are more realistic options. An organization that embraces automation can address increased capacity related to growth without adding headcount.
- Secondary Benefits
- **Asset Redeployment:** Workload Redistributions allow an organization to move headcount from one area to another to address organizational needs. If automation produces increased capacity and the workload doesn't match the excess labor supply can be reallocated to new areas. For example, consider how a bank would redistribute work in the front, middle, and back office if they suddenly had more "free" time to work with. Keep in mind that resources and capital refer not only to human capital, but also technology resources like computers and bandwidth.
- **Improved Customer Experience:** All the primary benefits mentioned above relate to cost savings, but viewed from another angle, these primary benefits enhance the customer experience which can lead to increased revenues as well For example, as employees' capacity increases (through speed, efficiency, redistributed workload), more time can be allocated to customer-facing functions and activities (like improved customer service, increased sales efforts, customer retention activities). There are also benefits from increased speed-to-market through faster loan decisioning and approval or improved competitive positioning through lower costs (reflected in reduced lending costs and interest rate margins) due to resource needs and efficiency improvements.
- **Faster Scalability:** In today's banking environment, top management should consider the question, "how do you make your bank immediately scalable without increasing headcount?" As financial institutions growth through acquisition and organically (new locations or branches), this question becomes top-of-mind. While physical hiring requires times, an automated workforce is distributed as a software resource. With automation you gain a pre-trained digital workforce. Scalability is instantaneous as jobs can be added by purchasing software licenses and applying them to an existing automation protocol. Literally load an automation workflow to a robot and press "Go."
- **Increased Job Satisfaction:** Job satisfaction surveys regularly reveal that the most engaged employees feel they are doing meaningful work that can be easily mapped to company success metrics. What can banks do to increase employee engagement and job satisfaction? Start by taking automatable functions away and allow these employees to be more customer-centric. Banks should consider who will do this work in the future if they are not automated.

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- While cost reduction is often touted as the most significant gain for banks implementing RPA, it's important to look beyond ROI and dig deeper into RPA's capabilities to truly grasp the potential benefits that come with implementing this tool.

## RPA USE CASES

While there is an unlimited number of use-cases for robotic process automation, certain business process lend themselves to higher ROI by leveraging RPA. These processes tend to be rules-based, repetitive, and large-scale. Or, simply so complex and mundane involving multiple disparate business applications that nobody wants do the task over and over. Let's take a look at a few scenarios where clients tend to see greatest return on investment.

1. Claims adjudication

With insurance companies often relying on a multitude of legacy software platforms to keep track of and adjudicate claims, RPA delivers exceptional savings as insurance processes fit perfectly into the "rules-based, repetitive, and large-scale" categories.

2. Procurement

The integration of the purchasing department and the accounts payable systems is an ideal candidate for RPA.

3. Supplier portal integration

Once automated, this process also leverages the software robot's integration capabilities. A portal is an important mediator between an organization and a supplier, and RPA can deliver a more consistent and error-free integration for your suppliers.

4. Data entry

Data entry is the epitome of monotony. Can you agree? Since RPA has the capability for basic pattern recognition, it can convert nearly all kinds of text into editable and searchable machine encoded text, so the need for manual data entry is reduced. Therefore, fewer errors, faster results, fewer tired and bored employees.

5. Reconciliation

By comparing documents such as cash and bank statements, the procedure is to ensure the reliability of the records.

The software bot can perform data extraction from the bank statement, thereby increasing the possibility of accurate comparison. By finding and approving matched orders, bots can also match purchase orders with delivery notes.

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6. Price comparison

Software robots can track varying prices and automatically extract the data for the optimal price setting.

7. Sales activities

We talk about data duplication, creation and provision of invoices, smooth update of CRM (Customer Relationship Management), and so on. Sales are an important aspect of all kinds of business, regardless of size or domain.

Take a moment to think about the monotonous work of keeping CRM and accounting records data consistent. The good thing is that software robots can handle this for you. For example, automation allows you to send invoices to customers much faster than by doing it manually.

It is the earlier customer payment, which improves cash flow, resulting in improved customer satisfaction as a result of this highly desirable result. More generally, the need for error-free sales activities is justified by the desire to avoid customer complaints and dissatisfaction, which is the result of administrative mistakes.

8. Payroll

If your company relies heavily on legacy systems, it may not be easy to adopt the latest payroll software. Software robots can be helpful to help automate the process.

9. Report generation

Regular reporting is necessary. Software robots can not only automatically summarize the data necessary to create these reports, but they can also be distributed to all stakeholders. It is not difficult at all to see how this relaxes the burden of compliance.

10. Customer service

With the advent of chat bots, RPA can be leveraged to instantly query legacy back-end systems whenever a customer asks a question to deliver a much more personalized answer than what a chat bot could deliver by relying on machine learning alone.

## FUTURE RESEARCH DIRECTIONS

Robotic process automation's workflow efficiency benefits have been of great value to financial services organizations. According to KPMG, banks and other financial organizations that leverage RPA realize 75% cost-savings. (How Robotic Process Automation Shapes Fintech's Future, 2018)

Bots can perform repetitive, clerical tasks such as processing customer applications and responding to basic customer queries faster and more accurately than human workers. Bots also behave more predictably than people. They don't deviate from their programming so they won't make mistakes or

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circumvent processes. Accordingly, RPA is a powerful risk management resource that many financial institutions already use to monitor compliance and create audit trails.

But RPA's contribution to operational efficiency is just the tip of the iceberg. Financial organizations that venture deeper into RPA's capabilities will find a wealth of transformational opportunities that can reshape the customer experience. In particular, RPA is an enabler of new digital financial technology (fintech) that enhances the quality of service and convenience for employees and customers alike.

According to a PwC report, RPA is the "starter piece" for long-term digital transformation initiatives. (The Role of Robotic Process Automation in Banking and Financial Services, 2018) On the most basic level, RPA can be used to bridge integration gaps between legacy software. For instance, RPA can act as an integration mechanism that integrates legacy solutions to newer IT systems. This gives banks and other financial organizations the opportunity to expand their fintech footprint gradually and with minimal disruptions to existing processes. Rather than uprooting and replacing existing legacy tools, bots can push and pull data between new and old applications to orchestrate workflows that might otherwise dwell in silos.

Robotic process automation can also reduce the testing surface of new custom developments and fintech applications. Software robots, which have roots in software QA automation, can be used to validate the output of new custom developments. Consequently, new financial services can be developed with minimal risk to existing processes.

Applied to customer-facing services, RPA is directly responsible for some of the most common fintech utilities. Case in point, bots can automatically populate data fields based on photos of documents that are uploaded via a mobile camera to a fintech application. This works for basic banking functions, such as mobile deposits, but also more advanced processes such as applying for a loan or even initiating peer-to-peer lending.

Robotic process automation can also catalyze new classes of fintech products. Consider the example of what American Banker calls "robo-advisory services" for wealth management. Investment values and information can change by the minute. Software bots can continuously interface with various data sources to track market conditions, and customers can automatically receive recommendations based on the most up-to-date information.

For the "more mature and astute investors," American Banker noted that financial institutions can build on RPA's capabilities to offer a "hybrid robo-adviser service." Bots and algorithms track the quantitative aspects of wealth management. Human financial advisers supply the qualitative consultations. This is a perfect example of adding value to a customer relationship by liberating human workers to focus on judgment-based services.

## IOT, BLOCKCHAIN, AND MORE

Putting RPA at the helm of quantifiable data-driven workflows will be especially important for innovation enablement in the years ahead. The Internet of Things is expanding the realm of financial technology services. Customers can now link their financial data to wearable technology and even household appliances. Software bots' ability to interface with the front ends of many application types can help automate the real-time movement of information between systems.

Likewise, RPA is an enabler of blockchain technology. Blockchain uses a distributed digital ledger system to verify data inputs through a consensus. No single source controls the ledger, which makes

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it difficult for anyone contributor to commit fraud. For this to work properly, financial organizations will need to continuously record data entries and attributes such as time stamps, geo-location and more from many disparate APIs and IT systems. The benefit of RPA bots is that they can operate as fluidly as humans can across IT infrastructure. This means RPA can effectively bridge multiple disparate systems to the blockchain.

Robotic process automation may also be important for blockchain security. According to PwC, financial services organizations will still need to prove the validity of their blockchain applications. Auditors must answer important questions such as "Who controls the blockchain?," "Who gets access?" and "Who monitors activity?" Rather than manually auditing the blockchain, PwC proposes automating these verification processes. And just as RPA can be used to validate data for compliance purposes, we anticipate that it will have a role to play in auditing the blockchain.

Many businesses are already using bots to enable fintech innovation. But like we said at the beginning of this post, most financial organizations have only skimmed the service of RPA's potential.

## RPA Market Predictions

The Robotic Process Automation (RPA) market size is anticipated to reach USD 8,781.2 million by 2026 growing at a CAGR of 29.5%. (Robotic Process Automation (RPA) Market Size, Share, Trends, & Industry Analysis Report, By Process, 2018) Requirement of businesses to eliminate human errors due to manual interference in processes along with reduction in time consumption are factors responsible for positively influencing the adoption rate of RPA technology.

Previously artificial intelligence and robotic process automation were largely considered to be different technologies. But, with advancements in the offerings it is observed these technologies are complimenting each other in terms of handling processes. It enables organizations in processing huge volumes of data and in providing support for better decision making. Cognitive computing which covers wide array of areas including adaptive learning, speech recognition, and pattern identification is integrated in robotic process automation (RPA) solutions to transform and automate crucial business processes of organizations across multiple industry verticals.

The potential of achieving robust ROI from deployment of RPA completely dependent on the organizational requirements and business processes which are to be automated. In the near future, the market is expected to witness growing base of RPA vendors as they target to gain revenue share from this expanding market. This is expected through introduction of solutions which will cater to the rising need to automate business process management processes. Furthermore, the adoption is expected to intensify as the prices of RPA deployment are continually witnessing a declining trend. Moreover, this technology adoption provides organizations the capability to accomplish better outcomes from their process with benefits including reduction in costs, improved accuracy, and better compliance.

However, factors like reluctance in the transition phase from conventional business process to automation along with shortage in technical expertise required during deployment and integration of RPA solution are challenges which might affect the growth in this market. Analysis for each region (North America, Europe, Asia Pacific, Latin America, Middle East & Africa) is provided for all segmentation of the robotic process automation market research report.

North America is expected to be largest regional market while Asia Pacific regional market is expected to witness significant growth during the forecast period of 2018 to 2026. The region's leading position is attributed to significant demand and preference of the BFSI industry vertical towards automation of

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business processes. Furthermore, presence of established and major players in North America region and availability of infrastructure for effective adoption of RPA is another factor responsible for the boost in adoption of robotic process automation solutions.

European region is expected to witness growth in this market as the region has a presence of significant amount of companies in the manufacturing and logistics sector. Adoption of RPA technology provides the capability to streamline pickup and drop operations. This eventually leads to reduction in cycle time ultimately resulting in enhanced customer experience.

The major key players operating in the robotic process automation (RPA) market include UiPath Inc. (U.S.), Blue Prism Group Plc (UK), Celaton Ltd. (UK), Softomotive (UK), Kofax Ltd. (U.S.), Xerox Corporation (U.S.), Automation Anywhere Inc. (U.S.), Ipsoft, Inc. (U.S.), UiPath (U.S.), Verint Systems Inc. (U.S.), Pegasystems Inc. (U.S.), Redwood Software (Netherlands), Daythree Business Services (Malaysia), and Kryon Systems (Israel).

Research has segmented the global robotic process automation market on the basis of process, operation, type, industry, organization size, and region:

- Robotic Process Automation by Process Outlook (Revenue, USD Million, 2015 – 2026)
  - Automated Solution
  - Decision Support and Management Solution
  - Interaction Solution
- Robotic Process Automation by Operation Outlook (Revenue, USD Million, 2015 – 2026)
  - Rule Based
  - Knowledge Based
- Robotic Process Automation by Type Outlook (Revenue, USD Million, 2015 – 2026)
  - Tool Based
  - Model-Based Application Tools
  - Process-Based Application Tools
  - Service Based
  - Consulting
  - Integration and Development
  - Training
- Robotic Process Automation by Industry Outlook (Revenue, USD Million, 2015 – 2026)
  - IT & Telecom
  - Healthcare and Pharma
  - BFSI
  - Manufacturing
  - Logistics
  - Retail
  - Travel & Hospitality
  - Others
- Robotic Process Automation by Organization Size Outlook (Revenue, USD Million, 2015 – 2026)
  - Small and Medium Sized Businesses (SMBs)
  - Large Enterprises
- Robotic Process Automation by Region Size Outlook (Revenue, USD Million, 2015 – 2026)
  - North America

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- Europe
- Asia Pacific
- Latin America
- Middle East and Africa

## CONCLUSION

No study is without limitations when it comes to the results, and neither is this one. All in all, the research design for this study has been well-constructed, but as with all case studies, they share the aspect that there is only limited generalizability. All the findings and conclusions apply only in the context of this study, and any generalization outside the established setting should be done with caution. If a more comprehensive understanding of RPA projects in different contexts is needed, then further research must be conducted.

Another point to keep in mind when interpreting the results from this study is that in its core, the research is centered on forming, analyzing and criticizing a process model. It is possible, that this approach, because of its focused nature, narrows the scope too much, leaving some important aspects completely outside the selection. It could be, that some aspects are therefore completely ignored in the study. The impact of this limitation on projects can be mitigated by being open and attuned to suggestions for improvements in the process flow, essentially treating this established process as a solid template to further build on.

RPA as a technology is still very new and the range of diversity of literature available is not too wide. It is likely that because of this, the contents of the RPA literature review are not as comprehensive as they could be. As the technology evolves, further studies should be conducted, to keep up-to-date with the state of RPA and how this context could change in the future. However, due to the test case being successful, the introduced process that was extracted from the literature is applicable and exhaustive enough to serve as a basis for the process model.

Another matter to consider, caused by the novelty of RPA, is the pace at which the technology is still advancing. Most of the sources for RPA literature are only a couple of years old, and with the completion of this thesis taking more than half a year in total, it is possible that during this timeframe there were some significant findings or advances in the field. To this end, it is worth noting that it is possible the findings of this thesis are already slightly outdated due to this fast pace. Again, further studies could help in understanding how and why RPA is different and how it has evolved.

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## ADDITIONAL READING

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Le Clair, C. (2018). *Use The Rule Of Five To Find The Right RPA Process*. Forrester.

Murray, S. (2018). *As Global Leader in Digital Transformation Market Research, IDC Reveals Worldwide Digital Transformation Predictions*. IDC.

## KEY TERMS AND DEFINITIONS

**AI:** Artificial Intelligence. A branch of computer science that focuses on simulating human actions and behavior.

**BPM:** Business process automation. A software tool used to improve an organization's business processes through the definition, automation, and analysis of business processes.

**ROI:** Return on Investment. The measure of gain or loss generated on an investment relative to the amount of money invested.

**RPA:** Robotic process automation. Software that can emulate human actions.