

## **A Fundamental Review on Candidate Processes for Robotic Process Automation (RPA) at Operational Level**

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### **Abstract**

Digitalization has transformed the way organizations run its routine business activities. Emerging digital tools are increasingly prevalent and these tools have substantial prospect to drive for enhance organizational operational efficiency and performance. Organizational operations are supported by Business Process Management (BPM) – which the automation capabilities are central in facilitating the competitive advantage of modern businesses. A prevalent theme in modern BPM is Robotic Process Automation (RPA). Through RPA approach, organizations can steer their ability to improve overall efficiency, qualitatively and quantitatively. This paper provides a fundamental exploratory study on RPA with a general overview, related techniques and approaches for RPA implementations, RPA applications existed in current business process and recognized improvements driven by RPA. Consequently, a summative outline of business operational functions relative to candidate of RPA applications is presented as an essential guide. The outlines and recommendations would be able to serve and assist practitioners who are venturing into RPA approach to be more oriented on the planning, assessing and deciding the candidate processes for RPA implementation.

### **Keywords**

Robotic Process Automation (RPA), Candidate Processes, Operational Level

### **Introduction**

Presently, it is transparent that information technology (IT) is the prime enabler for process improvement in organization. A central opportunity for process improvement in organization is the inclusion of RPA automation in the current business process. Starting with the initial phase of Business Process Reengineering (BPR), later to BPM, then to Lean and eventually Hybrid (integrated) methods, modern organizations are now leveraging the efficiency of RPA (Baranauskas, 2018). International companies including Walmart, AT&T, Ernst & Young (EY)



and American Express are using RPA in everyday business processes (Jovanović, S., Đurić, J., & Šibalija, T., 2018).

Baranauskas (2018) learned that public sector enterprises lack of RPA technologies in their general activities as, in most cases they see these technologies not as main solution regarding rising their revenue. The understanding on how RPA projects could seamlessly integrate with other information systems as well as with the operational staffs and workforce are equally least and minimal. Indeed, RPA technology is not designed to be another new business application, but it is designed to be a proxy for a human worker to operate business process applications (Dey & Das, 2019).

The main aim of this paper is to present an additional information on business process candidates that are potentials for evaluation and consideration for RPA automation projects. A fundamental exploratory study was conducted and information were collected on the reviewed definitions of RPA, potential techniques of implementing RPA, available applications of RPA projects as well as the prospective improvements offered by RPA automation project for organization. Data and information of this study were primarily collected through desktop research from previous literatures and studies. The last section of the paper concludes by providing and outlining few potential outlooks for future research in the area of RPA.

### **Definition of RPA**

In general interpretation, RPA appears to be tangible and physical in its nature like an electromechanical robot or mechanical machine. This is especially true for someone who are new or beginner to the concept. Indeed, RPA refers to a software-based solution, programmed to carry out procedures or tasks on a repetitive way that are usually done by humans (Jovanović et al., 2018). Institute for Robotic Process Automation (IRPA) defines RPA as an 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.

From the perspective of practical implementation, RPA is considered as a software applied in fully and independently working automation for a part of work activities or within an overall process, which typically done by human resources (M. C. Lacity & Willcocks, 2016). RPA is a technology based on smart software supporting repetitive daily tasks done by human and can facilitates time and quantify indicators (The Institute for Robotic Process Automation, 2015). M. C. Lacity & Willcocks (2017) stated it is important to know that RPA is not a physical robot, but a software based solution that is configured to carry out repetitive operational tasks and procedures that are used to be done by humans.

Essentially, RPA is a presentation layer automation software that mimics the steps of a rule-based, non-subjective process without compromising the existing IT architecture. It is able to consistently carry out prescribed routines and can easily scale up or down to meet changing business demands. Such process automation can expedite back office tasks in business functions like insurance, finance, procurement, supply chain management, accounting, customer service, and

human resources (Dey & Das, 2019). Further, RPA can be summarized as an IT based imitation of human daily work where limited number of autonomous decisions are needed, and great number of quantifications need to be done in a short period of time (Baranauskas, 2018).

### **Techniques of RPA Implementation**

There are several techniques in the approach to implement and develop RPA application. Shin, Wysk, & Rothrock (2006) outlined three (3) main parts of a standard automation model. A typical process flow starts with an input message called In-msg where a process is determined by a certain non-automated state of System state. This process can be affected by a specific internal or external physical preconditions with limited control options. At this stage, automation solutions can be used to stabilize the process and create a desired output process called Out-msg. The whole process is cyclical and may continuously improve in an automated way. RPA allow techniques to apply automation on the user interface (UI) level of computer systems. Since it operates on the UI level, rather than on the system level, it allows the automation to be applied without any changes in the underlying information systems (Asatiani & Penttinen, 2016).

Whaley (2017) describes four (4) main phases for developing RPA: assess, approve, design and implement. The main activity in the assess phase is the investigation of candidate process that could be automated. Output of this phase is a feasibility report of the RPA project. Approve phase includes proofing by testing the RPA concept of before automation state (AS-IS) and after automation state (TO-BE). It is when the analysis and documentation of the before and after findings are captured using the Business Process Model and Notation (BPMN). In design phase, available RPA tools will be evaluated and selected for the RPA project. Once selected, the building of the approved RPA will be carry out and the phase ends with User Acceptance Testing (UAT). The final phase involves the implementation and integration of the built RPA into real working environment (go-live) representing the end user's behavior and the RPA performance will be examined and monitored. Enriquez, J. G., Jimenez-Ramirez, A., Dominguez-Mayo, F. J., & Garcia-Garcia, J. A. (2020) provide a more comprehensive technique in their approach. In the approach, it is possible to identify and group different ideas and proposals to allow continuous improvement using a complete RPA lifecycle that include analysis phase, design phase, construction phase, deployment phase, control and monitoring phase and finally the evaluation and performance phase.

Combined with machine learning (ML), RPA is also appropriate to assist in handling unstructured data. The capture of input content in various formats such as text, picture, audio and video from any source through different devices can be automated by RPA. Furthermore, with the help of artificial intelligence (AI), big data and business analytics, RPA is capable of harvesting the big data collection via data mining and deep learning techniques. In relation, the integration with other associated techniques including image classification, text analytics or sentiment analysis can further drive the business operations to deliver more value (Madakam, S., M. Holmukhe, R., & Kumar Jaiswal, D., 2019). Wróblewska, A., Stanisławek, T., Prus-Zajączkowski, B., & Garncarek, Ł. (2018) suggested that most of business processes can be automated by using ML methods of 1) Image processing – scanning letters, invoices, attachments from emails, etc. 2) Classification – labeling documents according to a taxonomy described in process specification

documents, linking related information to documents and 3) Information extraction – extracting specific objects from image/text that are needed to process documents.

### **RPA Applications in Business Process**

RPA works with existing IT systems and is applied on top of existing applications, typically automating tasks within a single application (Fung, 2013). The automation of RPA is ideal and suitable for processes performed as a supporting process for core or main business processes. Fung (2013) also suggested that processes with high probability of human error usually performed by operators, should be as the top candidate for RPA implementation. Processes with limited exception handling or do not have a lot of possibilities for several exceptions are also among the best candidate for RPA implementation. In this view, RPA implementation is most suitable for processes or tasks performed by employees who involved in operational function in an organization. For instance, tasks such as back office Enterprise Resource Planning (ERP) transactions, tasks generating huge number of email messages or tasks of entering or converting data.

In a customer service oriented or financial type of organizations, software solutions acting autonomously or with minimal human interaction for any type or part of processes are used for overall process improvements and as a new standard of process management (Baranauskas, 2018). Automation solutions should be oriented not only to Computer Integrated Manufacturing (CIM) and Control Process systems, it is also relevant and useful for Supply Chain Management (SCM) and Customer Relationship Management (CRM) functions (Jha & Mohapatra, 2017). RPA can automate rules-based processes that involve routine tasks, structured data and deterministic outcomes, for example, transferring data from multiple input sources like email and spreadsheets to systems like Enterprise Resource Planning (ERP) and CRM systems. Most applications of RPA have been done for automating tasks of service business process like validating sales of insurance premiums, generating utility bills, paying health care insurance claims, keeping employee records up-to date, among others. One of the criteria for selecting candidate process for automation is where it involves a highly structured tasks with structured data and instructions, corresponding typically to back office business process like Finance, Procurement and Human Resources (HR) (M. C. Lacity & Willcocks, 2017).

Gao et al., (2019) outlines a ‘swivel chair’ process within HR function, which concerns transferring information from one system to another. The two systems are for employment involving an interview system and a HR system. The main business process is 1) An interviewee fills in Interviewee Form in the interview system. The form has 4 fields: “Name”, “Age”, “Gender”, and “Result”. 2) The HR department evaluates the interviewee and updates the evaluation in the Interviewee Form and 3) If the HR department’s evaluation equals “Pass”, an employee of the HR department subsequently fills in the New Employee Form in the HR system. The Employee Form has 3 fields, i.e., “Name”, “Age”, “Gender”, which the employee copies from the Interviewee Form. If the HR department’s evaluation equals “Fail”, the HR-department does not perform any action.

Aguirre & Rodriguez (2017) studied a use case carried out on a process for generation of payment receipt. The AS-IS process starts when a customer calls and request for the payment receipt. Then, a front office agent creates the case on CRM system. After which, a back office agent opens the case on the CRM, copy and paste the customer identification number on account receivables system and generate the payment receipt on a pdf file. The agent will write email to the customer and attach the payment receipt together. Once this is done, the case will be closed in the CRM by the back office agent. In the TO-BE automated process, the back office activities were assumed by RPA software robot. After the case creation on the CRM is recorded by the front office agent, the robot accesses the CRM, copy the customer identification number and paste it on the account receivable systems, generates the payment receipt, creates the email, send to the customer and finally, closes the case.

In relation, RPA applications have also been reported in business process like accounts payable, accounts receivable, travel expenses, fixed asset accounting, master data management, billing, and keeping employee records (Asatiani & Penttinen, 2016; M. C. Lacity & Willcocks, 2016). Aguirre & Rodriguez (2017) also proposed that RPA to be more suitable for high volume standardized tasks that are rules driven, where there is no need for subjective judgement, creativity or interpretation skills. Dey & Das (2019) described additional applications of RPA in corporate account opening and payment enquiry handling. Table 1 exhibits the summary of the business operational functions relative to the candidate of RPA applications.

Table 1. Summary of business operational functions with candidate processes for RPA

Business Function	Candidate Process for RPA	Source
Human Resource (HR)	Job applicant screening and interviewing	(Asatiani & Penttinen, 2016)
	Employee records keeping	(M. C. Lacity & Willcocks, 2016)
		(M. C. Lacity & Willcocks, 2017)
Supply Chain Management (SCM)	Purchase order (PO)	(Gao et al., 2019)
Insurance	Policy Issuance	(Jha & Mohapatra, 2017)
	Insurance Claim	(Gao et al., 2019)
Finance	Account receivable	(M. C. Lacity & Willcocks, 2016)
	Account payable	(M. C. Lacity & Willcocks, 2017)
	Corporate account registration	(Asatiani & Penttinen, 2016)
	Travel expenses	(M. C. Lacity & Willcocks, 2016)
	Fixed asset accounting	(M. C. Lacity & Willcocks, 2017)
	Billing	(Dey & Das, 2019)
Enterprise Resource Planning (ERP)	Master data management	
	<i>Not specifically available</i>	(Jha & Mohapatra, 2017)
Customer Relationship Management (CRM)		(M. C. Lacity & Willcocks, 2017)
	<i>Not specifically available</i>	(Aguirre & Rodriguez, 2017)
		(M. C. Lacity & Willcocks, 2017)

## **Improvements for Business Process with RPA**

Capgemini Consulting (2016) survey reveals that the main measures of RPA success are cost reduction, increasing process speed, error reduction. The survey also highlights the RPA contribution in facilitating compliance obligatory for the organization. Willcocks & Lacity (2016) study discovers that Xchanging estimates cost savings averaging 30% per process. The utilization of RPA in existing business process can further provides the following advantages to organization (M. Lacity & Willcocks, 2016):

1. RPA is easy to configure, so developers do not need programming skills.
2. The RPA software is not invasive, it is based on existing systems, without the need to create, replace or develop expensive platforms.
3. RPA is secure for the company, RPA is a robust platform that is designed to meet the IT requirements of the organization in terms of security, scalability, auditability and change management.

In another study conducted by Aguirre & Rodriguez (2017), the main benefit recognizes productivity improvement measured by cases per agent, where the observed group with RPA could handle 21% more cases than the group without RPA. This productivity improvement is part of the benefits expected from RPA and for this it means that RPA could increase the capacity by 20% on the related business process. A significant improvement feature of RPA is the capability to virtually eliminate human processing errors, when the processes are accurately mapped and properly optimized. As software robots handle the more repetitive, tedious jobs in business functions, employees in organizations can get the opportunity to participate in other value-added activities that involve personal interaction, problem solving, and decision-making, leading to improved workforce motivation and employee satisfaction. And as stated earlier, the other advantageous of RPA is complying with the regulatory requirements such as for yearly or periodically audit checks, since the business processes are fully tracked, captured, recorded and documented (Enriquez et al., 2020).

## **Conclusion and Future Study**

This paper provides an extended review on the RPA implementation in organizations. Ideally, RPA software is suited to replace human activities of collecting inputs from one set of systems, processing those inputs using well-defined rules, and then acting on with another set of systems. Any business process that is rule-based, repeatable, definable, and algorithmic is possible and capable to be assigned with a software robot to manage the execution of that process, just as a human operator would capable of doing. Essentially, BPM reengineers business processes with IT solutions, while, RPA automates these processes by eliminating manual activities of the related processes. In this regard, RPA can be considered as a subset of BPM systems, involving minor and incremental change in the structure of existing business process.

On the implementation side, it is important to consider that RPA doesn't store any transactional data and does not require a database. RPA sits on the top of existing IT systems and access these platforms through the presentation layer of an enterprise architecture. Fundamentally,

RPA solutions do not require high-level programming skills for configuring the software. RPA interfaces work like BPMN modeling packages, mainly with activities of selecting, dragging, dropping and linking icons. For future consideration, it is beneficial to explore and understand how RPA automation can be integrated and work together with cognitive automation. Cognitive automation primarily deals with unstructured data whereas RPA automation deals with structured data.

Hence, it would be useful to develop next understanding on the integration of these different levels of data architecture, including semi-structured data in facilitating the business process automation projects. Moreover, as current business process evolves and grow towards even more complex scalability, analytically and productivity, emerging technologies such as machine learning (ML) and artificial intelligence (AI) are on the verge. With this view in mind, a rising new topic which can be well explored is in the area of analytic process automation (APA).

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