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Article in International Journal of Business Process Integration and Management · July 2019

DOI: 10.1504/IJBPIIM.2019.100927

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Robotic Process Automation: Assessment of the Technology for Transformation of Business Processes

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Abstract: We examine how Robotic Process Automation (RPA) can be deployed as a technology solution in business processes and services as a transformation lever beyond traditional business process management and outsourcing. RPA is a new breed of software that allows for enterprise-wide automation of repetitive business processes, with the promise to potential FTE savings, better service quality and improved service delivery. Through an extensive survey of practitioners involved with RPA, this exploratory research identifies the motivation and challenges of RPA implementation as envisaged by the user communities. We also find the complementary perspectives of RPA product development communities. Consequently, we recommend ways to align the perspectives of the user communities and the developer communities to enable definitive value creation for the organizations. The findings and recommendations would help practitioners who develop RPA products or adopt these products in their IT ecosystems.

Keywords: Business Process Management; Process Reengineering; Robotic Process Automation; Software Product Development

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Introduction

Robotic Process Automation (RPA) literally may suggest physical robots occupying office space, performing human tasks involved in business processes. However, RPA is essentially a software-based solution, and the software ‘robot’ is expected to perform activities previously done by people. RPA software is ideally suited to replace human activities where humans take inputs from one set of systems, process those inputs using well-defined rules, and then act on another set of systems. Any work process that is definable, repeatable, and rule-based, it would be possible to assign a software robot to manage the execution of that process, just as a human would. RPA technology is not designed to be a business application, but is designed to be a proxy for a human worker to operate business applications. The transition of RPA from traditional IT enabled business processes could be likened to a driverless robotic car versus a car using cruise control – while cruise control simply modulates vehicle speed, the driverless car is able to be aware, learn, adapt, and respond to

various driving situations, as a human would. This adaptability and awareness is what gives RPA the edge over traditional business and IT processes (IRPAAI, 2013).

RPA does not replace business process management (BPM) layer of the IT ecosystem; rather it complements BPM. BPM solutions are best suited for processes involving extensive business logic and requiring IT expertise on high-valued IT investments like ERP systems. In contrast, RPA is designed to not disturb existing systems and work on automating the manual, repetitive elements of human activities involved in business processes. In other words, BPM reengineers business processes with IT solutions, whereas, RPA automates these processes by eliminate manual activities in the processes and the trick is to put them together in the right combination (Willcocks, Lacity and Craig, 2015).

The promise of RPA as a disruptive technology is strong. Analysts estimate that as the use of disruptive technologies like RPA grows at the rate it is expected to, as many as 110 to 140 million FTEs could be replaced by automation tools and software by the year 2025 (McKinsey, 2013). However, evidence of value creation through RPA till date lies with a handful of successful implementations and widespread adoption of RPA is limited, primarily due to lack of clear insights on how RPA products fit into the IT ecosystem of the organization, how they could seamlessly integrate with other systems and operational staff.

We conduct a detailed study on the expectations of the users of the RPA products, the motivations for adopting RPA as well as perceived implementation challenges. Primary data has been collected from key players in business organizations who have deployed or intend to deploy RPA in their respective organizations. This perspective is contrasted with that of the developer community of RPA products – the product development teams and the implementation teams. We argue that the misalignment in perspectives could be addressed

constructively for widespread and value-accreting adoption of RPA in a wide range of organizations.

RPA in Retail Market:

Sometimes the clients in retail markets do face issues due to adverse movement of its home currency compared to target market and sourcing currency. An extent of the affect calculation against the gross margin is required in this scenario. Robots can be used to perform the extraction of data across the company's website and compare the pricing pattern across various markets to gauge margin health

RPA in Corporate Account Opening:

Corporate Account Opening involves the following steps. The steps in which a RPA can be used are mentioned

1. Sending required documents to particular corporates interested in account opening through email- Robot
2. Creating a case once the document is sent- Robot
3. Receiving the document sent by email by Corporates and mapping it to respective case- Automatic
4. Reserving an account number in the core system of the bank- Robot
5. Filing in the details by extracting data from the form and putting the data in the Account opening System of the bank- Robot
6. Associating privileges for the particular account for the customer- Robot
7. Opening the Account though the core system of the bank- Robot
8. Account Maintenance Activities- Robot

Payment Enquiry Handled by RPA:

1. Responding to customer enquiries and even customized Reponses to customer request
2. Collating the data in an excel report format

Claim Adjustment for Insurance Provider through RPA:

Ability of the software bots to work according to rules to create parallel adjustments in the third party system and claims system in parallel to complete a unit of work.

Interplay of BPM and RPA

IT functions in today's organizations experience multiple, often conflicting, forces with a key demand on business-IT alignment, which is difficult to achieve, considering dynamic business contexts leading to constantly changing requirements. While IT functions are devoting a large proportion of their non-discretionary spending on maintaining existing legacy systems and IT landscape, they recognize that ensuring business performance through digitizing organization is a key imperative for them. Knowledgeable, IT-literate and demanding business users judge IT functions increasingly on business metrics in terms of quality, responsiveness, business value, end-customer service and satisfaction, cost efficiency, fit with business need, and time to market (Willcocks, Lacity and Craig, 2015).

The key challenges for the CIO's office include adoption of major new technology that disturb existing structures, culture and governance modes, rising information security challenges, integration and interoperability of newer technologies with the legacy technologies, and being an enabler for business process innovation in the organization.

Business process improvement in organization are carried out either through management accounting methods or IS influenced methodologies (Valiris and Glykas, 1999). The first approach includes methods such as activity based costing, six-sigma methodology, total quality management etc. where specific aspects of a process are investigated for improvement (Dalmaris et al., 2005). For example, six-sigma first sets a benchmark of quality of process

and then guides the improvement of processes keeping the benchmark as the baseline. The second approach includes methods such as workflow management and they use IT as the prime enabler for process improvement, by managing the interactions between processes and customers, and focusing on the automation of business processes through BPM systems.

BPM systems have been one of the key enablers for the CIOs over the past decade. These systems link business processes of the organization to the technical systems, automating the business rules and workflow, achieving desired operational efficiency (Warboys et al, 1999, p.26; Ellis and Kedara, 2000). While process automation involves technology change with minor or incremental change in the structure of business process, BPM involves reengineering and IT enabled business processes that require that the technology be leveraged by fundamentally and radically changing the underlying process (Teng, Grover and Fielder, 1994).

Services in BPM systems are composed using multiple business processes, configured through business rules, taking into consideration concurrency and parallel processing issues. BPM systems are designed to manage the variety of possible design choices and the complexity of how this variety changes, due to service offer changes and service need changes (Kalakota and Robinson, 2003, p.70; Shaw et al., 2007). Apart from process automation and process analysis, BPM systems are also responsible for operations management and organization of work (van der Aalst, 2012) through collaboration across processes. Liu, Li and Zhao (2009) argue that with collaborative business processes, organizations can create dynamic and flexible collaborations to adapt to the changing conditions, and stay competitive in the global market. Due to its significant potential and value, collaborative business processes are now turning to be an important issue of contemporary business process management, and attracts lots of attention and efforts from both academic and industry sides.

The BPM lifecycle has three stages. In the first stage, i.e., the design stage, a process model is designed, in the implementation phase the design is converted into a running model and in the run and adjust phase the processes are adjusted and enacted when needed. The key considerations that drive design and implementation stages are supporting process improvement, supporting process management, automating process guidance, automating execution support (Curtis et al. (1992, p.77; Shaw et al., 2007).

While the past decade has witnessed several BPM implementations to optimize business processes, industry data shows that, a large proportion of these initiatives have been unsuccessful in meeting the stated initial objectives over a longer horizon (Trkman, 2009). The fit between the characteristics of the adopting organization and the standardized business process designs embedded in the adopted system affects the likelihood of implementation success or failure (Morton & Hu, 2008). In addition, for an organization to succeed in reaping the benefits of BPM, it is essential that they first outline the business drivers of BPM, articulate the targeted processes, and have a clear agenda on deployment strategies (Bandara et al., 2007). For a BPM project implementation there are mainly three stakeholders the end users, the process champions and the vendors. The major reasons behind BPM failures could be strategic, i.e., lack of governance, lack of employee buy-in, lack of common mind share of BPM, broken line between BPM efforts and organizational strategy. In addition, there could be tactical challenges like lack of standards, weakness in process specification, lack of BPM education, lack of methodology, or operational challenges like lack of tool support and process visualization, perceived gaps between process design and process execution, miscommunication of tool capabilities, etc. (Bandara et al., 2007).

In contrast to complex process design and reengineering involved in implementation of BPM, RPA is positioned as a “lightweight” service automation – commercially available rule-based expert systems software that supports BPM services and automates activities that have low

business complexity and high volume (Lacity and Willcocks, 2016). RPA solution sits on top of existing systems, without the need to create, replace or further develop expensive platforms. Figure 1 demonstrates how RPA and BPM software interfaces with enterprise applications.

<<Insert Figure 1 here>>

RPA software accesses other computer systems the way a human does, and in essence, replaces the repetitive human involvement during the execution phase. The term robot in RPA merely suggests that it is attempting to have all the characteristics of a virtual human that can be instructed very quickly in order to carry out operational procedures at the speed of a machine. It is non-invasive with respect to rest of the IT ecosystem and the software is configured with the necessary rules and instructions (Willcocks, Lacity and Craig, 2015). Essentially, RPA is a presentation-layer automation software that mimics the steps of a rules-based, non-subjective process without compromising the existing IT architecture, and thereby it is able to consistently carry out prescribed functions and easily scale up or down to meet business demands. Such process automation can expedite back-office tasks in insurance, finance, procurement, supply chain management, accounting, customer service, and human resources. It could also perform duties including data entry, placing purchase orders, creating online access credentials, and completing business processes that require access to multiple existing systems (IRPAAI, 2013). The scope of its usability across various industries and its ability to complete a variety of tasks renders RPA as a versatile tool. For a particular task to be a good candidate for RPA automation, it must be definable, repeatable, and rules-based.

As RPA promises to replace human effort, it brings in a paradigm shift beyond labor arbitrage as outsourced business process labor is replaced with digital labor available 24/7, leading to efficiency improvement as well. A compelling feature of RPA is its capability to

virtually eliminate human processing errors, when the processes are properly optimized and accurately mapped. As software robots handle the more repetitive, tedious jobs in a business, employees can participate in other value-added activities that involve personal interaction, problem solving, and decision-making, leading to improved workforce satisfaction. In addition, as each task the robot executes produces data that allows for an analysis, which leads to better decision making on both a micro and macro level. As each step in a process is traced, a company is able to identify gaps where processes could be further optimized to increase efficiency. The other benefits of RPA include regulatory compliance, as the business processes are fully tracked and documented.

While these promises are encouraging, it is essential for us to see how realizable they are and whether there are issues similar to BPM implementations. In subsequent sections, we analyze inputs from RPA business users and product developers to evaluate alignment of objectives of these two key stakeholder groups.

Research Questions and Methodology

Being a niche and nascent area of information technology, the literature on RPA is scant. The proponents of RPA have documented its features and benefits through whitepapers and case studies from early adopters. However, there is a need for comprehensive assessment of the solution and consequently identify roadmaps for effective deployment of the solution towards organizational value creation.

Towards this, we conduct our research using primary data from RPA stakeholders across the world. The objectives of the survey are to understand the key drivers of adopting RPA, core expectations from the product, importance of product implementation and factors contributing to development of the product.

Separate questionnaires are floated to two different groups of stakeholders – the user community and the product development community. We define the user community as the individuals involved in using RPA – the business process owners, the users of the product, the CIO's office involved in adopting RPA etc. The product development community consists of companies that develop RPA products or third-party vendors who act as service providers for RPA products. The survey is a group-administered survey to ensure that only relevant people involved in the field of RPA responds. The survey design consists of close-ended questions with a few comment-oriented open-ended questions. For close-ended questions, the respondents are given a pre-determined set of responses on a 5-point Likert scale.

We circulate the survey through professional networking sites and through various groups and forums involved in RPA, across the globe. The questionnaire-based survey helps to get an extensive perspective from a wide range of individuals and organizations involved with RPA. The questionnaire consists of 35 questions for the user community and 22 questions for the product development community. First, we ask both the stakeholder groups about the key drivers of RPA implementation in organizations – a set of drivers have been proposed based on our initial assessment and the respondents are asked to identify importance of these on a 5-point scale. We also ask about the criticality of prior implementation experience to both the groups. Subsequently, we ask the user community about their key expectations from RPA implementation and challenges in rollout – based on our insights and reviews we list a large number of options and the respondents are asked to identify their importance on a 5-point scale. Finally, we ask the product community to rate a set of factors that may contribute to RPA product design and development.

Table 1 summarizes the research questions and associated analysis techniques used in our study. Apart from analyzing the data and graphically representing them, we conduct

statistical analysis to obtain further insights. Mann Whitney Non-Parametric test is conducted to test if the differences in perspectives of the user community and product development community are significantly different when they consider key drivers for RPA adoption and prior RPA implementation experience. Non-parametric tests are preferred over widely used t-tests for smaller sample sizes and where normality of distribution is not expected. Like t-tests, this test takes the assumption of the fact that the observations from both the groups are independent of each other and the test compares two sample means to ascertain if they come from the same population.

In addition to the Mann Whitney test, we use Exploratory Factor Analysis (EFA) to uncover the underlying key elements from the large set of factors assessed through the survey. We conduct EFA to arrive at the underlying elements of expectations from user community, implementation challenges and the factors contributing to RPA design and development.

<<Insert Table 1 here>>

Reviewing RPA from two distinct lenses is important and critical for RPA's future success. Our experience suggests that over the past few decades various "breakthroughs" in information technology, like ERP, CRM or BPM etc. often failed to produce the expected value to the organizations. One of the key reasons for this is lack of common understanding about product characteristics and benefits between the user community and product community. The above analysis is expected to develop an alignment between these two stakeholder groups and help drive value from RPA implementations.

Analysis Findings

We set restriction on survey respondents to ensure that individuals who have been directly involved in RPA product design, development and implementation or who have been directly involved in evaluating, adopting and using RPA products participate in this survey, with no

restrictions on geography or nature of organization / industry. The objective is to obtain first-hand experience of RPA from diverse perspectives. As a result, we have obtained complete and valid survey response from 57 participants. These participants represent different roles in RPA product development organizations, consulting organizations, and organizations that have deployed or considering RPA deployment. Participants from product development and consulting organizations include RPA Architect, Director – Product Development, Head of Robotic Process Automation, Founder / Partner, Vice President – Product Sales, Robotic Process Automation Specialist, Business Consultant, Consultant - Lean and Robotic Process Automation etc. Participants' from RPA user organizations include Chief Operating Officer, Transformation Lead, Head - Business Process Automation, Business Analyst, Head - Business Excellence, Senior Manager - Robotics & Analytics, Senior Specialist - Process Development, RPA Manager, Agile Lead, Senior Robotic Automation Architect, Head of Automation, IT Project Manager, Director - RPA Delivery etc.

Key Drivers of RPA and Importance of Implementation Experience

Results show that participants from RPA product development and implementation companies (hereafter referred as Prod Co) and the participants from RPA user organizations (hereafter referred as User Co) broadly agree on the organizational drivers for adopting RPA. The biggest disconnect in the perspective of these two communities is in the area of reduction of FTEs – while User Co believe that addressing operational costs through FTE reduction is probably the strongest driver for adopting RPA, the Prod Co are not so enthusiastic about actual reduction in FTE numbers. Similarly, on the question of how critical is prior implementation experience, Prod Co assign much larger weight than the User Co. Summary results on key drivers for RPA adoption and importance of prior implementation experience is depicted in Figure 2.

<<Insert Figure 2 here>>

As a follow-up, we use Non-parametric tests to see if these perspectives differences are statistically significant. We find that among all the RPA adoption drivers, there is significant difference on perception on *Reduced FTE* and it is significant at 95% level. There is no significant difference between perceptions on other four adoption drivers, i.e., *Standardized processes*, *Limited impact to current infra and core applications*, *Improved business process cycle time*, and *Reduced error rate*. The tests also show that the perception on *Importance of prior implementation experience* is significant at 90% level. The Mann-Whitney U statistics and respective significance are shown in Table 2.

<<Insert Table 2 here>>

Expectations of the User Community from RPA

On our subsequent question to User Co about their expectations from RPA, the participants have scored 13 distinct expectations on a 1-5 scale. The top three expectations from User Co are *Optimize business processes*, *Reduce error rate* and *Reduce repetitive manual work*. The findings are shown in a Radar chart in Figure 3.

<<Insert Figure 3 here>>

Exploratory Factor Analysis is run on this data to identify the underlying structure behind these 13 observable factors. Initially, the factorability of the 13 items is examined. The Kaiser-Meyer-Olkin measure of sampling adequacy is 0.53, above the commonly recommended value of 0.5, and Bartlett's test of Sphericity is significant ($\chi^2_{(78)} = 123.14$, $p < .01$). Table 3 shows the rotated component matrix after running Principal Component analysis and Varimax rotation.

<<Insert Table 3 here>>

From Table 3 it can be inferred that variables such as *Reduce repetitive manual work, Reduce error rate, Optimize business processes, Automate a large number of process, Strategic decision making from RPA data, Analytics features of RPA* are strongly associated with Component 1. Therefore, Component 1 in this case can be called “*Business Benefits*”, and we can conclude that for the users of RPA, improvement in business processes which corresponds to reduction in average handling time are important results expected on RPA adoption. Similarly, variables such as *Provide better quality work to workforce, Ease of configuration, Prior experience of vendor implementing RPA, Engage existing service provider* are strongly associated with Component 2. Thus, Component 2 can be referred as “*Vendor Credentials*”. Lastly, *MIS data generation from RPA* is strongly associated with Component 3 and hence Component 3 can be called, “*Management Insights from RPA Process Data*”. The management or sponsors deciding to implement RPA will always have an intention to derive meaningful metrics from the data generated after RPA implementation. These data may help them formulating business strategies for the future.

Challenges in RPA Implementation

The response on the question on typical challenges that User Co participants see is depicted in Figure 4. *Resistance from business users to change the process* appears to be the biggest hurdle in implementation whereas *Significant changes to core business systems* is the least significant hurdle for the User Co community.

<<Insert Figure 4>>

Factor Analysis on the responses has been carried out after checking for the factorability of the five items. The Kaiser-Meyer-Olkin measure of sampling adequacy is 0.739, above the commonly recommended value of 0.5, and Bartlett’s test of Sphericity was significant ($\chi^2_{(10)} = 41.177$, $p < .01$). Table 4 shows the rotated component matrix.

<<Insert Table 4>>

Factor Analysis captures a certain amount of overall variance in the observed variables. Any factor with an eigenvalue greater than one explains more variance than a single observed variable. From the results in Table 4, it can be deduced that all the five factors converge to a single latent component, Component 1 with almost equal contribution. We can conclude that Component 1 can be termed as "*ROI Associated with RPA Implementation*". While implementing RPA, User Co representatives consider achieving overall ROI as the key consideration for implementation.

Primary Factors Contributing to RPA Development

The last element of our survey is for the Prod Co participants to understand the factors that drive RPA product design. The responses on 11 factors are depicted in Figure 5. The top three factors from Prod Co perspectives are *Features like reporting and analytics*, *Implementation ease* and *Improve data yield from processes*. Interestingly, the factor that is given least importance is *Client's ROI vis-à-vis large transformational projects*, suggesting that Prod Co are not in a position to relate clients' ROI from RPA projects to clients' ROI from other large transformation projects.

<<Insert Figure 5 here>>

Factor Analysis has been run after checking for the factorability of the 10 items. The Kaiser-Meyer-Olkin measure of sampling adequacy is 0.520, above the commonly recommended value of 0.5, and Bartlett's test of Sphericity was significant ($\chi^2_{(55)} = 102.623$, $p < .01$). Table 5 shows the rotated component matrix from Factor Analysis after running Principal Component analysis and Varimax rotation.

<<Insert Table 5 here>>

The rotated factor matrix data in Table 5 represent the correlations between the variables and factors. The variables, *Flexibility of configuration*, *Features like reporting and analytics*, *Implementation ease*, *Fitment for non-functional requirements*, *Greater user acceptance* are associated with Component 1 and this component can be termed as “*Implementation Factors*” from Prod Co point of view. The variables, *Resolve cluttered desktop problem of business users*, *No runtime performance issues*, *Lean roll out team* are associated with Component 2, which can be termed as “*Operational Ease*”. Lastly, two factors, *Improved data yield from processes* and *Client's ROI vis-à-vis large transformational projects* are associated with Component 3. This can be termed as “*Business Case for RPA*” and is seen as the element that can be used by Prod Co community to convince the User Co community about benefits of RPA adoption through specific measures.

Discussion

Our findings in previous section lead us to a few critical observations. First, when it comes to drivers of RPA, the Prod Co and User Co are in alignment on factors like standardized processes, limited impact to current infra and core applications, improved business process cycle time and reduced error rate. However, they differ on the factor reduced FTE, with the User Co attaching significantly more importance to FTE reduction than the Prod Co. This critical misalignment can be explained. It is argued in industry literature that IT Operations in leading organizations are making use of RPA software bots at one-third of the cost of an FTE. These bots can operate 24/7 without break increasing the operational agility and using RPA leads to greater process compliance as the software robots follows the standard operating procedure without fail most of time. For instance, one report says, a leading bank engages a pure-play RPA provider to automate a wide range of processes such as personal loan application processing, branch risk monitoring and fraudulent account closures among others. This enables the bank to reduce their bad-debt provision by 175 million pounds

annually and also save on 120 FTEs (Business Standard, 27-April-2015). Such highlighted information on FTE savings through RPA plays a role on User Co community's perceptions. On the other hand, the Prod Co community views RPA as not only a way to reduce FTEs, but an efficient and cost-effective system to execute business operations. Therefore, they pitch in the benefits of RPA by stating that the FTEs can be freed up to perform value added activities from the regular monotonous work, which can be performed by the software robots. The Prod Co respondents feel that just like the other variables, reduction in FTEs is one of the advantages that RPA provides and it should not be classified as the main advantage.

Second, the Mann-Whitney test also shows that Prod Co and User Co respondents differ significantly on their opinion related to prior implementation experiences of RPA vendor, with User Co attaching a lot lesser emphasis on experience of RPA vendor. We argue that User Co tend to perceive RPA as off-the-shelf software and we observe that Prod Co participants rightfully see the importance of strong domain experience supported by successful implementation of RPA engagements across multiple clients. Previous track records not only help Prod Co participants win new engagements, but they also help in developing well-defined solution frameworks and repository of best practices which are enablers of future RPA engagements. Successful RPA implementations helps Prod Co providers assess new RPA opportunity appropriately.

Third, when we ask User Co community about essential expectations from RPA, we find that the factors that rank highest are optimization of business processes, reducing process errors during execution, and reducing repetitive manual work. These reflect on the critical business operations challenges that organizations typically encounter and RPA is expected to address these. In addition, our Factor Analysis shows that all User Co expectations considered in our survey converge to three latent expectations: business benefits of RPA, vendor credentials and deriving management insights from RPA process data. In other words, the User Co

community wants to see direct business benefits from RPA, would intend to engage RPA vendor with proven credentials. It is also expected that RPA process data would support MIS and operational decision-making.

Fourth, on the question of implementation challenges anticipated by User Co community, it appears that threat of process change, if any, is perceived as the biggest roadblock.

Consequently, as an input, Prod Co community needs to ensure that RPA implementations are light-touch with minimal impact to processes. Factor analysis shows that the factors contribute almost equally to the underlying latent construct, ROI associated with RPA implementation.

Finally, taking into consideration the perspectives of the Prod Co representatives, the focus is on reporting and analytics, ease of implementation, and improving data yield from process automation. These are not in complete alignment with the expectations from the User Co community, suggesting closer collaboration between the two stakeholders. In addition, we find that Prod Co community has limited focus on how client's ROI from RPA project compares with the other transformational project at client organization. It may be possible that RPA Prod Co community has limited information on ROI benchmarks from different transformation projects, but lack of such comparative data may hinder User Co community from making the right decision about RPA. Subsequently, factor analysis reveals the underlying construct representing the factors we have studied consist of three distinct components: implementation factors, operational ease and business case for RPA.

In our survey only 19% of the people felt that BPM and RPA are competitive technologies when asked about the synergy between BPM and RPA. To quote one of the respondents 'I think it is not really the technology that should be competitive, but rather the consultants who implement it and the users who understand how to use it. If the consultants and the users are

'competitive' in getting the best out of RPA and BPM systems, then yes, the technology will be as well.'

Among the rest 81% of the people quote a few 'They are complementary and not competitive. Robotics reduces human involvement in a process without changing how a process works, while BPM changes how processes work', 'RPA and BPM complement one another more than compete. Without workflow process, RPA cannot automate processes', 'RPA is a subset of BPM. Whereas BPM can be seen as a governance model that lays down rules and instructions for regulating a business process', 'BPM should handle the primary integrations and business processes, RPA should handle the long tail for which BPM doesn't have a business case', 'The key again is to identify the right areas for RPA in the processing landscape vertically. BPM is deployable cross-functionally as a horizontal'. These points clearly state that majority of the people is viewing the synergy between RPA and BPM as positive direction in implementation of change in business process along with automation. Together BPM and RPA can drive the Digital Transformation which most of the companies are aiming at. Many companies which earlier only used to have BPM suites are either taking over RPA firms or partnering with them to come up with better and innovative solutions. Several use cases in the current technology landscape also suggest the same. Some of the use cases are discussed below.

1. The expenditure for maintaining the operations set up in the investment banks are very high. The errors and processing done by the back office operations can be synchronized by using BPM and the manual effort can be replaced using a software robot. E.g. In the foreign exchange market errors are generated both at the host end and at the counterparty end. Resolving these errors requires interactions with a number of systems and orchestration of work across multiple parties. This is an ideal situation where BPM and robotics can complement each other where BPM can help with the orchestration and

business rules and RPA can help fetching data from multiple systems and resolving the error.

2. Several call centers like that of Insurance call centers have adapted the BPM and RPA combination. Once a customer requests service, a case is created in BPM. Software robots remain logged into the BPM suite to pick up the request and start processing on them based on certain rules. The robot may fetch data from multiple systems to complete the processing. Once the processing is completed, the control returns to the BPM engine and correspondingly letters, messages are generated to intimate the customer. The data related to the case can be stored in the BPM engine to enhance predictive analytics and the data gathered by the software robot can be used to improve processing efficiency. All these data gathered can be analyzed by a software bot to generate reports and provide suggestions

Conclusion

In this paper, we investigate the perspectives between two distinct groups of stakeholders, the RPA user community and RPA product community, involved in RPA design, development, deployment and value creation. The central issue that we address is: How do we align these two stakeholder groups on drivers, expectations and challenges of RPA adoption so that the products can be designed, developed and implemented for generating maximum value through RPA adoption. As articulated in industry literature, RPA holds an enormous promise to organizations that are increasingly looking at expert information systems to be a key enabler for business transformation and sustained growth. RPA has the potential to balance the requirements of IT in terms of governance, security, and resilience, with the business demand for automated, cost-effective, 24/7 enterprise applications that address the business imperatives such as better information, process improvement, improved customer service, and the ability to respond to changing market conditions. As we identify the differences in the

perspectives that need to be bridged for the promised value creation through RPA, practitioners from both the stakeholder groups would find the results valuable and informative on which they can act on. This would ensure that some experiences of disappointing ROI on BPM projects in recent past do not recur with RPA adoption.

As a follow-up, we intend to extend this empirical study further with focus group discussions and case-oriented deep dives on RPA implementations. We believe that by connecting with the participants to understand their specific situations will help us build a valuable knowledge repository for practitioners and help contribute in conceptual developments in information systems.

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Figure 1: RPA and BPM Interfaces with Enterprise Applications

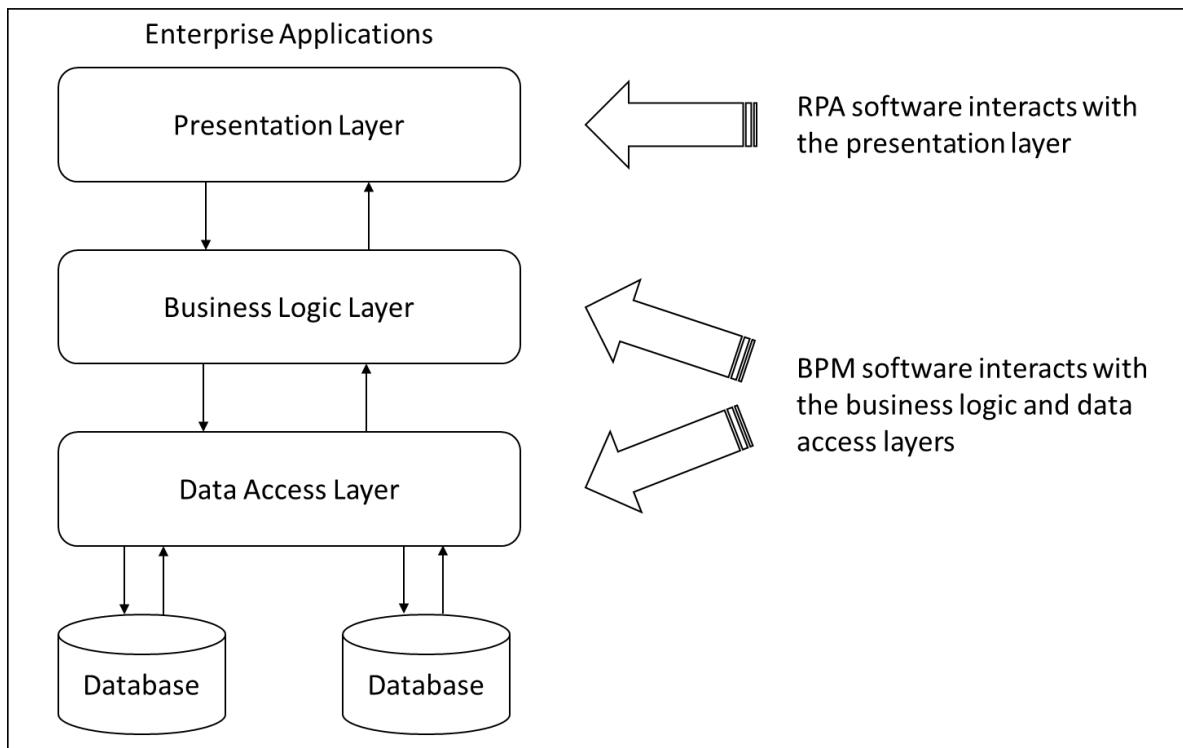


Figure 2: Key Drivers for Adopting RPA and Importance of Implementation Experience

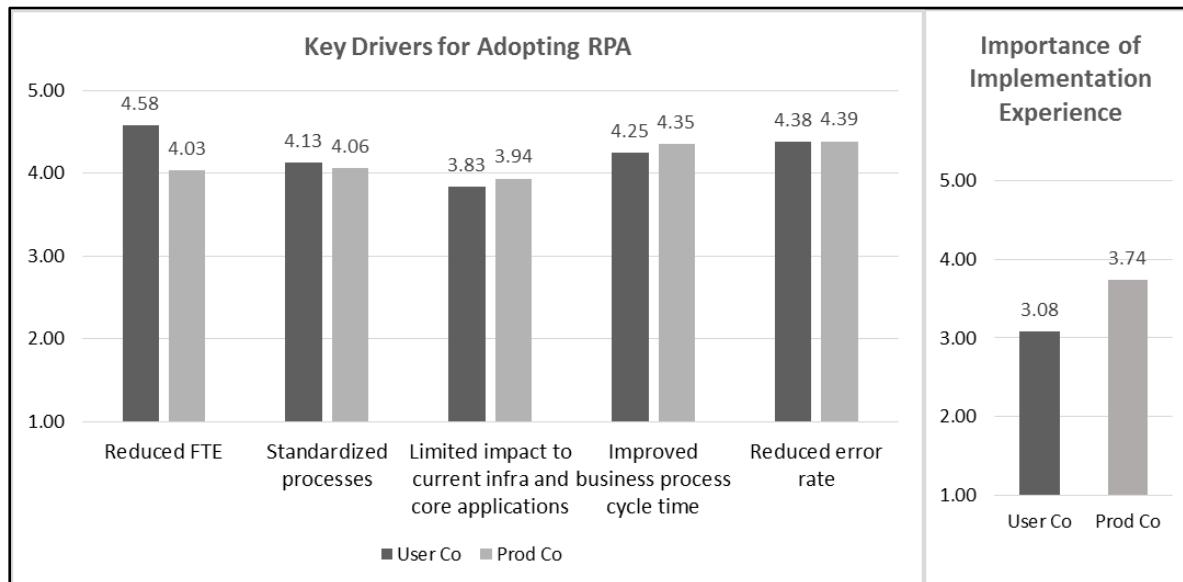


Figure 3: Expectations from RPA – User Community

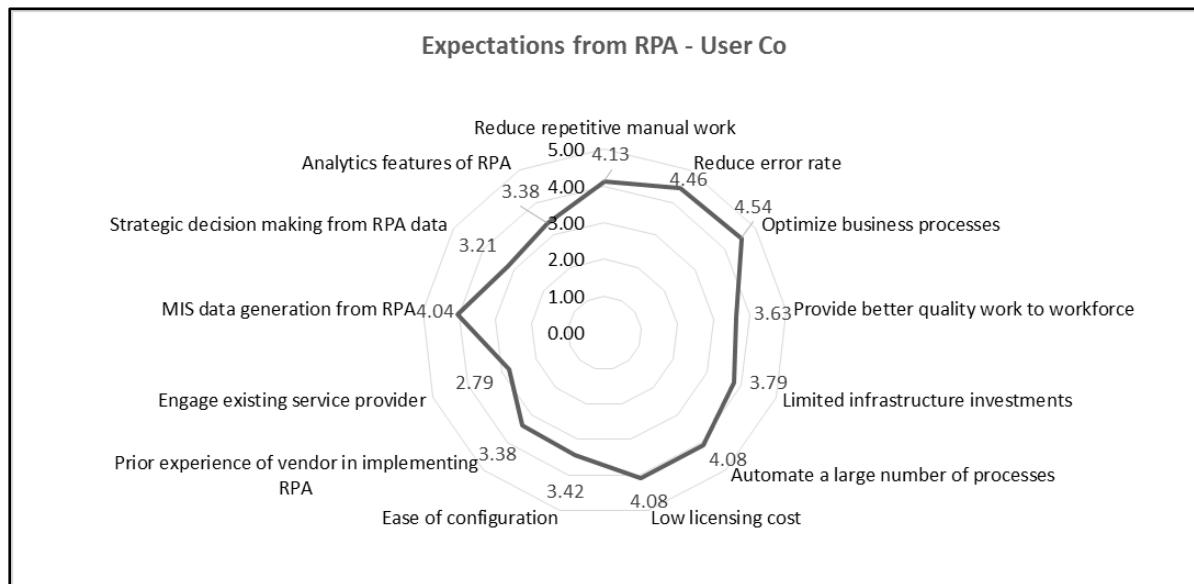


Figure 4: Challenges of RPA Implementation – Inputs from User Community

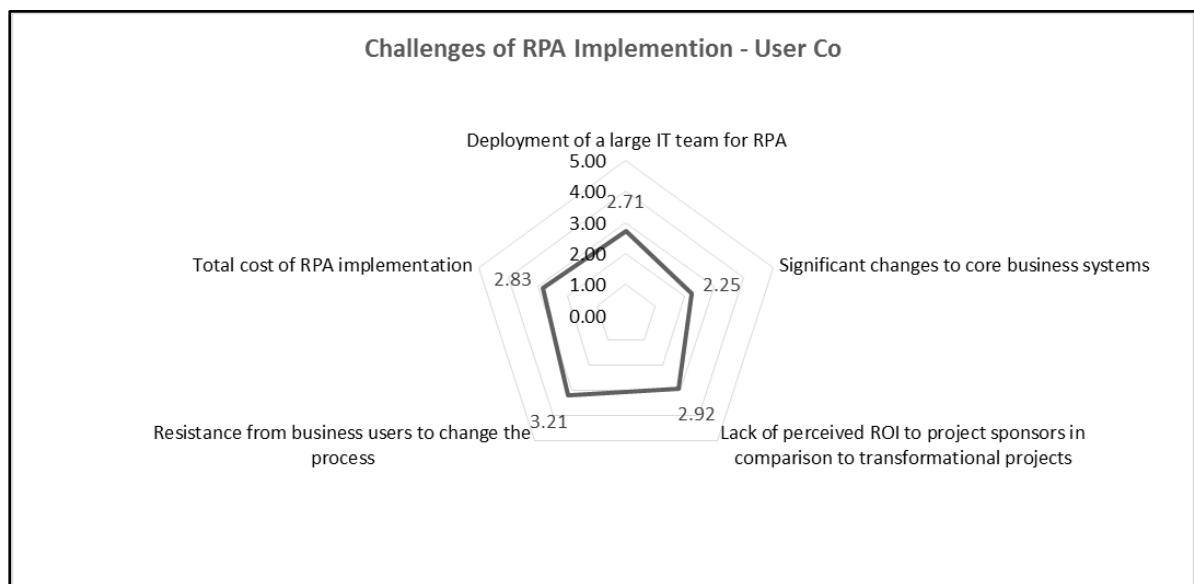


Figure 5: Factors Contributing to Design & Development of RPA – Perspective of RPA Product Community

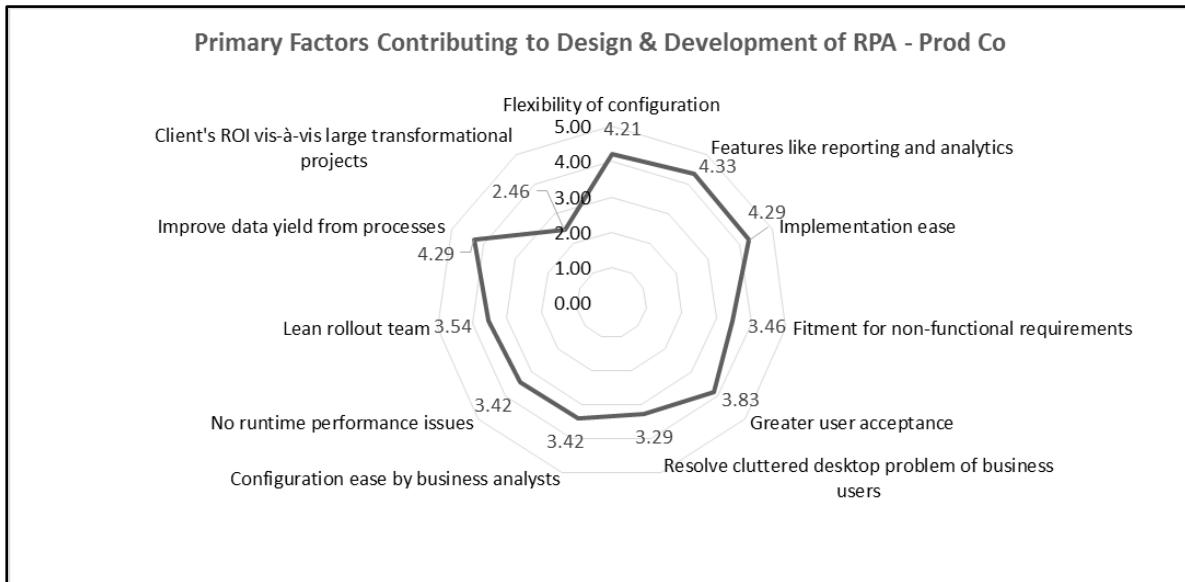


Table 1: Research Questions and Analysis Methods

Research Question	Respondent	Survey Questionnaire Type	Statistical Analysis
Key drivers for adopting RPA	Prod Cos, User Cos	Multiple questions on a Likert scale	Non-parametric tests (Mann Whitney) to compare perspectives of two groups
Importance of prior experience in RPA implementation	Prod Cos, User Cos	Single question on a Likert scale	Non-parametric tests (Mann Whitney) to compare perspectives of two groups
Challenges for implementing RPA	User Cos	Multiple questions on a Likert scale and text-based comments	Exploratory Factor Analysis to reduce the factors
Essential expectations from RPA	User Cos	Multiple questions on a Likert scale and text-based comments	Exploratory Factor Analysis to reduce the factors and arrive at underlying expectations
Primary factors contributing to RPA development	Prod Cos	Multiple questions on a Likert scale and text-based comments	Exploratory Factor Analysis to reduce the factors

Table 2: Non-Parametric Tests on Differences in Perspectives

Difference in Perspectives - RPA User Community vs. RPA Prod Dev Community						
Statistic	Non-parametric Test Statistics ^a					Importance of implementation experience
	Reduced FTE	Standardized processes	Limited impact to current infra and core applications	Improved business process cycle time	Reduced error rate	
Mann-Whitney U	251.000	361.000	326.500	328.000	337.500	276.500
Wilcoxon W	747.000	661.000	626.500	628.000	637.500	576.500
Z	-2.259	-.204	-.811	-.820	-.655	-1.749
Asymp. Sig. (2-tailed)	0.024 **	.839	.418	.412	.512	0.080 *

Table 3: Exploratory Factor Analysis – Expectations from RPA

Exploratory Factor Analysis - Essential Expectations of User Community from RPA			
Rotated Component Matrix ^a			
Factors	Component		
	1	2	3
Reduce repetitive manual work	.650	.198	.065
Reduce error rate	.536	.382	.279
Optimize business processes	.701	.099	.145
Provide better quality work to workforce	.334	.677	-.154
Limited infrastructure investments	.158	.159	.566
Automate a large number of processes	.772	-.063	-.161
Low licensing cost	.397	.508	.460
Ease of configuration	.473	.710	.048
Prior experience of vendor in implementing RPA	-.159	.743	.387
Engage existing service provider	-.150	.506	-.670
MIS data generation from RPA	-.095	.104	.849
Strategic decision making from RPA data	.675	.498	.336
Analytics features of RPA	.754	.127	.065

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
 a. Rotation converged in 6 iterations.

Table 4: Exploratory Factor Analysis – Challenges of RPA Implementation

Exploratory Factor Analysis - Challenges Faced by User Community in Implementing RPA	
Factors	Component
	1
Deployment of a large IT team for RPA	.818
Significant changes to core business systems	.700
Lack of perceived ROI to project sponsors in comparison to transformational projects	.754
Resistance from business users to change the process	.651
Total cost of RPA implementation	.882

Extraction Method: Principal Component Analysis.
 a. 1 components extracted.

Table 5: Exploratory Factor Analysis – Factors Guiding RPA Design & Development

Exploratory Factor Analysis - Primary Factors Guiding RPA Product Design & Development Community			
Factors	Rotated Component Matrix ^a		
	1	2	3
Flexibility of configuration	.841	-.093	-.030
Features like reporting and analytics	.650	-.010	.527
Implementation ease	.743	.229	-.400
Fitment for non-functional requirements	.613	.511	.144
Greater user acceptance	.831	.058	.196
Resolve cluttered desktop problem of business users	.078	.724	.089
Configuration ease by business analysts	.158	.460	-.168
No runtime performance issues	-.169	.681	.262
Lean rollout team	.041	.763	-.259
Improve data yield from processes	.074	.063	.768
Client's ROI vis-à-vis large transformational projects	.015	-.074	.670
Extraction Method: Principal Component Analysis.			
Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 5 iterations.			