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Data-centered Dependencies and Opportunities for Robotics Process Automation in Banking

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Abstract
Across the industry, financial institutions and financial technology (FinTech) companies are exploring the potential for transformative technology by implementing Robotic Process Automation (RPA) to improve service quality, reduce cost, and increase operational efficiency and effectiveness. Essentially, RPA is a software robot that mimics human functions through user interfaces. These robots interpret third-party applications and are configured to execute data and process flows identical to that of a human user. Traditional automated solutions typically require a higher level of programming knowledge; however, RPA solutions can be handled by non-technical business users. A subject matter expert or business operations employee would walk through the required process on an RPA interface, and code would be generated automatically. RPA uniquely disregards the need for programming skills, unlike traditional business process management tools. A key factor in enabling RPA implementation is the underlying data setup and management. Well-defined data structures are needed for effective automation – the easier the codification, the easier it is to create the underlying data flow, and automate it. This paper explores the centrality of data in enabling RPA, presents frameworks to identify and evaluate candidate-RPA functions, and provides examples of data-centric activities to implement RPA.

RPA AND DATA – A SYMBIOTIC RELATIONSHIP

The Institute for Robotic Process Automation (IRPA) defines RPA as "the application of technology that allows employees in a company to configure computer software or a robot to capture and interpret existing applications for processing a transaction, handling data, triggering responses and communicating with other digital systems."

Typically, RPA, or "Robomation," is applicable where there is a high volume of repetitive tasks. Such tasks are generally more prone to human error because of their monotonous nature. "Robomation" serves as a good solution to automate these tasks because it offers:

- Improved efficiency and execution quality of tasks.
- Increased oversight and control while executing tasks.
- Utilization of existing systems/application interfaces.

In many ways, RPA is a data-enabled, machine-centric mechanism for aligning process and technology. It is a component of a spectrum of intelligent automation technology geared to improve service delivery. There is, however, one key distinction between RPA and other automated process solutions: the ability to "do" versus "think." Systems, such as RPA, are oriented to execute tasks through defined and structured inputs and outputs; on the other hand, artificial intelligence and machine learning serve to "think" in judgment-based processes or solutions. Central to developing this capability is a robust data supply chain that presents appropriately defined, structured, and cleansed data. Data is the fuel that powers the process automation engine.

Since the early 1990s, banks have been increasing their investments in technology and process improvement to harness economies of scale. With the widespread adoption of virtual banking, banks must find innovative ways to deliver the best possible customer experience while trying to minimize cost, follow security standards, and meet regulatory and compliance requirements. Optimizing operations and improving efficiencies means more than just upgrading systems or outsourcing processes – the objective is to improve the speed and accuracy of core business processes, and RPA offers a potential solution to achieve this goal.

Financial institutions generate high volumes of documents across their operations. These are typically managed through a combination of legacy systems, manual processes, and emerging technology, which simultaneously create adoption, integration, and retrieval challenges. Everything from the initial application for account opening to deposits, withdrawals, loan documents, and a whole myriad of other day-to-day transactions inevitably generate documentation. Banking professionals struggle to connect the many legacy systems being used to manage and retrieve the information, which at times creates workarounds and inefficiencies. For example, one financial institution found that it was using 10-12 FTEs to collect data from one system, interpret and transform it, and then input it into another system. Substantial M&A activity has only added to this complexity by increasing the number of systems that need to be either linked or streamlined. In all such situations, it is the data flow and the structure of the data supply chain that directly impacts efficiency and effectiveness.

> Barclays uses RPA in its back offices to automate a range of processes, ranging from fraud detection and risk monitoring, to the automation of account opening. This enables Barclays to rapidly scale its ability to process customer requests and growing business needs while maintaining quality. Another example is U.K.-based Co-operative Banking Group which has automated over 130 processes with robotic automation including complex CHAPs processing, VISA chargeback processing, and other back-office processes. Source: Ovum (2015)

Technology disruption in the economy continues to be widespread, and business and operating models will likely be further disrupted by uncertainty in the geopolitical environment and industrialization of the financial services industry. The rise of virtual banking is making it increasingly difficult for many financial institutions to remain competitive in a saturated market. Customers have more options than ever before, and are demanding the best possible user experience. FinTech is eroding the space previously reserved for banks and financial institutions, who are being challenged to maximize efficiency, ensure the highest possible level of security and data integrity, and do this cost-efficiently. RPA is a powerful and effective mechanism to meet such demands. Michio Kaku suggests that "The job market of the future will consist of those jobs that robots cannot perform. Our blue-collar work is pattern recognition, making sense of what you see. Gardeners will still have jobs because every garden is different. The same goes for construction workers. The losers are white-collar workers, low-level accountants, brokers, and agents."[1]

1 http://bit.ly/2mdwHL8

Benefits

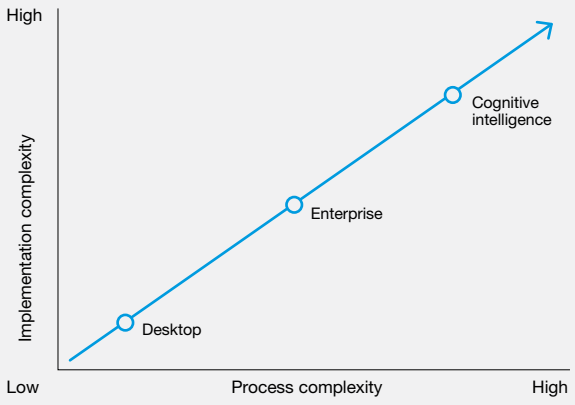
Potential core benefits of RPA include cost-reduction, improved quality, faster outputs, and the ability to integrate with legacy systems. This helps create a more uniform approach to data management without having to start from scratch. Examples include[2]:

- **Improved operational agility:** robots can be "trained" quickly and hence can respond much faster to changing requirement and business needs.
- **Improved scalability:** quick and easy enterprise level scalability as robots can be scaled up, as well as down, quite quickly as the business needs vary.
- **Increased speed:** the processing speed of the robots is at least 2-3 times higher (may be more in some cases).
- **Improved quality:** more consistent and predictable output. Dramatic reduction in error rate. Another aspect that leads to cost reduction.
- **Improved governance structure:** collaboration between IT and business since IT supports/governs it and business controls it.
- **Improved business planning and forecasting:** "robomation" can make data gathering, organizing, and analyzing much faster and easier, thus helping the organization to plan better for future business needs, trends, and opportunities.
- **Improved compliance:** every action is traceable and available for audit and reporting.
- **Enhanced customer experience:** an automated solution model with 24/7/365 availability.
- **Better labor management:** makes manual workforce available for other non-repetitive or knowledge-based tasks that need judgment/interpretation.
- **Geography independence:** can provide a single, centrally located geography independent solution to businesses which have a global presence.
- **Cost reduction:** automation costs are significantly lower than the costs associated with FTEs. Not only are there payroll and HR savings, it is also possible to reduce infrastructure cost as "robots" do not need space, desks, machines, etc.

EVALUATING CANDIDACY FOR RPA

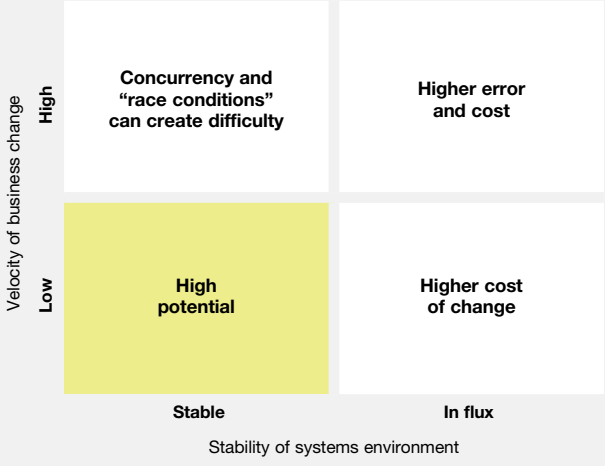
Process and implementation complexity are two key dimensions to consider when evaluating the potential for RPA, and to understand whether the focus will be at a desktop, enterprise, or at a higher cognitive (thinking) level. Figures 1 and 2 provide a structure to consider RPA potential.

To determine the best uses of RPA, we need to consider the nature of the activity being considered. Figure 2 provides a conceptual framework to understand the applicability of RPA.



The figure shows the degree to which the data is structured will drive the solution. Moving clients to standardized inputs is a key success factor to achieving significant benefits.

Figure 1 – Process and implementation complexity



Source: www.celent.com

Figure 2 – RPA scenario feasibility matrix

2 Source: www.blueprism.com; www.automationanywhere.com

In essence, RPA works best when the velocity of business change is low and changes to underlying systems are infrequent. If the data is not changing and the system is not changing, robotic process activities can most effectively be applied. The BPO industry has the highest adoption of RPA technology. Many of these processes occur with legacy systems that are not regularly updated, and the input data (format, standards, type, etc.) tends to be relatively static after the initial definition.

Business considerations

Four important considerations with examples of features that may help identify RPA-candidate activities are:

- **System characteristics:** data is entered in three or more applications (more than two duplicate data entry steps); dedicated full-time employees (FTEs) with 50% or higher administrative time for one process cycle; and percentage of manual decisions higher than 15% or fewer than five automatic validations.
- **Human characteristics:** people need to manually enter one or more documents; they print or sign more than three documents and capture one or more; and they make three or more handoffs and two or more back office tasks to complete.
- **Customer experience:** multiple authentications and sign-ins with duplicative information; long wait times for task execution and attention; and inconsistent outcomes.
- **Cognitive integration**: processes have a high degree of machine-to-machine interaction; high repetition of activity and data flow, which can help create learning points for cognitive integration; and processes have sufficiently discrete components to enable experiential learning.

Once potential RPA activities and functions are identified, next steps include:

1. **Capture data entry and review tasks that span multiple platforms:** more channels, products, and codification of systems can lead to more complex customer service or back/front office tasks. RPA robots would enter and review all the captured data required to complete tasks that would involve interaction with multiple systems. This reduces the amount of time required to train staff on multiple systems and allows robots to handle the transition process across platforms.
2. **Articulate processes at a detailed level:** to successfully program a bot, you need to understand where to grab a particular field on a screen, and which events may trigger an action. If a screen changes X and Y coordinates, oftentimes the robot will not be able to complete the task with the orientation change. However, cognitive platforms and machine learning allow the robots to reprogram themselves.
3. **Design with practitioners and experts:** programs should be planned in tandem with employees who understand the processes at a granular level. They have key subject matter expertise and know which systems work best and the shortcuts required for certain tasks. However, programming RPA with employees whose tasks are potentially being replaced will require a delicate balance of training and explanation on the use of RPA.
4. **Validate with compliance:** process changes should be validated by business and technology stakeholders, as well as compliance. RPA is efficient in compliance reporting by pulling information from desktops, web-based apps, and core systems. However, RPA programming should keep in mind the regulatory requirements to ensure completeness in addition to efficiency. Replacing human functions with robots provides a new level of risk in terms of understanding what is "right" and "wrong."
5. **Install airbags**: when connecting RPA to analytics, RPA will require cognitive support. The system should be designed to eventually allow room for machine learning so that the robots may take advantage of their self-correcting process and become more efficient over time. However, robots have the capability of learning "bad behavior" and would require protective cushions and domain knowledge to mitigate the risk of exacerbating incorrect behavior.

By shifting manual tasks from humans to machines, banks have been able to significantly reduce the need for manual intervention, which has had a direct impact on everything from performance and efficiency levels to staffing issues and expenses. With humans at the helm, errors are inevitable – some of which could prove incredibly costly to the institution, both financially and in terms of the bank's reputation. By automating back-office functions, delays and errors can largely be eliminated, thereby creating a more productive, efficient, and accurate process.

RPA can also help with compliance. Since regulatory changes occur so frequently, banks and financial institutions must stay up to date to accommodate these changes. RPA's ability to alter and adjust rapidly makes it useful in addressing situations where changes happen frequently.

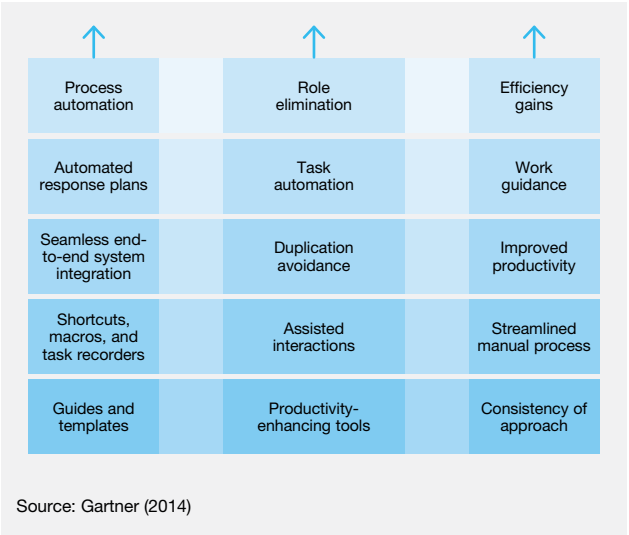


Figure 3 – Building adoption drivers by showing the value of automating processes

FRONT OFFICE	BACK OFFICE
Call center • Process information • Pre-segment clients • Address change • Credit card lost	**Branch** • Automatic calculations of terms and conditions • Sales/recommendations of financial products – cross selling • Applications for loans and deposits
Online/mobile • Chat bots • Prefill forms • Capture data to answer instant requests • Voice Payments	**Background processes** • Form filling • Data validation • Client data updates • Data migrations • Report and auditing • Claims processing • Inactivate/close account • Quality assurance

Source: www.celent.com

Figure 4 – Front and back office applications

RPA IN BANKING

RPA offers different opportunities for harnessing efficiencies and reducing errors across the front-, middle-, and back-office. Figure 4 shows a set of examples of front- and back-office functions that could be RPA candidates.

In general, the high degree of slow and costly back office manual processing present in banks can lead to inconsistent results and high error rates. Thus, there is significant opportunity to increase the levels of automation in back offices and reduce unnecessary errors and costs. By reworking their IT architecture, banks can reduce the size of operational units, and run additional value-adding tasks, such as deal origination and financial reviews. Operations can be improved both by automating specific processes (allowing for the reduction of paper, digitization of work flows, and automation of decision making) and by using IT solutions to manage residual operations that must be carried out manually. According to a report by McKinsey, by taking full advantage of this approach, banks can generate efficiency improvements of over 50% in productivity and customer service.

Certain industry leading banks have already taken key steps towards harnessing the considerable potential of this technology. For instance, one large global bank categorized its 900-plus end-to-end processes into three ideal states: fully automated, partially automated, and "lean" manual. The bank determined that 85% of its operations, accounting for 80% of its current FTEs, could be at least partially automated. At the time of this analysis, fewer than 50% of these processes were automated at all. According to a study by McKinsey [Lhuer and Willcocks (2016)], almost 50% of current FTE positions could be automated if automation programs where successful.

While this scenario is very attractive, implementation poses a unique set of challenges. The bank mentioned above did some due diligence to determine whether there was a viable business case for process automation in an acceptable time frame. It found that only half of the efficiency gains, measured by the automation business cases performed on manual processes, could be captured. Understanding and validating organizational capabilities will help clarify how robotic automation solutions can fit the needs of banks across various stakeholder interactions, such as:

- **Bank to bank –** new accounts, treasuries management, loan origination, wire transfer, and compliance filing.
- **Bank to consumer –** New accounts, change requests, problem resolution, loan servicing, consumer communications, and marketing.
- **Bank to government –** compliance filings (SEC filings like S1, 10K, 10Q, SARS), student loan servicing, FDIC reporting, NASD filings, and compliance with legislation (Patriot Act, Gramm-Leach-Bliley Act)
- **Bank to employee –** performance management, HR benefits enrollment, employee change of status, procurement applications, and leave/travel requests

Here are some of the areas within financial institutions where RPA can play an important role: data movement and multiple entries (account entry across systems); duplication/data movement (a/c reconciliation); cross-system report generation; eForms (data extraction and systems entries); support for accruals; mortgage approval process (data movement and automatic calculations); alerts and notifications (emails and letters to clients); credit card order processing; fixed asset amortization; foreign exchange/bad debt accounting/write-offs; performing calculations and entries for pricing reviews; account purge activities; client onboarding checks like required documentation; account set up operations across trading, settlement, and other systems; KYC/AML authentication process; legal and compliance process like credit checks, identification checks; data mapping across systems; activity tracking and fraud detection; reconciliation processes; and collection and distribution of payments (dividends, interests…). Examples of successful implementation of RPA in the above functions are shown in Figure 5.

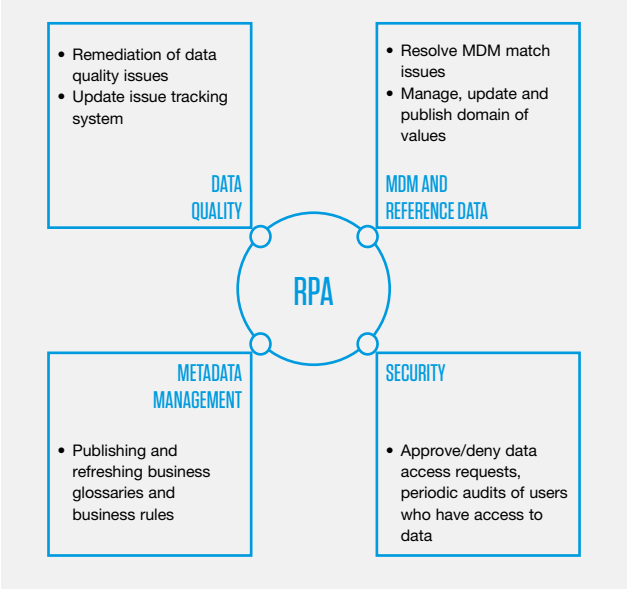


Figure 6 – RPA application within the data governance functions

	INSTITUTION	CHALLENGE	IMPLEMENTATION
1	$100+ billion asset bank United States	• Migrate loan documents to one system • Reduce cost and complexity of migration process	• Built RPA bot to take inventory of all content and its source • Extracted all data and meta-data and cleaned it according to business process rules • Loaded data into ECM system
2	$100+ billion asset bank Australia	• Deal with lack of agility in operational processes • Handle seasonal variable volumes	• Used RPA for institutional and retail banking • Automated sub-processes like transaction investigations, tracing funds, recalling funds, audit certificates
3	$100+ billion asset bank United States	• Lower call center costs • Improve customer satisfaction	• Built RPA to work with Alexa open APIs and development toolkits to give direct access to accounts through voice recognition
4	$20+ billion asset bank United Kingdom	• Improve customer service • Move staff from time consuming activities to customer-facing	• Automated 10 processes: automated, direct debt cancelation, account closures, foreign payments, audit reports

Source: www.celent.com

Figure 5 – Examples of successful adoption of RPA in banking and financial services

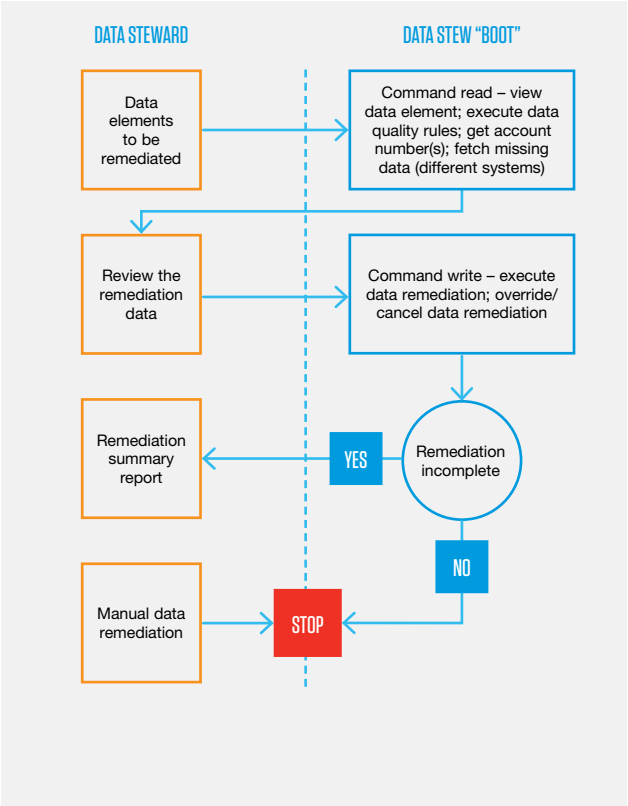


Figure 7 – Illustration of RPA assisting data steward in DQ remediation

DATA FUNCTIONS AND ACTIVITIES CAN BE EARLY ADOPTERS FOR RPA

Key to any successful RPA implementation is the right selection of tasks to automate. When selecting a task to automate, it is important to select those that have a clearly defined rule-based process and are repetitive in nature. One such use case that fits these criteria covers tasks performed by a data steward within the data governance organization. Data stewards in the financial services industry are not only responsible for data management and governance activities, but they also support business and technology users during any regulatory audit. In some cases, their workload can become significant and important tasks do not always get completed on time. A lot of the tasks are repetitive and manual in nature and make a good use case for automation (Figure 6). It is important to note that a RPA "boot" (Figure 7) is not a way to replace data stewards, but more of an automated assistant to take over repetitive manual tasks so that the steward can shift focus on other more important data governance activities which in turn will increase efficiency and reduce cost.

Data-centric activities for RPA

Data preparation and management activities provide good use cases for implementing RPA. Below are some examples of data-centric activities that can serve as early adopters of RPA and provide quick wins.

1. **Back-office service request:** information is received via email and needs to be transcribed into a structured form for input into other systems
2. **Loan onboarding data input:** collect information, capture patterns/ interpretations, transform and load data
3. **Data validation:** improve coverage, speed and accuracy of data quality checks on loan onboarding data
4. **CCAR reconciliation:** execute scripts, compare results, identify gaps/variances
5. **New loan validation:** examine, identify, and extract data from pdf files and upload into lending workflow systems requiring structured data input
6. **Manual file movement:** download and upload files from one directory to another. Manual handling of data received from a third-party source into one repository, and then downloaded, saved, and transferred to another repository
7. **Preparing and filing regulatory schedules**: download and upload files; extract data, populate work papers, and submit schedules
8. **Data stewardship:** execute data quality scripts, update metadata repositories, manage domain values, resolve MDM match issues

Using the RPA-candidacy structures discussed earlier, we can examine these 8 use cases as shown in Figure 8.

In both frameworks, activities that involve the manual movement of information from one structure to another emerged as the initial candidates for RPA-focus. The more complex activities are likely to require Cognitive Automation.

Cognitive automation

Cognitive Process Automation (CPA) takes the concept of RPA a step further. If RPA is, at a high-level, about automating repetitive high volume tasks like entering data from one application to another, CPA is more knowledge-based work, like extracting information from unstructured sources, and is all about enhancing decision making.

The cognitive agents act and learn from experience, from human trainers, and even on their own, thereby developing the ability to effectively deal with their environment. While RPA can help with eliminating inefficiencies, CPAs (like machine learning, chat-bot technology, artificial intelligence, natural language processing, big data analytics, evidenced-based learning, computer vision technology, and speech recognition) can help with work requiring judgment and perception. This has the potential of taking RPA to a new level.

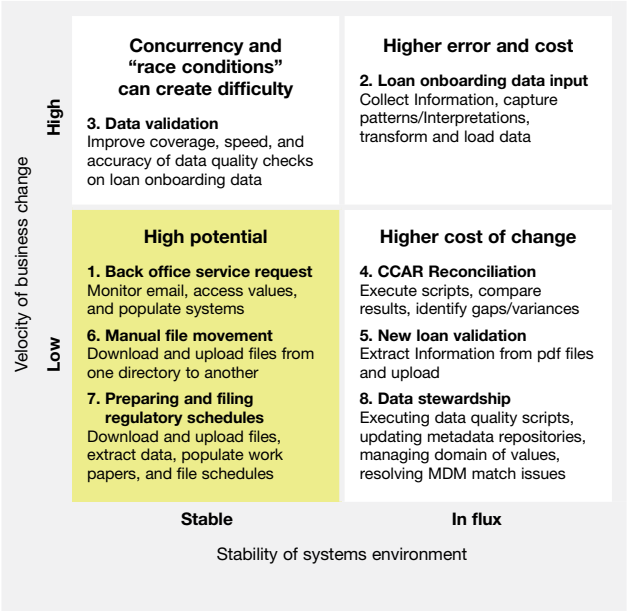


Figure 8 – RPA scenario feasibility matrix

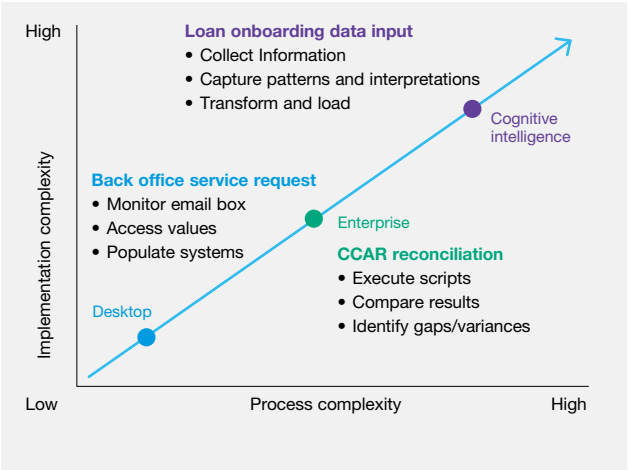


Figure 9 – RPA scenario feasibility

Cognitive RPA has the power and potential to deliver business results, such as greater customer satisfaction and increased revenues, by going beyond basic RPA. For example:

- Machine learning can make predictions about process outcomes by identifying patterns and helping RPA to prioritize actions.
- Unstructured data, like speech audio, text, or images, can be converted into structured information by bots, which can be passed to the next step of the process.

Organizations are just beginning to grasp the use and importance of robotic process automation. Combining RPA with cognitive technologies helps provide a more strategic perspective. One example of cognitive automation and RPA is shown in the document management use case below.

Document process flow use case

1. Collect documents from various sources
2. Process documents (classify, prioritize, etc.) based on type
3. Extract information from documents
4. Information validation against business rules
5. Populate downstream system with data

In this typical flow, RPA and cognitive automation can be combined effectively to increase process efficiency – RPA can be deployed for steps 1 and 5 while cognitive automation be used for steps 2, 3 and 4.

At a leading global bank, cognitive RPA was used to automate its payments business in the area of foreign trade finance. Highly unstructured datasets (comprised of invoices, bills, declarations, certificates, and letters), were one of the main challenges of automating this process end-to-end. A high daily volume of transactions requiring same-day processing, complex business processes, and the need to interface with multiple core systems were some of the other challenges. Instead of employing only RPA and partially automating the process, the bank took the approach of a combined solution. By combining traditional RPA techniques with a host of cognitive technologies that could automate most steps in the process, the bank was able to reduce the number of FTEs required to perform the process by nearly 60%.

Another instance involves a U.S. bank using cognitive RPA to automate its billing system. Like many organizations, it was facing a problem of revenue leakage due to mismatches between rate cards and client invoices. Contracts and client invoices were in paper form or PDFs. Additionally, they were written in multiple languages, which further complicated the matter. The reconciliation between paper documents was labor intensive and prone to error resulting in revenue leakage. The bank utilized NLP (Natural Language Processing) techniques to scan fee schedules and invoices. The bank also translated process requirements into an automated, executable business process workflow, identifying billing opportunities and chargebacks. Through this process, the bank recovered revenue leakage of about 10%.

CONCLUSION

Financial institutions continue to explore and expand their use of technology to improve customer experience and service, drive operational efficiencies and reduce cost – all of which can be addressed through RPA.

RPA is still in its infancy within financial services, however, many activities and functions offer the potential for RPA adoption. In particular, data preparation and data management activities are particularly attractive for RPA implementation because they span the spectrum of automation. Some that involve extraction, transport, and load (ETL) activities offer easy potential for immediate automation. Others that require transcription, interpretation, and synthesis offer the possibility of exploring cognitive automation through Artificial Intelligence and Machine Learning.

As RPA matures, the efficient and effective handling and presentation of data will become increasingly important, if not critical. A comprehensive and robust data supply chain is typically the foundation for enabling machine-to-machine interactions and realizing the potential of automation.

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