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14 RPA for the financial industry

Particular challenges and outstanding suitability combined

Abstract: Like many service industries, the financial industry is largely characterized by administrative and back-office processes and distinguished by a broad systems landscape with a high proportion of legacy systems. Missing interfaces between information systems, user interfaces, or web applications often require many manual activities. As banks are often functionally organized into traditional departments, a process-oriented organizational structure is rarely in place. The financial industry therefore offers enormous potential for the use of robotic process automation (RPA) and the raising of potential benefits such as process-related cost savings, time reductions, and quality improvements.

The aim of this chapter is to describe the tremendous opportunities that the use of RPA technology offers to the financial industry and to explain how these opportunities can be realized. Therefore, we start by explaining the challenges that progressive digitalization poses to the industry and how RPA, but also more advanced technologies (that work not only rule-based but also define own rules), such as artificial intelligence, can help to overcome them. As well as providing an overview of the various applications of RPA in the financial industry, we also provide a comprehensive case study of a relevant practical application.

Keywords: Robotic process automation, RPA applications, process automation, financial industry

14.1 Introduction

In financial institutions, they are on the daily agenda of many employees: time consuming processes that are completely rule-based and that follow rigid patterns. These processes keep them away from other, often more important activities. Maintaining data, checking, and entering systems using long lists and bridging non-existent technical interfaces by manual transfer work: in financial institutions, these activities are mostly found in the back office, but also in IT or controlling (management accounting) and financial accounting. Automating such activities creates opportunities for other, more complex tasks. But automation – here, the execution of repetitive tasks by software robots (Ivancic et al., 2019) – is not always done as easily and quickly as is sometimes propagated. Often, the costs of automation by creating interfaces and (re)programming the applications exceed their possible benefits or are simply technically not feasible. There is an alternative: robotic process automation (RPA) – the use

of software for automated handling of digital processes. RPA is still a quite emerging technology, and it is currently receiving enormous attention, especially in the financial sector (e. g., Kumar, 2018 and Smeets et al., 2019).

The following part of the chapter places RPA in the sector focus of the financial industry. The chapter begins by briefly explaining the individual challenges that the digitization of the financial industry involves. It then shows to what extent RPA can make a valuable contribution to overcoming possible hurdles on the way to becoming a digital financial institution. The potential contribution of RPA is illustrated in more detail using three different categories of use cases. These are those in which RPA supports employees, replaces them, or enables completely new processes or even new business models. A final, comprehensive example clearly illustrates how RPA can help to overcome departmental boundaries and digitize service processes end-to-end.

The example used is a case study from 2019/2020, which describes the end-to-end digitalization and automation of a customer-oriented process in a German securities institution. The case study is supplemented by numerous experiences of the authors from several years of strategic and operational consulting of financial institutions in their application of RPA and similar technologies.

14.2 Digitalization: a challenge for the financial industry

The term digitalization can mean two things (Alt and Puschmann, 2016): First, digitalization refers to a technical transformation of originally analogue data (text, image, sound, etc.) into a form that can be processed by IT. Secondly, digitalization can mean a social transformation. This refers to the increasing integration of IT in all areas of life and the resulting changes in habits or processes of daily life. Both aspects have an impact on the financial industry. In the following, the latter understanding of digitalization is relevant. In the further course of the chapter, however, when it comes to analyzing the transformation of analogue to digital data, the former understanding becomes relevant.

Digitalization creates major challenges for the financial sector.¹ Customers demand digital information exchange, communication, and product deals. Banks and financial service providers are therefore required to provide their products and services digitally. This leads to a transformation of such processes from analogue to digital, the “digital transformation.” But it often lacks an actual transformation. Rather,

¹ Alt and Puschmann (2016) provide a good overview of the potential, but also the challenges of digitalization for the financial industry.

business processes that have been tried and tested in the field are reproduced digitally, without considering the differences between a digital and an analogue process (more on this in the further course). This regularly leads to unclear and inefficient processes. They are often only partially digitalized and are provided with media breaks. An actual end-to-end digitalization – a process that starts and ends with digital input without analogue interruptions – is missing, as the following example shows.

A bank enables its customers to take out a liability insurance policy online – all digital – a typical commission business with which banks generate commission earnings outside the asset and liability business. For this purpose, the bank places advertisements on its own homepage. A direct link to the product offer is missing in the advertisement. Instead, it refers to the menu item to be selected. Once there, customers will find a wide variety of insurance packages, some with modular components that can be selected. As soon as the customers have made their decision, they enter their own data in an online mask and finally receive a confirmation that the data have been saved and forwarded. These data are now initially stored temporarily until a clerk in the bank's back office retrieves and prints them – after information by e-mail. With the help of the printout, he or she records the data in various systems. If individual data do not match, he or she creates a letter to the respective customer to request the remaining data or data that need to be corrected. If he or she receives the data a few days or weeks later, he or she creates the insurance policy in the system and sends all documents to the new customers (Smeets et al., 2019).

The example can be transferred to other areas and products, for example consumer credits or savings accounts. It shows the weak points of this digitalization attempt:

- The process is not planned from the customer's side, otherwise a direct jump to product completion would be possible.
- The variety of possible product variations makes it almost impossible to close a deal without prior comprehensive consultation – an example of digitalizing a stationary process without redesigning and adapting it accordingly – in other words, transforming it.
- The subsequent steps and the printing and recapture of data show the break between digital and no longer digital process flow. There is no end-to-end digitalization.

However, a digitalization according to our understanding would be possible with some adjustments, as the following continuation of the example shows.

The bank first revises the process by replanning it from the customer's side and eliminating obstacles and detours. The online product offering is reduced signifi-

cantly after analyses show that more than 80 % of customers who take out policies online choose a certain basic variant of liability insurance. All other combinations are chosen only very rarely. In the future, only two basic variants can be taken out online. For more specific variants, in the future there will again be stationary (or even media) advice from bank employees. Once customers have entered their data online, these could ideally be transferred directly into the legal database of all the necessary systems (Smeets et al., 2019).

From the customer's perspective, the process is fundamentally changed. The customer now finds a digital process that is so simple that they can find their way around on their own. However, a complete digitalization of the process has still not been achieved. As before, customer data are still processed by bank employees – manually – which still leads to unnecessary effort and costs. So, we must distinguish: digitalization of a process from the customer's point of view differs from digitalization from the point of view of the institute. While the former is achieved primarily through process adjustments, the latter requires technological adjustments. One technological alternative for taking the second step is RPA.

14.3 RPA in the financial industry

14.3.1 Our definition of RPA

In a first step, we need a suitable definition of RPA. We define it as follows (Smeets et al., 2019): RPA or the term “robot” does not mean a physical machine, but rather installable software. It supports people in carrying out their digitally executed activities and processes as a kind of virtual assistant. In most cases, processes can be automated with RPA when they are rule-based and structured. RPA communicates with other applications and systems, controls them, and transfers or manipulates data. This requires little or no intervention in existing IT architectures since RPA usually uses the user interface to operate the automated applications. There is no need for interfering with program code or for using interfaces to the automated applications. The software robots can work both on the desktops of employees and in a kind of dark processing – on servers, for example.

Unlike other authors (e. g., Ranerup and Henriksen, 2019), we explicitly distinguish RPA from artificial intelligence (AI), since RPA does not use any independent learning or the like, which in turn is key part of the definition of AI (see, e. g., Jarrahi, 2018, Kolbjørnsrud et al., 2017 or Mahroof, 2019). This precise differentiation enables us to regard AI as a complementary technology to process automation, which in our opinion promotes a clear distinction between those technologies in the automation environment that often require extensive explanation.

14.3.2 Goals of RPA

In a second step, it is useful to examine the different objectives that a financial institution can pursue with the use of the technology. There are at least four categories of potential that RPA has in store for the financial industry: cost savings, quality improvements, time reduction, and the other potentials that can often be derived from the first three (Smeets et al., 2019).

Cost savings

One of the most relevant arguments for process automation is the cost savings that can be achieved. These are often possible because employees can use their capacities for other activities if robots take over repetitive processes or process parts from them. This results in a reduction of the bound full-time equivalents (FTE) for the respective process. It should be noted that automation by RPA does not necessarily mean that the staff previously involved in process execution are released and no costs are incurred for them. Rather, the purpose of RPA is to free them from repetitive, time consuming processes, so that there is then more capacity available for value adding activities. The magnitude of the potential cost savings of RPA varies and depends on the process (its complexity and many other factors), the application area, and the industry. Cost savings range from 25 % (e. g., Ostrowicz, 2018 and Watson and Wright, 2017) up to 90 % (Smeets et al., 2019). The focus is in the range of approximately 30 % and 60–70 % (e. g., Willcocks and Lacity, 2016; Willcocks et al., 2017 and Tucci, 2015). The orders of magnitude also differ depending on the cost factors included. License costs, maintenance costs, and more should be considered, which unfortunately is not always the case. Based on the authors' many years of practical experience with RPAs, an order of magnitude of approximately 25 % cost saving compared to the current process using RPA technology appears to be a realistic value for financial industry.

Quality

Of course, the basic principle is always that the quality of a work result should be as high as possible. However, the quality objective is not always explicitly stated as a strategic goal and is often assumed to be more of a given. Nevertheless, such an increase in quality in process handling can also be a strategic goal for an RPA application. Human process handling, especially with frequent, repetitive activities, is prone to errors. However, process handling by RPA bots is not – if correctly developed and tested. Unsystematic errors – errors that occur randomly, for example caused by humans – are excluded by RPA. The only risk that remains is that of systematic errors, which should not be neglected. Incorrect programming that is not noticed until the RPA rollout can quickly lead to large volumes of false process results. This can be counteracted with appropriate tests, which are also required by supervisory authorities in the financial industry for software development (in Germany, e. g., BaFin, 2018).

Time reduction

Time reduction can be the third explicit goal of automation with RPA. It goes hand in hand with cost savings, as the following usually applies: Process costs are reduced through shorter processing times. Nevertheless, time savings can also be an advantage and can be considered an independent strategic goal. Especially in processes in which the (external) customer is directly or indirectly involved, an increase in speed can generate competitive advantages and improve customer satisfaction. This does not only apply to external customers, for example customers of the organization. Internal areas involved in or triggering processes are also considered customers and, as recipients of the services of another area, also often have the expectation of a high process speed.² Here, RPA contributes significantly to an increase in process speed (Willcocks and Lacity, 2016).

If the objective is “time reduction,” the following things are important and should be considered: The speed of the robot depends largely on the underlying process. If this was prepared and optimized accordingly before automation (“process streamlining”), a bot can usually work faster. In the same way, the quality of the process development (i. e., the RPA code) influences its speed. Reaction times of automated systems cannot be influenced. Since the robot works on the surface (the graphical user interface [GUI]), it is completely dependent on the speed of these applications.

Further potentials

In addition to the above-mentioned potential benefits, RPA offers the financial industry further exciting opportunities. One is to use the technology to reduce compliance and similar risks. Two options are conceivable here. First, once an RPA artifact has been developed in accordance with the specifications and protected against modification, it cannot be modified unintentionally or unnoticed. Misuse is thus significantly restricted. In addition, every step and every system input by the bot is documented, both within the target applications and in RPA’s own documentation. This means that all actions are fully verifiable by third parties, for example auditors (Willcocks and Lacity, 2016). The same applies to operational risks, for example those that lie outside the actual business activity. These are, for example, human errors, system errors, or errors within internal processes. Operational risks are a significant risk category, especially in the financial sector (Kaiser and Köhne, 2007). The discussed significant increase in process quality when using RPA reduces potential operational risks. Second, it is possible to carry out significantly more testing with RPA than with humans. Standardized test routines or even preparatory activities such as the gathering of information, which is particularly necessary in the audit areas, can be automated quickly and easily with RPA.

² This is not always given. It depends on the customers’ targets. If a customer outweighs quality over time, this statement might not be sufficient.

In practice, a high level of workload for the IT department can regularly be observed. In particular, this is the case when the bank has a heterogeneous system landscape with many applications and legacy systems. RPA can also provide support here by offering an alternative to build interfaces between these applications and systems.

RPA provides further potential for the financial industry by reducing the time-to-market for placing new products or setting up new processes, by standardized collection and evaluation of information, and much more.

14.3.3 Main areas for the application of RPA in the financial industry

Experience shows that processes suitable for RPA can be found in almost all areas of a financial institution. Regarding the above definition, however, those areas appear to be most suitable in which processes can be found that are exclusively digital and rule-based. These are the following (Smeets et al., 2019):

- **Back-office:** The department of a bank in which customer data are managed and contracts are created or maintained. Here, many employees regularly carry out structured, rule-based processes.
- **Finance (for example accounting):** The department usually prepares a variety of reports and analyses, checks invoices, makes transfers, etc., not always, but in many cases, rule-based and recurring work steps.
- **IT:** In IT, structured processes (and thus RPA use cases) are found primarily around user and authorization management or incident handling – in other words, whenever a standardized approach is taken.
- **Human resources:** The department also takes care of many issues where human interaction is necessary and useful, but especially in payroll accounting, high-volume and standardized work processes can be found repeatedly.

The individual assessments vary. For example, a study by the Information Services Group (ISG) assumes that IT will be the area most affected by automation in the coming years (Otto and Longo, 2017). Other studies differ, for example one conducted by PWC in 2017 among several dozen professionals in the United States. According to this study, the highest potential is offered by the back-office areas, with well over 80 % agreement. This is followed by the areas of finance and IT. In the areas of compliance, legal, risk control, and human resources, only minor potential for RPAs is assumed (approximately 5 % agreement). The same applies to sales. Ostrowicz (2018) also confirms the applicability in back-office, risk management, accounting, and HR.

Why are especially these units suitable? Wherever data are available in a digital format and are processed digitally, the use of RPAs is a viable option. If the de-

gree of standardization of a process area is now added as a criterion, it becomes clear why the process areas of the back office and, for example, accounting are particularly suitable for RPA. It is precisely here that most of the processes are standardized, rule-based, and based on digitalized data. The typical sales areas, on the other hand, are less suitable for automation (which can be implemented at least with little effort) according to the understanding of RPA used here. Here, existing processes often must be sub-divided into individual sub-processes, some of which can then be automated. In the sales area, the use of desktop RPA is also quite conceivable (Almato, 2020).

14.3.4 RPA as a first step towards overcoming some of the obstacles to digitalization

We follow the example from Section 14.2. For the customer, the process shown in the example appears completely digital, since the interaction occurs completely online. The customer selects his favorite product from a digital offer. He or she then concludes the contract online. He or she does not need to interact with an employee or perform any other manual activities. This is different from the bank's point of view. Although the offer is made available in a digital format, it is far from certain that the customer's order to conclude the product can be processed digitally without media and process breaks. Up to now, this is still processed manually, for example in the core banking system. For the true end-to-end digitalization of the process, the technical process view must therefore also be considered, in particular, the transfer of online input masks to the legally leading systems.

Usually, this requires technical interfaces that enable data transfer from system A to system B. However, this would require an enormous amount of IT implementation work, as new interfaces would have to be developed, tested, provided, and maintained. RPA offers an alternative, as the continued example shows.

Back to the online process with still existing system breaks and manual activities: In the future, a bot will take over the data entered by the customer and transfer them to all necessary systems – without paper printouts, without errors, and much faster than before. Instead of letters to customers, e-mails will be sent. Since the entry mask for customers was previously optimized and now contains mandatory fields and plausibility checks, the number of queries is reduced to a minimum. Only the final dispatch of the insurance policy is still done by a dispatch service provider. RPA thus manages to process a large proportion of cases automatically in the future. Human interaction will only be necessary in exceptional cases (Smeets et al., 2019).

The example shows how an end-to-end digitalization and thus digital (partial) transformation can be achieved with few changes. RPA enables an enormous reduction of effort compared to large IT-technical changes. The adaptations can be implemented

much faster so that a short time-to-market is ensured, and increasingly shorter change cycles can be calmly faced. Murdoch (2018) even calls RPA a digital disruptor. This means that RPA can modify existing processes in such a way that they are not returned to their original state over time.

14.3.5 RPA, related technologies, and their interaction regarding the financial industry

RPA can now often be the method of choice for digitalizing processes. The condition for this is that the respective process or activity fulfils certain basic requirements. For example, an RPA bot can only start working when digital data input is available in a structured format (e. g., Willcocks and Lacity, 2016). In the above example, this is the case when the data entered by the customer are made in a structured online input mask and then transferred to the RPA bot. If, on the other hand, the customer writes an e-mail with an order for product completion, this is unstructured digital input. RPA – in our definition, thus, not able to deal with unstructured data – cannot handle this. In such cases, complementary technologies can augment. In the case outlined, for example, an AI component is conceivable. With the help of a correspondingly large amount of training data (which can be seen as a major obstacle towards implementing such a component), the AI component generates a kind of own experiential knowledge. After some time, it is able to recognize and derive rules and thus structure unstructured data (Davenport, 2019).

It becomes even more challenging when customer orders are not only received unstructured, but also non-digital, for example, when orders are sent by letter. This can also be remedied, for example by using optical character recognition (OCR) technology. OCR allows scanned documents to be converted into a machine-readable format. The common RPA software already has interfaces to OCR applications or has integrated them.

When it comes to digitalization, such a process line should be ruled out from the outset and, ideally, should not occur nowadays. But there are still examples in practice where exactly such data flows exist. In banks this is regularly the case when for example garnishments and alike are received. These are often still sent by mail, so they must first be digitalized.³ Since not all forms look the same, there are also unstructured data that must be structured as in the example above. Figure 1 shows a process line combining RPA with OCR and AI. We are also going to discuss this interplay in the case example in Section 14.5.

³ At this point digitalization means the technical transformation of analogue data.

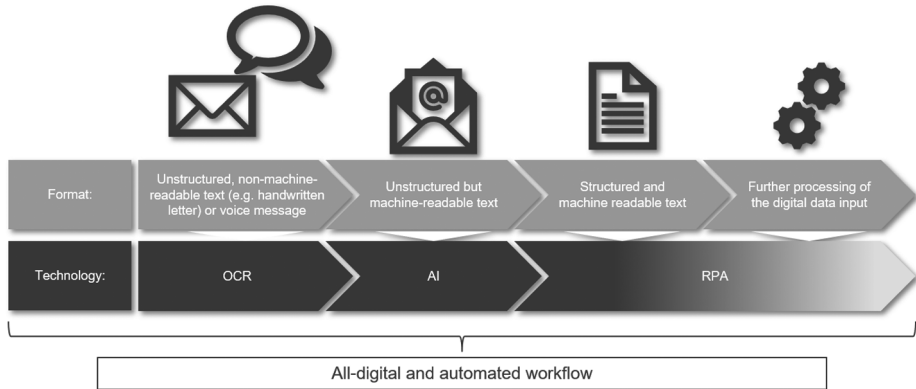


Figure 1: Digitalized and automated workflow (Smeets et al., 2019).

14.4 A selection of sector-specific RPA use cases in the financial industry

14.4.1 Possible roles of RPA

The roles that RPA can play are of great relevance for the classification of different use cases of the technology. Therefore, the following section explains different roles of RPA in the financial industry. The classical role of RPA is that of a digital assistant. It is assumed that the software robot supports humans in carrying out their tasks. The easiest way to imagine this is a desktop RPA that can be started by the employee on demand and takes care of delivery tasks.

Another role of RPA is that of a substitute for humans. Here, RPA carries out certain activities or individual tasks autonomously and independently of humans. The main difference to the first case is the independent starting of the robot. While in the first case the human triggers the robot, for example, it gives it a start and end signal, in the second case the robot is started by technical triggers. Alternatively, flow charts or similar can be stored to control the robot.

In both cases above it is assumed that RPA is used to automate existing processes. This is usually the case, especially at the beginning of an organization's RPA journey. Here, simple and rule-based processes are used and automated in a first step. But RPA can do more. Once RPA has been established in the in-house process management toolbox, it offers opportunities to set up new processes at a high speed and in sometimes new ways. If new market demands are placed on products or the legal framework changes, new processes may often be necessary or give sense from a sales and business perspective. Up to now, these could often only be put together from many manual activities, as technical adjustments were relatively too expensive or took too

long. RPA now offers the possibility to set up new processes quickly and flexibly – even if technical interfaces and other tools are not available.

In summary, RPA can therefore play three roles:

1. RPA as a support to humans in the execution of existing processes;
2. RPA as a replacement for humans in the execution of existing processes;
3. RPA as an opportunity to establish new business models or processes.

The following sections provide use cases for all three roles. Some of the examples can be found in Smeets et al. (2019). Importantly, all examples shown below refer to the exclusive use of RPA. If the above-mentioned complementary technologies like OCR and AI could be used, this is explicitly mentioned.

14.4.2 RPA applications to support humans in performing existing tasks

Provision of rule reporting

A bank's controlling department, which is organizationally assigned to overall bank management, creates daily and weekly reports for which various sources of information are used. In addition to in-house databases, the content of various web sites to which no interfaces can be created is also accessed, for example, statistical data or balance sheet data of other companies. All contents and data are condensed in a structured form and made available to the management of the bank in a layout that is always the same. In order to relieve the employees of these routine activities, an automation with RPA is introduced. The bots merge the information as far as possible and make it available to the employees of the controlling department. They then perform quality assurance, carry out final steps, and provide the final report: an example of the largely smooth interaction between man and machine. Due to the later inspection by humans, this is a cooperation. If the RPA results are of sufficient quality, it is even conceivable that humans could be completely replaced by robots in expansion stages.

Trading

Traders continuously monitor price thresholds to make changes to stop or limit prices or to execute buy and sell orders when the threshold is breached. To relieve them of the ongoing observation of prices and relevant market information, bots provide support for some of the activities. The bots monitor the prices in the institute's trading system as well as information on relevant web sites and send e-mails to the traders based on pre-defined patterns and when certain events occur. Once again, the advantage of RPA lies in the integration of different data sources. While trading systems today already have a wide range of functions, the integration of additional sources can generate a competitive advantage.

14.4.3 RPA applications to substitute human activities

Processing large amounts of data

A large securities institution regularly receives large amounts of data, which often have to be entered manually into further systems, for example, large volumes of securities orders for retail customers. The data are received as a CSV file and transferred manually to the core banking system. Direct processing is not yet possible. RPA can help here and transfer the data in each case – an RPA task that can be implemented with little effort.

Customization of customer data

A securities institution manages a high number of customer securities accounts. Using a variety of interfaces – digital and analogue – the institute receives up to several thousand change orders for customer data every day. After minor process adjustments, the digitally incoming data are further processed by bots, validated, and imported into various applications or databases – including the adjustment of the legally leading data sets. Even if the process does not achieve complete automation, a large proportion of all incoming orders can still be processed automatically. The additional use of an upstream OCR component could be considered, so that RPA can also process analogous incoming orders on forms.

Auditing of securities settlements and other book entries

In the same institute, several employees work daily on the reconciliation of securities transactions across different applications. Individual transactions are entered in in-house applications and transferred to spreadsheet programs for reconciliation. Visual checks and comparisons are carried out at the same time. This work can be fully automated. In particular, the transfer of data between systems and checking data for consistency or pre-defined values and thresholds are among the core capabilities of RPA.

Authorization management and IT

Every time an employee is hired, changes department, changes competence, or leaves the company, the IT department of an institute is required to grant, change, or delete various authorizations. In many cases, these are similar “authorization packages,” especially in the case of new hires or employees leaving the company. In all other cases, too, the steps to be taken are largely identical. An ideal application for RPA. With the help of RPA, all authorizations can be processed in all necessary applications, so that human intervention is only required for basic specifications such as the master data or the areas of competence to be assigned. Everything else, the “hard work” that is often perceived as annoying, is carried out by bots.

Resetting of passwords

Another example from the area of authorization management is the resetting of passwords, a use case that occurs daily in large quantities. Sometimes only small changes are required to make such processes automatable – for example, the implementation of a simple ticket system instead of a password hotline. Resetting passwords is just one example of the potential of RPA in IT. In principle, RPA can automate entire ticket systems and, in some cases, even answer first-level support queries independently (Beardmore, 2017). RPA is also suitable for monitoring servers or complex job chains, which is highly relevant for the IT areas of the financial industry.

Invoice processing

As a rule, incoming invoices are not posted immediately. Before the invoice amount is transferred, the correctness and legality of the invoice is usually checked. If all data are available in digital form, the entire process can be automated. If the data are available in an (as yet) unstructured form, an OCR component must also be connected upstream to make the data editable by RPA. Alternatively, initial cognitive components are already being used here, for example to recognize relevant information in unstructured texts. AIMultiple (2019) represents such a process by integrating cognitive components. The savings achieved here – without further explanation of the reference value used – are estimated at 67 FTE and thus at about \$4 million. At the same time, the processing time decreases from 6–8 minutes to about 30 seconds.

RPA in one-time scenarios

In most cases, the use of RPAs is aimed at the permanent automation of processes, i. e. the use of the technology in daily business. This need not always be the case. RPA can also be an attractive option for one-off applications. Let us give an example of data migration. A large bank transfers the accounts of a smaller subsidiary to its own core banking system. For various reasons, the migration cannot be carried out using technical interfaces. An alternative is the manual entry of hundreds of thousands of data records. This would take a long time and manual entry errors could not be ruled out, if not expected. Therefore, RPA was chosen as an alternative solution. Here, too, an interface description is first created, and a mapping is carried out. This is followed by extensive tests and a smooth data migration with robots.

14.4.4 RPA for innovation of new processes or even business models

Digital product terminations

In the future, a bank would like to offer its customers the possibility of concluding individual products and services online, such as an online current account. The data recorded digitally by the customer could be transferred to a service provider, which

– after a plausibility check – transfers the data by manual entry into the bank’s core banking system. This solution already exists for some other activities. For a new product or process, however, it does not seem to make sense. The alternative creation of an interface that would enable a direct transfer of the data entered by the customer into the core banking system is not possible in the short term, and initially not desired. Instead, however, an RPA solution can be developed that enables both plausibility checks and data transfer. In this way, an actual end-to-end digitalization of the process is achieved. Furthermore, the processing time and thus the costs of the individual process are low.

Compliance

The compliance unit monitors and checks various processes and other activities, just like other controlling bodies of the institutions. It can only carry out the control activities to the extent that it has resources – for example employees. The use of RPA can create additional capacity here. This enables the establishment of additional test routines. The bots are particularly suitable for routines that would mean repetitive and non-complex activities for the employees, where the susceptibility to errors in the control is particularly high.

14.5 Case study from the financial industry: how RPA helps to overcome departmental boundaries and to digitalize a service process end-to-end

14.5.1 Status quo: one organization, three departments, three separated processes

The following case study analyzes a process automated in 2020.⁴ Actually, it is initially about three processes, which have been combined into one at the end. The example shows impressively the possibilities for increasing efficiency that RPA can offer and how the technology can interact with other, related, but still advanced technologies. At the same time, it also becomes clear that it is rarely sensible to automate an existing process without first carrying out a thorough process analysis and subsequent reengineering. The scope of the latter varies from process to process and can, in extreme cases, lead to a completely new process being set up.

⁴ The case study is largely taken from practice. It is mostly a process that was automated in the year 2020. In some parts, necessary adjustments were made for didactic reasons.

The three processes considered here take place in a German securities institution. One of its core tasks is the management of securities accounts for retail customers. The securities institute has already been using the RPA technology for about 3 years. Around 60 processes have so far been automated and controlled by robots. The institute is supported in the implementation of new RPA processes by an external consulting firm that performs process analysis and RPA development. The processes discussed here were identified as automatable in an investigation to exploit efficiency improvement potentials around customer support. The original process flow is as follows.

A large proportion of the customers contact the bank during the year and ask it to prepare duplicates for statements of securities accounts, tax certificates, and the like. There are various ways for the customer to do this. Firstly, the customers call the call center and order the documents in a personal conversation with employees. Secondly, customers send letters, faxes, or e-mails which are read by employees and processed accordingly. Thirdly, the customers forward the order to the securities institution via their house banks. The latter orders also reach the bank via e-mail. In all three ways, employees are in contact with the customers or at least process the customer enquiry. Processing in the call center involves entering customer data and enquiries in an Excel list.

After the customer enquiry has been received by an employee in the first process, a second employee in the back-office creates the customer documents manually in the subsequent, second process. In doing so, he or she follows a kind of batch processing. The larger the batch, the longer the processing takes – no concrete deadlines have been agreed. An order is entered in the relevant system for this purpose. This is followed by an archiving process. In addition, documentation is made in another Excel list. This Excel list is passed on to a third employee.

This third employee, again in a different department, debits the fees corresponding to the respective customer order from the customer's securities account. Subsequently, archiving takes place here as well. The documents themselves have already been printed by an external service provider after the second process has been completed and sent to the customer centrally. Figure 2 shows the processes.

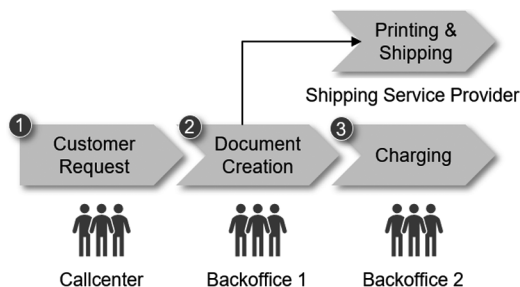


Figure 2: Initial process.

The processes and their interaction in their current state show numerous problems and – derived from them – potential for improvement:

1. Input channels:
 - a. There are too many different input channels.
 - b. Not all input channels are suitable for modern processes, for example, the input channel fax; here, non-digital and unstructured data are delivered. The processing can either be done by humans or – with enormous effort – by machines.
2. Process flow:
 - a. With at least three employees involved, the number of process participants is too high.
 - b. Waiting times result in long process throughput times. All in all, the process therefore takes too long – on the one hand from a business management point of view and on the other hand from the customer's perspective.
 - c. Not all process steps appear relevant and necessary. For example, the necessity of documentation in an Excel list for statistical purposes must be strongly questioned.
3. Systems used:
 - a. In addition to the input systems, data are recorded in Excel tables, a CRM system, portfolio management, a booking system, and archiving software. There are also other systems on the printing and dispatch side. All in all, there are clearly too many systems.
 - b. There are almost no interfaces between the systems used. The only exceptions are securities account management and the archiving system. Work steps cannot therefore be automated or parallelized.
4. General: A long process duration results from the interaction of the above factors. This has a negative effect on process costs and employee and customer satisfaction.

Perhaps even more problem areas can be listed, but these are already numerous and offer extensive potential for improvement. All in all, the initial situation offers a non-digital process. This is of great relevance in terms of costs and in terms of external impact on the institute's customers.

14.5.2 Stage 1: Process reengineering and overcoming departmental boundaries

Digitalization and automation seem to be possible in principle. In a first step, however, an intensive process improvement is necessary. This is done in four steps, along the points listed above. Importantly, in contrast to classical process optimization projects, it must be considered that digitalization should be carried out with automation soft-

ware, namely, RPA. The characteristics and requirements of such a technology should therefore ideally be considered in the process redesign right from the start. A further requirement for process optimization in this case is to overcome the department-specific “silos.” Up to now, there have been three individual processes, each of which is specific to a department. The objective is to develop a cross-departmental end-to-end process.

Step 1: Reduction of the number of input channels and digitalization

The number of input channels is reduced. Faxes and letters will no longer be accepted. It is now only possible to place an order via e-mail, call the call center, or use the online input mask. This is a first important success. There is no longer any analogue input data; all data are received digitally – even if still unstructured. It can justifiably be argued here that the restriction of input channels could be perceived by customers as a restriction rather than an added value. However, a trade-off must be made between customer satisfaction and technical feasibility/efficiency. Here, the latter prevails, as it can be assumed that customer satisfaction will not suffer significantly from this limitation.

Step 2: Optimization of the process flow

All unnecessary process steps are eliminated, e. g., the collection of “statistical” data in an Excel spreadsheet. For this purpose, it is checked which process steps or information stores are necessary from a business point of view and which are not. In addition to banking requirements, the financial industry has many other complex requirements. These are, for example, high demands on data protection and confidentiality of data. Auditing and compliance monitor data storage and use, especially in the case of the sensitive handling of customer tax data. In addition, process responsibility is shifted to the first of the three departments involved – the call center. Although further processing is carried out in one step, which is to be assigned to the back-office, this is to be automated in the future. A back-office employee is therefore no longer necessary in the target picture. The full process responsibility is therefore transferred to the call center or the respective employees there. Time savings are already achieved by shifting the work steps forward and executing them from one source.

Step 3: Adding interfaces and removing systems

Wherever possible and feasible with little effort, system-side interfaces are created. Systems that are not necessary are eliminated from the process flow, such as the Excel application from step 2.⁵ In some cases, information that must be entered in the individual systems can also be reduced.

⁵ We hereby assume that all process links are known and the procedure of eliminating systems does not lead to risks.

Step 4: Prepared process

Taken together, the changes achieved so far already result in a significant reduction of the process throughput time. Long waiting times – especially noticed by customers – are eliminated and the requested documents are made available more quickly than before. The process is now prepared and optimized for automation regarding business and technical requirements. Thus, an optimized, but still manual process is available.

14.5.3 Stage 2: Adding RPA bots

The next step is to use RPA technology. In the case study considered here, the bank is already a user of the technology. The software is available and installed, and the architecture – consisting of a central control unit, design components for the RPA engineers, and executing bots – is set up. In addition, sufficient resources are available to develop and test the future RPA process. The project team's approach follows a standardized procedure, which is shown in Figure 3.

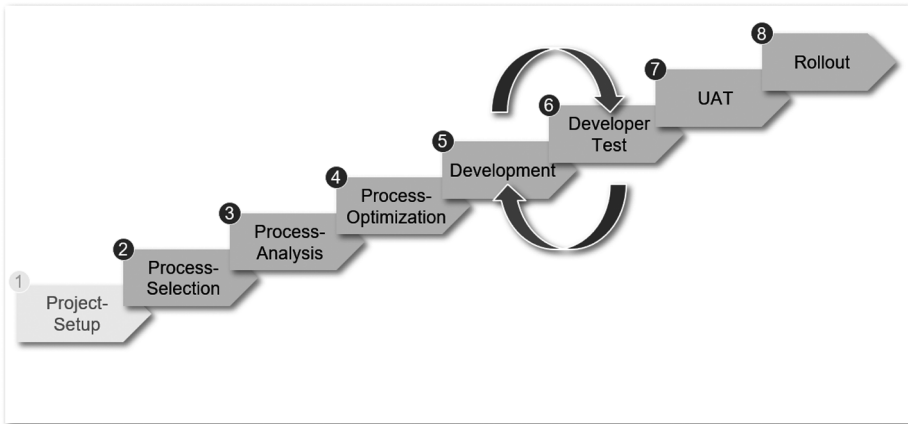


Figure 3: RPA implementation approach.

After selecting the process, the process analysis was carried out. The process was then optimized so that the development of the RPA process can now begin. The development follows an agile approach and takes place in so-called sprints. As soon as the required quality of the software development has been achieved and the developer tests have been completed, the user acceptance test (UAT) by the department follows. If this is successful, the RPA process can be transferred to productive operation.

Special requirements for the development process must be observed regularly when using a replication server in banks. In the financial industry in Germany, for example, BAIT (BaFin, 2018) makes demands on the software development process. Separation of functions and separate system environments must be considered. Many

banks use standardized software development procedures and documentation, which should also be taken into account by RPA. At this point, it can be critically discussed whether RPA development can be counted as software development in the classical sense or whether it is rather a pure configuration of already developed software. This discussion will not be held here; in case of doubt, the treatment as classical software is the more secure variant (regarding audits and the like).

Figure 4 shows where RPA is used in the known process. The sales order is still received by call center employees. This is because although the orders are largely placed digitally – if not by telephone – the data are still unstructured. However, RPA needs structured data as input to be able to work with it. The call center employees therefore enter all customer orders in a prepared table. This table is located on a central drive. The corresponding customer names with securities account number and concrete order, for example, the creation of a new tax return, are collected here throughout the day. At the end of the day, an RPA bot automatically starts reading the data entered during the day. It transfers these data to all relevant systems, searches for the necessary documents, and issues the corresponding shipping orders to the shipping service provider. The robot then opens the booking system and debits the customer accounts with the corresponding charges. A receipt is then produced and subsequently archived. In the example, RPA replaces the human being. Human processing is therefore only necessary at the beginning of the process, to create the two necessary prerequisites for processing with RPA: digital and structured data.

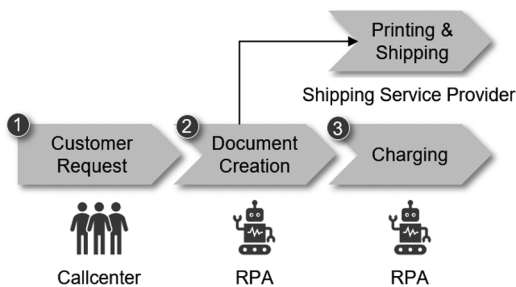


Figure 4: Process with integration of RPA.

14.5.4 Stage 3: Integration of machine learning

Much has already been achieved so far. Most of the process is automated with RPA and takes place in a dark processing environment. What is still missing is the automated processing of customer inquiries. Telephone orders are excluded at this point; these will continue to be received and answered by “real” employees. Since faxes and letters are no longer accepted, the e-mail channel remains. As already mentioned, e-mails are digital, but unstructured input. RPA cannot deal with this as there are no clear rules.

AI can provide a solution. In the meantime, approaches around machine learning have been developed which, after sufficient “training,” can recognize specific patterns in unstructured data (Davenport, 2019). Using these patterns, the data or incoming orders can be classified and – metaphorically speaking – fed into a respective input channel. The RPA bot is developed in such a way that it receives a concrete rule for each input channel and can process the data accordingly. Hereby complete process automation is achieved. However, this is opposed by a rather high preparation effort. The machine learning component, or better, the machine learning algorithm, usually requires several thousand data sets to “learn.” In this case, people must evaluate the classification of the algorithm – for example deciding whether the algorithm was right or wrong. A correspondingly large amount of time is required for this. The interaction of AI (machine learning) and RPA is shown in Figure 5.

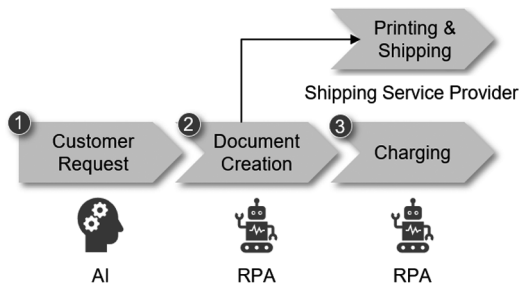


Figure 5: Process with integration of RPA and AI.

14.5.5 Interim summary and outlook

The case study shows three essential triggers to turn a complex and analogue process into a lean, digital, and automated one:

1. For successful automation with RPA, a preparatory process analysis and adaptation is almost always useful – especially if not only individual tasks but “real” processes are automated.
2. Even minor process adjustments sometimes have a big lever. With just a few changes, data input can often be made available digitally and in a structured form, making it editable with RPA.
3. Machine learning can be a useful supplement to turn a partially automated process into a fully automated one. However, this requires a great deal of preparation, so cost and benefit must be carefully weighed against each other.

The process offers further potential. For example, the input channel could become more standardized in the next step. If an online input mask were to be made available for customers and affiliated banks, structured data input would be available right at

the start of the process, not unstructured (e-mail) as is currently the case. This would also make the machine learning component obsolete. If technical interfaces can be created between the data entry mask and the processing system, the need for an RPA solution could even be eliminated for part of the process.

14.6 Summary

Although a broad study is lacking, various minor studies and surveys indicate that there is a gap between existing and used potential of RPAs in the global financial industry. In the financial industry, but also in other industries, RPA can play different roles. It can facilitate the work for human employees, it can completely take over their tasks, or the technology can be used to develop new business opportunities. RPA processes can be found in all areas of banks and insurers, with the focus on the back-office, finance, and IT. As the case example shows, the transition to a digital process is not always difficult and can sometimes be done with little effort. It becomes understandable that AI can be a useful addition to RPA and can lift the process from partial to full automation.

What is still missing is a more in-depth scientific investigation of the most diverse open questions concerning RPA. Which processes are actually best suited? What are relevant success factors? How does RPA interact with other, related technologies? What influences the acceptance of RPA by employees? And there are many more questions. Individual case studies are available, but comprehensive studies based on scientific principles are not known to us so far and, therefore, offer great potential for further research.

Bibliography

- AIMultiple (2019) RPA use cases. Accessed January 20, 2019. <https://blog.aimultiple.com/robotic-process-automation-use-cases/#banking>
- Almato (2020). <https://www.almato.com/automation/>. Accessed May 22, 2020
- Alt R, Puschmann T (2016) Digitalisierung der Finanzindustrie – Grundlagen der Fintech-Evolution. Springer, Berlin Heidelberg
- Beardmore L (2017) Robotic process automation. <https://www.capgemini.com/service/business-services/enabling-technologies/robotics-process-automation/>. Accessed January 20, 2019
- Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin) (2018) Rundschreiben 10/2017 (BA) in der Fassung vom 14.09.2018, Bankaufsichtliche Anforderungen an die IT (BAIT). Accessed December 23, 2018. https://www.bafin.de/SharedDocs/Downloads/DE/Rundschreiben/dl_rs_1710_ba_BAIT.html
- Davenport TH (2019) The AI advantage. How to put the artificial intelligence revolution to work. The MIT Press, Cambridge Massachusetts, London, England
- Ivancic L, Susa Vugec D, Bosilj Vuksic V (2019) Robotic process automation: systematic literature review. In: Di Ciccio G et al (eds) Business process management, vol 361, pp 280–295

- Jarrahi MH (2018) Artificial intelligence and the future of work: human-AI symbiosis in organizational decision making. *Bus Horiz* 61(4):577–586
- Kaiser T, Köhne MF (2007) Operationelle Risiken in Finanzinstituten. Eine praxisorientierte Einführung, 2nd edn. Gabler, Wiesbaden
- Kolbjørnsrud V, Amico R, Thomas RJ (2017) Partnering with AI: how organizations can win over skeptical managers. *Strategy Leadersh* 45(1):37–43
- Kumar KN (2018) Robotic process automation – a study of the impact on customer experience in retail banking industry. *J Int Bank Commer*. <http://www.icommercecentral.com/open-access/robotic-process-automation-a-study-of-the-impact-on-customer-experience-in-retail-banking-industry.php?aid=87176>. Accessed May 16, 2020
- Mahroof K (2019) A human-centric perspective exploring the readiness towards smart warehousing: the case of a large retail distribution warehouse. *Int J Inf Manag* 45:176–190
- Murdoch R (2018) Robotic process automation. Guide to building software robots, automate repetitive tasks & become an RPA consultant. Self-published
- Ostrowicz S (2018) Next Generation Process Automation: Integrierte Prozessautomation im Zeitalter der Digitalisierung. Ergebnisbericht Studie 2018. Horváth & Partners, Frankfurt a. M.
- Otto S, Longo M (2017) ISG-Studie: Robotic Process Automation (RPA) sorgt für mehr Produktivität und nicht für Jobverluste. https://www.isg-one.com/docs/default-source/default-document-library/isg-automation-index-de_final_form.pdf?sfvrsn=15defe31_0. Accessed January 20, 2019
- PWC (2017) What PwC's 2017 survey tells us about RPA in financial services today. <https://www.pwc.com/us/en/financial-services/publications/assets/pwc-fsi-whitepaper-2017-rpa-survey.pdf>. Accessed January 10, 2019
- Ranerup A, Henriksen HZ (2019) Value positions viewed through the lens of automated decision-making: the case of social services. *Gov Inf Q* 36:101377
- Smeets M, Erhard R, Kaussler T (2019) Robotic Process Automation (RPA) in der Finanzwirtschaft. Springer, Wiesbaden
- Tucci L (2015) KPMG: death of BPO at the hands of RPA. <https://searchcio.techtarget.com/blog/TotalCIO/KPMG-Death-of-BPO-at-the-hands-of-RPA>. Accessed December 30, 2018
- Watson J, Wright D (2017) The robots are ready. Are you? https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKewjizofA5MnfAhURYIAKHWHaBqoQFjAAegQlChAC&url=https%3A%2F%2Fwww2.deloitte.com%2Fcontent%2Fdam%2FDeloitte%2Ftr%2FDocuments%2Ftechnology%2Fdeloitte-robots-are-ready.pdf&usq=AOvVaw2luiVINhzNclPK70Ac7_zc. Accessed December 31, 2018
- Willcocks L, Lacity M (2016) Service automation. Robots and the future of work. Steve Brooks Publishing, Warwickshire
- Willcocks L, Lacity M, Craig A (2017) Robotic process automation: strategic transformation lever for global business services? *J Inf Technol Teaching Cases* 7:17–28