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ΙΩΑΝΝΙΝΩΝ

**ΣΧΟΛΗ ΟΙΚΟΝΟΜΙΚΩΝ ΚΑΙ ΔΙΟΙΚΗΤΙΚΩΝ ΕΠΙΣΤΗΜΩΝ**

**ΤΜΗΜΑ ΛΟΓΙΣΤΙΚΗΣ & ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΗΣ**

**ΠΜΣ ΔΙΟΙΚΗΣΗ ΕΠΙΧΕΙΡΗΣΕΩΝ & ΟΡΓΑΝΙΣΜΩΝ**

**ΜΕΤΑΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ**

**Governance Risk and Compliance with the use of Robotic Process  
Automation & Business Process Management: A path to  
Hyperautomation**

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## Περίληψη

Η τελευταία δεκαετία σηματοδεύτηκε από μια κατακόρυφη αύξηση της τεχνολογίας και της καινοτομίας. Πλέον υπάρχουν πολλοί νέοι τομείς γνώσης για εξειδίκευση, όπως βάσεις δεδομένων, big data, blockchain, τεχνητή νοημοσύνη (AI), cloud computing, machine learning, ρομποτική αυτοματοποίηση διεργασιών (RPA) μεταξύ άλλων, καθώς και επιχειρηματικές καινοτομίες όπως ο ψηφιακός μετασχηματισμός.

Η υπεραυτοματοποίηση (hyperautomation) είναι ένας πρόσφατος τεχνολογικός όρος που περιλαμβάνει αυτοματοποίηση διαδικασιών και εργασιών γνώσης με ευρύ επιχειρηματικό εύρος και ενσωματωμένες τεχνολογίες που ανταποκρίνονται συνδυάζοντας κυρίως τον προγραμματισμό του BPM με RPA, Machine Learning καθώς και άλλες τεχνολογίες τεχνητής νοημοσύνης. Αν και η λέξη υπεραυτοματισμός έχει χρησιμοποιηθεί σε προηγούμενες έρευνες τις τελευταίες δεκαετίες, μόλις πρόσφατα αναγνωρίστηκε σταδιακά ένα κοινό πλαίσιο και νόημα. Το 2017, η Wipro, μια κορυφαία εταιρεία παροχής υπηρεσιών πληροφορικής, συμβούλων και επιχειρηματικών διαδικασιών παγκοσμίως, αναφέρθηκε στα έργα υπεραυτοματισμού τότε ως μια γνωστική υπηρεσία που προσφέρει στους πελάτες της, η οποία συνδυάζει RPA και AI για αυτοματοποίηση διαδικασιών, προχωρώντας λίγο περισσότερο από την τυπική εκτέλεση επαναλαμβανόμενων εργασιών.

Ο υπεραυτοματισμός θεωρείται ότι είναι μία από τις τρεις κύριες πτυχές που αναγκάζουν τις εταιρείες να επανεξετάσουν τις πρακτικές διαχείρισης, με τις άλλες δύο να είναι το εργατικό δυναμικό υψηλής εκπαίδευσης και οι απόλυτα ενημερωμένοι πελάτες. Οι τεχνολογίες τεχνητής νοημοσύνης επιτρέπουν αυτόνομες ενέργειες για εργασιακές καταστάσεις όπου άνθρωποι και ρομπότ συνεργάζονται. Η τεχνολογία RPA φέρνει ευελιξία, υψηλή ευφυΐα στη λήψη αποφάσεων και προσαρμοστικότητα στο περιβάλλον επιχειρηματικών διαδικασιών με τη χρήση AI. Η τελευταία δεκαετία προσέφερε επίσης έξυπνα συστήματα διαχείρισης επιχειρηματικών διαδικασιών (iBPMS) για την υποστήριξη των επαγγελματιών της Διαχείρισης Επιχειρηματικών Διαδικασιών (BPM) στην προσέγγισή τους στον εντοπισμό, το σχεδιασμό, την εκτέλεση, την παρακολούθηση και τον έλεγχο τόσο των αυτοματοποιημένων όσο και των μη αυτοματοποιημένων επιχειρηματικών διαδικασιών. Τα συστήματα BPM διαχειρίζονται μακροχρόνιες διεργασίες και το RPA διαδραματίζει βασικό ρόλο στην πορεία του υπεραυτοματισμού, ειδικά κατά τη σύνδεση συστημάτων παλαιού τύπου.

Η παρούσα διατριβή εστιάζει σε σύγχρονες μεθόδους εταιρικής διακυβέρνησης, διαχείρισης εταιρικού κινδύνου και συμμόρφωσης (GRC) με τον συνδυασμό τεχνολογιών BPM και RPA προκειμένου να επιτευχθεί η βέλτιστη διαδρομή προς τον υπεραυτοματισμό.

Λέξεις κλειδιά: GRC, BPM, RPA, Υπεραυτοματοποίηση

## Abstract

The last decade has been marked by an increase in terms linked to technology and innovation. There are numerous new knowledge areas to specialize like big data, data science, blockchain technology, ransomware, artificial intelligence (AI), cloud computing, machine learning (ML), robotic process automation (RPA), among others, as well as business innovations like digital transformation.

Hyperautomation happens to be a recent technological term involving automation of processes and knowledge work with a broad business scope and technologies integrated with a responsive workforce, mostly combining the planning of BPM with the RPA, ML and other AI technologies.

Although the word hyperautomation has been used in previous research in the past decades, its only recent that a common context and meaning has been gradually acknowledged. In 2017, Wipro, a leading global IT, consulting and business process services company, referred to hyperautomation projects at the time as a cognitive service offering to their customers which combines RPA and AI for process automation, going a bit further than the classic execution of repetitive tasks.

It's considered that hyperautomation is one of the three main aspects that force companies to rethink their management practices, with the other two being a highly educated workforce and perfectly informed customers. AI technologies enable autonomous actions for work situations where humans and robots collaborate. RPA brings flexibility, decision making intelligence and adaptability into business process environment with the use of AI.

The last decade has also offered intelligent business process management systems (iBPMS) to support Business Process Management (BPM) professionals on their approach to identify, design, execute, monitor, and control both automated and non-automated business processes. BPM systems manage long running processes and RPA has key role to the path of hyperautomation, especially when connecting legacy systems. This thesis focuses on the modern Governance Risk and Compliance (GRC) methods with the combination of BPM and RPA technologies in order to achieve the optimal path to hyperautomation.

Keywords: GRC, BPM, RPA, Hyperautomation

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# Chapter 1

## Introduction

The past two years have been described as ‘‘the years of the coronavirus’’, and as it seems the global pandemic will remain in our lives for more. Although the negative impact of the pandemic in the economy, there have been some quite positive global technological and sociocultural advantages. In this thesis we will present the rise of the Robotic Process Automation (RPA) with an emphasis to the hyperautomation that it can lead. We will present how decisions are made, how business prepare for, and react to possible risks, and how comply with rules set by compliance authorities. Also, we will mention some of the latest software robots, technology, and Business Process Management (BPM) knowledge that business can employ on their path to achieve higher levels of efficiency.

## Thesis Aim

The aim of this thesis is to present a comprehensive approach found in literature for businesses that attempt a digital transformation. Business Process Automation and Robotic Process Automation. We aim to analyze them, present their benefits and flaws, and present the benefits they offer especially if combined together, while we also mention the risks and their flaws. For that we will also present some of the most common fields of practice, like banking, manufacturing, and financial services. The aim is to promote the result that hyperautomation is rather new and needs continuous improvement with the use of Artificial Intelligence and Machine Learning if we aim for a true digital transformation and automation of even more processes.

## Thesis Objectives

The aim of this thesis can be summarized as follows:

- Studying and understanding the way businesses are organized and comply with regulations
- Studying and understanding how risk enterprise management work
- Present the Business Process Management method and its benefits for businesses
- Present Robotic Process Automation bots, their capabilities and how they can benefit business that aim for automation techniques
- Present the benefits of companies when they implement both Business Process Management and Robotic Process Automation in order to achieve hyperautomation

## Thesis Structure

The rest of this thesis is in a manner to describe the elements of GRC and what tools can be implemented to the path of hyperautomation. More details:

- Chapter 2 introduces the term of Governance, Risk and Compliance and why is important to business small and large enterprises and what benefits it can offer.
- Chapter 3 focuses on dangers that companies face and how to turn them into opportunities for the management team.
- Chapter 4 we introduce the Business Process Management method. It's most popular modeling techniques, the importance of automation and the intelligent use of data.
- Chapter 5 presents the Robotic Process Automation rise and its effect to business process execution. We study mainly the capabilities, benefits, risks and the implementation on various industries and its future in a post COVID-19 world.
- Chapter 6 we attempt to set the differences of Business Process Management and Robotic Process Automation and present the benefits of the combination of those tools.
- Chapter 7 holds the contribution of this thesis along with a conclusion and the possible future works that might follow.

### Governance, Risk and Compliance (GRC)

#### Introduction 2.1

GRC is not something new in the business world. Almost every activity of GRC has been going on for quite some time. The duties coming from Section 404 of Sarbanes-Oxley act has been always part of the auditors' toolkit of recommendation when it comes to preventing fraud. Companies also have been under obligation to report financial results accurately, comply and report on their performance with respect to safety and trade laws and identify risk as soon as possible. Every well-run company puts its own unique self-inflicted policies in place and makes sure that they are being followed. As times change so does the policies which should be constantly updated.

As mentioned above G stands for governance. Corporate governance means taking care of business, making sure that things are done according to the corporation standards, regulations, and board of directors' decisions. The R is Risk. Everything a corporation do involves some element of risk. It's pretty clear that certain risks are not to be take. When it comes to business however, risk can become a way to protect asset value and also create value by strategically expanding an enterprise or add new products and services. C stands for compliance and is defined as ensuring that business processes, operations and practice are in accordance with prescribed and/or agreed set of norms. As such it encompasses laws and regulatory requirements, organization policies, internal codes, and guidelines as well as ethical norms in all kinds of organizations. Compliance management in general denotes a process of enforcing compliance by taking suitable provisions. Compliance management strives to ensure that an organization adheres to all relevant laws and policies. Its aim to effectively and efficiently, fulfill all external and internal regulations applicable in an organizations business context. Responsibility for this is generally assigned to senior management.

Going beyond the acronym GRC, it is important to keep in mind that these represent core disciplines of governance, risk management, and compliance. Each of the disciplines consists of the four basic GRC components: strategy, processes, technology, and people. Governance, risk management, and compliance principles are tightly bound to tie these principles together.

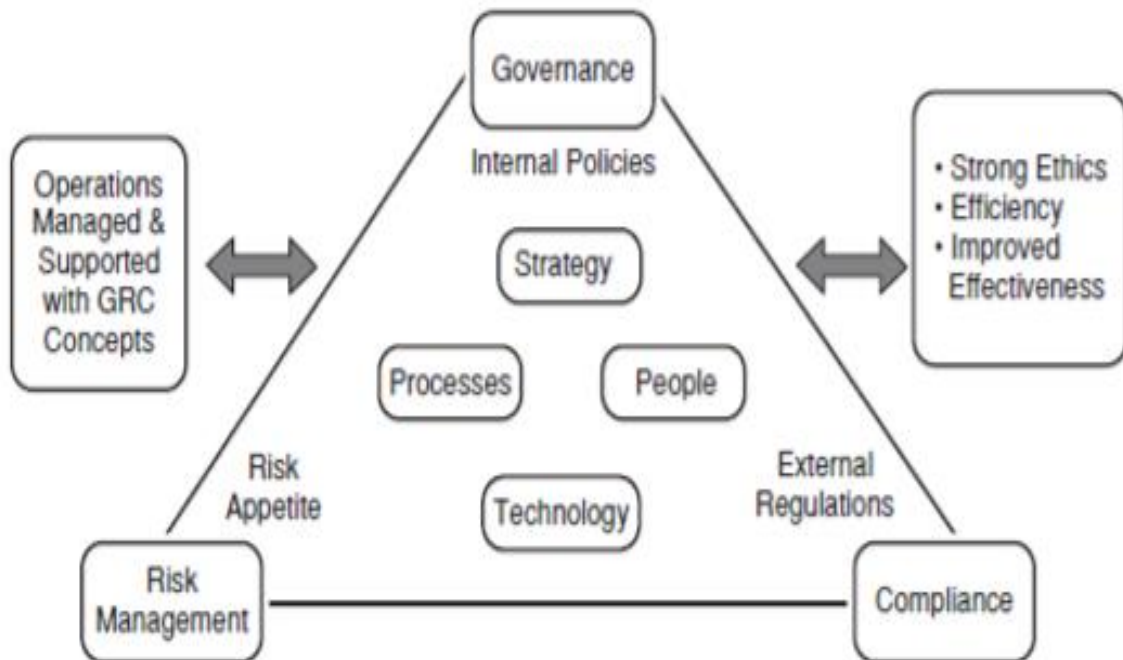


Table 2.1 Capability model (Moeller, 2011)

With the above diagram we can see the components of strategy, effective processes, technologies, including the IT departments, and the people in the enterprise to make all of this work. As we can see, an enterprise requires management attention and support, and correct ethical behavior, organizational efficiency, and improved effectiveness.

## [Why GRC Matters? 2.2](#)

Surveys have indicated for many years that investors will pay stock premium for companies that are well governed. It makes sense that a lower-risk investment is seen as a safe haven. If the safe haven also has a good track record of stability and profit growth, the premium will increase.

Well governed companies also have other advantages beyond premium stock prices. They typically access capital at lower costs than their poor governed competitors. Major fund agencies are more focused on good governance, risk and compliance management in their company assessments.

Although GRC is nothing new, what caused it to be an area of focus by companies and consulting agencies was the storm that brakes usually after every major finance crisis.

- In the wake of the late 1990's and the internet investing boom, massive systematic fraud was revealed at major companies such as Enron, WorldCom, Adelphi and others. In many cases, the controls and external forms of auditing were in place to stop such bad behavior had failed for many different reasons, including fraud, conflicts of interest and other forms of malfeasance.
- At the same time, the terrorist attacks on September 11th of 2001, led to a worldwide tightening of controls in trade, especially for trade of certain types of products and materials that were deemed dangerous to fall in the wrong hands. For example, ITT Corporation shipped night vision goggle components to China and other countries, resulting in a U.S. Department of Justice fine of 100\$ million. (Department of Justice, 2007)

These have led to the creation of the domain of GRC as companies realized that a non-planned approach to meeting those demands is too expensive and an increased risk for the companies because they can't process issues they don't know about. The main difficulty for most companies is how to meet these GRC challenges that in most cases are not optional and they have no choice but to comply and comply efficiently in a way that produces benefits. GRC should not be another cost for a company but an attitude they it wants to follow and become its policy.

GRC is a new trait that requires more work in order to work properly. More testing and control is required and it needs to be carefully designed. As exceptions to policies occur, behavior must be checked and monitored. As people are promoted or job requirements change, controls must be put in place so that compliance can be maintained. New data must be acquired and consulted; risk must be discovered while it's still small enough to be managed.

On the upside of the GRC is that in addressing these issues systematically, the culture and performance of a company improves. In many ways, GRC is concerned with meta processes, which are those that look at the flow of information from all other departments in order to identify weak points. Controls and compliance are only one result of GRC. When it is properly addressed GRC helps identify ways that core business process can be improved. Identification of risk leads to discovery of opportunities and governance processes can help evolve a company and improve its management.

### [Complying with financial regulations 2.3](#)

Concerns about GRC exist, although most companies that have engaged in a program of GRC are usually reacting to some pressure or concern that turns GRC from a necessary evil to an initiative that can really benefit the company if executed right.

Laws in the United States and in many other countries mean that if serious errors in financial reports are found, those responsible will criminal charges. As mentioned in the previous chapter the Sarbanes-Oxley Act section 302 says exactly that. The driving force behind this regulation is

the fear that inaccurate financial reporting will damage the financial system. Without accurate financial information, investors will have little knowledge when making decisions about where to invest. If confidence drops too far, all companies, not just those with poor governance, will find it harder raise funds.

So, while compliance with regulations aimed at improving financial reporting and corporate governance for improved internal procedure is a main goal of companies, it is the fear of failing to such compliances that driven most companies to action.

### **Failing an audit**

There is nothing like failing an audit that can actuate companies to improve their GRC process. Failing an audit, which must be made public, can cause investors lose confidence and sell their stocks. Nowadays, audits can fail for more reasons than ever. Discovery of fraud is probably the most serious one. But in the face of tighter regulations for governance and reporting, audit problems can include the lack of adequate controls, improper segregation of duties, insufficient oversight of the creation of financial reports, and many other causes. So even if nothing is wrong, audit reports can fail if sufficient documentation is not available.

In the wake of a failed audit, reporting requirements increase. Detailed reports of various activities that must be checked for problems may have to run on monthly or quarterly basis instead of annually and new controls are usually introduced. Other sorts of testing to discover what went wrong also usually result. The work related to all these new activities must be staffed either from inside the company or by external auditing firms. Either way the costs rise.

### **GRC for small companies**

Smaller companies that are on the dramatic growth curve frequently use a GRC implementation as a way to make sure that new employees are quickly hired and threats to organization's well care will not occur. With appropriate controls and tests, management can rest assured that the company is not at risk as more people take over key tasks.

Smaller companies generally have more issues with segregation of duties for obvious reasons. Segregation of duties requires dividing key steps among employees to help prevent fraud that could take place if one person did all the tasks. But with fewer employees, there is less specialization, and a single person may be doing more tasks than in a larger company.

One common misunderstanding is the implementing GRC means that all potential conflicts are eliminated. Even in the larger companies, this is almost never the case. Usually, some employees can do things that might result in fraud. Such potential conflicts can be handled by adding controls and tests that reveal bad behavior.



## Reducing Costs 2.4

The desire to cut costs related to GRC is another major driver of GRC automation. In the wake of the Sarbanes-Oxley Act, companies in the U.S. in order to comply with it as soon as possible performed those tasks manually. The information was gathered and organized in spreadsheets or other simple ways and then used to make sure they complied with all requirements.

While this sort of manual work was inevitable since it was something new, it was also beneficial since it gave those involved a heads-up understanding of what sort of work needed to be done and information needed to be assembled, it was not efficient.

Given the shortage of personnel trained in GRC and the expense of using external auditors to perform reporting and analysis related to controls and testing, many companies are seeking to implement GRC as a way to improve automation and reduce costs. Some companies have reported reductions in auditing costs of more than 20 percent. (Denise Vu Broady, 2008)

## The GRC stakeholders 2.5

No matter how much automation you may apply, the essence of GRC is to change the hearts and minds of the people in a company. The responsibility for GRC enforcement and implementation is spread across a variety of different stakeholders both internal and external, each of which plays an important role. Understanding the interactions between these stakeholders is a key element of a successful GRC.

### **GRC stakeholders inside a company**

Like all trends that affect business, increased attention to GRC concerns is having its effect on the organization chart of a company. Of course, the ultimate responsibility for all corporate issues stands with the board of directors and the company's CEO, and then it goes down through the rest of the organization. At most companies, the operational responsibility for implementing a program for improving GRC performance resides with the Chief Operating Officer (COO) or Chief Financial Officer (CFO). The consequences of inadequate attention to GRC processes are so extreme that interest from senior management is at high status. The need for effective management of GRC has led to the creation of a new set of titles that may include any of the following:

- Chief Compliance Officer
- Chief Risk Officer
- Chief Sustainability Officer
- Manager of SOX, Compliance, Risk, Trade management, Environment, Health, Safety.

Some analysts recommend that companies keep any organization dedicated to GRC as small as possible. Jeff Bezos of Amazon used to say that “individual teams shouldn’t be larger than what two pizzas can feed”. The ideal way to implement GRC is to make compliance efficient and easy through controls, training, and automation, so that improved business processes make the process easy and part of everyone’s day-to-day work instead of creating a large cost center.

### **GRC stakeholders outside a company**

Investors and shareholders have perhaps the most to lose, financially, from failures of GRC processes. When a stock price drops after a company’s failed audit report, a breach of compliance with regulations or any other sort of negative event that could have been foreseen, investors demonstrate their concern.

Besides investors though, there are other important external groups that set rules that must be followed. These groups include all types of organizations like:

- Legislative bodies that form the laws that companies must comply.
- Government agencies responsible for carrying out laws.
- Financial regulators that set standards for financial reporting.
- Non-governmental organizations charged with setting policies.
- Trade organizations.
- Auditing firms that certify the correctness of procedures and policies used.

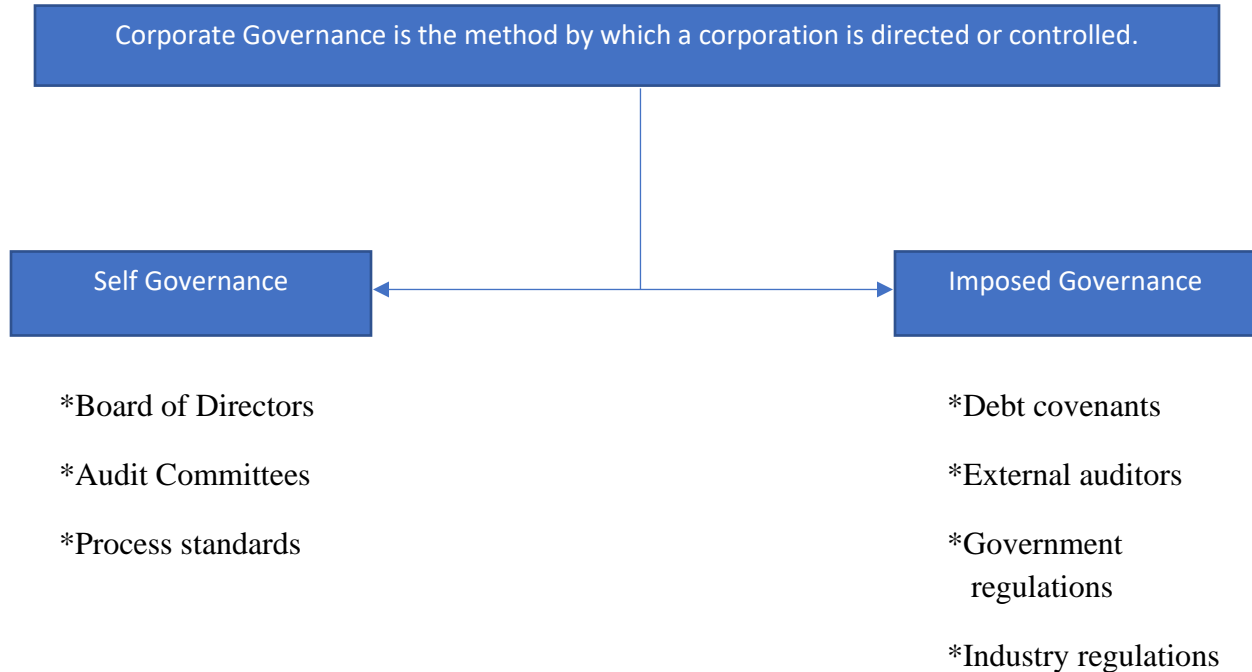
### **Importance of GRC 2.6**

The three GRC principles should be thought in terms of one continuous and interconnecting flow of concepts and neither part is more important or significant than the others. We will start explaining GRC here with governance.

### **Governance**

Governance is about the big picture, about taking the company to the right path and evolving policies, procedures and processes based on the needs of the company. Governance is about how carrying out business strategy, about establishing goals and the path to achieve them, a top-down perspective that organizes compliance and risk management activities as well as everything a company does. Governance is about the data gathered by GRC are processed and analyzed to improve business.

At the highest level, governance is about steering the corporation, making sure that a company sells the right product in the right market. Governance exists to translate the strategy set by the board of directors into action that will bring the chosen strategy to life.



*Table 2.2 Governance infrastructure*

The first step most companies take, is to make sure the firm is complying with external requirements. After that has been achieved it focuses on self-governance. Self-governance means adding policies, procedures, and controls to enforce them to those already imposed by external factors. Self-governance helps create a continuous feedback loop of information to improve the operations of a company and to make sure that any important operational processes take place as desired by the board and CEO.

One of the most important governance activities is to look at the existing set of controls for both imposed and self-imposed governance and ensure that they have the proper effect. In performing this analysis, a company frequently gains insight into how to redesign its processes to increase efficiency, decreases costs, and better align them in order to achieve the company's goals. In other words, governance when properly implemented, helps guide and evolve a company. For this reason, there is a natural link between governance and program management. (Pohlman, 2008)

## **Risk management**

Risk management is the process of uncovering what could go wrong for the express purpose of making more things go right. All strategies and opportunities worth pursuing involve risk that must

be monitored and managed. Risk management can help companies identify potential pitfalls and optimize their opportunities for success. Some risks don't appear on balance sheet but have disastrous consequences. That risk can be:

- Environmental catastrophes
- Difficulties with integration of acquisitions
- Aging workforce
- Extreme weather
- Currency fluctuations

As an example, let's think that a key supplier is going to be taken over by a competitor. The sooner a company knows about it the better. Or perhaps a major customer has indicated they are in financial trouble and may cut orders. Or a piece of equipment critical for production suddenly becomes unavailable. A well-run company has a way for its employees, responsible with risk management, to identify such risks before they become unavoidable.

There are four interconnected steps in effective GRC processes of risk management:

**Risk assessment and planning:** An enterprise faces all levels of risks, whether global issues based on weather or currency threats to weather-related threats at local operations. We cannot plan or identify every type of risk that might impact an enterprise, but there should be an ongoing analysis of these various potential risks that may face an enterprise.

**Risk identification and analysis:** Rather than just planning for the possibility of some risk event occurring, there is a need for a more detailed analysis on the likelihood of these risks coming to fruition as well as their potential impacts. There is a need to quantify the impacts of the identified risks and to determine mitigation strategies in the event the risk event occurs. Mitigation refers to assessing the best way to manage or eliminate an identified risk. The final factors associated with these risks should also be identified. An identified risk will be much more significant if we can identify the total costs to the enterprise if the identified risk occurs.

**Exploit and develop risk response strategies:** Essentially a concept that should be considered in parallel with risk identification, an enterprise should develop plans and strategies to return to normal operations and then recover from the risk event. This may include an analysis of risk-related opportunities. That is, if there is an identified risk that some older production equipment may fail, an opportunity may be to abandon that production line and install new equipment following a newer technology and possibly even at a newer, more friendly location.

**Risk monitoring:** Tools and facilities should be in place to monitor for the identified risks possibly occurring. A smoke detector fire alarm is an example here, although most risk-related monitoring requires a wide series of special reports, established and measurable standards, and a diligent human resources function. The idea is to keep ahead and to reenter these prior risk management steps as necessary.

Risk management should create value and be an integral part of organizational processes. It should be part of decision-making processes and be tailored in a systematic and structured manner to explicitly address the uncertainties an enterprise faces based on the best available information. In addition, risk management processes should be dynamic, iterative, and responsive to change with the capabilities of continual improvements and enhancements.

Unmanaged risks increase the potential for unpleasant surprises, but also risk management is not only about catastrophic risks. A series of unanticipated smaller risks can have an equally devastating effect especially if they cause missing financial goals, even by small amount. Risk management has great potential helping companies to maximize opportunities. Reporting mechanisms to raise alerts about risks can also be used to identify opportunities. When done right, risk management can help adjust strategy and achieve company goals easier.

## Compliance

Compliance is the process of adhering to a set of guidelines or rules established by government agencies, standards groups, or internal corporate policies. Adhering to these compliance-related requirements is a challenge for an enterprise because of the following issues:

**The frequent introduction of new regulations:** Using the United States as an example, a wide array of agencies, such as the Environmental Protection Agency (EPA), regularly issue new rules that may have wide impacts on many enterprises, despite their prime business purposes. Companies have a challenge to monitor these rules and determine which apply to them.

**Vaguely written regulations that require interpretation:** Again, using the United States as an example, in 2010 Congress passed a massive health care reorganization bill, which was printed on many thousands of pages, covering a wide array of issues and rules. Compliance with those types of rules can be difficult.

**Multiple regulations often overlap:** U.S. states and local governmental units from different geographies may issue rules that cover similar areas but may have different requirements. These differences eventually are resolved in court, but compliance until matters are resolved can be a challenge.

**Constantly changing regulations:** Regulatory agencies constantly changing or reinterpreting their rules, making compliance a challenge for many enterprises.

Therefore, compliance becomes a continuous process, not a one-time project, and continues to drive business agendas as organizations are being held accountable for meeting the myriad of mandates specific to their vertical markets.

In addition, enterprises might also be required to address cross-industry legislation, such as Sarbanes-Oxley (SOx) and other internal control processes, such as ISO 9000 or Six Sigma. Simply stated, the number and complexity of these laws and regulations has caused challenges for many enterprises over the years. Enterprises need to approach their GRC compliance principles

from a more strategic perspective that could help them move beyond simply meeting individual compliance mandates to realizing tangible business benefits from their infrastructure investments.

The scope of compliance also affects other aspects of an enterprise. A consistent approach on the use of compliance driven capabilities and supporting technologies across an enterprise can provide these potential benefits:

**Reduced total cost of ownership:** Investments can be leveraged across multiple regulations. For example, many regulations specify document retention requirements, which can be met by a single investment in a content and records management system.

**Flexibility:** One of the difficulties with compliance is that new regulations are introduced, and existing regulations are changed on a frequent basis. By centrally managing compliance initiatives via organization-wide compliance architecture, an enterprise can quickly adapt to these changes.

**Competitive advantage:** A broad and consistent compliance architecture can allow an enterprise to better understand and control their business processes, which allows them to respond more quickly and accurately to external or internal pressures. Furthermore, certain regulations may contain tangible business benefits through reduced minimum capital requirements, which could be enabled by an enterprise-wide compliance architecture.

Effective GRC compliance processes help an enterprise to transform their business operations and gain deeper insight and predictability from their business processes as they address regulatory-driven requirements. Key business drivers here include the ability to better manage information assets, demonstrate compliance with regulatory and legal obligations, reduce the risk of litigation, reduce cost of storage and discovery, and demonstrate corporate accountability.

## [GRC Integration 2.7](#)

What a successful GRC method looks like, is something that constantly changing and must change in order to reflect the evolving modern business environment. Organizations can no longer get by with manual reporting management methods. Spreadsheets, differing data and process in every department can't provide an enterprise-wide view of risks, opportunities, and their impact on business outcomes.

Businesses are increasingly coming to that conclusion. The Risk Management Society found that CEOs identified integration with strategic planning as the biggest performance gap in their organization's risk management function, with less than half organizations surveyed (38%) using risk data to make long-term adjustments to risk management strategy and only 29% supplying data for strategic planning. (Marsh, 2019)

When it comes to GRC, integration is a deeply underutilized step forward. Without connection between their governance, risk and compliance management activities, business miss opportunities

to make significant improvements in organization performance, decision making, risk awareness and digital transformation. An integrated approach to GRC, supported by consistent processes and a technology platform that enables data integration a company can:

- Provide leadership with the data and insights needed to make informed, risk-based decisions that align with organizational objectives
- Unlock powerful data-sharing and automation of processes that reduces duplications
- Create a centralized hub for task management, data and documentation, assessment, and reporting.

## Benefits of GRC Integration 2.8

### **More Strategic Decision-Making**

Technology-enabled GRC integration helps risk and compliance management teams analyze and share their data for a complete view of the organization's risk landscape. In turn this perspective helps boards and executives make decisions that align management activities with business strategy and performance.

### **No Data Silos**

Sharing data across business units and departments is not only cost efficient, but also enables better visibility, an interconnected understanding of risks and controls, and improved access to data and reporting. Siloed data breeds duplication and inaccuracy and may even conceal potential risks, while integrated data highlights critical connections and dependencies across the organization and improves executive oversight.

### **Improved Cross-functional Communication**

An additional benefit of data-sharing between departments is enhanced communication and collaboration. When all teams share a single system of risk, data, documentation, and task management, they'll also share a common language for defining and discussing risk. This encourages departments to share relevant information helping individual business units work together effectively toward organizational objectives.

### **Streamlined Management**

Tracking down important information across multiple documents, computers and storage methods is time consuming and makes data and task management a bigger challenge that it has to be. Automating manual activities and developing repeatable processes and workflows, on the other

hand, simplifies day-to -day GRC management tasks, reducing time and resource requirements and minimizing human error.

### **Improved Agility**

Many organizations struggle with a lack of visibility into their business process, vendor relationships, risk exposure and other critical considerations for integrated risk management. Uniting analytics and reporting for these and other areas under one platform enables organizations to quickly analyze risks and opportunities and develop data driven action plans. As a result, launching a new product or service, contracting with a new vendor, or responding to market changes becomes faster and more efficient.



### Business Process Management (BPM)

#### Introduction 3.1

Every organization, public or private, needs to coordinate its work in order to forecast its resources and activities, manage them on a daily basis and promote the continuous improvement of its operations. A company is a set of interrelated process and understanding an organization from this perspective is essential to improve its management (Muller, 2013).

With the growing globalization the effective management of an organization's business processes became ever more important. Many factors such as:

- The rise in frequency of goods ordered,
- The need for fast information transfer,
- Quick decision making,
- The need to adapt to change in demand,
- More international competitors,
- Demands for shorter cycle times,

are challenging the profitability and survival of organizations no matter if they are large corporations or small companies.

In an attempt to deal with these challenges, information technology (IT) was used to manage business processes. Over the past two decades, previously manual hand-filled forms were increasingly replaced by their paperless electronic counterparts. This eventually evolved into what is known as business process management (BPM) today.

BPM is defined as “supporting business processes using methods, techniques and software to design, enact, control and analyze operational processes involving humans, organizations, applications, documents and other sources of information” (Aalst, 2003). Software tools supporting the management of such operational process became known as business process management systems. (BPMS).

## BPM Context Framework 3.2

The BPM context framework describes the factors in the context of BPM that are relevant to BPM projects based on their settings (J. vom Brocke, 2017). The model guides to represent a BPM initiative according to elements like its goals, the process's characteristics, and the organizations and external environment's characteristics. The key contribution of the framework is to capture the situation around the BPM initiative so it can be aligned to the organization's specific context. The BPM context framework helps in assessing this context.

The BPM context framework captures four contextual dimensions:

Contextual factors	Example characteristics		
<b>Goal-dimension:</b>			
<b>Focus</b>	Exploitation (Improvement, Compliance)	Exploration (Innovation)	
<b>Process-dimension:</b>			
<b>Value contribution</b>	Core process	Management process	Support process
<b>Repetitiveness</b>	Repetitive		Non-repetitive
<b>Knowledge-intensity</b>	Low knowledge-intensity	Medium knowledge-intensity	High knowledge-intensity
<b>Creativity</b>	Low creativity	Medium creativity	High creativity
<b>Interdependence</b>	Low interdependence	Medium interdependence	High interdependence
<b>Variability</b>	Low variability	Medium variability	High variability
<b>Organization-dimension:</b>			
<b>Scope</b>	Intra-organizational process		Inter-organizational process
<b>Industry</b>	Product industry	Service industry	Product & Service industry
<b>Size</b>	Start-up	Small and medium enterprise	Large organization
<b>Culture</b>	Culture highly supportive of BPM	Culture medium supportive of BPM	Culture non-supportive of BPM
<b>Resources</b>	Low organizational resources	Medium organizational resources	High organizational resources
<b>Environment-dimension:</b>			
<b>Competitiveness</b>	Low competitive environment	Medium competitive environment	High competitive environment
<b>Uncertainty</b>	Low environmental uncertainty	Medium environmental uncertainty	High environmental uncertainty

Table 4.1 Context Framework

- **Goal Dimension:** The goal a BPM project is targeting has a major influence on the BPM-related actions to be planned. The difference between exploitation and exploration may serve as an example, as the first fosters optimization, and the second fosters innovation.
- **Process Dimension:** BPM can be applied to a number of processes, so the process characteristics affect the appropriate BPM methodology. Examples of factors include the knowledge-intensity, complexity, creativity, and variability involved in a process.
- **Organizational Dimension:** BPM serves many organizations, but the characteristics of the organization determine the right BPM approach. Organizational factors include industry, size, and culture.
- **Environmental Dimension:** BPM can also be applied in a variety of environments, which are characterized by, for example, differing levels of competitiveness or uncertainty. Considering the dynamics of the environment is important in scoping and positioning a BPM initiative.

### BPM Governance 3.3

BPM has a steady growing interest, meaning companies applying process management have higher expectations regarding its promised benefits. This requires knowledge of how to approach BPM methodology, which is achieved by compiling a model that guides companies in their actions. These models must be structured to enable a complete understanding of BPM, that is, as an organizational skill rather than isolated initiatives to improve processes. As such the BPM Six Core Elements Model was introduced by vom Brocke, describing organizational capability areas relevant to BPM. This model helps decision makers to classify the actions an organization undertakes in conducting BPM by conceptualizing six BPM capability areas. This model evolves BPM from a technical concept to complete management discipline (J. vom Brocke, 2018) :

- **Strategic Alignment:** BPM needs to be aligned with the overall strategy of an organization. Strategic alignment (or synchronization) is defined as the tight linkage of organizational priorities and enterprise processes enabling continual and effective action to improve business performance. Processes have to be designed, executed, managed, and measured according to strategic priorities and specific strategic situations. In return, specific process capabilities may offer opportunities to inform the strategy design leading to process-enabled strategies.
- **Governance:** BPM governance establishes appropriate and transparent accountability in terms of roles and responsibilities for different levels of BPM, including portfolio, program, project, and operations. A further focus is on the design of decision-making and reward processes to guide process-related actions.
- **Methods:** Methods in the context of BPM are defined as the set of tools and techniques that support and enable activities along the process lifecycle and within enterprise-wide

BPM initiatives. Examples are methods that facilitate process modeling or process analysis and process improvement techniques.

- **Information Technology:** IT-based solutions are of significance for BPM initiatives. With a traditional focus on process analysis and process modeling support, BPM-related IT solutions increasingly manifest themselves in the form of process-aware information systems (PAIS). Process-awareness means that the software has an explicit understanding of the process that needs to be executed. Such process awareness could be the result of input in the form of process models or could be more implicitly embedded in the form of hard-coded processes (like in traditional banking or insurance applications).

Strategic Alignment	Governance	Methods	Information Technology	People	Culture	Factors
Process Improvement Planning	Process Management Decision Making	Process Design & Modelling	Process Design & Modelling	Process Skills & Expertise	Responsiveness to Process Change	Capability Areas
Strategy & Process Capability Linkage	Process Roles and Responsibilities	Process Implementation & Execution	Process Implementation & Execution	Process Management Knowledge	Process Values & Beliefs	
Enterprise Process Architecture	Process Metrics & Performance Linkage	Process Monitoring & Control	Process Monitoring & Control	Process Education	Process Attitudes & Behaviors	
Process Measures	Process Related Standards	Process Improvement & Innovation	Process Improvement & Innovation	Process Collaboration	Leadership Attention to Process	
Process Customers & Stakeholders	Process Management Compliance	Process Program & Project Management	Process Program & Project Management	Process Management Leaders	Process Management Social Networks	

Table 4.2 BPM Six Core Element Model

- **People:** People as a core element of BPM is defined as individuals and groups who continually enhance and apply their process and process management skills and knowledge in order to improve business performance. Consequently, this factor captures the BPM capabilities that are reflected in the human capital of an organization and its ecosystem.
- **Culture:** BPM must be met with a common value system that supports process improvement and innovation. Related capabilities include the ability to assess the

organizational culture's values and the ability to derive measures to develop these values accordingly.

### BPM Lifecycle Phase 3.4

A process must be repeatedly adapted and improved in order to keep up with the ever-changing business environment of customer needs, technology, geopolitical changes, financial crises and competition. That's why BPM lifecycle can be described as a circular, the results of monitoring and controlling feeds back into the discovery, analysis, and redesign phases. Changing a process is not as painless as it sounds mostly because people are used to work in a certain way and might refuse to change. Moreover, if the change involves modifying the information systems, the change might be costly that requires changes in the organization.

As mentioned, we can see the BPM as a cycle consisted with the following:

- **Process identification.** In this phase, a business problem is posed and processes relevant to the problem being addressed are identified, delimited, and related to each other. The outcome of process identification is a new or updated process architecture that provides an overall view of the processes in an organization and their relationships. In some cases, process identification is done in parallel with performance measure identification. However, we will associate performance measure identification with the process analysis given that performance measures are often used for process analysis.
- **Process discovery** (also called as-is process modeling). Here, the current state of each of the relevant processes is documented, typically in the form of one or several as-is process models.
- **Process analysis.** In this phase, issues associated to the as-is process are identified, documented and whenever possible quantified using performance measures. The output of this phase is a structured collection of issues. These issues are typically prioritized in terms of their impact, and sometimes also in terms of the estimated effort required to resolve them.
- **Process redesign** (also called process improvement). The goal of this phase is to identify changes to the process that would help to address the issues identified in the previous phase and allow the organization to meet its performance objectives. To this end, multiple change options are analyzed and compared in terms of the chosen performance measures. This entails that process redesign and process analysis go hand-in-hand: As new change options are proposed, they are analyzed using process analysis techniques. Eventually, the most promising change options are combined, leading to a redesigned process. The output of this phase is typically a to-be process model, which serves as a basis for the next phase.
- **Process implementation.** In this phase, the changes required to move from the as-is process to the to-be process are prepared and performed. Process implementation covers two aspects: organizational change management and process automation. Organizational

change management refers to the set of activities required to change the way of working of all participants involved in the process. Process automation on the other hand refers to the development and deployment of IT systems (or enhanced versions of existing IT systems) that support the to-be process. Our focus with respect to process implementation is on process automation, as organizational change management is an altogether separate field.

- **Process monitoring and controlling.** Once the redesigned process is running, relevant data are collected and analyzed to determine how well the process is performing with respect to its performance measures and performance objectives. Bottlenecks, recurrent errors or deviations with respect to the intended behavior are identified and corrective actions are undertaken. New issues may then arise, in the same or in other processes, requiring the cycle to be repeated on a continuous basis.

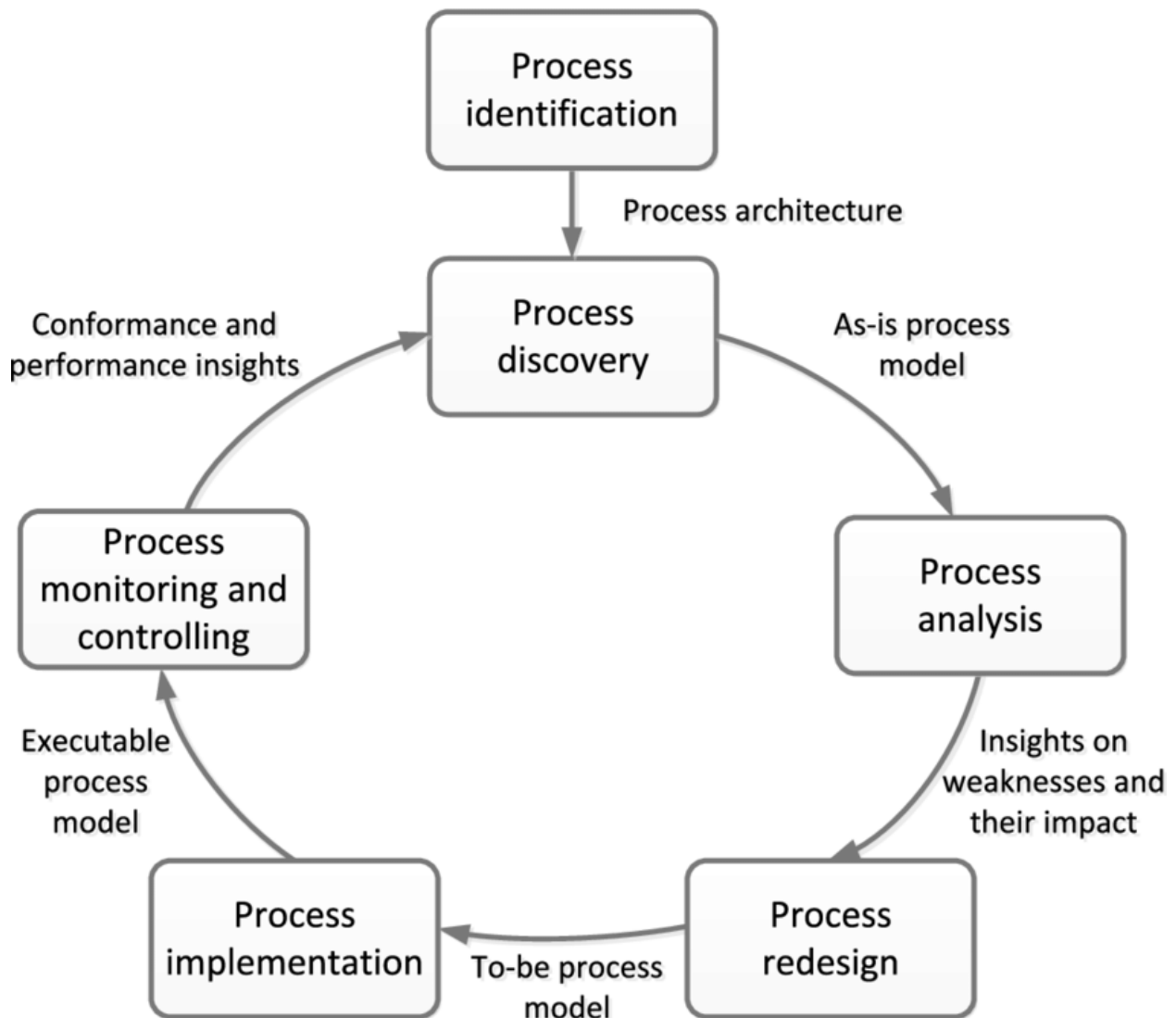


Table 4.3 BPM Lifecycle Model



The BPM lifecycle helps to understand the role of technology in BPM. Technology commonly, and especially Information Technology (IT), is a key instrument to improve business processes. Not surprisingly, IT specialists such as system engineers often play a significant role in BPM initiatives. However, to achieve maximum efficacy, system engineers need to be aware that technology is just one instrument for managing and executing processes. System engineers need to work together with process analysts in order to understand what the main issues affecting a given process, and how to best address these issues, be it by means of automation or by other means. Learning how to design and improve processes and not only how to build an IT system to automate a narrow part of a business process is a fundamental skill.

The total processes that are identified in the Designation phase must display a trade-off between impact and manageability. The smaller the number of the processes one wish to identify, the bigger their individual scope is. In other words, if only a small number of processes are identified then each of these will cover numerous operations. The main advantage of a large process scope is that it potentially increases the impact one can have with actively managing such a process. The more operations are considered to be part of a process, the easier it will become, for example, to spot opportunities for efficiency gains by rooting out redundant work.

On the other hand, a large scope of a business process brings along a range of issues that make it more difficult to manage it as a process:

- The involvement of a large number of staff will make effective communication among them problematic
- It will become more difficult to keep models of a large process up to date
- Improvement projects that are related to a large process are more complex

In addition to a rather accurate view on what business processes exist, an understanding must be developed about the relations between the numerous processes. In a situation where organizations define both narrow and broad processes, to avoid confusion, it is important to map how narrow processes relate to broader processes. A broad process like order management, for example, can be related to the more narrowly defined processes of order booking, billing, shipment, and delivery. All of these can be considered sub-processes of order management. We can call this an example of hierarchical relations between processes. Processes may also be related to one another variously. Billing, in the example we just used, is an upstream process compared to shipment: for the same order the bill is sent out usually before the ordered goods are shipped. Another way of expressing this relation is, of course, that shipment can be considered a downstream process comparing to billing. This illustrates how processes can be sequentially related.

### [Value Added Analysis 3.5](#)

Analyzing business processes is both an art and a science. In this respect, qualitative analysis is the artistic side of process analysis. Value-added analysis typically consists of two stages: value classification and waste elimination. Value classification is a technique by which an analyst

decorticates a process model, extracts every step in the process and classifies these steps into one of three categories, namely:

- **Value-adding (VA):** This is a step that produces value or satisfaction of the customer. When determining whether a step is value-adding, it may help to ask the following question: Would the customer be willing to pay for this activity?
- **Business value-adding (BVA):** The step is necessary or useful for the business to run smoothly, or it is required due to the regulatory environment of the business.
- **Non-value adding (NVA):** The step does not fall into any of the other two categories.

Having identified and classified the steps of the process as discussed above, we can proceed to determine how to eliminate waste. A general rule is that one should strive to minimize or eliminate NVA steps. Some NVA steps can be eliminated by means of automation (makes these NVA steps transparent to the performers of the steps).

While elimination of NVA steps is generally considered an expedient goal, elimination of BVA steps should be considered as a trade-off given that BVA steps play a role in the business. Prior to eliminating BVA steps, one should first map BVA steps to business goals and business requirements, such as regulations that the company must comply to and risks that the company seeks to minimize. Given a mapping between BVA steps on the one hand and business goals and requirements on the other, the question then becomes the following: What is the minimum amount of work required to perform the process to the satisfaction of the customer, while fulfilling the goals and requirements associated to the BVA steps in the process? The answer to this question is a starting point for process redesign.

When analyzing a business process, it is worth keeping in mind that “*even a good process can be made better*”. Experience shows that any non-trivial business process, no matter how much improvement it has undergone, suffers from a number of issues. There is always errors, misunderstandings, incidents, needless steps, and other forms of waste when a business process is performed on a day-to-day basis.

### [Process Performance Dimensions 3.6](#)

Any company would ideally like to make its processes faster, cheaper, and better. This leads to identify three process performance dimensions: time, cost, and quality. A fourth dimension gets involved in the equation once we consider the issue of change. It is not always needed for a process to be faster, cheaper, or better. A process might perform remarkably well under normal circumstances, but then perform poorly in other circumstances which are perhaps equally or more crucial. Therefore, sometimes all it is needed is to make the process more flexible and this leads us to identify a fourth dimension of process performance, flexibility.



We briefly discuss each of the four dimensions and how they are typically refined into specific performance measures:

**Time:** Usually the first performance dimension that comes in mind while analyzing processes is time. A common performance measure for processes is cycle time. Cycle time is the time that it takes to handle one case end to end. Although it is frequently the aim of a redesign effort to minimize cycle time, there are many ways of further specifying this aim. For instance, one can aim at a reduction of the average cycle time or the maximal cycle time. It is also possible to focus on the ability to meet cycle times that are agreed upon with a client at run time. Different aspects of the time dimension come into view while considering the constituents of cycle time, namely:

- Processing time (also called service time): the time that resources (e.g. process participants or software applications invoked by the process) spend on actually handling the case.
- Waiting time (also called idle time): the time that a case spends in idle mode. Waiting time includes queuing time for example because synchronization must take place with another process or because input is expected from a customer or from another external actor.

**Cost:** Another common performance dimension while analyzing and redesigning a business process that has financial nature. While we refer to cost here, it would also have been possible to put the attention on turnover or profit. Apparently, a profit increase may have the same effect to an organization's profit as a decrease of cost. However, process redesign is more often related with reducing cost. There are different viewpoints on cost. At first, it is feasible to differentiate fixed and variable cost. Fixed costs are overhead costs which are not affected by the intensity of processing. Typical fixed costs follow from the use of infrastructure and the maintenance of information systems. Variable cost is certainly correlated with some variable quantity, such as the level of sales, the number of purchased goods, the number of new hires, etc. A cost approach which is closely related to productivity is operational cost. Operational costs can be directly associated to the outputs of a business process. A substantial part of operational cost is usually labor cost which can be related to human resources producing goods or delivering a service. Within process redesign efforts, it is very common to focus on reducing operation cost, particularly labor cost. The automation of tasks is often noticed as an alternative for labor. Although automation may reduce labor cost, it may cause incidental cost involved with developing the respective application and fixed maintenance cost for the lifetime of the application.

**Quality:** The quality of a business process can be examined from at least two different points: from the client's side and from the process participant's side. This is also known as the contrast between external quality and internal quality. The external quality can be measured as the client's satisfaction with either the product or the process. Satisfaction with the product can be indicated as the extent to which a client feels that the specifications or expectations are met by the delivered product. On the other hand, a client's satisfaction with the process concerns the way how it is executed. A typical issue is the amount, relevance, quality, and timeliness of the information that a client receives during execution on the progress being made. On the other hand, the internal quality of a business process related to the process participants' perspective. Typical internal

quality concerns are the level that a process participants feels in control of the work performed, the level of variation experienced, and whether working within the context of the business process is felt as challenging. It is very interesting to mark that there are various direct relations between the quality and other dimensions. For example, the external process quality is often measured in terms of time like the average cycle time or the percentage of cases where deadlines are missed.

**Flexibility:** The criterion that is least marked to measure the effect of a redesign measure is the flexibility of a business process. Flexibility can be defined in general terms as the ability to react to changes. These changes may concern various parts of the business process, for example:

- The ability of resources to execute different tasks within a business process setting.
- The ability of a business process as a whole to handle various cases and changing workloads.
- The ability of the management in charge to change the used structure and allocation rules.
- The organization's ability to change the structure and responsiveness of the business process to wishes of the market and business partners.

Another way of approaching the performance dimension of flexibility is to separate run time and build time flexibility. Run time flexibility concerns the opportunities to handle changes and variations while executing a specific business process. Build time flexibility concerns the possibility to change the business process structure. It is important to distinguish the flexibility of a business process from the other dimensions.

### [Simulation 3.7](#)

Process simulation is by far the most famous and most widely supported technique for quantitative analysis of process models. The initial is quite simple. Basically, a process simulator generates many hypothetical instances of a process, executes these instances step-by-step, and records each step in this execution. The output of a simulator includes the logs of the simulation as well as some statistics related to cycle times, average waiting times and average resource utilization.

During a process simulation, the tasks in the process are not literally executed. When a task is ready to be executed, a so-called work item is created, and the simulator first tries to find a resource to which it can assign this work item. If there is not any resource able to perform the work item is found, the simulator puts the work item in waiting mode until a suitable one is freed up. At the time that a resource is assigned to a work item, the simulator determines the duration of the work item by drawing a random number according to the probability distribution of the task's processing time. This probability distribution and the corresponding parameters need to be defined in the simulation model. Once the simulator has determined the duration of a work item, it puts the work item in sleeping mode for that duration. This sleeping mode simulates the fact that the task is being

executed. Once the time interval has passed (according to the simulation's clock) the work item is declared to be completed, and the resource that was assigned to it becomes available.

The simulator does not effectively wait for tasks to return from their sleeping mode. For instance, if the simulator determines that the duration of a work item is 2 days and 2 hours, it is not going to wait for this amount of time to pass by. Fortunately, simulators use smart algorithms to complete the simulation as fast as possible. Modern business process simulators can effectively simulate thousands of process instances and tens of thousands of work items in a matter of seconds.

For each work item created during a simulation, the simulator records the identifier of the resource that was assigned to this instance as well as three-time stamps:

- The time when the task was ready to be executed.
- The time when the task was started, meaning that it was assigned to a resource.
- The time when the task completed.

The simulator can compute the average waiting time for each task, using the collected data. Bottlenecks in the process are mostly identified by these measures. Indeed, if a task has a very high average waiting time, it means that there is a bottleneck at the level of this task. The analyst can then consider multiple options for addressing this bottleneck.

Also, since the simulator records which resources perform which work items and it knows how long each work item takes, it can find out the total amount of time during which a given resource is busy handling work items. By dividing the amount of time that a resource was busy during a simulation by the total duration of the simulation, we can obtain the resource utilization, that is, the percentage of time that the resource is busy on average.

Considering the above description of how a simulation works, we can view that the following information needs to be specified for every task that is included in the process model to simulate it:

- Probability distribution for the processing time of each task.
- Other performance attributes for the task such as cost and added value produced by the task.
- The set of resources that can perform the task. This set is usually called a resource pool. For example, a possible resource pool could be the "Claim Handlers" or "Clerks" or "Managers". Separately, the analyst needs to specify for each resource pool the number of resources in this pool and other attributes of these resources such as the hourly cost.

It should be noted that the mostly simulation but also the rest quantitative analysis techniques are based on models and on simplifying assumptions. The reliability of the output produced by these techniques generally depends on the accuracy of the numbers that are given as input. Simulation also assumes that process participants work over and over on the process being simulated. That can't be accurate since people can't work at 24 hours per day and after a certain amount of time their productivity starts to drop. People can get distracted due to interruptions, they display varying performance depending on various factors, and they may adapt differently to new ways of working.

In this respect, it is good practice whenever possible to derive the input parameters of a simulation from actual observations, meaning from historical process execution data. This can happen when simulating an as-is process that is being executed in the company, but not necessarily when simulating a to-be process. In the same spirit, it is fully recommended to cross-check simulation outputs against expert advice. This can be achieved by presenting the simulation results to process stakeholders and including process participants. The process stakeholders are usually able to provide feedback on the credibility of the resource utilization levels calculated via simulation and the actual manifestation of the bottlenecks shown in the simulation. For example, if the simulation points to a bottleneck in a given task, while the stakeholders and participants perceive this task to be minor, there is a clear indication that inaccurate assumptions have been made. Feedback from stakeholders and participants can be used to reconfigure the parameters so that the results can meet the matching the actual behavior. Particularly, process simulation is an iterative analysis technique with potentially multiple validation loops.

Certainly, it is desirable to perform **sensitivity analysis** of the simulation. Categorically, that means that observing how the output of the simulation changes when adding one resource to or removing one resource from a resource pool, or when changing the processing times by 20 % for example. If such minor changes in the simulation input parameters significantly affect the conclusions from the simulation outputs, a question mark can be putted on these conclusions. The methodology of Heuristic Process Redesign involves the phases of initiation, design, and evaluation. Various heuristics are available to support the design phase. They target on the seven areas being related to processes, including customers, business process operations, business process behavior, organization, information, technology, and the external environment.

### [Group roles and Stakeholders in BPM Lifecycle 3.8](#)

There are different stakeholders involved with a business process throughout its lifecycle. Among them we can distinguish the following individuals and groups.

**Management Team.** Depending on how the management of a company is organized, one might find the following positions. The Chief Executive Officer (CEO) is responsible for the overall business success of the company. The Chief Operations Officer (COO) is responsible for defining the way operations are set-up. In some companies, the COO is also responsible for process performance, while in other companies, there is a dedicated position of Chief Process Officer (CPO) for this purpose. The Chief Information Officer (CIO) is responsible for the efficient and effective operation of the information system infrastructure. In some organizations, process redesign projects are driven by the CIO. The Chief Financial Officer (CFO) is responsible for the overall financial performance of the company. The CFO could also be responsible for certain business processes, particularly those that have a direct impact on financial performance. Other management positions that have a stake in the lifecycle of processes include the Human Resources (HR) director. HR directors and their teams play a key role in processes that involve significant numbers of process participants. In any case, the management team is responsible for overseeing

all processes, initiating process redesign initiatives, and providing resources and strategic guidance to stakeholders involved in all phases of the business process lifecycle.

**Process Owners.** Process owner is responsible for the efficient and effective operation of a given process. A process owner is responsible on the one hand for planning and organizing and on the other hand for monitoring and controlling the process. In their planning and organizing role, the process owner is responsible for defining performance measures and objectives as well as initiating and leading improvement projects related to their process. They are also responsible for securing resources so that the process runs smoothly daily. In their monitoring and controlling role, process owners are responsible for ensuring that the performance objectives of the process are met and taking corrective actions in case they are not met. Process owners also provide guidance to process participants on how to resolve exceptions and errors that occur during the execution of the process. Thus, the process owner is involved in process modeling, analysis, redesign, implementation, and monitoring. Note that the same individual could well be responsible for multiple processes. For example, in a small company, a single manager might be responsible both for the company's order-to-cash process and for the after-sales customer service process.

**Process Participants.** Process participants perform the activities of a business process on a day-to-day basis. They conduct routine work according to the standards and guidelines of the company. Process participants are coordinated by the process owner, who is responsible to deal with non-routine aspects of the process. Process participants are also involved as domain experts during process discovery and process analysis. They support redesign activities and implementation efforts.

**Process Analysts.** Process analysts conduct process identification, analysis, and redesign activities. They coordinate process implementation as well as process monitoring and controlling. They report to management and process owners and closely interact with process participants. Process analysts typically have one of two backgrounds. Process analysts concerned with organizational requirements, performance, and change management have a business background. Meanwhile, process analysts concerned with process automation have an IT background.

**System Engineers.** System engineers are involved in process redesign and implementation. They interact with process analysts to capture system requirements. They translate requirements into a system design, and they are responsible for the implementation, testing, and deployment of this system. System engineers also liaise with the process owner and process participants to ensure that the developed system supports their work in an effective manner. Oftentimes, system implementation, testing and deployment are outsourced to external providers, in which case the system engineering team will at least partially consist of contractors.

**The BPM Group** (also called BPM Centre of Excellence). Large organizations that have been engaged in BPM for several years would normally have accumulated valuable knowledge on how to plan and execute BPM projects as well as substantial amounts of process documentation. The BPM Group is responsible for preserving this knowledge and documentation and ensuring that they are used to meet the organization's strategic goals. Specifically, the BPM group is responsible for maintaining the process architecture, prioritizing process redesign projects, giving support to

the process owners and process analysts, and ensuring that the process documentation is maintained in a consistent manner and that the process monitoring systems are working effectively. In other words, the BPM group is responsible for maintaining a BPM culture and ensuring that this BPM culture is supporting the strategic goals of the organization. Not all organizations have a dedicated BPM Group. BPM Groups are most common in large organizations with years of BPM experience.

### [Benefits of Business Process Management 3.9](#)

According to research (Fersht, Horses for Sources, 2018) the global BPM market is expected to grow from \$8,766 million in 2020 to \$14,440 by 2025. COVID-19 also has a major impact on that market as according to surveys conducted on business, 54% of enterprises are increasing investment in a process automation platform. Process automation is a main component of BPM.

The COVID-19 pandemic has only increased the need for a companywide BPM platform. The goal of BPM is to align the development of business process with the goals of the company. With the help of BPM managers can more easily:

- Measure and adjust operational processes to suit business needs
- Improve staff productivity by coordinating workforce demands and business process enhancements
- Apply IT developments to the challenges of business processes
- Respond quickly to changes in projects and emerging opportunities

Below we can see some of the most important benefits of BPM implementation:

**Improved business agility:** Companies must have the ability to react to change. These changes may come from advancements in technology, an upstart competitor or a new regulation affecting an aspect of the organization's business activity. Whatever the source, changes demand a quick response, in order for the company to remain competitive. Adopting BPM can give companies the speed and ability to meet these demands. A well-integrated BPM allows a company to pause its business processes at the first sign of a problem, make adjustments to the process, and then bring it back on track quickly and with minimal loss of time. BPM's flexible designs enable users to track these changes in business processes and refine them to suit the company's needs. As the processes evolve, precise documentation gives managers the ability to see and predict the effect of changes on the overall business process.

**Increased efficiency:** All companies face the challenge of making their business processes function more smoothly and efficiently. Inefficient processes waste valuable time and money but are often difficult to identify and hard to change. BPM practices are designed to pinpoint these inefficiencies and to eliminate the slowdowns they create. BPM allows managers and workers a greater understanding of each step of the business process. This enhanced knowledge can lead to new process solutions that avoid the bottlenecking of workflow and other needless redundancies. Ideally, BPM can help determine how the process might work under optimal conditions, allowing

users to make alterations to the process with that goal in mind. BPM can also automate manual tasks to increase productivity and cut down on the chance of human error.

**More complete visibility:** BPM uses refined software to track and monitor business processes from initiation to completion. BPM allows for an ongoing register of automated processes, gauging the effectiveness of each step in real time. Automated monitoring reveals the performance of each business process without relying on labor-intensive manual techniques. By studying the performance of each step in the process, management can gain a better understanding of the overall business activity, further enabling them to adapt or modify the flow of each business process.

**Ensured compliance and security:** Rules and regulations affecting business productivity can create unnecessary complications and result in costly fines. A company using BPM has a greater ability to create a workplace that is compliant with changing regulations and secure against the threats of fraud or theft. Because each phase of the process is mapped out with a detailed workflow, managers and users can ensure that all necessary documentation is in place to meet compliance standards. In addition to assisting with compliance, the thoroughly documented workflow can provide a framework for greater security. The organizational structure inherent in BPM practices foregrounds the importance of business assets, private information and physical resources, safeguarding these from theft or loss.

**Easier transfer of business knowledge:** As a company's workforce shifts and expands, the need for a reliable way to transfer business knowledge grows. Too often, companies rely on an individual employee to have a thorough understanding of any particular process. But changes in workforce make this an inefficient, and potentially costly, model. As employees retire, transfer, or take employment elsewhere, the knowledge they've gained goes with them, leaving the company with a significant gap. BPM practices offer a solution to this problem. Because BPM encourages a well-documented process map of each workflow, company knowledge can be recorded, archived, and shared with other members of the workforce. This knowledge can then be used in the training and orientation of successive employees, with the hope of reducing the level of disruption that shifts in workforce can create.

**Increased opportunities for continuous improvement:** Continuous improvement initiatives operate on the assumption that businesses can be more successful by making a series of small, ongoing improvements rather than a sudden, top-to-bottom change. The information that BPM gives a company regarding its various business processes encourages process refinement and adaptation. BPM can ensure that the decisions governing these incremental changes are backed by the evidence and data needed to assure success.

Business process management software allows managers the ability to look inside their company and understand how each business process works. This greater understanding can lead to savings in costs, increases in revenues and improvements in company efficiency. Considering all these benefits, it is no wonder more and more companies are turning to BPM software to help their companies succeed.

### Robotic Process Automation (RPA)

#### Introduction 4.1

BPM goal is to identify and automate working practices within an enterprise. Once those best practices have been captured, the BPM team activates them as work standards throughout the entire enterprise. The ideal result would be the maximum possible degree of automation while keeping the manual labor at minimum.

When an enterprise decides to pursue a path of automation it's only natural that in many cases it will try to achieve complete automation of its processes. That of course it's not that simple. When the effort of automation begins it is wise to begin with simple processes instead of more complex and critical ones, in order to test the impact of implementing automation procedures, identify bottlenecks and adapt by implementing potential solutions. After extensive testing the organization can begin a steady pace by automating more procedures. Another important thing is to pick for testing tasks that require minimum human intervention.

Automation is not a one-time process, but an ongoing one. It needs continuous monitoring of the results and it's impossible to achieve better efficiency if they are not. Constant adjustments will be needed by the implementation team, in cooperation with the organizations management, to achieve the desired results. The continuous monitoring and optimization is crucial for the success of the BPM implementation. Overlooking it may cause BPM inefficiency for a prolonged period of time ending up with increased costs.

For an automation process to be successful the choice of the correct tools is pivotal. The market today offers many automation tools and the choice of the correct one for each organization is a difficult one. Some tools are developed to offer application development while others are designed to offer transparency and process tracking. Nonetheless the choice should be for software that offers ease of use, doesn't require special skills and can be easily adopted without dependance on specialist outside the organization.

Robotic process automation (RPA) is a software solution for the creation of programs that mimics the behavior of human workers when performing repetitive and structured tasks with information systems. This solution has been applied in many industries and contexts. However, several specialists have concluded that the best candidates to conduct a successful RPA project are the processes within the back offices of a company since they (a) are highly frequent, (b) lack excessive exception control, (c) require limited cognitive effort, and (d) are prone to human errors.



There are many vendors who offer out-of-the-box solutions to deal with RPA, such as BluePrism, UiPath, or Automation Anywhere. In general, such tools share a common RPA life cycle although each tool provides different support to each phase. The life cycle starts with the analysis of the candidate process for automation. The processes are then designed to contain elements such as actions or dataflow that must be coded. Subsequently, robots are constructed in accordance with the design. They are then deployed in individual environments, like virtual machines, to perform their tasks. During the deployment phase, the robots are controlled and monitored in their operation to start new robots and stop them in case of serious errors. Finally, the performance and error cases of the robots are evaluated to enable a new analysis for the enhancement of the robots.

### Who is using RPA? 4.2

RPA is used in most industries today, particularly those that include repetitive tasks such as insurance, banking, finance, retail services, healthcare, and telecommunications. Especially in finance RPA is used to automate governance, reconcile accounts, or process invoices. It is also used to automate various supply chain processes, including data entry, predictive maintenance and after sales service support.

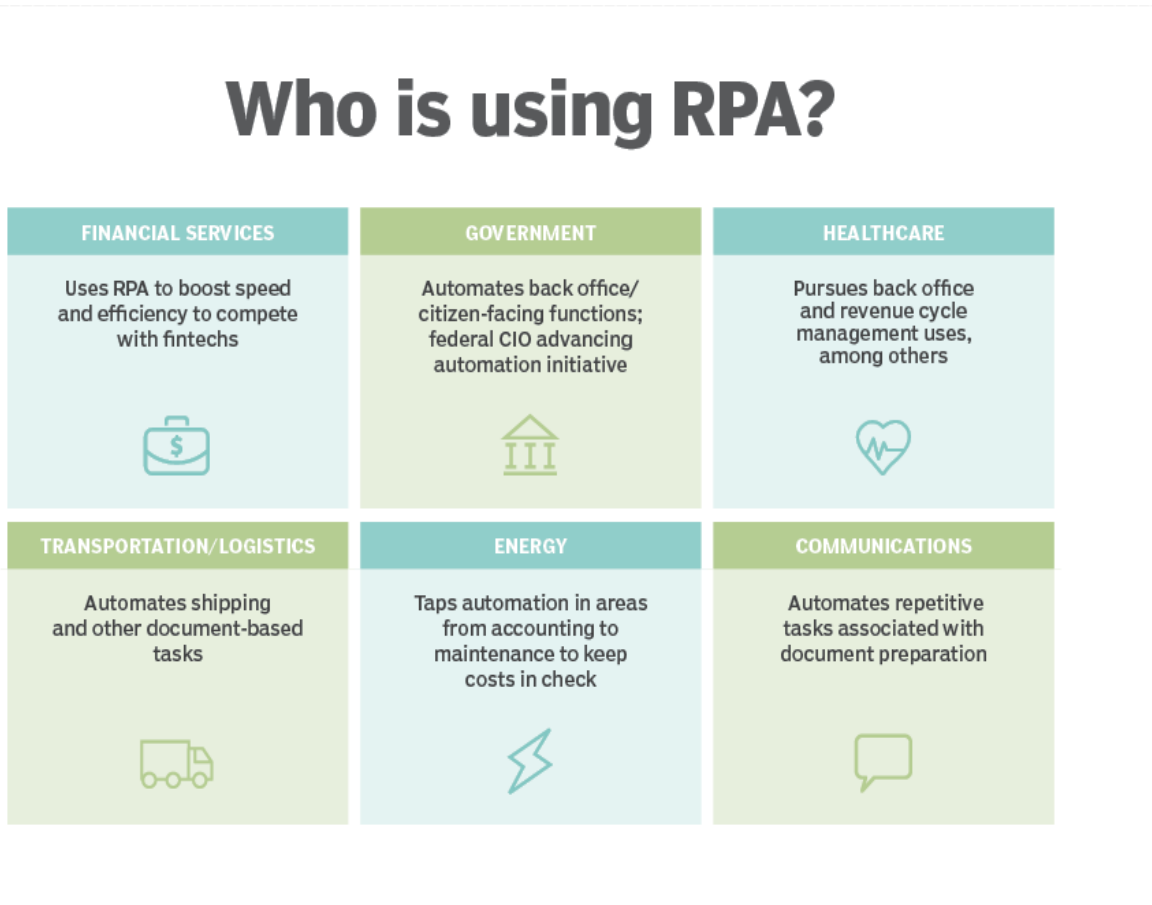


Figure 5.1 Who is using RPA

Some of the top RPA applications include the following:

- **Customer service:** RPA helps companies to provide better customer service by automating contact center tasks, including verification of e-signatures, uploading scanned documents, and verifying information for automatic approvals or rejections
- **Accounting:** Organizations use RPA for general accounting, operational accounting, transactional reporting, and budgeting.
- **Financial services:** Companies in the financial industry use RPA for foreign exchange payments, automating account opening and closings, managing audit requests and processing insurance claims.
- **Healthcare:** Medical organizations use RPA for handling patient records, claims, customer support, account management, billing, reporting and analytics.
- **Human resources:** RPA can automate human resource tasks, including onboarding and offboarding, updating employee information and time sheet submission processes.
- **Supply chain management:** RPA can be used in supply chain management for procurement, automating order processing and payments, monitoring inventory levels and tracking shipments.
- **Telecommunications companies:** RPA is used to configure new services and the associated billing system for new accounts. They also use RPA to pull data from multiple systems when triaging equipment or predicting problems.

All the major systems integrators including Deloitte, Ernst and Young, Tata Consultancy Services, they use RPA to help build vertical applications that can make it easier for companies to adopt best practices in their procedures.

### [Types of RPA and Capabilities 4.3](#)

There are two main approaches to RPA: attended automation and unattended automation. Both types of automation are key when it comes to transforming workflows and picking processes to automate, and companies can use one type or a mix, depending on their needs. Different bots handle different activities so the type of automation you choose should correspond with the processes you are automating.

**Attended Automation:** Automation can be carried out at the workstation level, where a software robot will perform certain actions in place of a human being. Like a human, it will read the contents of an application window, locate fields containing the useful data, copy the data to another window, launch a transaction, and so on. The robot can also perform checks on the data it handles, providing the company additional compliance guarantees relative to its defined procedures.

During the process, the robot can return control to the person in front of the workstation, if necessary, so that the person can make a decision that requires their intelligence or business experience.

This aspect of Robotic Process Automation, where the robot acts like a human being’s software assistant, interacting with the workstation while complying with business logic, is called “**attended RPA**”, or **Robotic Desktop Automation** (sometimes referred to as RDA).

An example of this, in a sales context, is a robot that assists a salesperson in developing a proposal or processing an order:

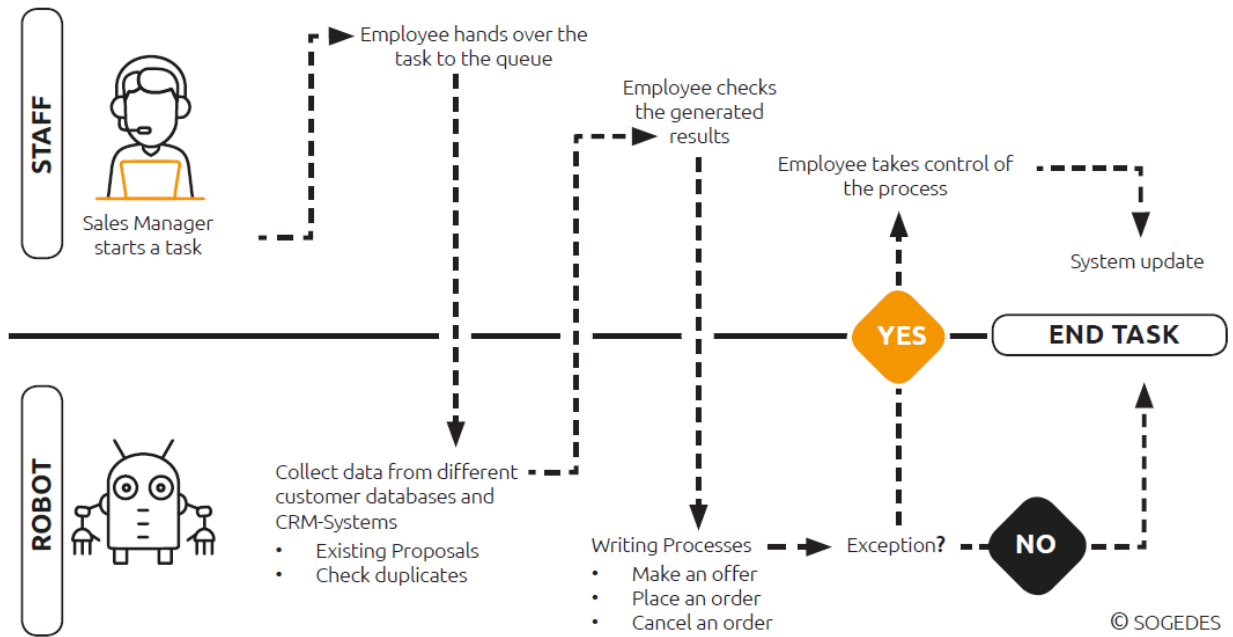
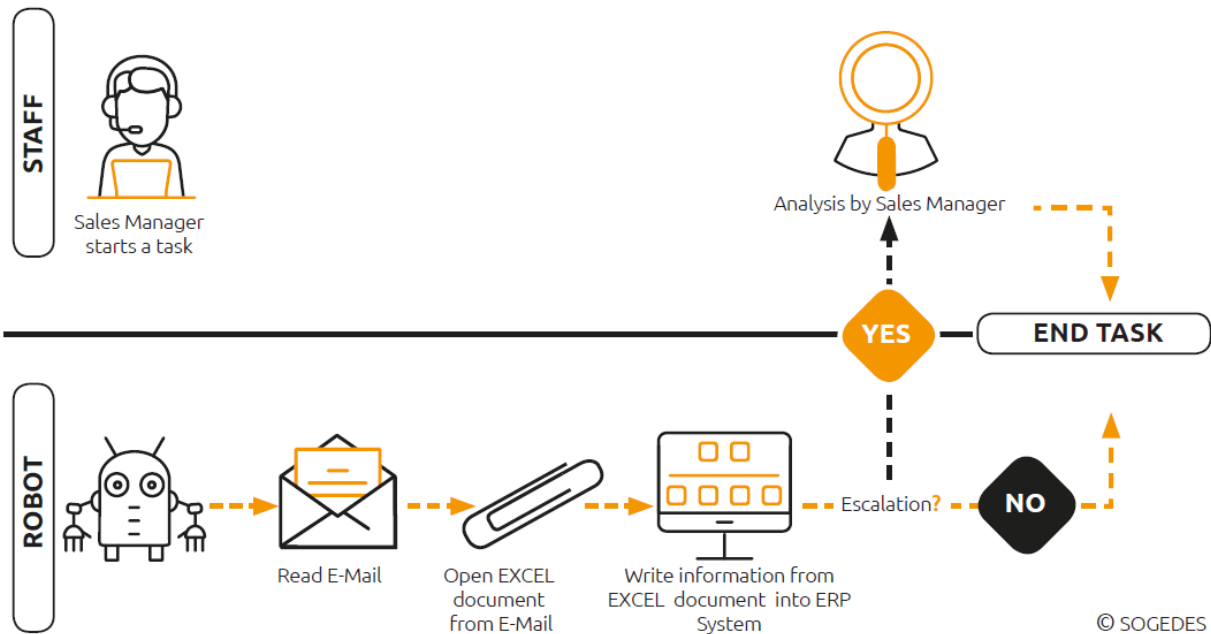


Figure 5.2 Attended RPA as an assistant.

**Unattended Automation:** Automating certain processes can also take place on servers, almost without human interaction. A standalone software robot can use applications to retrieve information, apply control rules to that information, execute processing to produce new data, and then inject that new data into other applications through their user interfaces (UIs) or application program interfaces (APIs). This aspect of Robotic Process Automation, where the robot works alone, is called “**unattended RPA**”.

However, the standalone robot remains under the supervision of human beings, as it is necessary to monitor the execution of processes to ensure they are successful. When an exception or problem occurs, a human expert (a “robot supervisor”) must determine the cause, correct it, and then restart the robots so that the process resumes where it had stopped.

An example, still in a sales context, is a robot that analyzes Excel tables, retrieves information, and injects that information into the company’s ERP:



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Figure 5.3 Unattended RPA robot.

The capabilities of RPA are endless. There are some certain features though to look for in an RPA tool that maximizes its benefits by helping the company to get started faster and make procedures more efficient. Some of the most important capabilities of an RPA software are:

- Launching and using various applications like:
  - Opening emails and attachments
  - Logging into applications
  - Moving files and folders
- Integrating with enterprise tools by:
  - Connecting to systems APIs
  - Reading and writing databases
- Augmenting data
  - Scraping data from the web including social media
- Data process
  - Following logical rules such “if/then”
  - Making calculations
  - Extracting data from documents
  - Inputting data into forms
  - Extract and reform data into reports or dashboards
  - Merging data from multiple sources

An RPA bot can do these functions on virtual environment since no hard code programming is necessary.

#### [How RPA works 4.4](#)

An RPA bot mirrors the way people are accustomed to interacting with and think about software applications. RPA's ability to copy the way humans perform a computer-based process has contributed to its popularity compared with automation tools such as application programming interfaces (APIs) or soft-code development that are scalable but less intuitive or require expert knowledge to use.

The simplest RPA bot can be created by recording the clicks and keystrokes as a user interacts with an application. When problems emerge, a user can simply watch how the bot is connecting with the application and identify the steps that need to re-defined.

In practice these basics recordings often serve as a template for building more complex bots that can adapt to changes in screen size, layout, or workflows. More sophisticated RPA tools use machine vision to interpret the icons and layout on the screen and make adjustments accordingly.

some RPA tools are also able to use these initial recordings to create hybrid RPA bots that start by simply recording an existing workflow and then dynamically generating a workflow automation on the back end. These kinds of hybrid bots take advantage of the simplicity of RPA development and the scalability of native workflow automation.

In other RPA implementations, process mining and task mining tools are used to automatically capture business process workflows that serve as starting templates for RPA automations. The process mining can analyze the logs of ERP and CRM applications. for example, to automatically generate a map of common enterprise processes. Task mining tools use a locally running app with machine vision to capture a user's interactions across multiple applications. Modern RPA applications include these kinds of process mining integrations.

RPA tools can also be connected to AI modules that have capabilities like machine vision, natural language understanding or decision engines, resulting in what is called intelligent process automation. These capabilities are sometimes packaged into cognitive automation modules designed to support best practices for a particular industry or business process.

#### [Benefits of RPA tools 4.5](#)

RPA can help business solve their systematic automation challenges that are repetitive, and rule based. It is a way of creating a virtual workforce that brings in extended capacity to business to gain a competitive edge in customer satisfaction end enterprise agility. RPA bots offer a magnitude of benefits some of which are:

- **Accuracy:** RPA can significantly improve the accuracy of business operations since they are impervious to human error.
- **Consistency:** RPA can automate any business process that is repeatable, and rule based. It can execute business processes with extreme precision at very high velocity that even smartest humans cannot.
- **Reliability:** RPA with its inbuilt capabilities including Monitoring and Analytics, can offer detailed Audit logs that allows users to oversee the health of their systems and processes. If any unexpected errors occur, the processes could be configured to notify required personnel and handle them appropriately with specific workflows.
- **Scalability:** RPA tools offer centralized management of bots that allows business to scale up/down quickly. With a simplified bot architecture and ensuring the bots are audited in regular intervals post deployment, scaling up/down RPA infrastructure would be simple.
- **Reduced Costs:** RPA bots cost way less than a full-time employee. By deploying bots to automate mundane business processes, RPA can significantly reduce operation costs.
- **Non-Invasive:** RPA is designed to mimic human action hence the technology interacts with data withing the presentation layer of platforms and applications. This allows companies to implement RPA without making any significant changes their already installed ERP systems. This also brings in significant savings as it reduces the need for consistent IT development and technical workforce.
- **Improved Productivity:** RPA can autonomously execute business process 365 days, 24 hours with high efficiency and accuracy significantly increasing business gains. Bots cut down the time it takes to do mundane repetitive tasks and outperform humans as virtual workforce.
- **Improves Employee Morale:** RPA can relieve employees of repetitive tasks so they can focus on more engaging and challenging activities. Most employees have better moral when they invest their time and talent in jobs that are more interesting and less routine. Since better morale improves productivity, business can get more work done by their human workforce as well.
- **Improved Transparency:** RPA bots can detect poor data integrity errors and enable standardization. This leads to transparency in any industry by identifying significant errors hampering both management decisions and operational performance.
- **Improved Compliance:** RPA bots execute processes per instructions they have been configured to follow and provide an audit trail for each step. Furthermore, if any step in a specific process needs to be reviewed, bots have the ability to replay their actions. This controlled nature of bots increases transparency and eliminates frauds.
- **Improved Reporting:** RPA generates significant amount of data that allows organizations to analyze and identify process inefficiencies. This operational insight provided by bots allows organizations to streamline existing business processes.

- **Improved Quality:** RPA enables business to streamline and standardize their processes with reduced data errors. This reduction in errors lead to high quality data that enables more reliable analysis.

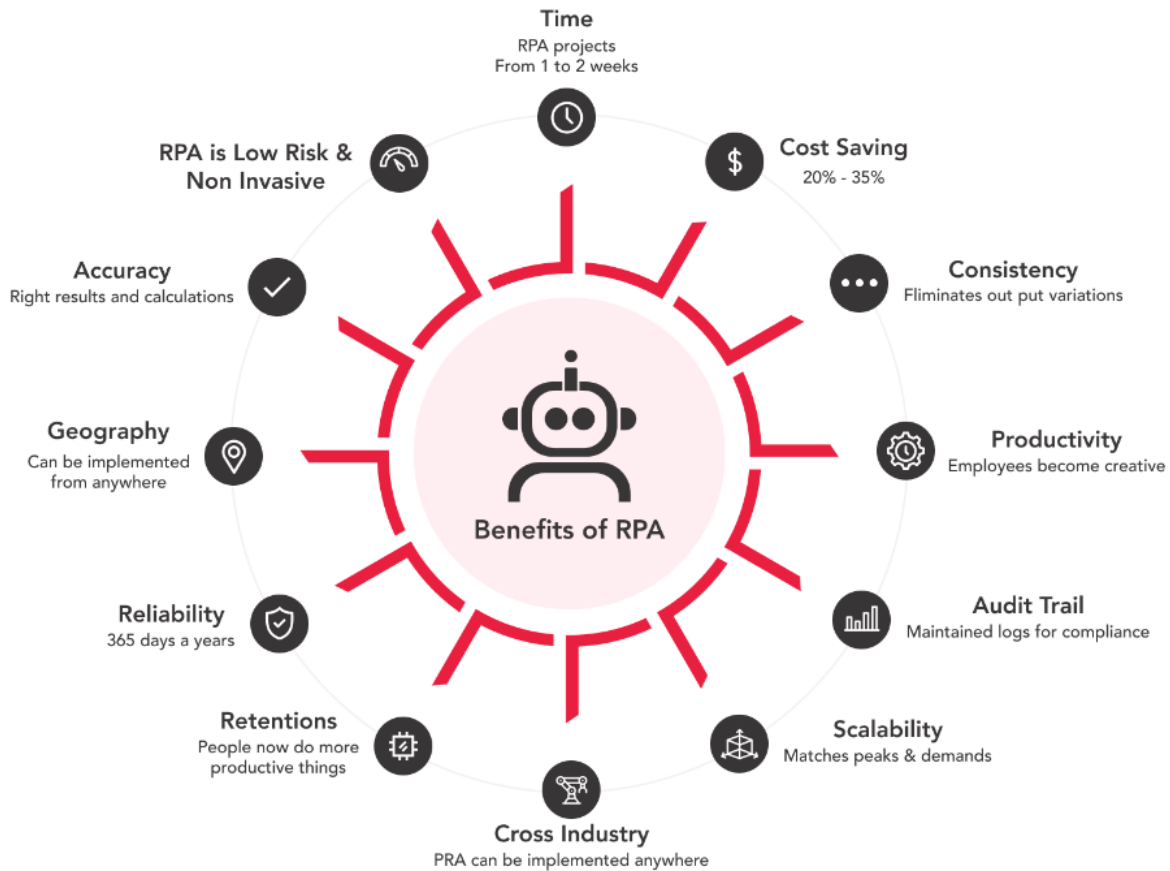


Figure 5.4 Benefits of an RPA bot.

## [RPA in various industries 4.6](#)

In order to remain competitive in this rapidly evolving ecosystem, every industry need to make significant investment in disruptive technologies that could maximize their efficiency while keeping the costs low and offer best possible user experience to their customers. RPA is one of the disruptive technologies that companies across various industries want to implement.

### [RPA in banking](#)

Banking industry deals with enormous amount of data every single day and its critical for banks across the globe to deal with this sensitive dataset with high level of accuracy and quick turnaround

time. RPA can minimize the manual processing data errors by automating various processes including,

**Customer service:** RPA can help in resolving low priority customer queries and lets human employees focus on high priority customer service issues.

**Accounts Payables:** RPA can help automating the vendor invoice processing and payment to vendor account post reconciliation & validation.

**Accounts Receivables:** RPA can automate processing incoming payments and clearing customer dues.

**General Ledger:** RPA can help automating the collection of financial data, assets, liabilities, revenue, expenses, and update GL with right information.

**Credit Underwriting:** RPA can automate verification of income/expense/exposure of credit applicant against internal and external databases.

**Compliance:** RPA generates full audit trails of every process executed which significantly improves the quality of compliance process.

**Credit card processing:** RPA can automate various time-consuming processes like document collection, credit checks, background check and quickly determine if the customer is eligible for credit card.

**Consumer Loan processing:** Most of the consumer loans including Auto, Mortgage, personal involves credit checks, employment check and verification. RPA could accelerate this process based on predefined rules and enable quick decision making.

**Fraud detection:** RPA can quickly perform if-then analysis on the customer transactions and detect anomalies that could facilitate fraud detection.

**Report Generation:** RPA can help banks collect information from various sources, validate them, organize it in required format with high level of accuracy and share the reports with required stakeholders.

**Account opening / closure:** Account opening and closing involves a set of predefined tasks that could be automated with RPA. All known exception scenarios could be configured as well. RPA can maintain all required compliance audit logs throughout this process.

### [RPA in audit](#)

Accounting/Auditing firms also deals with massive volume of data that are analyzed/audited by a variety of processes that are repetitive & time consuming and that do not require audit judgment. RPA can help in variety of Audit processes including,



**Data Collection and Cleansing:** Auditing involves collection of data from various sources and validate the data for completion, duplication etc. RPA can automate this data collection and manipulation / cleansing process with high level of accuracy.

**Controls testing:** RPA could be utilized in automating a variety of controls testing including auditing segregation of duties, exception reporting, access related controls, change management controls etc.

**Risk Assessment:** RPA can automate the data collection, classification of data and identify core trends as part of the annual risk assessment process.

**Reconciliation:** RPA can automate data collection from various sources and reconcile data against preconfigured rules with high level of accuracy. RPA can reconcile huge volume of data consistently which is real tedious work for the human partners.

**Audit Project Management Office:** RPA can handle a variety of tasks including identifying open items, sending reminders at required intervals / criteria, tracking the progress against plan, automating reports etc.

### [RPA in insurance](#)

Insurance companies across the globe are heavily burdened with manual back-office processes. This necessitates insurance companies to automate various processes to meet rapid customer growth and improve their processing time. Some of the potential automation processes includes,

**Claims processing:** RPA can expedite the claims processing by gathering required information from various sources and integrate all this disparate information with high level of accuracy.

**Underwriting:** RPA can collect information from various internal & external data sources and perform risk assessment quickly with high level of accuracy.

**Appeals processing:** RPA can automate extracting data from policy and claims decision document in-order to expedite appeals processing.

**Data collection and cleansing:** RPA can automate extracting required data from internal and external data sources. RPA can cleanse this data, format, and remove duplicates, fill required information in forms ensuring high data quality.

**New policy opening / policy cancellation:** RPA can follow predefined rules and checklists to automate various processes involved in policy opening and cancellation. It also maintains detailed audit trail of all processes involved for compliance purposes.

**Business process analytics:** RPA allows monitoring and recording every task it executes which gives valuable insights including number of documents processed, exceptions generated etc. This insight allows further process improvements and decision making.

## Present situation of automation systems 4.7

According to data, global spending on automation systems and artificial intelligence applied to business processes is expected to grow strongly through 2023, maintaining the growth rate experienced over the past few years, and the global market size is expected to grow to \$10.4 billion by 2023 as well.

These estimates, published in January 2020, suggest that by the end of this year, \$9.6 billion will have been invested in intelligent process automation. That is, in all those computer tools designed for autonomous decision making, simulating human behavior and associated business processes. This includes automatic self-learning systems, data mining, pattern recognition tools and natural language processing. Specifically, 4 billion will be allocated to RPA, growing by more than 50% in just three years.

However, these estimates were issued without considering the real impact that the Covid-19 crisis was going to cause in the following months. This is where the question now arises as to whether this impact can lead to a much stronger and faster take-off of RPA due to its potential to reduce costs and speed up professional tasks at a time when it seems to be becoming more necessary.

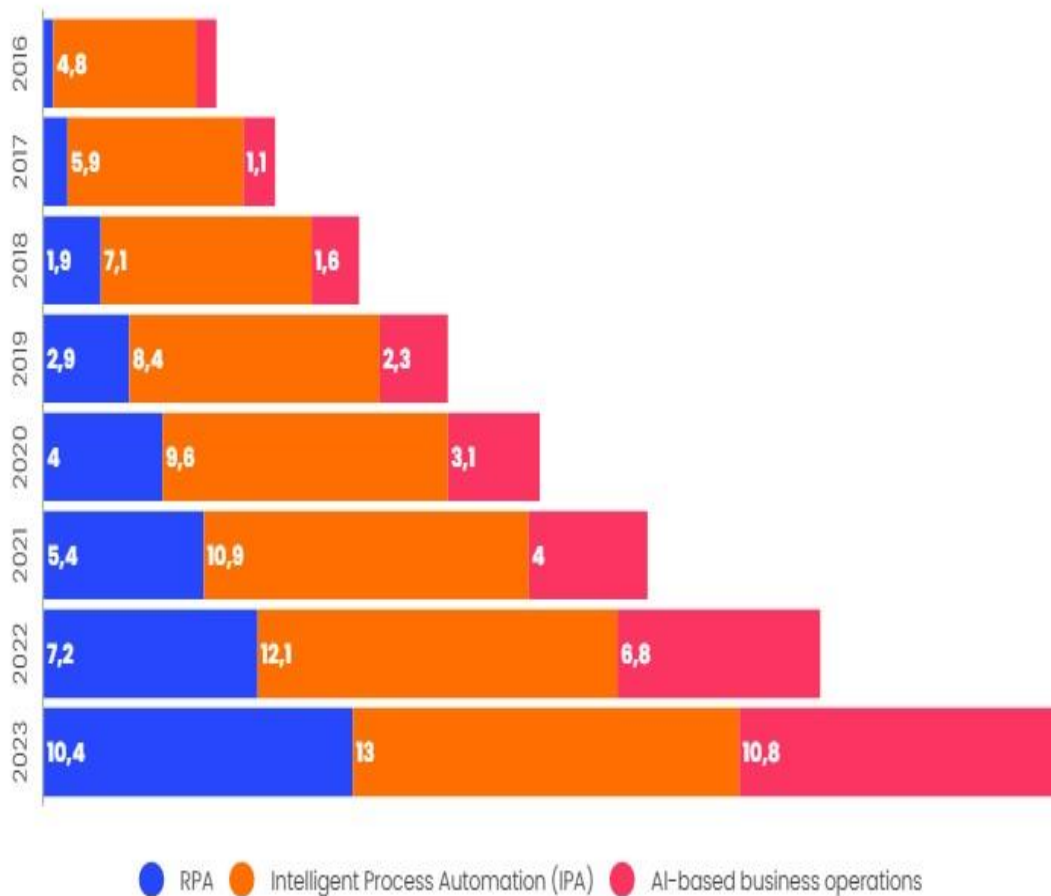


Figure 5.5 RPA market by 2023

## Risks 4.8

As the financial services industry entertains this inflection point of puzzlement, curiosity and concern surrounding RPA across organizations, the question is no longer “if,” but rather “why,” “when,” “how many,” “where” and “how fast” robotics have been deployed. Boards, executives, committees, regulators, risk management and compliance functions, and internal audit departments are receptive to leveraging technology to reduce costs and streamline processes, yet queries have arisen about the parallel degree of focus on risk, control, and compliance. Instances have also been identified whereby control consciousness has been viewed as secondary to deploying RPA and realizing business returns.

Risk mitigation remains the foundation for strong business performance, and organizational trepidation has surfaced that, robotic deployments may be a new vehicle that presents both traditional risks, and also introduces new, unforeseen risks. Minimally, from a risk and control perspective, organizations are tackling the following representative apprehensions with their RPA journey.

**Rationalization** - Although organizational direction may be communicated with regard to RPA, anxieties exist regarding the improper usage and deployment of robotics. RPA sometimes may rightly serve in a bridge capacity, but situations have occurred whereby RPA is not the appropriate

technology and was solely selected due to a speed-to-market goal. As a result, the advantages of flexibility and convenience have been a curse and led to knowingly circumventing extensive queues within development teams and cumbersome technology controls.

**Maintenance and operations** - Similar to an employee, robots require guidance to perform the activities desired. Although robots are configured as of a point in time based upon defined business requirements, broader architecture and system changes can severely affect the expected performance. Modified data field mappings, orphan and dangling robots, vendor upgrades, system integrations, capacity and performance monitoring, and

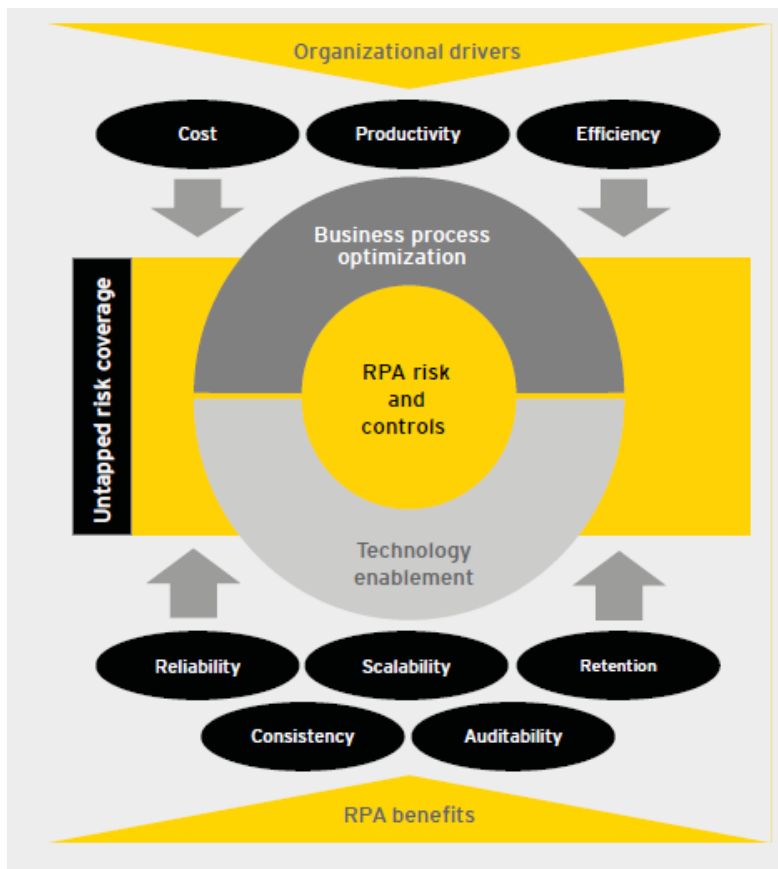


Figure 5.6 Risks and Controls

forward compatibility considerations require attention to preserve the original intentions of the robot and manage the perceived brittleness of the application and RPA dependencies.

**Cybersecurity and resiliency** - As robotics become mainstream, these new entrants to the IT environment represent additional vectors for compromise. Abuse of privileged access, mismanaged access entitlements and disclosure of sensitive data are valid concerns.

Additionally, platform security vulnerabilities, privacy implications and denial of service may yield ramifications that impact the RPA integrity, reliability, and downstream business processes.

**Methodology and documentation** - Granted that agile development methodologies encourage improved iterative communication and coordination between key stakeholders, adherence to documentation standards should be a staple of this approach to support the risk and control mindset. Although business functionalities may be delivered in time and accurately, the traceability of artifacts related to RPA decisions often is absent, and even an afterthought. (Young, 2018)

A 2017 report by Ernst and Young reveals that between 30 to 50 percent of RPA projects initially fail. (Codezup, 2020). As mentioned before the RPA market is rising by approximately 36% per year since 2016. Generally, there is a dominant idea that RPA can be applied everywhere and automate anything. Overall organizations must better understand how RPA works and apply it where it can offer the most benefits.

The challenge in using robotics effectively comes from the misuse of the “P,” or “Process,” in “Robotic Process Automation.” In fact, most bots are designed to automate tasks, a far cry from redesigning and automating the end-to-end business processes that are at the heart of real transformation. Used appropriately, RPA can be a very useful tool in a strategic transformation initiative. But if approached incorrectly, they can perpetuate legacy system problems.

RPA goes wrong when organizations that have been promised significant savings by using lots of bots to try to automate as much as possible, including increasingly complex operational processes. Most bots are designed to automate tasks – they won’t address the transformational need to optimize or redesign processes for the digital world. And they can’t deliver meaningful digital transformation on their own.

Business leaders that have high hopes for huge returns from massive RPA process implementations are frequently disappointed. Problems arise when organizations mistake tasks for processes, and either vastly underestimates the complexity of the processes they’re trying to automate or the time it takes to fully integrate and automate unattended bots. The result can be delayed or abandoned projects.

RPA can’t fix bad processes; it just speeds them up. When a business tries to use unattended RPA to compensate for poor processes, not only is the process not improved, but the resulting errors and bottlenecks are typically shifted down the line, creating new problems. Organizations need to shift their thinking to reevaluate existing processes and modify or redesign them to give customers and employees better experiences.

## RPA Life cycle 4.9

As we already mentioned RPA are software systems that can complete a task without human intervention. Being a computer software RPA has a life cycle. Although they are software, the software development cycle does not have a specific structure. It includes different phases of the automation process from the development of bots to their execution.

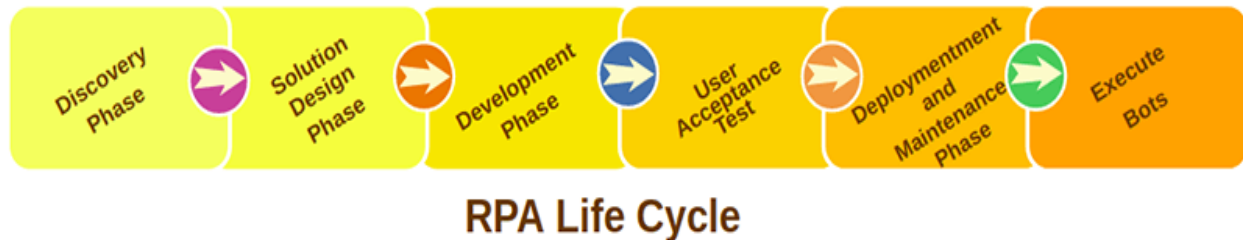


Figure 5.7 RPA life cycle

**Discovery Phase:** Discovery phase is the first phase of the RPA life cycle. At this phase, the RPA process architect analyzes the customer’s requirements. Then, a decision is made as to whether the process can be automated or not. If the process can be automated, the RPA analyst team will work with the RPA architect team to analyze the complexity of the process.

**Design Phase:** The steps to automate the task are designed according to the requirements. The RPA technical architect, together with the process architect, develops a “Process Definition Document” (PDD) that contains information about the whole process. They follow the development methodology and develop a strategy to automate the task according to this document. Once all requirements are met, the next step is to decide on parameters such as the budget, the number of people, and the time to spend on the project. Next, the analyst team creates a flowchart to understand the flow of processes. Once the design is completed, the RPA tool is used to start the development of RPA software and automate the tasks.

**Development Phase:** At this phase, the RPA developer creates scripts/bots to automate tasks with the help of RPA tools. There is usually no need for coding to develop these tasks in RPA tools. However, this could change depending on the tasks to be automated.

**Deployment and maintenance Phase:** RPA software is placed in a production environment only when they have completed the development and testing phases. Users can use them to automate their tasks after the deployment process. If problems are discovered on the software during this process, they would be sent to the RPA development and testing team. The development team analyzes the bots again and fixes the problems.

**Execution of Robots:** The bots, whose errors are fixed, are executed in the production system at this phase. Bots are checked to make sure the implementation is done according to the requirements. In case of errors that may arise at this phase, the software is sent back to the testing and development team to fix the errors.

RPA lifecycle provides a structure to the automation process where at each stage we can ensure that the implementation is as expected. It is all about using robots to handle the repetitive or

complex tasks which need high precision. RPA tools vary according to the requirement and degree of complexity which needs to be handled between multiple applications.

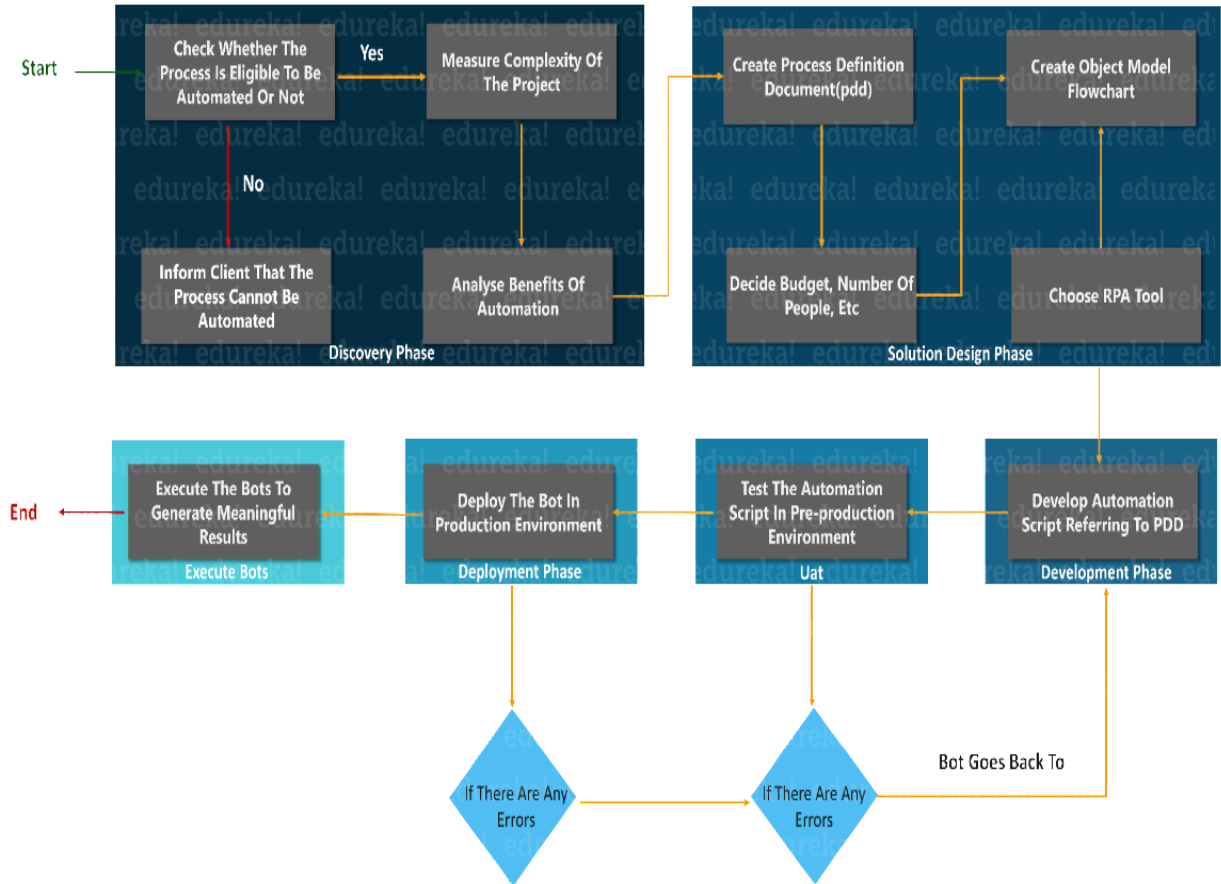


Figure 5.8 RPA building flow

## RPA vs IPA 4.10

Intelligent process automation is increasingly seen as a complement to RPA, extending the scope of RPA with artificial intelligence technologies. IT leaders should understand the important distinctions between the two automation technologies before incorporating them into their technology roadmaps.

As we mentioned above RPA is a type of automation that mimics the way humans interact with computer programs. It is often used for automating simple processes, as well as integrating legacy applications to modern applications. Technically speaking, RPA is only used to automate task rather than processes. RPA is excellent at automating simple and straightforward tasks. Businesses that handle large volumes of data such as ERP and CRP are perfect candidates for RPA. They can also greatly benefit from the speed and consistency it offers.

The easiest way to think about RPA in action is to imagine it as a sort of digital assistant - it can reroute documents, sort and file attachments, and perform actions if a certain keyword pops up - and has high processing capabilities. The main issue with RPA is the fact that it lacks any form or sense of intelligence. When it comes to learning or teaching the system, RPA tools only make sense if there are processes in the organization that you can write very clear rules for. RPA will only do what it's told, and it doesn't change its behavior based on past experiences.

Intelligent Process Automation (IPA) combines RPA with Machine Learning, as well as other AI techniques and Digital Process Automation (DPA) to operate and automate digital processes. To make it simpler, RPA combines workflow automation with AI, while IPA combines the more intelligent disciplines of AI to process automation. But from an operational perspective, RPA and AI are the two sides of the same IPA coin.

## Intelligent automation continuum

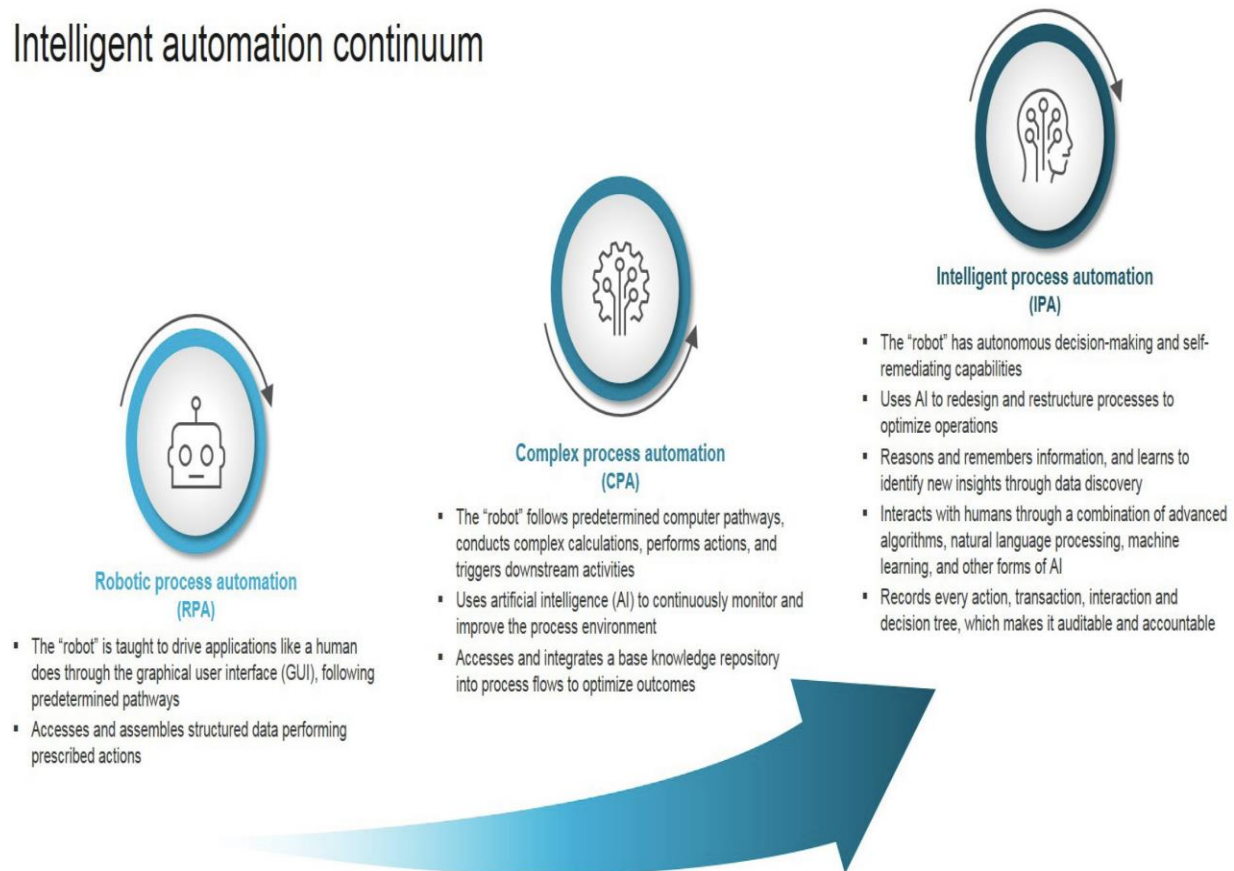


Figure 5.9 Definition of Intelligent Automation according to IBM

The main difference is combining RPA's process-driven and AI's data-driven focus. The data concerned is often unstructured, or semi-structured at best, and the automation of processes that incorporate unstructured content, such as text and images is not only process or data-oriented - but



also focus on outcome actions. It doesn't need big training data samples or rule-based training, which are complex and beyond the reach of most companies.

### Key differences between RPA and IPA 4.11

IPA is basically an upgraded form of RPA. Unlike RPA, IPA can understand context, learn, and iterate. IPA can also handle both unstructured and structured data and supports some level of informed decision-making. Informed decision making can further be divided into task level or process level automation. IPA helps organizations to access and analyze unstructured data like images or text that is inaccessible by other means to gain important insights. IPA can take unstructured data and turn it into structured data for use with RPA technologies. For reasons like these, the technologies are not mutually exclusive but can work together to optimize business processes. RPA makes work less tedious and allows organizations to scale their operations to provide more value to customers. IPA builds upon RPA, giving systems the ability to automate tasks and to learn from them. For organizations that are new to automation, getting started with RPA technologies is the way to go. They are easy to use and can be implemented with low-code business process management software. Once automation has been introduced into one or more processes, organizations can consider IPA for complex business processes.

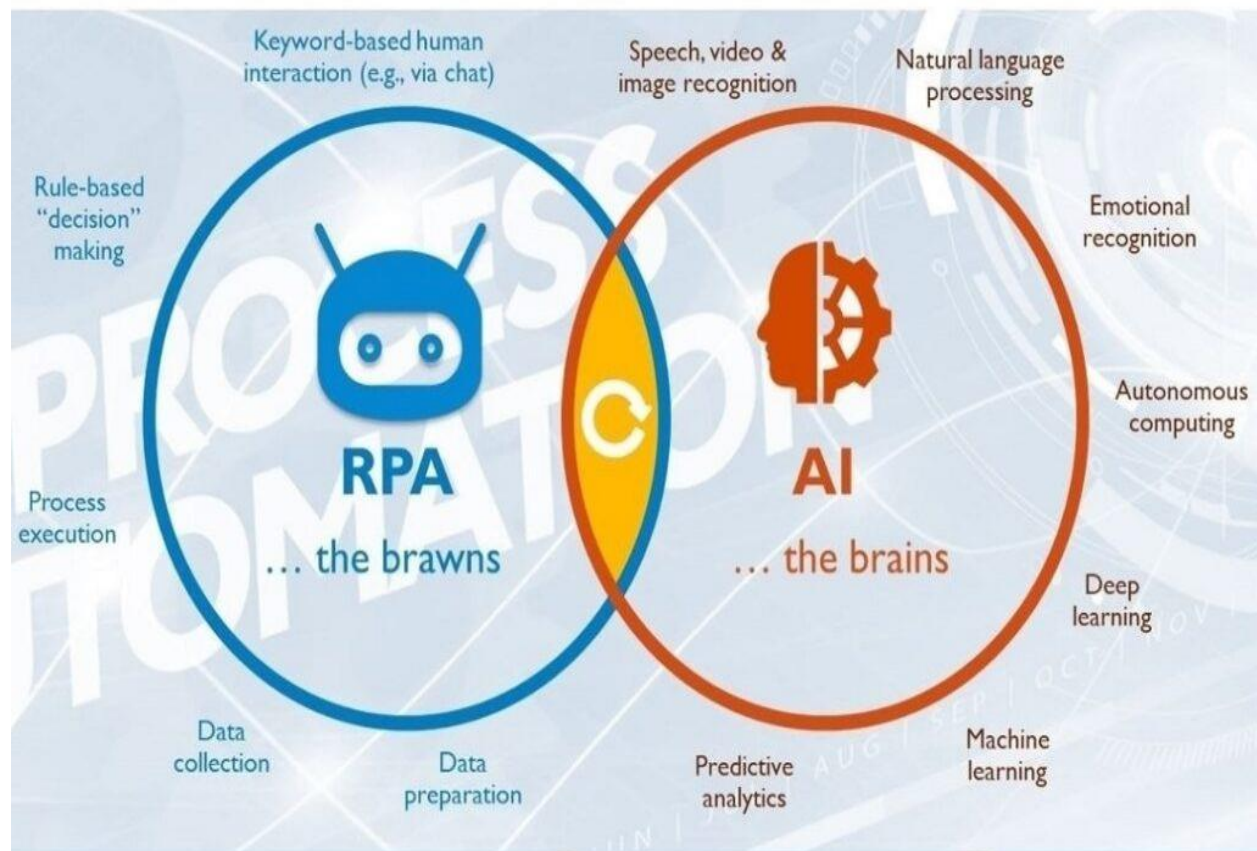


Figure 5.10 Differences of RPA and IPA



## RPA in a post-covid world 4.12

The COVID-19 crisis has pushed companies to innovate like never before, and as life is slowly returning to normal and the health crisis is lessening, companies around the world are starting to think about how to change and evolve their businesses, as the economic effects of this crisis will continue to be present. Many companies in various industries are facing several challenges because of the COVID-19 crisis:

- Reduction in staff or equipment due to teleworking
- Protecting the health of workers with distance
- Decrease in demand for some products and services
- Large increases in demand for some products and services
- Need to improve processes to increase productivity and reduce costs

Many experts agree that this new crisis has created a very lasting and fundamental change in the way companies work and recognize that there is little chance that many companies will be able to return to the way they were before COVID-19 in a short or medium term. However, these companies must accept the changes they have to make in their businesses, due to the situation, to stay in the market, be more resilient in the future and be competitive, something that is achieved through automation, and in particular the deployment of RPA solutions, which will be key for those organizations that are visionary and accept change. Companies and organizations that had not used this technology before the crisis are now seeing the benefits of scalability, flexibility, and diversity of these RPA applications, and many of these companies are starting to use them.

### RPA deployment to BPM

#### Introduction 5.1

BPM is a concept that has been on the market for many years and has earned the trust of users, while RPA is a relatively new technology with great potential. RPA became more popular topic today mostly because of the world COVID-19 crisis, and an increased need for companies to achieve more by using less people. At the same time, questions often arise, whether BPMS are disappearing into oblivion and whether a new technology is coming to replace that will allow automating processes more efficiently.

Despite this, BPM and RPA are increasingly being used together, and in some tools, they are even integrated. It should be noted that BPM and RPA are not competing technologies. They help each other and solve the same issues from different aspects. BPM systems solve the issues of process management automation and RPA – the automation of specific operations. The correct combination of these technologies gives a powerful synergistic effect, which we will see more in the future as the market for automation services and practices increases as we mentioned in a previous chapter.

The integration of these technologies causes some confusion as many users do not understand how they are connected and where the differences lie between RPA vs BPM.

#### Synopsis of RPA 5.2

RPA helps automate monotonous, routine, and time-consuming tasks, and in turn, allows automation teams to focus on more important and complex business tasks. It is application agnostic and is based on low-level events or triggers like keyboard or mouse use and web page scraping. However, RPA is more of a surface-level solution, and it doesn't aim at optimizing processes. Instead, its goal is to try and make processes work faster by replacing manual human efforts.

#### **How RPA is used**

RPA is heavily used in the financial sector as business often have large amounts of data stored in legacy systems, the primary use case for RPA. There is a lot of data and many processes at a scale where, when automating, we can see the impact on the business in terms of:

- savings

- efficiency
- mitigation of risk
- business results can be measured

However, the real value of RPA will be revealed when AI is added to these applications, as mentioned on the previous chapter. Adding AI to RPA will free it from its exclusive focus on mundane tasks. AI will make up an increasingly large portion of the digital workforce, and RPA will account for a small fraction of the total spending of the AI cabinet market. However, for now RPA is mainly used for routine work.

### Synopsis of BPM 5.3

BPM focuses on streamlining and reengineering underlying business processes to drive higher efficiency. It can improve business processes by analyzing how they work in different scenarios, making improvements to them, monitoring the modified processes, and continually optimizing them. It's important to note that BPM is neither a task management tool nor a project management tool. Like RPA, it focuses on optimizing ongoing and repetitive processes that follow a predictable pattern.

#### **How BPM is used**

In contrast to RPA, BPM is used to automate end-to-end processes. This is done in different ways:

- It defines and clarifies all administrative responsibilities associated with the process
- It describes the work that people do that is their work processes
- Then it finds areas where these workflows can be optimized

There are aspects of standardization and documentation here, but BPM is also key to getting people to work together. Ultimately BPM is about mapping a process, tracking its performance, and looking for opportunities to improve that performance.

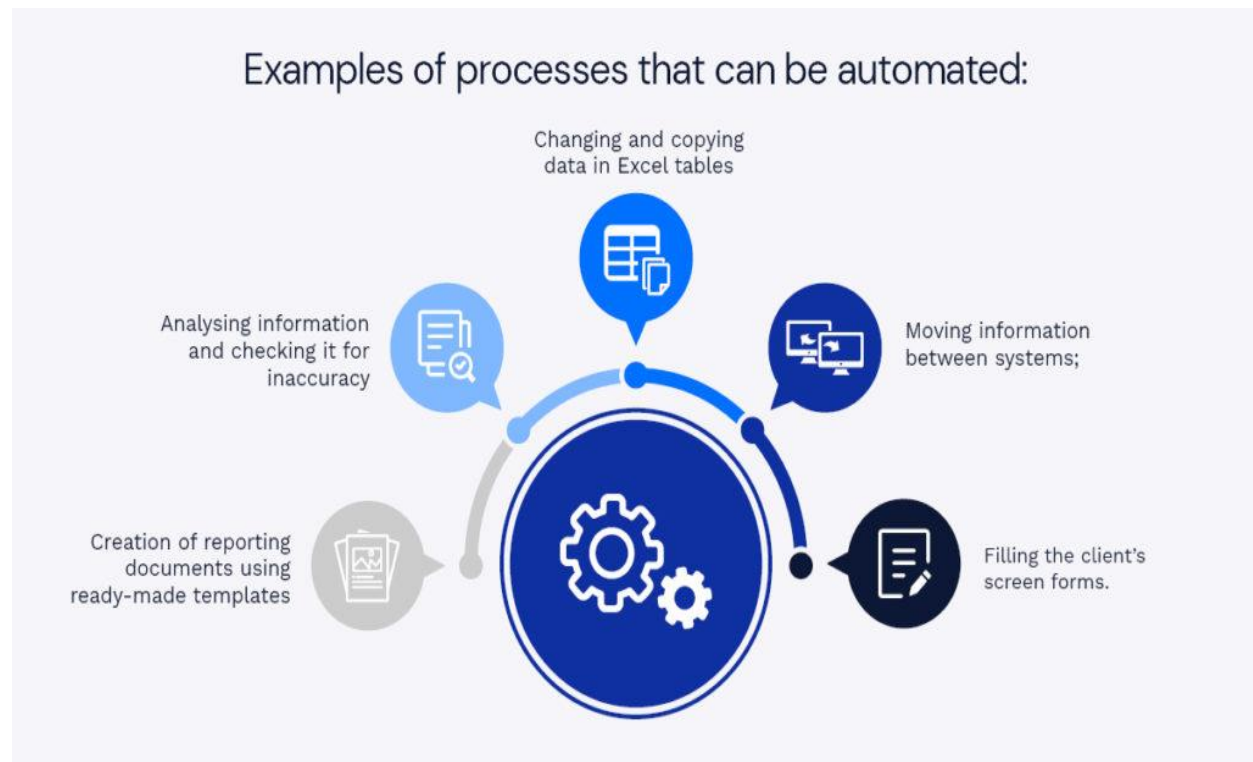
### Why businesses today need robots 5.4

The idea of automating business processes is to have software robots to perform everyday routine actions instead of people.

In most companies, these monotonous tasks are still done by people. This work is also important but does not require special skills and abilities from employees, so there is no need to spend valuable human resources on its execution.

For example, in the industrial sector, repetitive processes have long been entrusted to corresponding robots. The advantages of such a replacement are obvious. Robots are able to work

without breaks and weekends, while they do not get tired, they do not need to pay salary and provide a social package. All actions of the robot are programmed in certain algorithms, which provide the desired result without errors and in a much shorter amount of time.



*Figure 6.1 Examples of automated processes*

As the most visible effects we can mentioned the following:

- cost reduction
- elimination of errors due to the human factor
- reduction of time spent on daily task
- improvement of the quality of work

An important factor in the joint work of a person and a robot is the redistribution of the company's resources. The time that was previously spent on performing routine actions can be spent by employees on developing and scaling the business, making decisions, and controlling quality of products or services.

### [The main differences of BPM and RPA 5.5](#)

Though the two technologies seem to share similar capabilities there many differences between them:

### **Technology**

- RPA configures bots to complete monotonous and time-consuming tasks to save time and allow employees to focus on more complex and high priority tasks.
- BPM identifies and streamlines business process to remove bottlenecks and obtain shorter cycles.

### **Primary Focus**

- RPA minimizes the number of manual, repetitive, and rule-based tasks that do not require complex decisions.
- BPM re-engineers and modifies business process to improve enterprise-wide efficiency and productivity.

### **Deployment effort**

- RPA runs non-disruptively within an organization's existing process and applications without requiring coding or extensive training.
- BPM is a long-term effort that may require specialized technical resources, depending on the complexity and depth of the process.

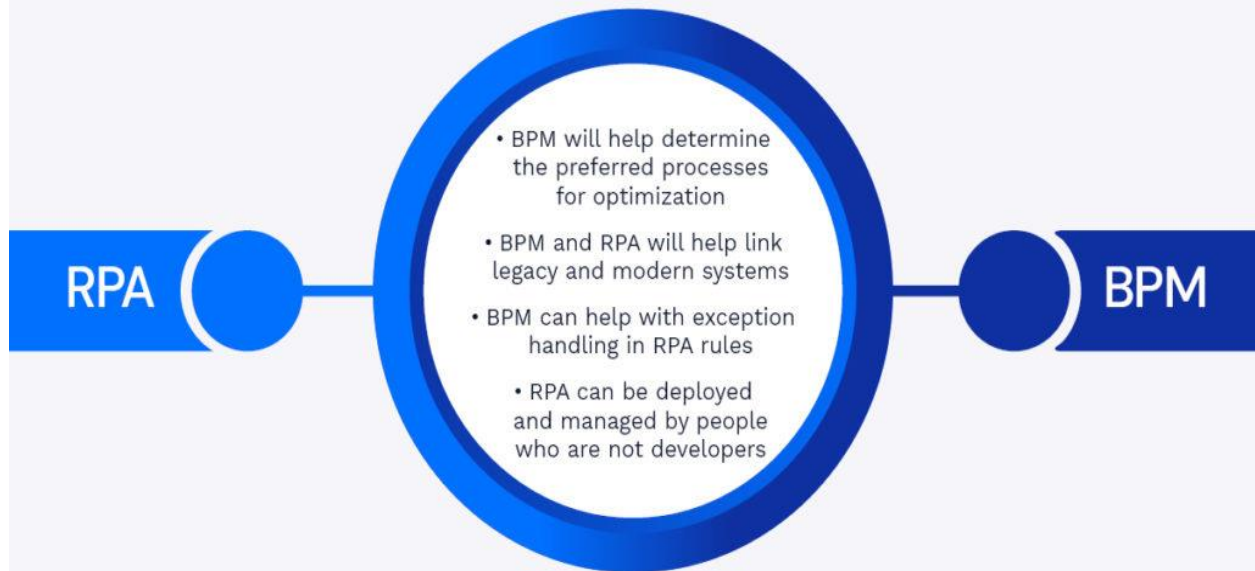
### **Business Impact**

- RPA benefits are quick and immediate with minimal cost, but implementation may not always solve the problem of inefficiency in the business processes.
- BPM offers significant gains in overall productivity, agility, cost savings, efficiency, and regulatory compliance.

## [RPA and BPM as a combined approach 5.6](#)

While RPA and BPM are different terms, they complement each other and, when deployed together, can contribute to digital transformation. The ultimate goal of BPM is to improve processes, but by itself, it does not automate them. On the other hand, RPA is designed to automate certain types of processes, but by itself, it cannot improve or optimize them. By automating an ineffective or faulty process it will not fix, it will simply run faster and increase the repetition rate along with the failed result. Organization use BPM to create robust workflows that connect disparate systems, data, and people digitally. In turn, RPA works within these workflows to perform specific rule-based automation tasks.

## How can you benefit from combining **BPM** and **RPA**?



*Figure 6.2 How to benefit from BPM-RPA combination*

Below are four reasons why to combine BPM and RPA:

### **BPM will help determine the preferred process**

The essence of BPM is to better understand and document the wide range of processes that make up the day-to-day activities of an organization. BPM is about managing business process that are usually hidden in people's heads as well as in guidelines, rules, laws, and worksheets. They inevitably accumulate in any business and tend to be poorly managed over the long term.

Thus, BPM is an excellent foundation for an RPA program because success requires well-understood, well-documented processes and a mindset focused on continuous improvement. We should keep in mind that trying to automate processes we don't understand is destined to fail.

BPM also allows to identify areas in the various processes of the organization, including the workforce, where automation would bring the most benefit and where is the only optimization tool. RPA is a convenient and cost-effective way to automate gaps in areas where organizations have legacy platforms, web applications, or back-end systems that lack enterprise integration functionality.

## **BPM and RPA will link legacy and modern systems**

BPM has long been used by organizations to transform end-to-end business processes so that people in the organization can connect to them. It also links processes to underlying systems to ensure streamlined and efficient operations.

In theory, this looks good and is reminiscent of discussions between business leaders and IT professionals about what digital transformation should look like. Experts believe that digital transformation can be seen as the heir to BPM.

But that doesn't mean that in pursuit of the goal of becoming digital company, it will be able to get rid of legacy systems overnight or that it will instantly find itself in an ideal environment where people and teams always work together or where integration and automation will be achieved instantly. BPM continues to rely on complex and often legacy core systems that perform critical business functions that require human intervention to maintain them.

RPA plays a key role in integrating with complex systems and automates repetitive and manual task, especially when it comes to retrieving, transferring, and processing data. It can significantly save time, reduce errors, and improve data quality.

BPM and RPA has been used for years to rapidly modernize legacy IT systems and business operations across many industries. As an example, banking and financial services companies have deployed robust mobile applications that enable customers to mobile escrow, transfer funds or apply for mortgages from their smartphones. To achieve this, they needed to find a way to connect mainstream legacy systems with modern mobile applications. BPM is used to create digital connections between modern mobile applications and legacy IT systems, while rules-based RPA takes action to move data from one system and enter it to another.

## **BPM can help with exception handling in RPA rules**

RPA operates according to the previously set rules – it does not know how to make exceptions or take “last resort” actions. When faced with them, the bot is practically out of order. BPM will help you solve the problem with exception handling.

Both RPA and BPM can be very effectively combined in scenarios where RPA relies on BPM to handle certain exceptions to perform automated actions, such as when a bot encounters a missing document or information shortage while processing an HR process.

Conversely, BPM can rely on RPA to automate time-consuming and manual tasks such as transferring employee data to various payroll systems as part of the HR process.

The same can be said for other scenarios where BPM and RPA go hand in hand, such as in banking. RPA relies on BPM to handle any exceptions that do not match a set of rules, require human intervention, or a decision on a transaction. Because RPA is rule-driven, a changing environment

or process can destroy the bot, so BPM can act as a kind of backup for it to handle all exceptions and keep it running.

In addition, BPM informs the company about existing exceptions and changes. Without knowing about them, enterprises are putting RPA implementation at risk – a bot can be disabled even by such a simple thing as a change in the configuration of the user interface of a web application.

### **RPA can be deployed and managed by people with limited IT skills**

BPM is increasingly overlapping with IT, responding to organizations' aspirations to acquire the expertise and skills needed to implement an automation strategy. RPA is a technology that allows you to do this without over-engaging IT professionals, as many of its tools are designed to be used by personnel who do not have deep technical knowledge. This means that the same people who work with BPM, such as business analysts or business units, can also deal with the automation of certain processes.

A collaborative approach to RPA is the preferred approach, but this does not mean that CIOs will need to recruit or reallocate additional developers or other IT professionals to support automation. RPA bots can be customized by non-technical employees, which means less work for IT staff who are already overwhelmed by the fact that companies have moved their employees to remote work.

These features make RPA ideal for organizations looking to quickly deploy integration and automation solutions in response to change.

## [What is Hyperautomation and its benefits 5.7](#)

Hyperautomation is defined as harnessing multiple advanced technologies to achieve end-to-end automation. It starts with RPA at its core and adds a range of complementary and advanced technologies, including:

- Artificial Intelligence
- Machine Learning
- BPM
- Advanced Analytics

Hyperautomation involves a combination of tools and technologies to help an enterprise achieve real progress on its digital transformation journey. The combination allows for end-to-end automation of more complicated business processes that can also include human tasks when needed. This delivers productivity gains to more employees, improves their job satisfaction, and thereby their motivation and performance. It can also improve customer experience, help with new customer acquisition and retention of both customers and employees. The goal is to improve the productivity and efficiency of business processes across the enterprise.



- Flexible and easy to integrate tools
- Better team collaboration
- Ability to move beyond tactical automation
- Advanced and accurate analytics
- Management of complete process life cycle
- Effective orchestration between humans and bots
- Greater productivity

### Orchestration of RPA activities using BPM 5.8

Typically, each bot in an RPA solution is focused on a specific activity within a larger end-to-end process flow. Unlike BPM activities, bots are designed to execute activities independently from other activities within the process, where tasks from multiple processes are executed in batches of many hundreds or thousands of processes. If implemented several independent RPA activities as bots, BPM can be used to sequence the RPA activities and connect them to the other systems and human activities that make up an end-to-end BPM process flow. It is good practice for business analysts to capture enterprise process models using collaborative modelling tools to determine which RPA and BPM automation projects would most benefit each organization.

If an existing RPA activity that is the first step in an end-to-end process, then on successful completion of each bot, a BPM process can be launched to orchestrate the rest of the process. Else, if an existing RPA bot implementation that belongs in the middle of an end-to-end process, then after the successful completion of each bot activity it can send an event to BPM to trigger the next activity in the process.

### How process orchestration and automation fit together 5.9

A successful digital transformation requires both RPA and BPM. RPA helps remove manual tasks that slow down companies' everyday work, while BPM brings all the moving parts together into a well-running machine. Employed together RPA and BPM, can gain significant benefits for companies.

**Cost savings:** With a full understanding of each process in the system, IT costs drop, and unnecessary resource costs are eliminated. Employees no longer needs to fix a single issue across multiple processes, but have the visibility needed to fix in one instance. The powerhouse pair of RPA and BPM also enables systems to dynamically scale.

**More tightly regulated processes:** If we must make the same security update to each and every application or process within an ERP/CRM suite, human errors are more likely to appear. With

everything under a single roof, we can enact mass policies that quickly trickle down to every automation procedure within the system.

**Increased agility:** Businesses constantly push to increase their time-to-market. RPA and BPM open a new market of tools where we can handpick pre-built services instantly ready to expand business or improve customer experience.

As customers continue to demand more from the businesses they interact with, the technologies behind these interactions become an increasingly complex puzzle. The dynamic duo of RPA and BPM empowers organizations with the objective needed to coordinate and streamline the ERP and CRM to better serve customers.

## [Digital Transformation Case studies 5.10](#)

### **The W&W Gruppe Case Study**

Wüstenrot & Württembergische (W&W Gruppe) is a financial services conglomerate serving approximately six million customers in Germany. For many decades, it has served as a “pillar of strength” helping customers with insurance (life, health, property, casualty, pensions), financing (home loans, construction loans, and commercial financing), and other financial services.

In 2016, W&W uncovered about four years’ worth of backlog in one of its departments that has been growing year over year. The W&W Center of Excellence team and the top management—dedicated to process improvement—realized the department simply did not have the workforce to reduce the backlog on its own.

In 2016, W&W COE started to work with an automation experts’ team on deploying RPA to automate several insurance processes in the life insurance department. 18 bots were deployed from August 2016 to December 2016 and, within four months, eliminated the four years of claims backlog. After this significant success, more organizations turned to W&W’s COE team for automation implementation in their areas.

The insurance and financial services businesses are complicated and generate a high volume of processes and paperwork. A Center of Excellence (COE) within the W&W Group was tasked with process improvements within the company and discovered that one department had amassed four years’ worth of backlog in claims processing.

The COE, together with management, saw an opportunity to implement RPA as a solution for the backlog. Before a process could be running, human processors had to examine the contract for each customer and check it against a regulatory sheet, which was maintained in Excel. The automation expert first engaged to create a software ‘bot’ that automated that step, removing human error and helped to run the process extremely fast. The first deployments were successful: in the insurance departments, the bots removed that time-consuming task and enabled employees

to spend more time serving customers. The COE achieved early buy-in by seeking input from employees throughout the process so that their end-user experience could be worked into the bot solution.

The COE hosted internal “roadshows” to demonstrate the power of RPA and invited all employees to see for themselves that, for example, a process that took someone 20 minutes now could be done in two minutes with a bot. These sessions also dispelled fears that people would be replaced by automation; W&W has not eliminated one position in four years of using bots. Instead, bots made employees’ jobs easier.

The case for RPA was made. Since 2016, W&W has automated more than 50 processes and counting.

RPA has been so successful at W&W that the company now allows departments to build their own bots under the direction of the COE. This is sourcing new ideas for innovation from every level of the company. The COVID-19 pandemic has made employees realize that process automation is needed now more than ever.

W&W is excited about leveraging Discovery Bot by the end of 2020 to refine company processes even more. The COE focuses on process mining, and Discovery Bot can reduce the amount of time the team spends analyzing processes. (Automation Anywhere, n.d.)

## **The KeyBank Case Study**

KeyBank is committed to building a team of engaged employees to help clients and shareholders achieve financial wellness. Headquartered in Cleveland, Ohio, KeyCorp is one of US’s largest financial services companies. Key Companies provide investment management, retail and commercial banking, consumer finance and investment banking products to individuals and companies throughout the United States and, for certain businesses, internationally.

Using RPA was a way for KeyBank to solve a full spectrum of business challenges. The goal of automation was to streamline processes to provide a better employee and customer experience. As the financial organization grew, organically and through acquisitions, it needed to make work processes more efficient and keep costs manageable.

After doing an analysis of its operations, KeyBank saw opportunities for business efficiency. Instead of continuing to hire at a high rate, the company decided to implement automation to systemically handle some of the manual workload.

The company created its own internal RPA training program with 175 employees completing the course. This was supplemented with the business analyst class and other learnings offered by automation experts’ field of training. A major focus was on loans processing and account reconciliation.

Using a blend of RPA and IQ Bot, one of the manual processes automated was for mortgage quality checks. Before a customer gets funded, underwriters must first approve a loan. Data on appraisal

documents and flood certifications produced by a third-party had to be completely accurate. The mortgage team was responsible for 100% of the time-consuming, manual reviews every day. The volume quality checks required fluctuated from a few dozen to more than 100 loans during the peak seasons of spring and summer.

Partnering with Automation Anywhere, KeyBank came up with an automated workflow for end-to-end processing. Documents are downloaded and turned into PDFs. Those with more than 30 pages are split up. Then, the PDFs are uploaded to IQ Bot which is tailored to recognize the difference between the appraisal and flood certification forms. After this step, a response file in the form of a CSV is sent back for an RPA task bot to do lookups and comparisons. Lastly, an output report of anything that needs to be manually checked is sent to the team. With automation, employees no longer must process these documents and the exception rate has only been 15%. To date, 40,000 documents have been processed through IQ Bot.

When the COVID-19 pandemic created challenges for teams to work on site, KeyBank needed a way to respond to increasing call volumes and amounts of work with no time to add to staff, the company turned to RPA.

One of the biggest success stories was in loan origination where nine bots were created to manage the bank's loan origination process. The bank did not have the ability to recruit to ideal staffing levels in such a short time, though with automation, it was able to complete nine years' worth of work in just two weeks.

KeyBank continues scaling its digitization program and plans to use IQ Bot for additional robust capabilities such as classifying and preparing documents for data extraction. Particularly, the company is looking forward to using Azure OCR, which can recognize handwriting and markings to allow it to expand from processing traditional printed PDFs to non-standard documents such as credit reports as well.

Currently the company is taking a big step by conducting a proof of concept (POC) for Enterprise A2019, the world's only web-based and cloud-native RPA-as-a-Service platform. The POC to investigate attended bots is expected to turn into a pilot next quarter. (Automation Anywhere, n.d.)

## **The BAE Systems Case Study**

BAE Systems is a global defense, aerospace, and security company, employing 85,000 people in more than 40 countries. With an annual revenue of £18,400M its products and services cover air, land, and naval sectors as well as advanced electronics, security, information technology and support.

The Shared Services Team at BAE Systems centralizes the HR and Finance functions company wide. Its more than 350 employees manage the back-office activity for the recruitment and life-cycle management of 34,000 UK employees and the financial activity that crosses all business units including Expenses and Accounts Payable. Looking for new ways to become more efficient by reducing the human effort needed to perform repetitive tasks, BAE Systems recognized Robotic

Process Automation (RPA) was the integrated, scalable solution that could be applied across its organization.

After investing time researching and consulting other businesses about how they ran their RPA programs, the team created a unique profile of the types of processes they wanted to start automating. The tasks were high volume, rule-based, and with structured information. BAE Systems launched its automation program focusing on HR and Finance processes managed by the Shared Services team. The approach was to start small while planning to scale for the future.

Payroll was one of the first processes to be automated within the Shared Services team, which had inherited many different payroll cycles as various parts of the business merged to become what BAE Systems is today. Due to the restrictive nature of the processing, only one of 10 payroll clerks could access part of the system to make data changes at any time, leading to frustration for the team. Now, a bot completes the payroll tasks, processing all the data files to a schedule defined and managed by the payroll team. Every morning the bot reports what it has completed, and the team can now focus on more valuable work like data quality checks to ensure accuracy instead of the mechanics of uploading data. Using a bot also allows this work to be completed outside of business hours. Automation has increased payroll data uploads by 7x.

RPA has empowered back-office teams to enable change by giving them the tools to improve processes and workflows. This results in higher quality, right-first-time, consistent processing, and scalability. Without RPA, adapting transactional processes is a large IT project, which could take years to complete.

To date, BAE Systems has automated 50 processes, saving more than 2,600 hours annually, and benefiting from 7X faster Payroll data upload.

The Shared Services team hopes to have 120 automations in production by 2021. Using RPA will continue to help improve quality, giving BAE Systems a competitive edge in its high-precision industry. (Automation Anywhere, n.d.)

### Conclusions

#### Thesis Overview 6.1

The aim of this thesis is to present the benefits of Governance Risk and Compliance (GRC) practices with the use of modern solutions, implementing Business Process Management (BPM) for more accurate and efficient business planning of organizations everyday processes with the use of the quick work that can be achieved by using Robotic Process Automation (RPA) tools. These solutions can help existing business to face an everchanging and challenging environment, and assist new emerging companies achieve high efficiency levels that will help them thrive in a highly competitive business world.

These solutions can be implemented by companies of variable size and activity, but it's the organizations that contain a high amount of complex business processes that are considered the best environment for study. As a result, this thesis is presenting mostly enterprises from the banking, manufacturing, and auditing sector.

Nowadays the trend is to apply automation on as many processes possible. That has become even more intense due to the COVID-19 pandemic. No company around the world was left unaffected and forced companies to work with less personnel due to healthcare restrictions. RPA solutions, which deal with rule-based processes help automate routine and time-consuming tasks, allowing the human workforce to focus on improving business practices.

We mentioned that RPA deployment is considered easy, as it doesn't require high IT skills by the people using it, but in order to be implemented properly and bear fruits to its user, it needs careful planning of processes that a BPM tool can offer. Our conclusion is that businesses who wish to achieve a level of hyperautomation, they must employ both the 'brain' power of BPM practices with the 'muscle' of RPA tools.

#### Thesis Contribution 6.2

There have been numerous talks before, whether RPA is destined to replace BPM. this thesis concluded that RPA and BPM tools have many differences but shouldn't considered as competitors. On the contrary organizations on their path to hyperautomations should deploy both

tools in order to achieve maximum efficiency. Although we should keep in mind that, BPM might recognize the business process that need improvement, RPA cannot automate every single process mostly due to technology restrictions. As mentioned, it's the Artificial Intelligence (AI) and Machine Learning (ML) that in the future will help achieve greater levels of automation since RPA tools can only automate processes that it has been taught by humans and cannot learn new ones by each self.

### Conclusion 6.3

During this thesis we attempted to present how enterprises today can effectively use modern IT tools on their path to hyperautomation. In the past years there has been a trend for automation, especially for mundane tasks. The COVID-19 pandemic made that trend more imperative. RPA bots can help complex industries such as financial services, banking and manufacturing, gain a significant advantage. It reduces human error, fraud attempts waiting time etc.

Robotic process automation market revenues were expected to eclipse four billion U.S. dollars worldwide in 2020. Forecasts predicted continued growth in the following years with market value set to reach more than ten billion by 2023. Of course, those numbers were accounted before the COVID-19 pandemic and estimations show that those numbers will probably increase even more.

The conclusion of this thesis is that BPM and RPA tools can complement each other in a productive way and can help business achieve an automation level that will help them adjust and adapt to the challenges of the future.

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