

THE RPA BIBLE: ADVANCED TOPICS



**Your Practical & Technical Guide to
Robotic Process Automation**

FOREWORD

The rise of automation fueled by Robotic Process Automation (RPA) has allowed the world of business operations to think different and to think fresh. It enables organizations to transform to a state where there is only "OneOffice" that matters anymore, one that is focused on creating an impactful customer experience and intelligent operations to enable and support it. The Triple A Trifecta – Automation, Analytics, and Artificial Intelligence (AI) is a C-level strategic priority.

Despite the promise, the hype, and the high expectations, the RPA client experience is bi-polar. According to HfS Research, nearly half the RPA clients did not meet or barely met the expectations from their RPA initiatives. The reason is not the technology itself but quite simply the lack of rigor in selecting and implementing the right tool.

This comprehensive report describes an actionable set of eight elements required for successful RPA orchestration. Symphony Ventures collaborated with HfS Research with the objective to help RPA clients realize its true potential.

Happy reading!

Sincerely,

Phil Fersht, CEO and Chief Analyst, HfS Research

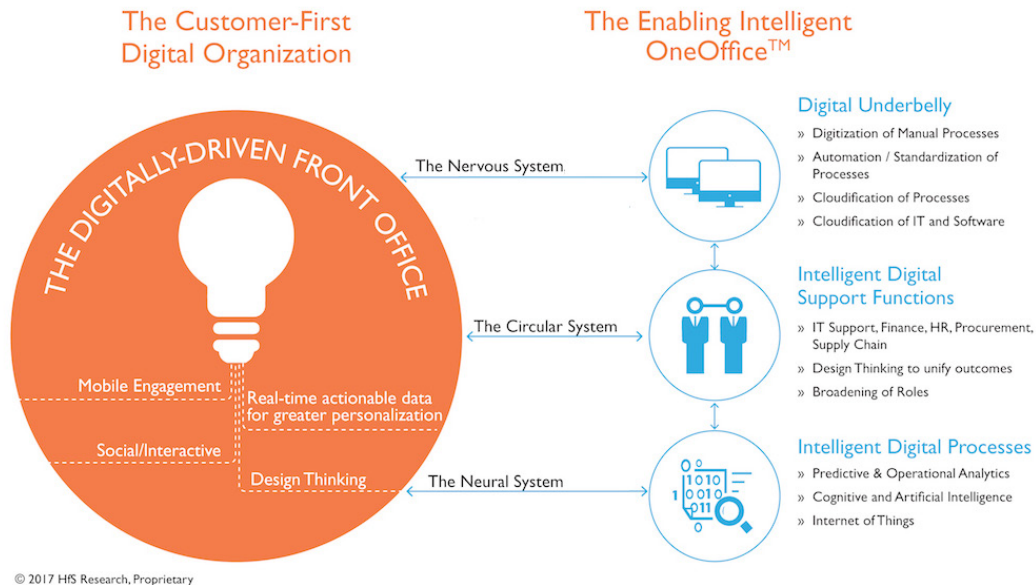
David Brain, COO, Symphony Ventures



	Introduction	4
	What is Robotic Process Automation (RPA)?	6
	The Eight Elements of Successful RPA Orchestration	11
	Architecture	
	Building a Complex Automation? You'll Need Layered Design	16
	How to Choose the Right Delivery Model for Your Project	19
	Optimizing Your Virtual Workforce with Process Administration	22
	Usability	
	Why Visual and Interface Design Matter	28
	How Steep is the Learning Curve?	30
	Selecting the Right Code Structure for Process Design	33
	How Sustainable RPA Design Can Pay Dividends Down the Road	36
	Integration	
	How to Mitigate Database Integration Risks	40
	Why Screen Scraping is Essential to the RPA Toolkit	42
	The Most Common Application Integrations in RPA	44
	Customize Your RPA Solution Through Code Integration	46
	Exception Handling	
	How to Defend Your RPA Workforce from Technical Failure	50
	How Exception Handling Can Save Your Automation From Failure	52
	Security	
	Three Ways Encryption Can Augment Your Business Automation	56
	Why Efficiency Goes Hand-in-hand with Security	58
	The Key to Governance, Compliance, and Auditing	60
	Configuration Features	
	Four Configuration Features That Aid Automation Development	64
	Deployment Features	
	Doing More for Less: How to Optimize Resource Allocation	70
	Why You Shouldn't Blindly Pile Work Onto Your Automation	72
	Vendor Support & Documentation	
	Transformation Begins With Education	76
	How to Make the Most Out of Your Automation Support Resources	78

Introducing the HfS OneOffice™

The Digital OneOffice™ Organization



The OneOffice™ concept is all about creating a digital customer experience and an intelligent, single office to enable and support it.

Why Digital?

People simply want to operate digitally these days, whether they are an employee, customer or partner. They want to use interactive technology, mobile apps, social media, text, online chat, etc. to get things done. People are used to using sophisticated digital technologies in their personal lives, and now expect to use them in their professional lives. Whether they are buying products, groceries, renting accommodation, ordering Starbucks, takeout, applying for mortgages, insurances policies, etc., digital technology is the new language of business.

The issues facing many traditional businesses today is the fact that while the consumer is increasingly digitally sophisticated, many

organizations are still beholden to legacy technologies and processes that are fast sinking into obsolescence. In addition, many have employees in the "back office" who are so steeped in the legacy way of doing things, they are facing a double-edged issue: how do they drag their operations out of the dark ages to support their digital customers?

The OneOffice™ Solution

The answer, believe it or not, is quite simple: break down the barriers between departments, involve the digital customer experiences into all the business processes and practices, by creating a OneOffice™ digital culture where an organization's customers, partners and employees are all entwined together to deliver the end customers the ultimate experience, and the operations function a genuine connection with the true running of the business, from back to front.

The world is becoming increasingly digitized.

For businesses, traditional outsourcing models are being upended by a wave of automation technologies, with the first and foremost being Robotic Process Automation (RPA).

Adopting RPA is not just a strategic shift, it lays the foundation for a future of work toolset and paves the way for a transformation journey.

Symphony Ventures is collaborating with HfS Research to provide an actionable, research-backed evaluation of the RPA vendor market and help you select an RPA tool based on proven technical capabilities.



What is Robotic Process Automation (RPA)?

Robotic Process Automation (RPA) represents the 'Automation' portion of the Triple A Trifecta. Its process-centric nature and compatibility with legacy IT make it a key driver for business transformation, especially as the underbelly of the Digital OneOffice™.

RPA can be the link between antiquated legacy systems in the back office and the customer-facing front office, serving as the digital process foundation for intelligent automation and support tools in the Future of Work toolkit. As a result, capabilities based on machine learning and advanced analytics will ultimately rely on RPA to align the customer experience.

RPA Basics

According to the IEEE definition, RPA is a preconfigured software instance that uses business rules and predefined activity choreography to complete the autonomous execution of a combination of processes, activities, transactions, and tasks in one or more unrelated software systems to deliver a result or service with human exception management.

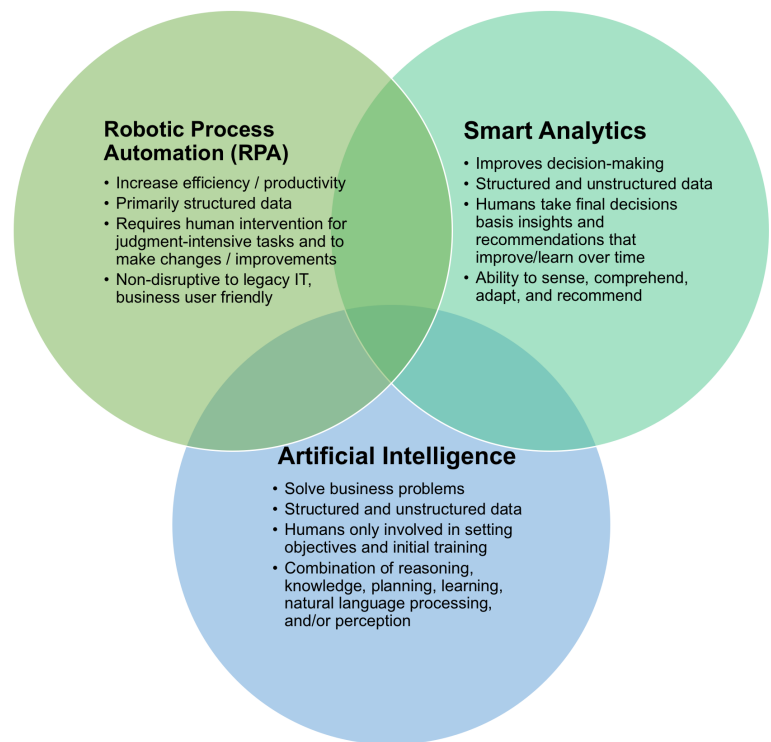
In other words, RPA allows businesses to tailor complex automations for their end-to-end transactional processes, thereby removing the human component from many repetitive, complex, rule-based actions and processes. When an RPA robot is at work, it performs tasks just like a human would: logging in, operating applications, entering data, performing complex calculations, and logging out. The term robot is traditionally applied to machines executing human-like tasks. More recently, the

term has evolved to describe a class of software applications - software robots - that automate work by emulating tasks executed by human operators. This form of automation is referred to as robotic process automation, or RPA.

What Can RPA Do?

RPA excels at performing high volume rule-based transactional tasks, including record maintenance, queries, calculations, and transactions. In addition, RPA is compatible with a range of widely-used applications.

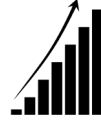
HfS Triple-A Trifecta





Higher Quality Services

Better accuracy and better customer service.



Increased Agility

Reduced overhead and more flexible business resources.



Employee Experience

Increased staff productivity and reduced attrition.



Comprehensive Insights

Improved efficiency by digitizing and auditing process data.



Greater Compliance

Operate in accordance with regulations and standards.



Reduced Costs

Carry out manual or repetitive tasks at a fraction of the cost.

For example, Citrix, .NET, HTML, and Java are all technologies commonly supported by most RPA vendors. Compatible systems include Mainframe Terminals, SAP, Oracle, Blackline, and many more. Programmable automation means that RPA can be configured to perform almost any rule-based task.

Benefits of RPA

As the backbone of digitization in a business, RPA opens the door for innovation through the integration of big data, cognitive reasoning, and AI systems. Additionally, RPA can help digitally transform your business and unlock value by providing the benefits outlined on the following page.

All of these factors can set your company apart from your competitors and can contribute to the overall success of your business' digital operations strategy.

RPA For Your Company

RPA can be applied to a vast array of rules-based processes across a wide range of sectors, including process automation of office tasks, IT support, and customer service. With the need of businesses to reduce cost, increase efficiency, and provide high-quality services, it's no surprise that so many companies are taking advantage of this technology.

Due to its versatility, RPA has seen widespread success across almost all industries and functions. Businesses across a wide range of industries, including banking, healthcare, logistics, consumer products, food and beverage, entertainment, and more, have successfully implemented RPA to improve their human resources, finance, supply chain, and procurement processes.

Where Should You Start?

RPA is complex. While it has the potential to achieve the many benefits listed above, RPA projects require a complete understanding of the business case as well as collaboration with IT capabilities. Symphony COO David Brain appropriately noted that RPA "is a lot harder than

people think,” due in part to the various technical considerations such as integrating with existing systems, maintaining security protocols, and establishing proper failure prevention.

First, it is increasingly important to be educated on RPA’s capabilities and identify potential areas within your company where RPA could transform your company processes and transactions. This often begins with research, RPA/AI workshops, and utilizing tools and resources such as this ebook. Seek out seasoned experts who are dedicated to provide lasting value and success in RPA projects. There are a wide range of RPA tools to consider, each with distinct strengths and weaknesses. To distinguish between marketing hype and reality, the experts are invaluable sources of objective and experienced advice when making these decisions on automation strategy.

Ensure that your company approaches RPA deployments in a thoughtful, encompassing manner by identifying and getting buy-in from a broad set of stakeholders who can help guide and inform the overall process.

Engage allies and partners among IT sooner rather than later. RPA deployment is both compliant and an inclusive company effort. As you embark on your RPA journey, plan to identify areas of highest priority as well as the budgets and resources necessary to have a lasting impact on your company.

How Can You Learn More?

Want more information on RPA? Symphony is here to help with your digital transformation. The following sections will help you determine why, where, and how to apply RPA into your company.

We hope that the insights included here will help you to get a better understanding of Robotic Process Automation and how it can be an important component of your digital transformation toolkit.



According to HfS Research¹, the market is expected to reach £920 million (\$1.2 billion) by 2021

¹Source: horsesforsources.com/RPA-marketsize-HfS_061017



“

From our vantage point, RPA is taking off. All major enterprises are now asking the question, 'Can we automate this?' first, rather than 'Can we centralize, nearshore, offshore, outsource, etc.?' ”

Ian Barkin
Co-founder & Chief Strategy Officer
Symphony Ventures



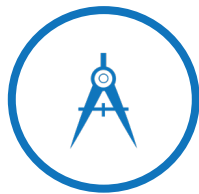
The Eight Elements of Successful RPA Orchestration

When it comes to exploring the implementation of Robotic Process Automation (RPA), it is no surprise that many businesses experience challenges deciding on the ideal tool to meet their current and future needs.

RPA tools are diverse and abundant in their range of features, and many leading vendors claim to fit all sizes. After countless RPA projects, designing, deploying, testing, and orchestrating, Symphony has not only identified trends for a successful rollout and the suitability of tools for different sectors and scenarios, but also a set of criteria for businesses to refer to as they select an RPA tool to meet their needs.

Ultimately, a successful RPA implementation comes down to two overarching factors: business and technical.

To help businesses understand the complexities and features of RPA tools, the following aspects will be covered:



Architecture

How an RPA tool is designed and structured has big implications for how and where it can be used, as well as the skills and controls that are needed in order to augment the technology.

A tool's architecture influences various tasks during development and deployment. In conjunction with a formidable automation toolset, the ideal architecture can provide the capability to create complex designs efficiently and effectively.



Usability

Ease of use is the cornerstone of almost all software and for automation it can play a big role in accelerating the development of internal capabilities. It can make the overall configuration and administration of processes more efficient and easier to understand by others, which is key to the reusability of components. Moreover, superior usability can lead to quicker scalability, greater ease of deployment, and higher levels of adoption.



Integration

System and technology integration is a core capability of RPA. Strong integration capabilities can lead to more robust, quicker, and more effective automations.



Exception Handling

The ability to effectively handle exceptions, and refer them to experts, where judgment or manual activity is required, is an essential component of RPA. This means errors during automation can be easily detected, circumvented, and in many cases, automatically resolved.

Where not possible, or where a process has been designed to require a person to review and take action, cases are passed into a separate queue and are visible in reports. With solid exception handling, the orchestration of automation in the workplace can operate in a smooth and reliable fashion.



Security

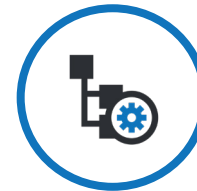
RPA deployment will almost always go hand-in-hand with the processing of sensitive data. As a result, security measures are an essential part of an RPA tool and cannot be underestimated.

With different vendors addressing different markets, and in doing so taking different approaches to establishing controls, finding the right solution for your needs and corresponding data is essential.



Configuration Features

Embedded in all RPA tools are specific features designed to accelerate and simplify the editing and configuration process. These features allow for a more effective deployment of automation and support the building of internal capabilities. Each RPA tool boasts its own arsenal of configuration features, each differing in use and structure and tailored to address different challenges.



Deployment Features

Once configuration and testing are complete, deployment is the next major task. Deployment features include the capability to roll out releases across machines, handle environment specific variables, and provide security controls for deploying to a live environment. Certain businesses call for specific deployment scenarios, for which a powerful set of deployment features can pay dividends.



Vendor Support & Documentation

Having a strong network of support from RPA vendors can provide resources that facilitate the overall ease of deployment. With several established tool providers on the market, and many joining this ever-growing market, the level of support a vendor is able to provide differs broadly.

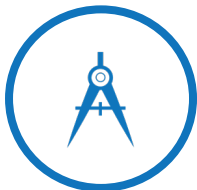
Some vendors provide access to user forums and online communities, helpdesk ticketing systems, and shared methods and best practices. Others have professional services teams and some do not have anything as formal. A vendor with a robust set of support documentation and structure can minimize delays in deployment and strengthen maintenance procedures.

Since there is not a singular RPA tool that is ideally suited for every process, the challenge is selecting the RPA tool that most closely matches the automation profile and needs of your business.

Each aspect of an RPA tool plays a significant role in the decision-making process and should require collective consideration. However, some aspects may be more important to you than others, which will help in narrowing down the list of potential vendors.

Throughout the course of an RPA deployment, these eight aspects must be properly understood and orchestrated to achieve the full potential of Robotic Process Automation.

The Eight Elements of Successful RPA Orchestration



Architecture



Usability



Integration



Exception Handling



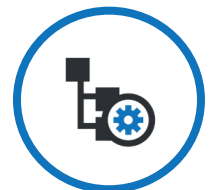
Security



Configuration Features



Deployment Features



Vendor Support & Documentation



ARCHITECTURE





Building a Complex Automation? You'll Need Layered Design

There are many aspects at play when identifying and successfully deploying an RPA tool.

Most RPA tools use layers to organize complex processes. Layers help to separate different levels of abstraction that exist in a process automation. They enable you to separate different logic and functionalities into distinct parts of the configuration thereby allowing for the reuse of components, minimizing the impact of system changes, and even aiding in collaboration between teams. Often used to divide an automation into sectioned roles, layers are the perfect organizational feature to make an automation that is both easy to understand and to develop.

Dividing an automation based on the purpose of each section (e.g. separating business rules from steps to perform basic functions such as logging into a system) is a great example of using layers to allocate roles.

When you separate the automation based on different types of logic and functionality, the team can be allocated to work on the sections and parts that fit their strengths. This logic could be developed in conjunction with a *business process architect* – someone who is well-versed in creating and optimizing the decision-making elements within an automation.

Meanwhile, in parallel, a more junior configurator could build the layers to interact with screen elements and to create objects that would be used by the business process architect. This delineation of tasks and layers, allows for increased efficiency but more importantly provides a development framework where each element in the configuration operates separately, which makes it easier to identify a fault, make a change, or share the configuration between team members.

Along with logic layers, it is important to consider the benefits of subprocesses as well. Rather than dividing the automation based on logic, subprocesses divide individual processes into a hierarchy of smaller components. Some RPA tools incorporate subprocesses in a collapsible outline, resembling 'nesting' in computer science.

For example, a subprocess that sends an invoice can be a small, but crucial part of a product management automation.

Properly implemented subprocesses make it easy for almost anyone to understand the underlying structure. The development of an automation can be further bolstered by using premade subprocesses, which house smaller, well-tested automation components that are frequently used in development. By fostering an environment where talent and work are reusable, an RPA build with this capability ultimately leads to cost-efficient and labor-saving deployments.







An automation without logic layers or subprocesses would be missing the structural features that make complex automation possible. A lack of organization would make it almost impossible to distinguish separate functions or trace the automation as it processes. Without the robust error handling that a well-structured automation provides, finding bugs would become unnecessarily burdensome. Ultimately, it would hinder the speed of development and inflate human errors.

When choosing an RPA tool, it is important to choose an architecture that supports your team’s configuration preferences. Some tools provide structured layering, thereby enforcing design standards, but have other implications, such as removing the potential for screen recorders to be

used in the tool.

Alternatively, some tools provide the capability to deploy in a layered manner but don’t enforce the use of layers, therefore requiring you to establish custom layers and tighter manual controls on your development effort.

The organizational capabilities that layers and subprocesses provide are essential to optimizing the deployment and maintenance of automation. Well-defined layers increase the effectiveness of each role in a development team and reduce the risk and impact of system changes, but you may find them equally restrictive. While within the automation, subprocesses can maximize structural efficiency.

LAYER	PURPOSE	BENEFIT
	<ul style="list-style-type: none"> • Business rules • Hand-off point • Prioritization if not in management console 	<ul style="list-style-type: none"> • Focus on business rules without needing to create links • Simplify changes
	<ul style="list-style-type: none"> • Reusable business logic <ul style="list-style-type: none"> • Identify • Verification • Reconciliation 	<ul style="list-style-type: none"> • Reusability • Avoid multiple changes in processes when logic/business rules change
	<ul style="list-style-type: none"> • Procedures for performing specific tasks <ul style="list-style-type: none"> • E.g. Log on, enter address 	<ul style="list-style-type: none"> • Reusability within systems • Development does not require business rule understanding
	<ul style="list-style-type: none"> • Individual screen interactions <ul style="list-style-type: none"> • E.g. Enter address in Line 1 	<ul style="list-style-type: none"> • Lower risk, faster changes <ul style="list-style-type: none"> • Target application integration can be changed without a risk of changing business rules

You will find that the organizational benefits of layered design will make it a priority in the development process.

Both processes and subprocesses not only make automation processes more readable, but also make complex automations drastically more intuitive.



How to Choose the Right Delivery Model for Your Project

RPA distributes and manages work across machines as a *virtual workforce*. RPA tools offer two modes of deployment:

- *Assisted Automation*, where an RPA tool automates other applications running on the employee's desktop, or
- *Unassisted Automation*, in which RPA is deployed on numerous machines to run without the need for the automation to be attended.

There are benefits and limitations to each model. First, let's start with Assisted Automation.

Assisted Automation

Assisted Automation began as a breed of productivity tool for call centers. Here, agents would be able to trigger a series of automated steps across multiple applications using robots installed on their desktops, and typically accessed through a sidebar provided as part of the software. This approach effectively reduced average handle times, resulting in savings and an improved customer experience.

Long, complex processes were replaced with single mouse clicks, greatly reducing the time it takes to train an agent. The issue with many of these deployments soon came as desktop settings became inconsistent across an operation and the methods of integrating with the applications started to fail. These inconsistencies could be different graphic cards, different resolutions, or display settings.

RPA software has come a long way since then but this surface level automation is still required for certain tasks to be completed within certain applications. Thus, there are still times when inconsistent desktop images cause automations to fail.

Assisted Automation is not limited to call centers. Today, it is also known as Robotic Desktop Automation (RDA) and is used to support agent productivity. It is well suited to tasks where real time human-system interaction is required. When this is not the case, unassisted automation provides a more optimal solution.

Unassisted Automation

Unassisted Automation does not need an employee to go up to the machine, logon, trigger the process to start, observe its performance, then close the automation when it's finished.

These steps can be automated and facilitated through dashboards that provide a control room to allocate work to machines, adjust priorities and queues, and intervene with a specific robot's performance (if required).

For all intents and purposes, these machines do not need an employee's help to perform the automation. This Unassisted Automation opens up great possibilities; robots can work 24x7 through a queue of cases, only alerting an employee when something goes wrong, delivering the level of automation expected from a brand new, optimally designed system.

RPA tools automate all types of legacy, mainframe, Win32, and web applications without the need

for replacing any systems or building custom integrations into each of the application.

Unassisted Automation does however have a single and significant drawback; it needs structured digital information and clearly defined rules.

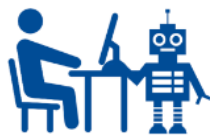
Unassisted Automation may not be the best solution for every case. It is possible to use smart OCR tools or voice-to-text engines to convert unstructured input, but sometimes people are still required to interpret or parse the data. For these cases, Assisted Automation may be the better solution.

Alternatively, splitting the process into human processes and automated processes can be the best option leveraging Unassisted Automation. For example, an employee interacts with a client to complete an order form, then the robot could be

triggered through Unassisted Automation to perform the required checks, place the orders for the parts, schedule the installation, produce the invoice, etc.. Choosing the right automation model for a business depends on the processes to be automated. As you expand your RPA deployments, you will likely need to cater to both types of automation to fully consider where RPA fits within your digital toolkit and overall digital operations strategy. A few RPA tools on the market offer the capabilities to support both, while some specialize in just one or the other.

Do not necessarily rule out a vendor's product just because it doesn't support both models. More than one tool is often required within an enterprise.

Outside consultants can be invaluable partners in devising a digital operations strategy. When this approach is followed, the impact of RPA is far greater and the buy-in across a business is far more rapid.

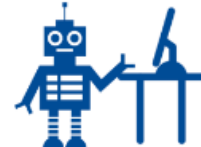


Assisted Automation

DESCRIPTION: Automated process triggered by human agents across multiple application using a desktop interface.

BENEFITS: Complex processes can be replaced with single mouse clicks, reducing the time it takes to train an agent. Average handling times can be reduced, resulting in savings and improved customer and employee experience.

DRAWBACKS: Inconsistency of desktop environments can slow down completion times.



Unassisted Automation

DESCRIPTION: Automated processes that run on machines without needing human control.

BENEFITS: Robots can operate 24 hours a day, 7 days a week, only alerting an employee when something goes wrong. Any application can be automated to perform on par with specially tailored business systems.

DRAWBACKS: Structured, digital information and clearly defined rules are required to minimize human intervention.

Instead of first trying to find the right tool, focus instead on finding the right project.

Find a project where the stakeholders are aligned, the benefits are clear, and the impact is tangible.

From there, design your operating model, your business case, and choose the vendor that best supports both.



Optimizing Your Virtual Workforce with Process Administration

After identifying your project scope, selecting your automation model, and constructing your processes (following the layered design principles outlined in the previous section), you're on your way to administer them in production.

Process administration provides the necessary capabilities to deploy and manage automation solutions. Put simply, process administration makes it possible for your business to monitor and track the progress of deployed processes. This provides administrators with the operational agility to properly maintain and upgrade the RPA system.

Aside from analytical benefits, process administration can also offer queue and remote management capabilities. Tasks such as resource allocation and task designation can all be handled through administration portals. The system level configurability that each of the tools above provides is what makes process administration so useful.

RPA tools, designed for central orchestration, make use of a central interface from which all commands are issued.

Typically referred to as the *control panel* or *control center*, this feature orchestrates the automation akin to a control panel in a PC. The control center allows administrators to launch each management tool from a central user interface.

Features to Look for in an RPA Control Center:

Error Handling

Another critical feature of process administration is error handling. Monitoring and handling errors goes hand in hand with upgrading and maintaining an automation. Many control panels will list real-time errors in the process queues.

When a process encounters a system exception, that specific instance will be labeled with an error. Often times, RPA tools can be configured to send notifications when an error is encountered. More comprehensive monitoring systems will provide detailed logs of each specific queue item, along with traceable details, allowing a team to track down problems in less time.

A critical feature in the handling of errors is the ability to retrigger the failed cases so that the automation can be re-run. This is particularly helpful if errors occur when a system is temporarily down.

Having a maintenance team that monitors and fixes any recurrent errors, whether it is in-house or third party, is the key to ensuring that processes run at their full potential.

Process Analytics

RPA analytics is driven by global process tracking. Monitoring the status of each process through the control panel helps administrators reduce

inefficiencies. It is also common practice to check in on the real-time status of each process to ensure that the system is up and running and performing as intended.

Many enterprise-level RPA tools take advantage of real-time analytics to present a dynamic dashboard on the control panel. These typically include visuals based on statistics like resource usage, process completion time, and transaction success rates.

When it comes to auditing an automation, accessible analytics simplify the performance review process and highlight areas of improvement. When paired with the appropriate actions, analytics can foster continuous improvement in automation quality.

“The incredibly powerful opportunity for enterprises to reduce costs, improve customer satisfaction and tighten controls is universal and is accessible to all companies.”

David Poole
CEO, Symphony Ventures

Source: IDG Connect, *The Thorny Issue of Automation Across Latin America*

Resource Allocation

Controlling resource usage is another key function to look for in RPA tools. This is how you would act upon the analytics data gleaned through process monitoring.

Control centers will often have a section dedicated to resource allocation to allow administrators to control the task that each machine will perform. Full control of the automation system enables administrators to make the most out of license value and limited resources.

What makes the best RPA tools stand out is how the assignment of resources is handled, among constraints such as environment, run time, and task schedules.

Ideally, the necessary configuration settings are built into the software architecture, so workarounds are not needed. A robust control center will have real-time analytics, resource allocation, and comprehensive error handling.

In an ideal deployment, analytics provide the basis for workforce oversight, while data from analytics drives the optimization of resource allocation and continuous improvement.

Meanwhile, error tracking enhances the debugging/testing process and ensures all processes run smoothly throughout. This repository of management tools not only bolsters your RPA operations, but can also be a good indicator of an RPA tool’s overall capabilities and layout.

Due to the importance of administrative features, there is pressure to constantly improve them.

A Checklist for Optimizing Your Virtual Workforce

Use the checklist below to make sure you're not missing any features to look out for when selecting the right robotic process automation (RPA) tool.

Error Handling

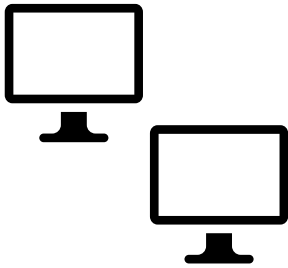


Global error handling

Error notifications

Fully traceable error logs

Resource Allocations

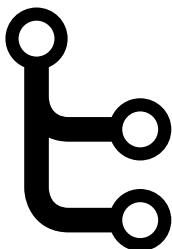


Resource allocation panel

Machine and task allocation

Built-in resource configuration

Process Analytics



Global process tracking

Real-time process monitoring

Dynamic dashboard analytics

Process administration provides the necessary capabilities to deploy and manage automation solutions.

This repository of management tools not only bolsters your RPA operations, but can also be a good indicator of an RPA tool's overall capabilities and layout.



USABILITY





Why Visual and Interface Design Matter

Usability is measured by how intuitive it is to develop and configure processes, and administer those processes within the RPA tool.

People enjoy using software that is simple to use and RPA tools are no exception. Thus, usability can help your business develop automations at a faster rate with less risk of errors.

Interface Design

The design of the interface is important, considering that RPA development hinges on providing a clear, workable interface accessible not only to programmers, but also tech-savvy business users. It is also what drives the process modeling capabilities that make RPA the perfect fit in business operations. Poor visual design can lead to errors in code becoming harder to spot and longer development times.

Each of the features listed here can affect your entire RPA deployment from start to finish.

Drag and Drop

What makes RPA intuitive is the lack of a typical programming interface. This is best exemplified by the ability to simply drag and drop process activities. For instance, building automation workflows involve working in a 2-D flowchart environment. Being able to drag new activities to attach to the current work in progress is often the fastest and easiest method of construction. In addition, the capability to insert or shift old

elements through click and drag movements allows a workflow to be reorganized within seconds.

Configuration Assistance

Optimal usability comes with a proper mix of user-friendliness and configurability. However, the best RPA tools compromise on this trade off with configuration assistance. Simple tips such as activity or parameter descriptions reduce the need to memorize every functionality while retaining high levels of configuration. These extra details can be especially useful in bolstering the training process. Ultimately, RPA tools that include configuration assistance are easier to train and work with.

Cohesive Interactions

In addition to all the facets of RPA software that make an automation beginner's (or expert's) life easier, it helps in general to have a cohesive interface that makes it hard to make mistakes.

For example, some RPA tools make structure-sensitive modules that guide the user's actions. Rather than instruct users with long-winded details, inappropriate actions might be grayed out or omitted completely. When interfaces are presented well, they encourage faster adoption and mastery of the RPA tool.

Proper interaction design can simplify automation development.

Some features like drag and drop transform workflows into a familiar environment. Others like configuration assistance or cohesive interactions augment the user's capabilities and improve the training process.

By providing extra degrees of usability, RPA tools reduce friction in the learning and development process. For your business, this could translate into accelerated digital transformation.



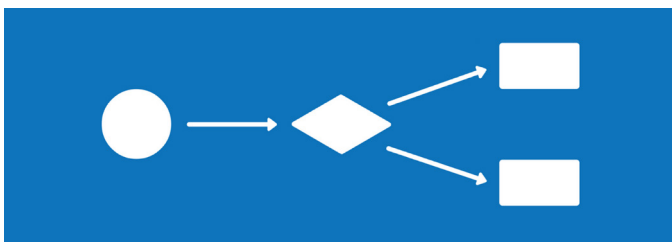
How Steep is the Learning Curve?

Like any complex application, RPA tools take time and resources to master. So, it is crucial to select a tool that will not restrict adoption with prohibitive knowledge and skill prerequisites. Choosing an RPA tool that is easier to learn will not only save time and cost in training, but will also improve scalability within your organization.

Process Design Interface

How the processes are configured heavily impacts the ease of learning RPA. The most important part of creating and deploying an efficient automation is visualizing and understanding the flow of the process inside and out.

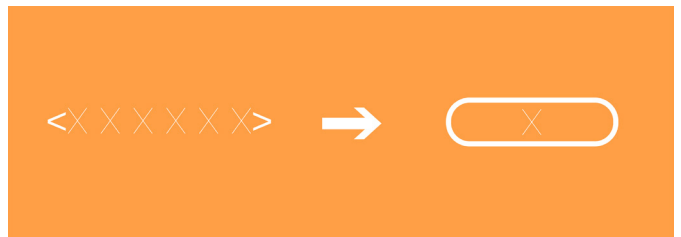
Visual flow, in the form of a flow chart with drag and drop components, can alleviate the need for keeping a mental chart of programming nodes. Instead, it enables a user to produce diagrams that represent loops, decision points, and actions. RPA tools with effective visuals are favored by teams because they are more accessible and organized; easier to read, quicker to learn, and easier to collaborate on.



Hiding the Code

At the code level, RPA is just a series of interactive scripts. What makes a big difference among RPA tools is the ability to hide most of the complicated code under the hood of the software. In fact, certain RPA tools are designed to be used without any previous coding knowledge.

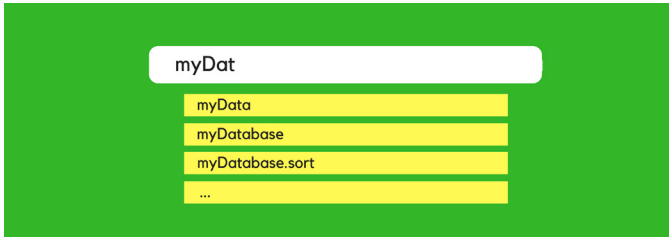
When the code is tucked away well, you will see user-friendly elements like buttons and labels. In cases when programming is needed, manual coding functionalities are always present.



How Far Can You Get Without Code?

A true indicator of codeless input implementation is if a highly complex automation can be created without the need to insert code. More usable and accessible RPA tools will be able to create powerful automation processes without complex expressions of code. A feature that makes this possible is the utilization of low-level activities that serve as the building blocks for the rest of the automation components. These can essentially mask the tiniest fragments of code as workflow components.

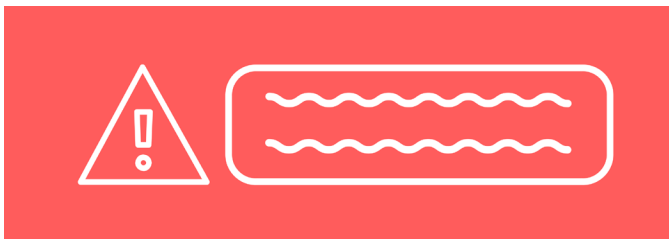
Another helpful feature is automatic expression-completion, allowing users to have a lower threshold of coding knowledge to effectively create processes. In practice, each of these contributes to a simpler user interface and streamlined work.



Easy Debugging

Another usability factor that differentiates RPA tools is the helpfulness of debugging information. While it is mainly tied into the software architecture, the ability to present relevant descriptions and to alert the user to them at corresponding sections of the automation can save RPA teams a lot of time fixing mistakes.

Well-presented debugging information directs users to what needs to be inspected more effectively, greatly reducing frustration and making it easier to get quick feedback and learn from each instance. For RPA beginners, it can be immensely helpful to have access to well-formed debugging details.



“We advise customers to really look at the business case and start there, because if you have a strong and compelling business case, then it is easier to get people in IT and other areas on board.”

**David Brain, COO
Symphony Ventures**

Source: SIG Summit Keynote 2017

Workflow diagrams that illustrate every action can make your automation accessible to any business or IT stakeholder.

Additionally, not everyone who uses RPA has to have programming experience. The need for code savvy developers can be reduced by finding RPA tools that limit coding requirements, as well as those that provide easy debugging functionalities.



Selecting the Right Code Structure for Process Design

The architecture of an RPA tool can often affect usability and the direction of development. Different tools take different approaches to designing and constructing automations.

Since these approaches can have a significant impact on the effectiveness and resilience of the solution as well as the speed of implementation, knowing their differences will help you choose the tool that is right for you.

Functional

RPA tools that have adopted a functional structure are easy to get started with and quick to program in. They, by default, produce single scripts for the end-to-end process which include all elements, integrations, and business rules. This is intuitive to teams who are familiar with producing macros or Standard Operating Procedures.

Functional tools also have another unique advantage – a recorder function. This can help speed up the configuration of the ‘happy paths’ through the process, but will not capture all routes, so additional configuration will be needed once the recording has been made.

Not all RPA tools that have a functional structure by default need to be used that way, some in the market enable the configurator to produce code structures and take an object oriented approach, but this must be very carefully designed and implemented. Failure to manage this tightly could result in a jumbled approach.

If you are embarking on a project with a functional-based tool, then consider how you will use its functionalities, whether you wish to create reusable components based around screen elements, and whether your chosen tool can enable such an approach.

Creating reusable components will slow down the initial build, but as you will read later, provides great advantages with regards resilience and risk around future changes.

When deploying a functional based tool, consider building code management and governance into your plans and your team’s capabilities.

Object Oriented

Tools that use an object oriented structure bring different considerations. Object oriented tools often do not have recorder functionality and require a greater level of design before commencement. When deployed appropriately however, these tools provide great reusability and resilience, which pays dividends in the long run.

By separating out screen elements, from reusable objects and business logic, you can have multiple people working on the same automation at the same time. This not only reduces end-to-end build time but can help in ensuring that your process architect, often the bottleneck on a project, only spends their time working on the critical path activities of building the business rules and logic.

The real advantages of an object-oriented approach become more obvious over time. When embarking on your second, third, or fourth process automating the same systems you will find you

now have a lot of the components already built which can speed up configuration significantly.

When it comes to the 'run' stage, the advantages of an object oriented approach are seen further. A significant number of the changes made to an RPA process when in production are related to changes to the systems that are being automated (i.e. a new release of SAP requires a change in the RPA configuration).

In a functional oriented tool this requires going through all related scripts to look for where the change needs to be made. In an object oriented tool there is one small script that needs changing. By limiting this maintenance work to the application connectivity layer, you significantly reduce the risk of unintended changes.

Considerations When Selecting a Tool

While the two design methodologies listed above are not strictly enforced by all RPA software, each vendor has its own form of best practices and limitations which encourages or restricts you to one of the two. Based on the architecture of their software, a certain design methodology might make more sense. In any case, facilitating durable and efficient solutions requires one to follow some general design considerations.

One factor to focus on is solution durability, which has a large impact on usability. An automation

that requires constant maintenance due to bugs can end up incurring delays, and especially cannot afford to break down when in use. This is why an automation process must be built with long-term durability and transformation in mind. Safeguards like extensive exception handling can help, but the most important factor is a well-built process. With a comprehensive design methodology, developers can avoid common mistakes and build automations to last.

Another consideration is the business-level organization of the automation. It is crucial to have flexibility when it comes to modifying business components. Enterprise-level RPA is often implemented with a modular, hierarchical system that allows for easy process substitution, simplification, or add-ons. It is up to a properly executed design methodology to ensure that these standards are met. When implemented well, this will not only increase solution durability, but also hasten turnaround times for development.

It is also prudent to consider how certain practices can add to or detract from a developer's experience. Methodologies each have their pros and cons. For example, deciding to use a single level process as the base of an automation is often a faster, simpler way to automate a process. However, it can lead to problems later when accounting for exceptions and design constraints. On the other hand, creating an object-oriented system requires prolonged initial development, but can be easier to modify with changes down the line.



Successful designs lead to successful deployments.

Automations should be built with best principles in mind. When processes are deployed, success ultimately comes down to the solution design that was used in development.

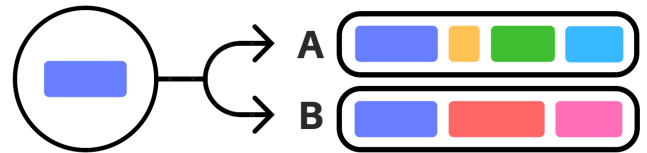
Comprehensive exception control will result in robust solutions that require minimal user input and reduce inefficiency and automation error risks. Adequate preparation for RPA development is necessary.



How Sustainable RPA Design Can Pay Dividends Down the Road

Keeping an automation optimized throughout process updates and business changes is essential.

RPA tools allow for sustainable development through capabilities like component reusability, can help your business streamline resource usage, and reduce turnaround times. Proper implementation of reusable modules is core to an efficient, well-designed automation.



The Benefits of Building Reusable Components

Reusable modules are a feature of the object-oriented design methodology. Reusable components come in the form of business objects or layers, which can be implemented in multiple processes to reduce the need to replicate sections of processes in development.

For instance, two automated processes begin with the same 12 steps to log into SAP and select a new case. By turning that initial “login > select a new case” into a reusable module, this well-tested component is used as a building block for other automated processes. This flexibility enables a business to streamline the development of complex processes.

Reusability also allows developers to avoid building redundant components in different automations by sharing components between processes that target the same business systems. In cases where a specific component is necessary in multiple processes, having the ability to make use of reusable components is essential.

How Sustainable Automation Impacts Maintenance

Reusable components also bolster maintenance procedures. When an update is required, changes implemented in the reusable component will apply to all processes that use it, thus removing the need to implement the same changes across multiple processes. Taking the effort to create a sustainable RPA solution can pay dividends in the future.

Consideration must also be given to the maintenance capabilities of RPA tools. The most efficient way to update your automation is to change all affected processes at once. To do this, your business will need an RPA tool that can perform maintenance through network distribution.

This feature is commonly found in advanced control centers, allowing one to send process updates across groups of machines. Ideally, the implemented RPA solution will make use of a Control Room or server, allowing for centralized distribution of processes and updates. Features like this make adaptation to business process changes much more timely.

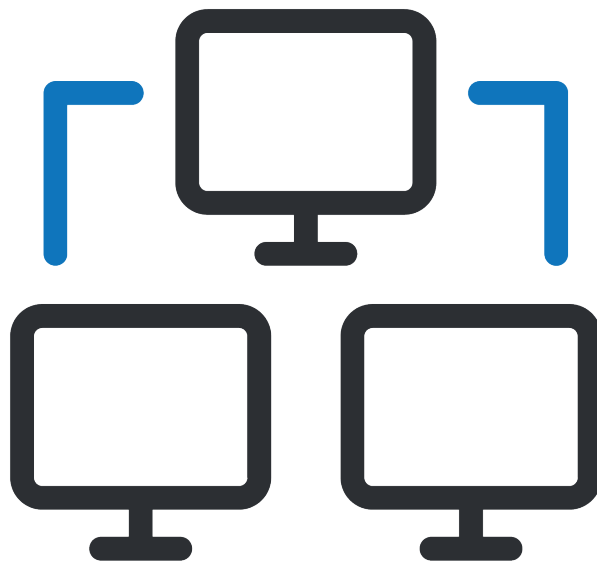
A business that seeks to deploy RPA for the long-term should have solution sustainability in mind.

Being able to employ objects across multiple systems not only encourages collaboration and organization but also simplifies maintenance. Thus, factors like reusability end up being strong determinants of scalability and reliability. You will also want features like network distribution, to make sure that your entire automation system can adapt to changes.

Together, these considerations can contribute to deployments that can stand up well to the dynamic needs of a business environment.



INTEGRATION





How to Mitigate Database Integration Risks

In RPA, the ability to integrate with third-party applications is the key to achieving maximum functionality. However, integration with the database layer is not as simple as connecting to it from an RPA tool. Database integration can pose many challenges, such as information security, that your business should be aware of.

Best Practices for Automating Database Interactions in RPA:

Beware of Database Integrity

The core strength of RPA tools is that they can automate processes at the user interface layer. This ensures that any data rules or controls you have implemented through your systems can be maintained when automation is introduced. Having RPA tools directly interact with a database could lead to compromising your data stores as it bypasses the rules implemented in your user interface (such as validation or formatting of collected information).

So, while RPA tools have the ability to make direct changes to the database layer, they should only be used via a user interface. This way, the automation will execute database-related tasks just like a person would, ensuring that data stores are kept away from risky interactions.

Risk-Assess Your Integration

There are cases in which direct access to a database might be required, and they are as follows:

- If your business process lacks a user interface for interacting with data, there might be no other way to access or update the database.
- If your business process has a user interface, but experiences slow turnaround times due to functional latency. In this case, only if the data is in a read-only format, is it advisable to directly accessing the database layer. The RPA tool can then be used to read in items from database and circumvent the slow user interface.

In either of these cases, it is important to risk-assess the work and ensure that the integration is validated by experienced developers.

Weigh Your Integration Needs

When a direct integration is warranted, the variation in RPA tool connectivity can make a difference. Many database languages and systems exist, such as SQL, DQL, Oracle, SAP Microsoft Access, and Microsoft Excel. Each of these systems requires different forms of integration to achieve full connectivity.

Therefore, it is ideal to select an RPA tool that can connect well with multiple systems, especially those that match the existing systems of the business. You will find a minute lag in querying a data item can be greatly amplified over time if the database is under constant use.

While it may seem attractive to directly hook up a database system to an RPA solution, caution should be exercised.

The integrity of your business's data should be prioritized. That is why direct access from an RPA tool should only be implemented as a last resort.



Why Screen Scraping is Essential to the RPA Toolkit

One useful feature of RPA tools is screen scraping. Screen scraping captures and compares the bitmap data from a screen against stored screen data in order to decipher what it contains. While it is not the fastest or most accurate method, the flexibility it provides with almost any application makes it a very useful and pragmatic tool to have.

Uses of Screen Scraping

A common use of screen scraping is working with application interfaces that are not directly accessible through available UI frameworks or code. In these cases, data input and extraction requires manual navigation of screen elements.

For example, an application within a Citrix window is inaccessible by any sort of code framework. However, surface automation allows the user to outline a box around the icon and label it accordingly. This region of the screen will then be recognized (pixel by pixel) by the RPA software as the application icon and can subsequently be assigned to be clicked when the form is complete.

The Benefits of Text Scraping

Using screen scraping for text is very common, when text from an application cannot be directly accessed through code or by navigating a UI framework. In these cases, the automation needs to capture and decipher blocks of text so they can be digitized. This is achieved through optical character recognition (OCR).

Digitizing text often requires a more comprehensive toolset since it involves a new step of interpreting characters. Some RPA tools provide integrations with well-established OCR engines

like Microsoft or Google. One step up from text recognition is the ability to structure data when reading structured documents.

For example, a capable system might read an invoice and automatically categorize each section of it, saving a series of steps in the process, this type of process links cognitive algorithms with OCR abilities.

How Screen Scraping Affects Performance

The quality of surface automation depends largely on two factors: stability and speed.

Stability is crucial because it ensures that the automation will have consistent actions. It would be inconvenient to use surface automation when a slight movement of the application window throws the whole automation off.

Enterprise-level RPA tools combat this using features like image within image recognition to dynamically search for the coordinates of the desired field, preventing any errant clicks. Another feature that can be employed is an optimized image recognition algorithm designed to determine the image based on a set of rules that calculates the object coordinates.

In terms of speed, surface automation is inevitably slower than a code-based, direct integration. The screen scrapers that make use of special techniques to enhance accuracy often give up speed as a result. In the worst cases, the more meticulous methods could end up magnitudes slower than their slimmer counterparts. Hence, a cost-benefit analysis is recommended. The ideal screen scraping qualities will depend on your business's needs.

Screen scraping is key to achieving a full breadth of integration.

When paired with other RPA features, screen scraping can expand your business's automation capability.





The Most Common Application Integrations in RPA

The core of enterprise-level RPA integration is connecting with the various third-party applications in a business's digital infrastructure. Take advantage of some of the most common business integrations in RPA to create a more capable automation.



Microsoft Excel and Microsoft Access

Since Microsoft Excel and Microsoft Access are widely-used, they are often well-integrated in RPA tools, through built-in connectors and commands. What sets the RPA vendors apart from each other are the specific connectors that they employ.

Connectors come in the form of actions or objects that allow developers to easily access application functions. For example, they can operate the opening/closing and input/extraction of Excel data. Enterprise-level RPA connectors are intuitive and simple, requiring minimal configuration to get started.

Internet Explorer

RPA tools are typically well-integrated with Internet Explorer because it runs on the Microsoft framework. This means that most of its functionalities can be automated without the need for extra extensions.

Actions like text/data input and extraction are possible because RPA tools can parse the underlying structure of a webpage. In fact, browser-based automation is mostly based on identifying and interacting with HTML elements, which will be covered in the next section.

Mainframe Systems

Mainframe system integration is a complex challenge of RPA tools. They are historically difficult to integrate with because most of them still use advanced, rule-based logic that is protected through the user interface. Thus, many RPA tools make use of mainframe emulators to establish a connection.

Enterprise-level RPA tools must not only be able to integrate with a diverse range of these systems, which use different protocols and application bases, but also provide intuitive methods for automating them.

Basic integration features are based on positional coordinates in the terminal, like screen scraping. Whereas, RPA tools with more powerful integration features offer specialized terminal recording, which is a quicker, straightforward way to create a fully-fledged mainframe automation. The overall efficacy of the automation will depend on the speed and accuracy that the RPA tool brings to the table.

RDP and Citrix

RPA tools have come up with different takes on automating over Remote Desktop Protocols (RDP) and Citrix servers, which are thin client applications. Some involve installing software on the Citrix / RDP server side of the connection, which allows direct interfacing but involves a more complex set-up.

Others use surface automation techniques, like screen scraping, which tends to be slower but requires minimal set-up. The speed advantage certainly goes to the former integration method, but some enterprise-level screen-scraping speeds can be on par.

Being able to integrate well with multiple applications is a hefty task for a single piece of software.

Because of this, it isn't surprising that many RPA tools have strengths and weaknesses depending on the type of integration.

Your business should carefully examine its most important integrations, or seek an implementation partner to ensure a successful digital operations strategy.



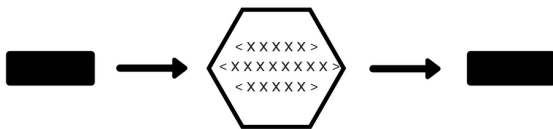
Customize Your RPA Solution Through Code Integration

Code integration in RPA refers to the general capability of an RPA tool to work with code-based actions. This provides the RPA tool with the ability to embed code internally within a process or execute external scripts.

Common Framework Integrations

Just like common application integrations, RPA tools are compatible with various code frameworks to provide a wider breadth of integration capabilities.

One of the most common is the Windows .NET framework. This is the most widely used coding library within RPA tools currently, typically allowing developers to make use of the C# or VB languages to enhance an automation.

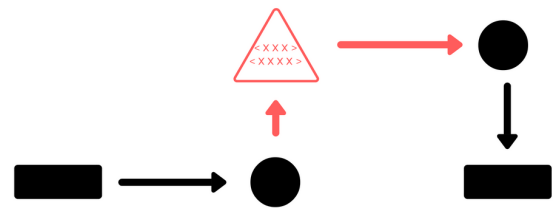


Customization Through Embedded (Internal) Code

RPA relies on its ability to perform elaborate integrations without needing much code to be written. However, cases can arise where custom code will optimize a solution.

Most RPA tools allow developers to embed code directly into the process. This is usually done through objects or actions that include code-based input for extra customization.

For instance, an object tasked with filling in a spreadsheet can be embedded with code to allow it to apply advanced formatting to data and cells.



Utilizing External Scripts

Other uses for extra code involve running custom external scripts that perform specific actions. While this strategy can improve capabilities, it increases the amount of moving parts and can make an automation harder to maintain.

Additionally, if the script is not fully secured and is externally accessible, it could pose a security risk when used. That is why it is important to fully assess the external script before employing this capability.

API Compatibility

Utilizing custom built application APIs in an RPA project is uncommon, but there are instances where interfacing with applications through their custom APIs can help improve the speed of a process.

The two main web APIs - SOAP and REST - are most commonly used by RPA software to communicate application data. These enable your business to extract structured data in XML or JSON formats.

Not all RPA deployments will depend on code integration, but having compatibility with a wide variety of code frameworks can improve the capability and functionality of a process.

If a system makes use of the SOAP or REST APIs, then first look for built-in functionality within your RPA tool to simplify data retrieval.



EXCEPTION HANDLING





How to Defend Your RPA Workforce from Technical Failure

Exceptions (or errors) that occur during a deployed RPA solution, can halt or slow down processes. They are bound to happen with any complex automation. To minimize the effects of exceptions, RPA tools provide functionality to handle them.

Two Tactics to Effectively Deal with Exceptions:

Failure Configuration

When a process encounters an exception, there may be instances when the best course of action is to shut it down and report it. Processes that are left alone to attempt task completion with faulty inputs or components can lead to unnecessary wastage or compromised data.

RPA tools use failure configuration to customize how a process deals with exceptions. Here, one would configure the automation to prevent the continuation of undesired actions, aiming instead for a safe exit of the process.

Enterprise-level failure configurations include specialized notifications to ensure that RPA administrators are aware of the error. They provide the functionality to enable the process to either log or capture relevant information about an error. This could include a screenshot or other diagnostic information depending on what is appropriate for your process.

Administrators can then be alerted to what sort of exception was thrown and where in the automation it happened. Equipped with the details, they

can exercise discretion on whether to perform maintenance to fix any glaring issues, or to continue the automation. Additionally, there are options to maintain the flow of the automation by setting a different task to be run upon receiving an exception.

Restart Configuration

Sometimes it might be necessary to continue specific processes despite encountering an exception. In these cases, failure configuration needs to be complemented with restart configuration. Restart configuration aims to get an automation back on track when an error is caught. RPA tools use different systems to initiate restarts, including general exceptions and try-catch components.

General exceptions tend to be more versatile because they encompass the entire scope of the automation. Try-catch components must be built for specific groups of actions. Either way, with a comprehensive restart configuration in place, a process can be restarted without delay upon an exception.

One instance in which restart configuration should be used is when an automated application is not as reliable as desired – if something were to go wrong and a human user was using the system, they would just restart it without informing IT of an issue. The same behavior can be mimicked within a process with the addition of informing IT if required.

Exceptions will occur. An RPA tool's functions must tackle them and developers should use these functions to their fullest potential.

A best practice is to build RPA solutions with the expectation of encountering unforeseen errors.

It is essential to prepare your processes to safely deal with failures when relying on an automated workforce. Notifications can alert administrators to any pressing errors. Processes can be configured to deal with failure according to protocol, whether it is through shutdown, continuation, or a restart.

When resiliency measures are implemented properly, your automation, and therefore business, will be better prepared for any bumps in the road.



How Exception Handling Can Save Your Automation From Failure

Exception handling is defined by the management of exceptions in unassisted automation. It ensures that problems can be automatically resolved if possible, or easily identifiable and repairable by system administrators or passed for employee completion where appropriate. If left unhandled, exceptions could drastically impair RPA functionality.

The success of exception handling depends on how well it is implemented during development. Developing proper exception handling practices is key. There are two main forms of exceptions in the RPA world: Business Exceptions and System Exceptions.

What Are Business Exceptions?

Business exceptions occur when established business rules are broken. They tend to happen when data or inputs to an automated process do not conform to business or application criteria. For example, a business rule for making payments states that if the payment amount is over a set amount, then approval needs to be gained from a line manager.

Business Exceptions can be used to represent the rules of a process that are being automated along with providing a level of control over your deployed processes (throttling or restricting the work cases they may process). Processes that encounter business exceptions are typically re-routed for alternative processing by employees. This method allows a business to process high-volume work while maintaining operational accuracy.

What Are System Exceptions?

System exceptions happen in purely technical situations. They involve system-based events like non-responding applications, application crashes, or new screens and/or changes within an application that were not accounted for or captured during design and development. System exceptions should be used to handle the unknown (scenarios we have no rules for), to ensure a case is always safely dealt with.

These exceptions are typically handled by cancelling the current case, flagging it with exception details, and moving on to the next one in the scheduled queue. System Exceptions can also be monitored to determine if it is safe to run a process. An example of this may be that the target system has stopped working (determined by a number of failed attempts), rather than continuing to work cases it would be more appropriate to stop the process and highlight the error.



Business Exception



System Exception

Despite the advantages that RPA software can bring to the table, achieving enterprise-level exception handling is not necessarily dependent on the type of RPA tool.

Successful exception handling is contingent on having an established strategy set forth by the developers who work closely to adhere to an organization's existing practices.

Having established standards of managing exceptions is the key to a high-performing unassisted automation that operates safely and efficiently. Your automation, and therefore business, will be better prepared for any bumps in the road.



SECURITY





Three Ways Encryption Can Augment Your Business Automation

Enterprise-level RPA solutions often involve a considerable amount of data processing and information transfer. As with all important processes, this data can contain sensitive information. RPA solutions must have sufficient security measures to avoid compromising the integrity of company data. Therefore, security is one of the primary points of focus when making any RPA software considerations and should be discussed with your RPA team.

What is Encryption?

Encryption, a standard way to protect data access, is one of the most practical and effective forms of digital security in modern times. Encrypted data is notoriously secure because it requires a direct transfer of a secret key or password to access. Any attempt by a perpetrator to guess or brute-force an industry-standard key would take an infeasible amount of time.

Encryption in RPA

When looking at encryption within an RPA tool, you should be asking yourself a few key questions:

Can the tool encrypt my data at rest?

Am I able to choose which data is stored at rest?

Has adequate thought / design been put into my process regarding the data they will be using?

When designing a process to run within your RPA environment, there should be a conscious and pragmatic decision made regarding the data that will be handled and what actually needs to be stored at rest by your RPA tool.

This decision should be influenced by multiple factors, including but not limited to:

- The quality of encryption that can be imposed when data is at rest
- Does storage of the data break your organization's data policies or compliance?
- Is your RPA environment/tool compliant for storage of the data (PCI for example)?
- Is there safe data that can be stored instead to get you back to the sensitive data your process requires (obfuscated identification like user ID or code)?
- Should you decide sensitive data needs to be stored at rest within your RPA environment, then time should be taken to ensure that you both know when this data may appear within logs, a configurable administration feature among enterprise-level RPA tools, and to what level you can or need to encrypt the data.

Can the tool encrypt my data in transit?

Does the tool support secure network setups?

Enterprise-level RPA tools will allow your organization to employ different techniques to secure data that is being transferred across a network through your RPA suite, this allows the methods employed to meet your internal security policies.

Besides the features offered by the RPA tool itself, it is always advised that a comprehensive network design is employed to provide further levels of security. This can take the form of hosting environments within dedicated V-Lan's and behind environment specific firewalls, it is highly important that the chosen RPA tool can also support these methods.

Can the tool support my organization's encryption methods?

A stand-out security feature of enterprise-level RPA tools is the implementation of a *credential safe*.

A credential safe is a utility that is employed to secure credentials that may be utilized by your processes. It can ensure that login information is only accessible by the process/robot intended to carry out the task.

On top of the credential safe, a good RPA tool will allow you to develop specific processes to maintain passwords that are stored. An example of such a maintenance process could be to ensure that the password is changed after every use, with a new one generated to your password standards. By employing such a design, you can provide a dynamic layer of security for extra-sensitive processes.

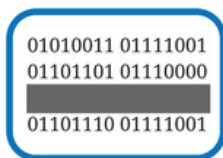
Due to its importance, most of the RPA tools that lack credential safes are striving to create similar built-in functionalities. Others make use of similar features, built into the developer tools themselves, or simply third-party credential managers. Ideally, a credential safe would be secured in the RPA tool itself, because it would be more readily accessible.



What is Encryption?

A method of encoding digital information with an encryption algorithm. Typically, decryption is practically infeasible unless the generated encryption key is at hand.

How is Encryption used to secure information in RPA?



Adding an extra layer of security to sensitive client data



Securing the operational data stored within an automation task.



Protecting network communication from malicious interception.



Why Efficiency Goes Hand-in-hand with Security

One scope of RPA security is limiting fraudulent activity or misuse of the automation from within the team. Any user that is able to configure your business automation carries a risk, whether it is the exploitation of security flaws or simply careless mistakes. Even tools like encryption cannot fully protect from direct-access attacks.

To prevent this type of security flaw, RPA tools provide the means to limit user action based on roles. *Role-based access* allows an organization to segregate duties across an RPA team, restricting any actions by role, both increasing security and bolstering administrative efficiency.

How Does Role-based Access Work?

Role-based access often involves a built-in authentication system that can be configured by the administrator. Users will have to login to interact with the automation, and can be restricted based on security protocol.

For example, a developer who configures the automation can be blocked from releasing the configured changes into the live environment until they are fully approved. When internal permissions are secured, not only are the risks of fraudulent activity mitigated, but unapproved changes can also be caught in their tracks.

Role-based Environment Access

Coupled with using an RPA tool's built-in abilities to assist with segregation of duties, it is also important that the same level of thought is given to the environment that is being utilized. The biggest

risk to business could be inadvertently providing access to sensitive data to someone who is not authorized to see it, like say your developer. It is essential that environments are created and managed via user access to ensure you can validate what is being accessed and by whom, whether that be a process or a person.

The Benefits of Active Directory Integration

Roles and permissions can be assigned with the help of active directory integration, a functionality that centralizes team credentials for management. Managers can create and restrict user role identities to fit with your company's policies. When properly configured, it reduces the overhead in ensuring the correct security policy and role-based access rights are deployed across an organization.

Compared to the use of third party platforms, active directory integration in an RPA tool directly controls the permissions of user accounts. Therefore, when properly implemented, restricted actions will be confined to those who login with permitted credentials.

Among enterprise-level RPA tools, this also means that specific components within processes can be secured, allowing for a high degree of customization. With the capabilities of personnel management and restrictions tied into one, look out for active directory capabilities in securing your automation.

Role-based access is an essential component to securing an automation before and during deployment.

It ensures that the right people get access to the right components and minimizes internal security risks.

Active Directory Integration, the function used to directly carry out role assignment tasks, is very beneficial to have in an RPA tool. It enables an administrator to configure and enforce user access.

When complemented by other security measures like encryption, your automation will be both internally and externally secured.



The Key to Governance, Compliance, and Auditing

Activity logging is essential to tracking data compliance and reinforcing security measures. Logging also provides detailed information that can be used to improve process efficiency. You will find that activity logging has a wide range of uses that makes it very useful in both security and process improvement.

Global Process Tracking

Enterprise-level RPA tools set logging actions at a global level, which means that every possible action in the automation can be tracked and time-stamped when the feature is activated.

Typically, RPA robots record all activity on a step-by-step basis and store it in a session log. This global process tracking provides a fully operational audit trail, but the detailed action logs can also be used to extract actionable analytics, to be displayed in a centralized control panel.

Thus, with comprehensive governance measures, your business can ensure security compliance while bolstering efficiency.

The Benefits of Logging Configuration

To fit your business needs, log messages can often be custom configured to help administrators filter metrics based on relevance and data governance standards. This enables your business to streamline the review process for especially complex automations.

Custom configuration can also allow your business to format log data (in terms of file type and

structure) to be leveraged with business auditing and intelligence tools. Populating relevant data into your incumbent intelligence tool and team is helpful in long term understanding of RPA impact and seeing trends.

Built-in Compliance Measures

Robust logging assists with process compliance. Traditionally, employee errors and deviations from precise consistent documentation make it hard to validate compliance. Once an RPA process is built, however, it will always follow the exact same steps (always compliant), along with providing the logged steps to prove that the developed steps have always been followed.

Visual Logs

Another audit control mechanism is the less-common visual log. Unlike the typical text data stored in activity logs, visual logs are a series of screenshots that are created for each action in an automation during the recording phase.

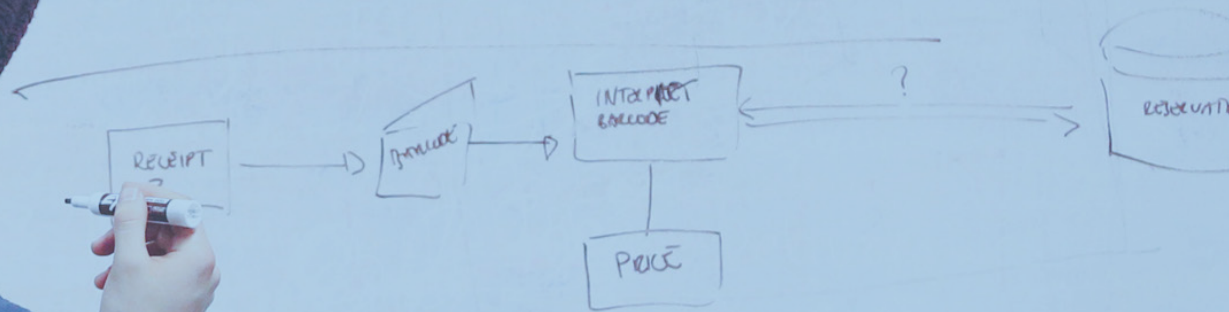
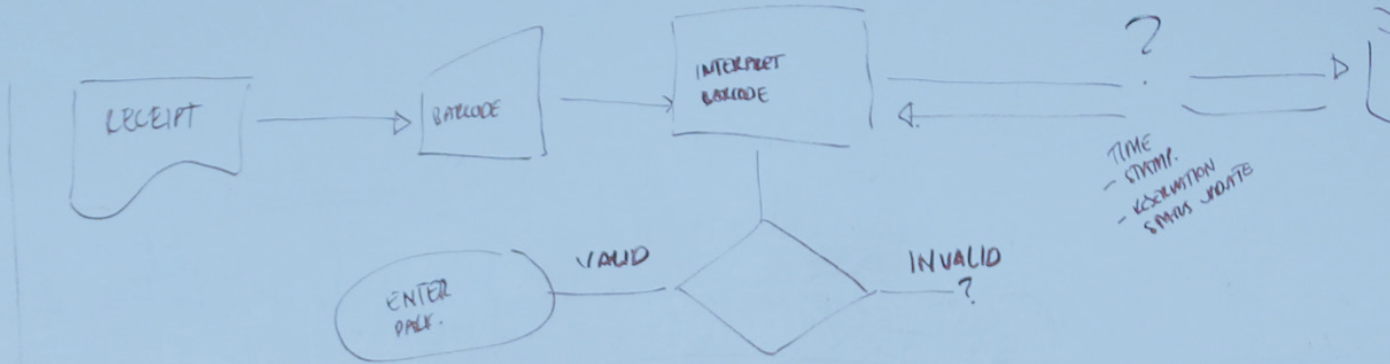
While they provide a handy reference image as to what each action is intended to perform, they are most commonly used for auditing and debugging purposes.

Visual logs can be very helpful when looking to debug an issue caused by a difference within a target system that has not been captured or introduced by an update. The use of visual logs needs to be thought about carefully due to the information that can inadvertently be captured within them (i.e. customer personal data).

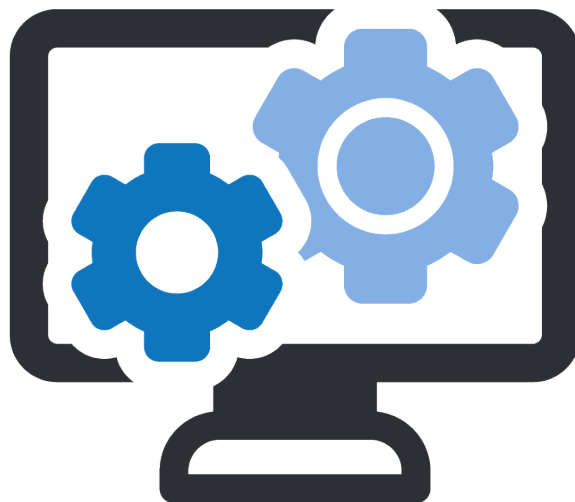
In terms of security and optimization, logging is one of the most powerful features in RPA.

Global process tracking ensures that all actions in the automation are auditable. Meanwhile, features like logging configuration enable businesses to match logged data to their standards.

The top RPA tools are built with enterprise data needs in mind, providing a wide variety of data governance standards to fit your security requirements.



CONFIGURATION FEATURES





Four Configuration Features That Aid Automation Development

A durable RPA deployment can save business resources, cut costs, and reduce downtimes. However, automation processes require meticulous planning and development, especially if they are to be used in a complex business environment.

So how do teams deliver optimal solutions on time, amid many complex obstacles? The time-saving configuration features contained within an RPA tool are one of the key factors to a successfully deployed RPA solution.

User Interface Targeting

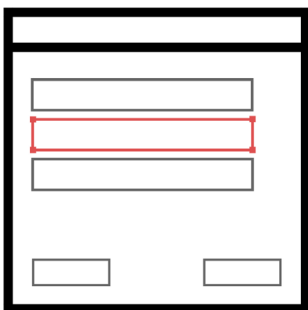
One of these features is a user-interface element-identification tool. The name is self-explanatory, as these are used within RPA to identify user interface

(UI) elements. These element identifiers vary in effectiveness based on their ability to track and code elements. A versatile UI element identification tool helps developers interface accurately with most applications with minimal extra configuration work.

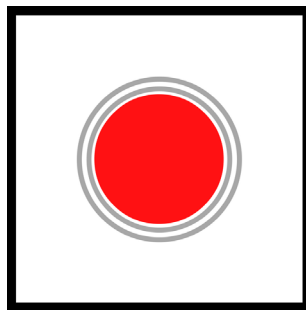
Process Recording

Built-in process recording goes hand-in-hand with UI element identification tools. A recorder function follows the steps that a user performs when recording. The steps are then translated into a script or workflow that performs the same actions. Thus, a process recorder practically automates the automation.

The better the identification technology, the



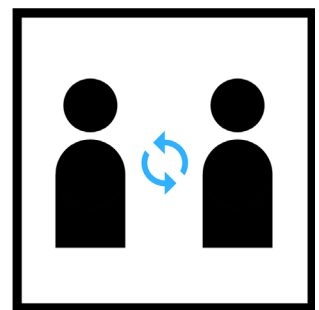
**USER INTERFACE
TARGETING**



**PROCESS
RECORDING**



**DEBUGGING
FEATURES**



**COLLABORATION
FEATURES**

more accurate and quick a recording tool will be. Although recorders are intuitive to use, they can lack the configurability of a layered design if not supplemented with proper development principles. While process recording can allow a developer to quickly create a process configuration, work must be put in to ensure the final product is robust, accurate, and efficient.

An example of this is that most recording tools will also record any human delays that were used during capture, this can cause the process to not be robust, with it always expecting an element or screen to be available after X number of seconds. So, make sure to understand where and when the recording tool is best applied.

General Debugging Features

It is inevitable that complex automation development will produce bugs that RPA teams must work around or fix. That is why many teams place importance on built-in debugging tools to assist with identifying bugs.

Built-in debugging tools allow a user to step through the automation at their own pace, watching the processes closely to find problems. Seeing what values are entered, how they change, and how they interact with the environment can tell a developer a lot about the inner workings of the automation. Of course, the amount of information depends on how advanced the debugging interface of the RPA tool is.

Different RPA tools provide this functionally to varying degrees of success. Debugging provided by RPA tools, while helpful, is no replacement for good process capture and design.

Collaboration Features

Like debugging, collaboration in a team development environment is a highly important RPA tool feature. For instance, in a corporate environment, the work of multiple configuration consultants may overlap on the same components.

The evolution of Intelligent Automation in general and RPA, in particular, is one of the most disruptive shifts our industry has witnessed.

Source: HfS Research, *Intelligent Automation in HR Services and Solutions*

In this case, controlling the code versions, locking the scripts to prevent anomalies, and being able to roll back to previous versions are all critical functionalities. If these configurations are implemented in development, the entire team's labor can be utilized without fear of risking the loss or overriding of work.

Collaboration features also empower your organization's change control processes that need to be considered during an RPA project, saving your project teams from also having to document versions and releases of processes.



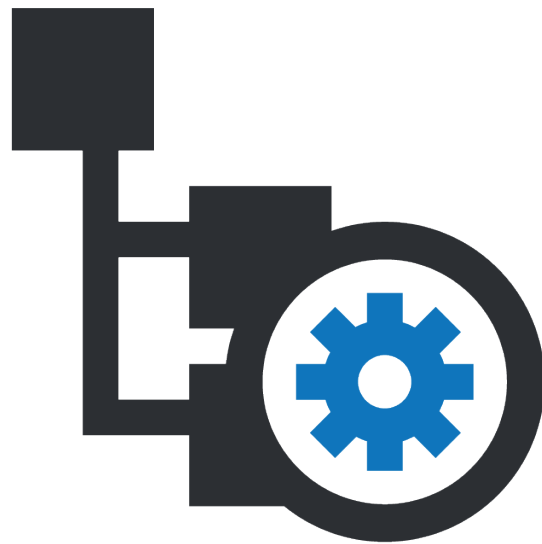
If your business values the efficiency that RPA can deliver to existing processes, then you will appreciate the same sort of principles applied to RPA development.

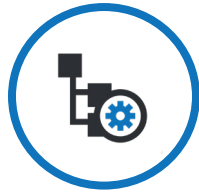
Element identification and recording speed up the building process, while debugging tools help pinpoint issues in an automation. Additionally, collaboration tools can minimize the chance for versioning conflicts through collaboration features.

Each of these features can lead to significant increases in the efficiency and quality of the development process.



DEPLOYMENT FEATURES





Doing More for Less: How to Optimize Resource Allocation

Making sure a deployed RPA environment runs at its full potential should be a top priority for businesses. Misallocating resources has the potential to lead to lower costs savings along with resulting in unnecessarily wasted processing time. The RPA tool being implemented should provide the business with the tools to ensure efficient allocation of robotic resources.

Efficient Management of an RPA Environment

Scheduling the work to be done by your virtual workforce is a key component of efficient management. Usually administered through a control center, scheduling options need to be comprehensive within your chosen RPA tool. Features like being able to set defined, repeatable time spans against a flexible number of resources are the most common.

Compared to the RPA tools that lack full functionalities in these areas, enterprise-level RPA tools tend to offer superior flexibility in scheduling. Some RPA tools also offer schedules that account for system triggers. These allow for implemented processes to work in a more fluid manner with users, this is highly important when an implemented process may only be doing part of a process.

Process load balancing is a feature found in some enterprise-level RPA tools. It enables the RPA platform to dynamically control the usage of available robotic resources. With this feature, the automation can be configured to respond to varying degrees of demand, minimizing process wastage.

Running Multiple Processes on a Machine

The ability for processes to execute in the background can help RPA teams distribute machine usage efficiently. If an automation process can 'run headless,' it can operate while not being visible on the screen of the machine. This allows the desktop interface to not be overrun with windows popping in and out as the automation operates.

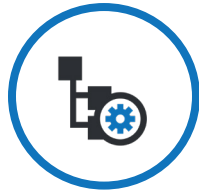
Running headless is particularly useful when an agent-assisted automation is running on a user's desktop. Due to its ability to run quietly in the background, the automation will minimize the likelihood of interference when an agent is also using the machine. A business can free up machines for parallel usage, minimizing wastage.

There is also the potential to run a virtual machine in a multithreaded mode, in which multiple instances of automation processes are executed in parallel. The benefit of using a multithreaded system is mainly to increase processing speeds. However, there is also a cut-off point at which the general performance decrease of running multiple threads outweighs the cost benefits.

It is important to note that background processing is only available when the RPA suite can interface with its target applications on an API level. So, it is most commonly used with browser or office applications. This means that the entire process may not use physical clicks or physical typing techniques. If any of these methods are used, the interface may not be hidden from the desktop.

Features that contribute to the management and distribution of physical or virtual resources save your business both time and money.

Without these features, automation systems tend to be less flexible to sudden changes. So, make sure your business is prepared for as many deployment scenarios as possible by selecting a properly equipped RPA tool.



Why You Shouldn't Blindly Pile Work Onto Your Automation

An RPA system may be more powerful and faster than its human counterpart, but you can't just throw work at it expecting it to get everything done in an orderly manner. Ideally, there should be an organized workflow at hand for your digital workforce.

This is where work prioritization and resource grouping come in. Prioritizing the more important tasks ensures that critical requests are fulfilled immediately.

The Importance of Work Prioritization

Any time-based work will vary in precedence. In customer service, for example, responses will need to be measured out based on timeliness. Even though scheduling processes can help organize the tasks to be carried out, a work prioritization system (or RPA tool functionality) is needed to order queues of work based on their importance to the business.

Queuing Your Workload

To do this, RPA systems commonly utilize a built-in queuing engine to process workloads. Process queues help dynamically sort the execution of a stack of tasks, focusing resources to complete important ones first.

Tasks can be manually ordered through a tagging or labeling hierarchy that the process obeys when deployed. The top RPA tools allow for the tagging of tasks through a control panel or through process interaction.

With process interaction, a process can do an initial 'reading' of the workload and tag the tasks

for the next process based on configured rules (i.e. sorting by due dates, price, or quantity).

Resource Grouping

Queue management can be aided by resource grouping as well, in which a queue of work is assigned to multiple machines at once. This way, a prioritized task can be worked on by a team of robots. Grouping also creates the advantage of separating machines based on environmental compatibility (differing based on the software ecosystem of your machines), ensuring maximal efficiency.

To give an example of both prioritization and resource grouping in action, consider how an automation system can work on a day-to-day basis:

A central work queue for every task is set, but only the tagged tasks will be moved to the front of the line. These top-priority tasks will then be processed by the robot group, resulting in optimized performance and a dramatically faster completion time.



Both work prioritization and resource grouping are critical components of coordinating your virtual workforce.

Work prioritization ensures that your business doesn't skip a beat on critical tasks. Meanwhile, resource grouping enables a lean automation system to effectively process large volumes of work.

If you are searching for RPA tools, you will want to make sure that these features are built in, as external methods tend to be slower and more difficult to implement.



VENDOR SUPPORT & DOCUMENTATION





Transformation Begins with Education

When choosing which RPA tool to employ, the maturity of the vendor's support and training services should contribute to your decision-making process. Vendors strive to make their products powerful yet accessible, often supplementing training material and additional assistance to ease the transition to RPA. If you are new to this technology, this material can prove to be invaluable in getting you started.

The Importance of Basic Training Material

Offerings like structured training materials are extremely useful for getting developers and users off the ground with how to use the software. These often come in the form of user manuals, with pages of structured content that walk a user through a development path. Ideally, they can be downloaded and viewed offline, allowing for easy access and reading.

Having a user manual or training guide present and accessible means that users will have a baseline understanding of the tools abilities, which are invaluable when it comes to design and deployment.

The Growing Popularity of Video Tutorials

Aside from training manuals, other forms of visually informative content like video tutorials are being produced by a few top RPA vendors.

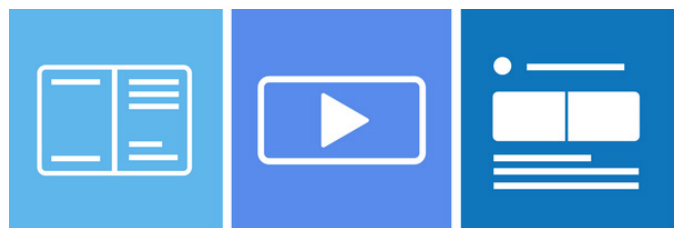
A training video, for example, can provide a demonstration of the step-by-step process of designing a practical workflow or how to use one of the tools abilities. In general, you will find that visual training materials are especially helpful for RPA, since most RPA software use a visual interface.

Other Training Outlets

As a seeker of RPA information, you might have noticed that vendor training content is relatively scarce. Fortunately, this may not be true for long.

The RPA world is currently undergoing a massive expansion of training materials and opportunities to improve accessibility and meet growing demand. Some of the top vendors have, or are currently developing, online training courses, to provide comprehensive e-learning environments.

E-learning is beneficial because it offers the whole suite of training, practicing, and testing. There are now e-learning and on-site training partners focused specifically on RPA and intelligent automation technologies.



In today's fast-paced, digital environment, it is critical to avoid being slowed down by a lack of proper training.

It is prudent to expect your RPA vendor at a minimum to provide quality training material, whether a structured manual, training guide, or series of video tutorials. It's critical to gain valuable knowledge from experts to efficiently and effectively grow internal capabilities.



How to Make the Most Out of Your Automation Support Resources

Whether it is an immediate update request or a rogue bug, disruptions to your RPA system require quick action. Your business must have the means to either create solutions or request support during these critical times to ensure the success of your automation. The degree to which a vendor can support a customer through deployment and live operations can have a notable impact on the level of success.

Vendor-Assigned Contacts

The busiest times in the RPA development life cycle are the design and implementation of an automation. To support the project team, vendors can assign trained resources from their partner network to directly collaborate with clients. From reviewing designs to fixing technical mishaps, they liaise with the client to make sure everything runs smoothly.

Trained resources can also offer coaching and guidance to a client through the stages of an implementation. Communication is the key to properly supporting an RPA deployment, so having a direct point of contact with a vendor can prove to be immensely helpful.

Aside from communicating and providing general guidelines on RPA, vendor-assigned contacts can provide continuous support within the deployed RPA software. For enterprise-level RPA clients, this support can come in the form of product solutions that are tailored to address client-specific issues. Therefore, you can expect continuous support throughout changes in the RPA software and your business applications.

Service Desks

In the same realm, technical support and account management capabilities are often strong indicators of an RPA vendor's general support capabilities. Aside from a project advisor, service desks are often employed by enterprise-level vendors to provide a baseline of assistance with any issues. These are especially useful for larger projects, in which the team of agents can scale accordingly to respond to incoming requests. This versatility can mean that support is always on hand and that preventable issues can be addressed.

Online Resolutions

For the problems that require more drawn-out technical solutions, issue reporting and forum resolutions are useful forms of support. Both are resources that strive to solve reported issues through dedicated solutions.

More established RPA vendors offer community forums where optimal solutions and guides can be discussed. In these communities, workarounds and fixes can be shared, helping users avoid more time-consuming alternative solutions. Vendors also commonly offer online portals to share FAQs or to resolve support tickets. Access to these tools is typically routed through implementation partners to support clients.

Having a comprehensive set of support tools during the deployment of RPA not only reduces delays but also ensures quality solutions.

Support is usually directed through an implementation partner or directly from the vendor, depending on the relationships and experience the client has developed. The key is to make sure that the necessary support measures are in place, no matter what.



The Future of Work Journey

As enterprise digitization efforts increase, RPA will undoubtedly be a major component in the future of work. Companies reaping the greatest rewards from RPA are those that do not treat it as a standalone technology, but as one important element of a larger digital operations strategy.

Other tools in the future of work toolkit, such as Machine Learning, Natural Language Processing, and Artificial Intelligence can be combined with RPA to reach unprecedented levels of automation and efficiency. With the proper foundations in place, this set of technologies will truly revolutionize the digital operations strategies of tomorrow.

Whether you are a business executive or an RPA trainee, you will benefit immensely by educating yourself on the capabilities of tools like RPA.

Understanding the ins and outs of automation will help you extract the most value out of your business processes and capture the long-term benefits. In addition, you will be better equipped to wade through marketing hype and misleading claims that can arise in this rapidly growing market.

When considering how to build the foundations of your digital operations strategy, it is especially critical to distill hype from reality.

We hope that the technological knowledge we have detailed in this book will help you navigate your future of work journey.

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David is a process and automation expert who has gained recognition as the pre-eminent expert in Robotic Process Automation recently named 'Consultant of the Year 2016' by the Global Outsourcing Association for his work in transforming international organizations through deploying Future of Work technologies and methodologies. As COO, David has built, and now continues to lead the global consulting, implementation and managed services teams within Symphony Ventures ensuring flawless solution design and execution on every engagement.



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Fersht is an acclaimed author, analyst and visionary in IT Services and BPO, the Digital Transformation of organization operations and cognitive automation strategies. Fersht coined the terms "The As-a-Service Economy" and "Digital OneOffice", which describe HfS Research's vision for the future of global operations and the impact of cognitive automation and disruptive digital business models. Fersht was named Analyst of the Year in 2016 for the third time by the Institute of Industry Analyst Relations, which voted on 170 other leading IT industry analysts.

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Symphony Ventures is a the leading global, specialized RPA and AI consulting, implementation and managed services firm. We work with clients to not only discover the best-in-class digital solutions but also to develop an execution plan that is tailored for organizational needs.

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