**Robotic Process Automation (RPA)**

**Introduction**

Robotic process automation (RPA) is the application of technology that allows employees in a company to configure computer software or a “robot” to capture and interpret existing applications for processing a transaction, manipulating data, triggering responses and communicating with other digital systems.

Any company that uses labor on a large scale for general knowledge process work, where people are performing high-volume, highly transactional process functions, will boost their capabilities and save money and time with robotic process automation software.

Just as industrial robots are remaking the manufacturing industry by creating higher production rates and improved quality, RPA “robots” are revolutionizing the way we think about and administer business processes, IT support processes, workflow processes, remote infrastructure and back-office work. RPA provides dramatic improvements in accuracy and cycle time and increased productivity in transaction processing while it elevates the nature of work by removing people from dull, repetitive tasks. The technology of RPA can be applied specifically to a wide range of industries.

**Historic evolution**

Although the term "robotic process automation" can be traced to the early 2000s, it had been developing for a number of years previously. RPA evolved from three key technologies: screen scraping, workflow automation and artificial intelligence.

Screen scraping is the process of collecting screen display data from a legacy application so that the data can be displayed by a more modern user interface. The advantages of workflow automation software, which eliminates the need for manual data entry and increases order fulfillment rates, include increased speed, efficiency and accuracy. Lastly, artificial intelligence involves the ability of computer systems to perform tasks that normally require human intervention and intelligence.

As a form of automation, the same concept has been around for a long time in the form of screen scraping but RPA is considered to be a significant technological evolution of this technique in the sense that new software platforms are emerging which are sufficiently mature, resilient, scalable and reliable to make this approach viable for use in large enterprises (who would otherwise be reluctant due to perceived risks to quality and reputation).

By way of illustration of how far the technology has developed since its early form in screen scraping, it is useful to consider the example cited in one academic study. Users of one platform at Xchanging - a UK-based global company which provides business processing, technology and procurement services across the globe - anthropomorphized their robot into a co-worker named "Poppy" and even invited "her" to the Christmas party. Such an illustration perhaps serves to demonstrate the level of intuition, engagement and ease of use of modern RPA technology platforms that leads their users (or “trainers” to relate to them as beings rather than abstract software services. The "code free" nature of RPA (described below) is just one of a number of significant differentiating features of RPA vs. screen scraping.

**Deployment**

The hosting of RPA services also aligns with the metaphor of a software robot, with each robotic instance having its own virtual workstation, much like a human worker. The robot uses keyboard and mouse controls to take actions and execute automations. Normally all of these actions take place in a virtual environment and not on screen; the robot does not need a physical screen to operate, rather it interprets the screen display electronically. The scalability of modern solutions based on architectures such as these owes much to the advent of virtualization technology, without which the scalability of large deployments would be limited by available capacity to manage physical hardware and by the associated costs. The implementation of RPA in business enterprises has shown dramatic cost savings when compared to traditional non-RPA solutions.

**Differences between RPA and regular automation**

What distinguishes RPA from traditional IT automation is the ability of the RPA software to be aware and adapt to changing circumstances, exceptions and new situations. Once RPA software has been trained to capture and interpret the actions of specific processes in existing software applications, it can then manipulate data, trigger responses, initiate new actions and communicate with other systems autonomously. RPA software is particularly useful for organizations that have many different and complicated systems that need to interact together fluidly.

For instance, if an electronic form from a human resource system is missing a zip code, traditional automation software would flag the form as having an exception and an employee would handle the exception by looking up the correct zip code and entering it on the form. Once the form is complete, the employee might send it on to payroll so the information can be entered into the organization's payroll system.

With RPA technology, however, software that has the ability to adapt, self-learn and self-correct would handle the exception and interact with the payroll system without human assistance.

**Characteristics of RPA software**

**Code-Free**

RPA does not require programming skills: Business operations employees - people with process and subject matter expertise but no programing experience - can be trained to independently automate processes using RPA tools within a few weeks. Many RPA platforms present a flowchart designer, much like Microsoft Visio: process definitions are created graphically by dragging, dropping and linking icons that represent steps in a process.

**Non-disruptive**

One of the challenges of traditional IT deployments is that the transformation or change of existing systems is complex and risky. Thus, many large organizations are reluctant to redesign, replace or even to enhance existing systems through the creation of new IT interfaces (or APIs). For this reason, the philosophy behind RPA is to avoid the complexity and risk of such changes where they are not warranted, (or indeed to enable such changes to be prototyped and tested, simply by simulating equivalent input/output via the user interface in lieu of APIs). RPA tools therefore lean towards "light" IT requirements and do not, for example, disturb underlying computer systems. The robots access end user computer systems exactly as a human does - via the user interface with an established access control mechanism (e.g. logon ID and password) - so no underlying systems programming need be required. This is an important point because, from a security, quality and data integrity perspective, the UI of many applications encapsulates many years of requirements and testing for error prevention, data integrity and security access control. To bypass a UI by creating a new API is a risky undertaking and requires extensive testing in order that the same levels of functionality and protection are maintained.

**Business user friendly**

RPA’s relative ease of use and low requirement for technical support perhaps explains why adoption typically originates inside business operations and not inside Information Technology (IT) departments. Because RPA projects do not require expensive IT skills and investment in new platforms, the economic threshold of processes with a viable business case for automation is substantially lowered.

**Scalability**: Organizations shouldn't select RPA software that requires them to deploy software robots to desktops or virtualized environments. They should look for RPA platforms that can be centrally managed and scale massively.

**Speed**: Enterprises should be able to design and test new robotic processes in a few hours or less, as well as optimize the bots to work quickly.

**Reliability**: As companies launch robots to automate hundreds or even thousands of tasks, they should look for tools with built-in monitoring and analytics that enable them to monitor the health of their systems.

**Simplicity**: Organizations should look for products that are simple enough that any employee in the business can build and use them to handle various kinds of work, including collecting data and turning content into information that enables leaders to make the best business decisions.

**Intelligence**: The best RPA tools can support simple task-based activities, read and write to any data source, and take advantage of more advanced learning to further improve automation.

**Enterprise-class**: Companies should look for tools that are built from the ground up for enterprise-grade scalability, reliability and manageability.

**Top RPA vendors**

Automation Anywhere Inc. provides an enterprise digital workforce platform geared toward procure-to-pay, quote-to-cash, HR, claims processing and other back-office processes.

Notable RPA software vendors include:

**Automation Anywhere**

**BlackLine**

**Blue Prism**

**Datamatics**

**EdgeVerve**

**HelpSystems**

**Jacada**

**Kofax**

**NICE**

**Pegasystems**

**Verint**

**Blue Prism** focuses on providing organizations in regulated industries with more agile virtual workforces, offering desktop-aligned robots that are defined and managed centrally.

**EdgeVerve Limited**, an Infosys company, helps enterprises modernize customer service, improve business processes and enhance operational productivity.

**HelpSystems** enables companies to streamline IT and business operations by automating tasks and workflows without the need to write code.

**UiPath** offers an open platform to help organizations efficiently automate business processes.

**Workfusion** combines robotics, AI-powered cognitive automation and workforce orchestration to automate enterprise business processes.

**C-level decision-making around RPA**

Though automation software is expected to replace up to 140 million full-time employees worldwide by 2025, many high-quality jobs will be created for those who maintain and improve RPA software.

When software robots do replace people in the enterprise, C-level executives need to be responsible for ensuring that business outcomes are achieved and new governance policies are met.

Robotic process automation technology also requires that the CTO/CIO take more of a leadership role and assume accountability for the business outcomes and the risks of deploying RPA tools.

Additionally, the COO, CIO and chief human resources officer, as well as the relevant C-level executive who owns the process being automated, should all work toward ensuring the availability of an enterprise-grade, secure platform for controlling and operating bots across systems.

**Impact of RPA on employment**

According to Harvard Business Review, most operations groups adopting RPA have promised their employees that automation would not result in layoffs. Instead, workers have been redeployed to do more interesting work. One academic study highlighted that knowledge workers did not feel threatened by automation: they embraced it and viewed the robots as team-mates. The same study highlighted that, rather than resulting in a lower "headcount", the technology was deployed in such a way as to achieve more work and greater productivity with the same number of people.

Conversely however, some analysts proffer that RPA represents a threat to the Business Process Outsourcing (BPO) industry. The thesis behind this notion is that RPA will enable enterprises to "repatriate" processes from offshore locations into local data centers, with the benefit of this new technology. The effect, if true, will be to create high value jobs for skilled process designers in onshore locations (and within the associated supply chain of IT hardware, data center management, etc.) but to decrease the available opportunity to low skilled workers offshore. On the other hand, this discussion appears to be healthy ground for debate as another academic study was at pains to counter the so-called "myth" that RPA will bring back many jobs from offshore.

**The future of RPA**

A Global Market Insights Inc. report expects the RPA market to reach $5 billion by 2024. The increased adoption of RPA technologies by organizations to enhance their capabilities and performance and boost cost savings will reportedly drive the growth of the robotic process automation market most during that time.

The future of RPA is subject to much speculation, as the early majority adopt the technology and discover new uses and new synergies. Possible future trends may include:

* A convergence of BPM and RPA tools, much in the way that the distinction between BPM and workflow tools is now blurred. The acquisition of OpenSpan in 2016 by Pegasystems is perhaps just one early indication of such a convergence.
* Greater incorporation of artificial intelligence (AI) for advanced decision making and inferencing, leading to RPAAI. Some analysts speculate about such developments but, as yet, it is not easy to identify verifiable public domain case studies which provide evidence of this type of technology being deployed alongside RPA.

**Impact on Society**

Academic studies project that RPA, among other technological trends, is expected to drive a new wave of productivity and efficiency gains in the global labor market. Although not directly attributable to RPA alone, Oxford University conjectures that up to 35% of all jobs may have been automated by 2035.

In a TEDx talk hosted by UCL in London, entrepreneur David Moss explains that digital labor in the form of RPA is not only likely to revolutionize the cost model of the services industry by driving the price of products and services down, but that it is likely to drive up service levels, quality of outcomes and create increased opportunity for the personalization of services.

Meanwhile, Professor Willcocks, author of the LSE paper cited above, speaks of increased job satisfaction and intellectual stimulation, characterizing the technology as having the ability to "take the robot out of the human", a reference to the notion that robots will take over the mundane and repetitive portions of people's daily workload, leaving them to be redeployed into more interpersonal roles or to concentrate on the remaining, more meaningful, portions of their day.

**Applications of RPA**

Some of the top applications of RPA include:

**Process automation**

Technologies like presentation-layer automation software – a technology that mimics the steps of a rules-based, non-subjective process without compromising the existing IT architecture – are able to consistently carry out prescribed functions and easily scale up or down to meet demand. Process automation can expedite back-office tasks in finance, procurement, supply chain management, accounting, customer service and human resources, including data entry, purchase order issuing, creation of online access credentials, or business processes that require “swivel-chair” access to multiple existing systems.

**IT support and management**

Automated processes in the remote management of IT infrastructures can consistently investigate and solve problems for faster process throughput. RPA can improve service desk operations and the monitoring of network devices. Separating scalability from human resources allows a company to handle short-term demand without extra recruiting or training.

**Automated assistant**

As in voice recognition software or automated online assistants, developments in how machines process language, retrieve information and structure basic content mean that RPA can provide answers to employees or customers in natural language rather than in software code. This technology can help to conserve resources for large call centers and for customer interaction centers.

**Benefits of RPA**

Robotic process automation technology can help organizations on their digital transformation journeys by:

* Enabling better customer service
* Ensuring business operations and processes comply with regulations and standards
* Allowing processes to be completed much more rapidly
* Providing improved efficiency by digitizing and auditing process data
* Creating cost savings for manual and repetitive tasks
* Enabling employees to be more productive

**Conclusion**

As RPA brings more technologically-advanced solutions to businesses around the world, operating models that adopt automation, whether in-house or offshored, will cut costs, drive efficiency and improve quality.