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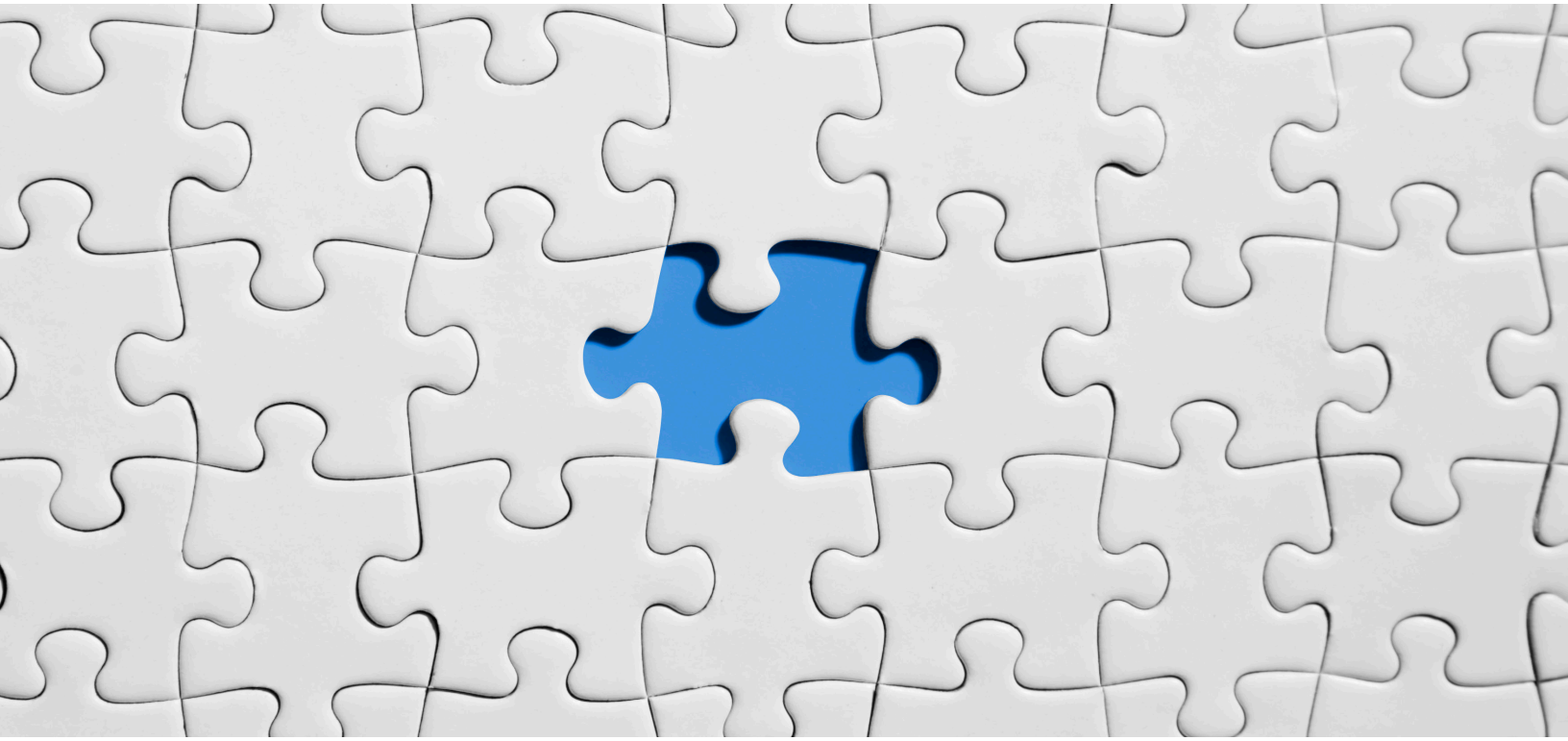
BRIDGING DIGITAL TRANSFORMATIONS THROUGH RPA



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Knowledge Sharing Article

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Overview

Robotic Process Automation (RPA) technology simply allows configuration of a Bot which can emulate and integrate the actions of a human, interacting within digital systems to execute a business process. RPA Bots act as the Digital workforce designed to imitate human activities interacting with any technology application in accomplishing repetitive mundane tasks, enabling employees to focus on more innovative value creation activity. Technically, RPA is a software application that can be configured to automate any rule-based, repeated and non-subjective process.

Some of the most compelling figures responsible for the rise and proliferation of the RPA industry are below.

- Accenture predicts that RPA can reduce costs[1] by 80% and reduce time by 80-90%
- McKinsey & Co. estimates[2] that RPA solutions can generate return on investments of 30-200% in the first year
- PwC estimates[3] that 45% of work activities can be automated saving up to USD 2 trillion in global workforce costs
- Gartner estimates[4] that by 2020, Automation and AI will help shift employee focus from mundane tasks to more creative solutioning by 65%

No wonder, over 70% of business leaders plan to invest more in implementation and development of RPA[5], according to the Institute for Robotic Process Automation and Artificial Intelligence Survey. The global adoption to a digital economy is driving rapid digital transformations within business organizations, powered by their IT transformations. Apparently, Enterprise IT organizations are beginning to resemble cloud providers more and more. Further, the budget allocations for Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) on demand are increasing for business units that are developing and deploying ever more software applications and utilities intended to better understand and service their customers.

As the RPA industry matures from being champions of digital workforces to pivot of digital transformations, the next frontier for enterprise transformations would be adoption of Cloud and Cloud-based services augmented by RPA. Despite the growing adoption of Cloud platforms with its widely proven benefits, a vast subset of organizations are inevitably tied to their legacy systems and applications. Although hardly any of them would want to remain deprived of the resounding benefits of cloud solutions, they are held back mostly by their customized solution requirements, legacy technology mindsets, migration costs constraints and uncertainties on ROI. At times, the legacy applications cater to a domain-specific function that operates smoothly and enhances differentiation

from the competition, so it makes business sense to keep it running. These legacy applications can also be vendor/customer hosted or inherited through mergers and acquisitions, complicating the migration challenges and manageability of diverse systems.

RPA can bridge the gap of co-existence between Legacy and Cloud applications, by retaining the usefulness of the legacy system and adding the efficiencies of the cloud. It can broker the orchestration between Legacy and Cloud applications, allowing enterprises to reap the business benefits of the older software while leveraging the efficiency gains provided by the new-age cloud solutions on their journey towards digital transformation. RPA Bots would act like Digital employees that can be trained to fetch and interact back and forth with data from multiple separate and unrelated systems. The Bots operate at a user level and require no code-level changes to the software systems/programs, easing RPA solution deployment. RPA is both platform and application agnostic, making the Bot capable of doing almost anything that a trained user does on a routine basis, i.e. systems accessing, monitoring, reporting, notifying, executing scripts and templates, validating records, transferring data, scheduling tasks and so on.

This Knowledge Sharing article discusses the adoption strategy of Intelligent automation continuum, Global automation market, tactical RPA transformation use cases, deployment methodologies, keys to a successful implementation, phased ROI planning and future enhancements. The article guides enterprises, digital automation/cloud consultants, technologists, solution architects and the academic community who are interested in understanding Intelligent RPA, its practical applications, identifying transformation opportunities, designing enterprise-wide RPA solutions, and adopting Intelligent Automation at scale for bridging the gaps and accelerating their digital transformation journey.

Accelerating Digital Transformations

RPA Bots can accelerate the digital transformation journey by automating the manual intrinsic tasks that don't require human creativity, problem-solving capabilities or empathy. Additionally, they can provide flexible options of being natively deployed on premises, in the cloud or in a hybrid environment wherein data resides on-premises while the orchestration is in the cloud. It is a worthwhile investment, both short- and long-term. At some point, legacy applications will be updated, replaced or become obsolete. Until then RPA can help organizations advance their technology with the adoption of Cloud services while continuing to leverage the critical functions of their legacy applications.

When the organization is ready to detach from its legacy applications, RPA will continue to be of value to the other areas of cloud migrations and smart operations involving artificial intelligence (AI) to broaden the spectrum for end-to-end enterprise automation. Advanced RPA modules combine rule-based automation with decision-making capabilities and predictive insights through deep learning and Chat/Voice Bots integrations. These help realize enhanced efficiency, decreased costs, increased staff performance, reduced operational risks, improved response times and better customer satisfaction

The biggest adopters to date are the Banking, Finance, Securities, Insurance, Telecom and Utilities sectors that traditionally have numerous legacy systems and choose RPA solutions to integrate faster and quickly accelerate their digital transformation initiatives, while unlocking the value associated with past investments. The sector-wide detailed RPA adoption trends worldwide are covered in Appendix B.

Leveraging RPA to transform and scale computing resources via the cloud would help organizations automate more complex workloads especially involving other sectors like Retail, Logistics and Supply chain, to maintain their critical business applications and automation processes. As RPA technologies get integrated with cloud services, the benefits would stretch across the board in terms of scalability, resiliency, management, security, costs and ease of access and deployment.

Furthermore, RPA solutions are rapidly evolving with newer capabilities such as:

- Automated Maturity and Opportunity Assessments
- Multi-RPA vendor orchestration with centralized console
- Heterogenous Bot Workload sharing among cloud platforms
- Interactive User experience with Voice- and Chat-enabled Bots
- Predictive Risk Insights on Business and Operations with ML/DL
- Advanced Data Insights by integrating AI modules to IoT and Big Data

RPA is now being considered the shortcut to adoption of AI according to an HBR study[6]. The increasing demand for Business Process Automation (BPA) using AI would be a key growth driver as enterprises adopt RPA to streamline IT and business operations. The Automation industry estimates[7] that the RPA software market will reach USD 2.9 billion in 2021. Overall, the RPA market will continue to experience growth with increased value differentiators that would influence the enterprise digital transformation journey. Apart from being a non-invasive technology leading to considerable savings potential[8], the business benefits driving RPA adoption across enterprises are captured in Figure 1.

Figure 1: Overall RPA Benefits (Source[9]: EY)

Appendix C covers a set of platform and technology agnostic RPA use cases widely followed across various leading industry segments like Banking, Finance & Accounting, Insurance, HR, IT and others.

Intelligent Automation Continuum

The Intelligent Automation Continuum (IA) depicted in Figure 2 focuses on a vendor agnostic tools and platforms selection approach across the journey from RPA to AI based on the strategic business needs, technology requirements and IT landscape of an enterprise. RPA is the foundation followed by Heuristic at intermediate to AI as advanced level of automation. The Bots operating across these three levels can be termed as “Doing Bots”, “Thinking Bots” and “Learning Bots” respectively with their salient features mentioned. The vendors shown are indicative and should be aligned to the customers techno-business landscape and assessments. RPA is considered the gateway to AI or White-Collar automation, discussed more in upcoming section on Hype vs. Reality.

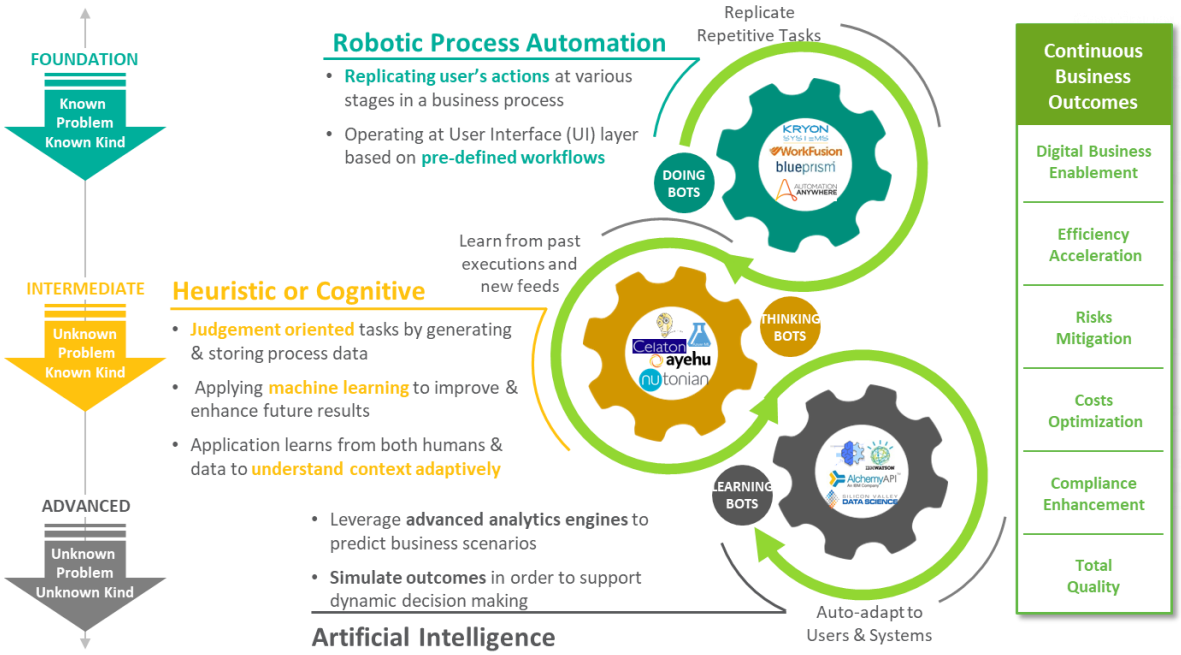

Figure 2: Intelligent Automation Continuum

The ideal solution approach is to adopt Intelligent Automation in phases into the business mainstream for an enduring competitive advantage promoting:

a. Newer avenues of Innovations across the Organization Ecosystem
b. Superior Service Levels resulting in enhanced Customer Satisfaction
c. Options for alternate pricing and rapid transformation in the marketplace

The major business driver would be to constantly excel in outcomes across:

a. Process Quality and Compliance
b. Operational Efficiency and Scalability
c. Costs Optimization and Effective Resources Utilization

Smart RPA Adoption

Smart RPA combines both RPA and AI capabilities that can help accelerate digital transformation of enterprises. Apart from automating routine transactional processes, it can also empower the human workforce in handling judgment-oriented processes, thereby increasing overall workforce productivity. The 5 Stepped Smart RPA adoption based on Everest group research playbook[10] is depicted in Figure 3.

The framework at large guides to adopt, expand and scale RPA deployments, enabling enterprises to conceptualize their customized Intelligent Automation journey. It predominantly covers the strategy part; Where do you want to go with enterprise automation? What capabilities do you need to develop to get there? Which are the practical paths and what would be the phased milestones to be

accomplished in the transformational journey? It also helps in continuous baselining and rediscovering greater business impact across the enterprise through innovations that matter and maintain a ROI-positive business case. Appendix D illustrates a reference Integrated Digital Platform (IDP) architecture that can support an enterprise scale IA strategy for Smart RPA adoption.

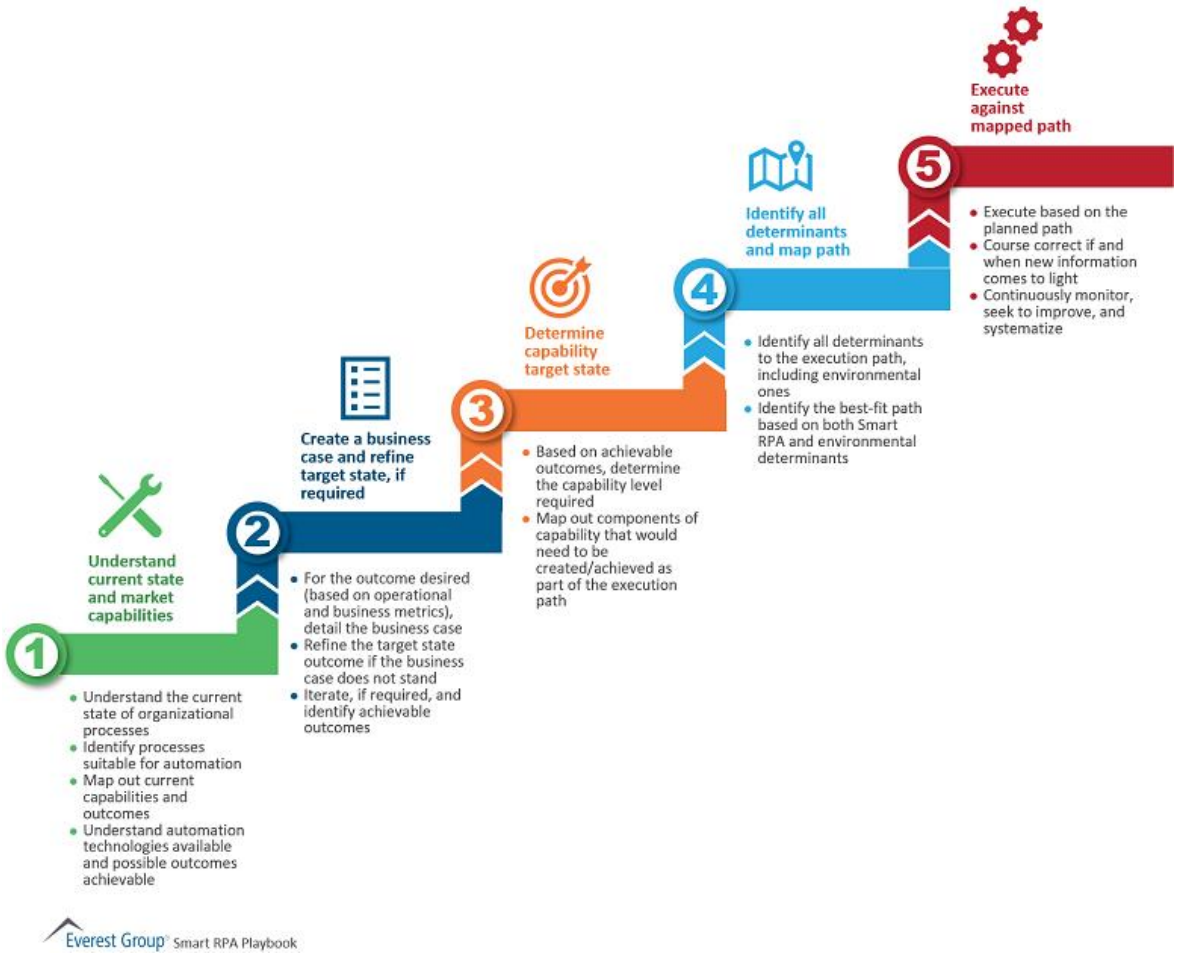

Figure 3: Smart RPA Adoption (Source[11]: Everest Group)

Modes of Operation

RPA Solutions can basically operate in the following modes based on the tasks being automated and degree of human dependency across the process lifecycle.

a. **Attended**: BOT resides on the user's system and works hand in hand by assisting him/her during various stages of the routine tasks. Also known as Robotic Desktop Automation (RDA) as the Bots often interact with humans on a desktop.

b. **Unattended**: BOT resides on a dedicated system and executes usually batch tasks, scheduled or adhoc requests that do not require manual user intervention. In cases of exceptions it can notify a user and/or trigger a set of remediation actions.

c. **Hybrid**: Combination of Attended and Unattended Bots based on end-to-end use case to utilize the best of both worlds also leading to Cognitive Automation.

Figure 4 illustrates how Attended, Unattended and Hybrid/Cognitive modes of RPA can complement each other and co-exist in an ecosystem.

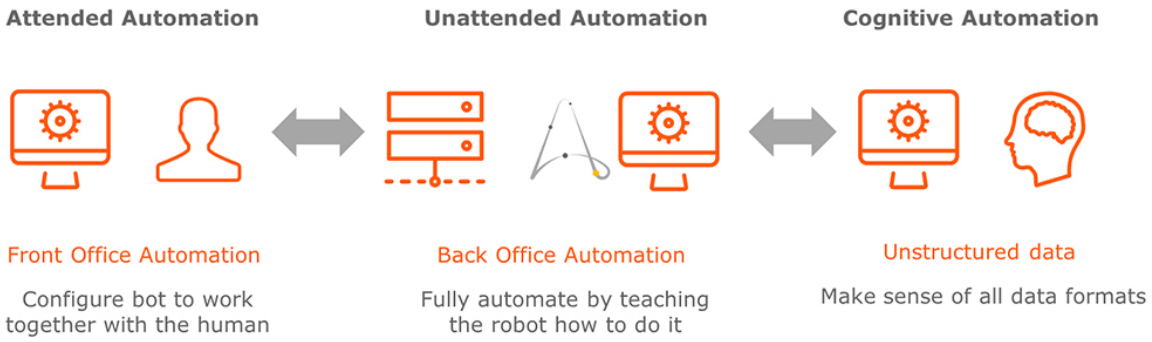

Figure 4: Attended - Unattended - Hybrid RPA (Source[12]: Automation Anywhere)

Table 1 compares the various RPA modes of operation across Businesses applicability, Key objectives and Automation invocation triggers with sample use cases.

Focus	Attended	Unattended	Hybrid
Business Applicability	Usually front-office work where human intervention is required from time to time and business processes which cannot be fully automated	Usually mid-office and back-office work where human intervention is negligible (only in case of exceptions) and can be fully automated by the means of process reengineering	Complex and Mixed tasks representing end-to-end business process with multi-level interactions across people and systems
Key Objectives	Reducing AHT and not necessarily FTEs, Improving Quality of work and thereby CSAT through agent assisted automation, Increasing employee productivity	Reducing both FTEs and overall cycle time, increasing ROI, streamlining business processes and standardizing operations	More benefits can be reaped throughout the entire business process regardless of whether a person or robot is executing the task
Invocation Methods	By the user through the RPA Client Console, Embedded Screen Button and/or based on Users' on-screen activity	Based on File Status, Scheduled Time and/or adhoc requests factoring System Events and/or business demands	Both

Common Use cases	Daily routine activities where data is to be collected from different applications to answer a query, execute a scripted task or process standard work requests. In most instances, the maximum lead time is due to unusual toggling between applications, data entry/validation/visualization, comparing and compiling reports, updating customers and so on	Bulk batch operations that are repetitive, redundant, tedious, manual and time consuming. These can be data transfers between systems, processing files in bulk like daily invoices, onboarding registered customers at scheduled intervals, tallying/auditing ledgers at close of business and so on	Here, tasks can be passed back and forth between the two workforces with full visibility to create a collaborative interaction between human and virtual workers. This results in a truly unified workforce comprised of people and robots that maximizes efficiency, scalability and flexibility required for the digital age

Table 1: Deep dive of RPA Modes of Operations

Solution Design Considerations

The Best in Class design principles to be followed for a successful RPA solution implementation are:

1. **Holistic Assessment** The approach assesses both the Business and IT landscapes to identify and verify automation feasibility for processes considering all relevant aspects of Security, Application Landscape, Hosting Environments and Capacity-Availability-Performance (CAP) planning. Some additional focus areas here would be:
    a. Which business process areas are underperforming? e.g. Speed-sensitive processes that can delay delivery of services to customers resulting in unhappy customers.
    b. Are there processes that cannot be scaled unless you hire more people?
    c. Is there an Intelligent Automation adoption roadmap with ROI calculations?
    d. Are there any processes that can be outsourced or involving irregular volumes based on peak business requiring irregular labour? Can RPA bots scale up or down easily to manage peak demands?
    e. Mostly rule-based processes are impactful and easy to automate. Bots need to be programmed and if the rules of the process cannot be programmed, it is not a great candidate for RPA.
    f. Be cautious of rule-based processes with many undocumented rules that would be time consuming or impractical to identify all rules with domain experts. Such processes are not good candidates.

Appendix E outlines an industry recognized approach from WorkFusion that is targeted to identify and prioritize right processes that will yield the greatest benefits when automated.

2. **Architecture** – This pertains to system's adaptability to various tasks during RPA workflow development and deployment. In conjunction with a formidable RPA toolset, the ideal architecture can provide capability to create complex designs efficiently and effectively, to develop, test and deploy the automation components and Integrations. Some of the additional focus areas here would be:
    a. Where are rigid applications or information silos creating bottlenecks?
    b. Are there processes that cannot be scaled unless you enhance a platforms computing power?
    c. Has the necessary Bot Capacity-Availability-Performance planning been addressed in the architecture design?

3. **Usability & Configurability** – Ease of use can play a vital role in accelerating 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. Additional focus areas here would be:
    a. Are employees performing manual repetitive tasks?
    b. What is the ROI on your highly paid knowledge workers dedicated to time-consuming administrative tasks?
    c. Are human data-entry errors creating frequent rework or exception handling?
    d. Are the processes error-prone due to chance of human errors that can affect customer experience or cause regulatory issues?
    e. Native Configuration Features embedded in most automation tools are designed to accelerate and simplify the editing and configuration process. These enable effective workflow deployment and support better process lifecycle management.

4. **Integrations** – The ability to integrate with different systems and technologies is a core capability of RPA-based automation. Strong integration capabilities can lead to more robust, quicker and effective automations. In the case of legacy systems, custom integrations would need to be developed based on the use cases. At times, replacing legacy systems can automate processes more effectively than RPA bots, e.g. errors due to screen scraping or siloed systems requiring multiple automation methods not making business sense.

5. **Exception Handling & Risks Mitigation** – The ability to robustly handle business and technology exceptions within the tool and referring to experts where judgement or manual activity is required. This means errors during automation can be easily detected, circumvented, and in many cases, automatically resolved. Where this is not possible, or where a process has been designed to require a person to review and act, cases are passed into a separate queue and visible in reports. With solid exception handling, the orchestration of automation in the workplace can operate in a smooth and reliable fashion in any mode – Attended, Unattended, Hybrid. Apparently, if a process cannot handle errors, then it should either be deprioritized or there should be a quality control mechanism to ensure the errors are detected and addressed in runtime probably due to changes in the related user interface (UI) or business processes.

6. **Security** – Automation deployment can result in sensitive data being processed by BOTs. As a result, security measures are an essential part and must be factored for establishing the right controls. Data governance as well as data quality is key factor in eliminating the problem of incorrect data being processed by BOTs by accommodating Data Quality Process into RPA workflows. Additionally, it should be compatible with the Organization and/or Industry specific compliance and risk guidelines being followed.

7. **Deployment** – Deployment is the next major task after configuration and testing. This include features to roll out releases across machines, handle environment-specific variables and provide security controls for deploying to a live environment. Further, it should also have considered Delivery Risks and Mitigation, Error/Exception Handling, BOT Performance and Control Room Management. End-to-end transparency is key to a sustainable and trusted RPA infrastructure.

8. **RPA Vendor Support and Documentation** – Having a strong link of support with vendors can provide resources that facilitate ease of deployment. These include access to user forums and communities, helpdesk ticketing systems and best practices. For effective management and maintenance of the Bots, it is essential to have thorough documentation of the Bots landscape, including the processes, responsibilities, systems involved and troubleshooting procedures. Appendix F provides a comprehensive comparative analysis and objective ranking of the major RPA players as a reference.

9. **Centre of Excellence (CoE)** – As strategic business model changes are required when developing a new RPA-enabled digital workforce powered by Bots, a CoE is essential for adopting RPA effectively into the organization and redistributing acquired knowledge and operational resources across future enhancements. Regular Monitoring & Reporting, enablement of Developers, Administrators and Support, CSIs (Continuous Service Improvements) and R&D would also be part of the CoE. Timely feedback from the CoE would also be used for other businesses as lessons learnt, best practices and options for next level of automation. CoE would also advise on overall process maturity and RPA baselining from time to time.

Reference Architecture

RPA platforms at large caters in the design, management and execution of Bots to automate repetitive tasks that are usually performed through an application user interface. The Bot workflow consists of tasks that require the exchange of information between multiple, unconnected application systems, thus enabling automation of routine activities. In case a Bot needs to connect to another system without an accessible user interface, it would leverage web services to pull or push data.

RPA is extremely valuable in bridging the digital transformation gaps for integrating modern enterprise application workflows with legacy enterprise applications that do not expose the necessary backend APIs. Additionally, it can be extended as a stand-alone tool to help business users complete their routine, repetitive and predominantly rule-based activities.

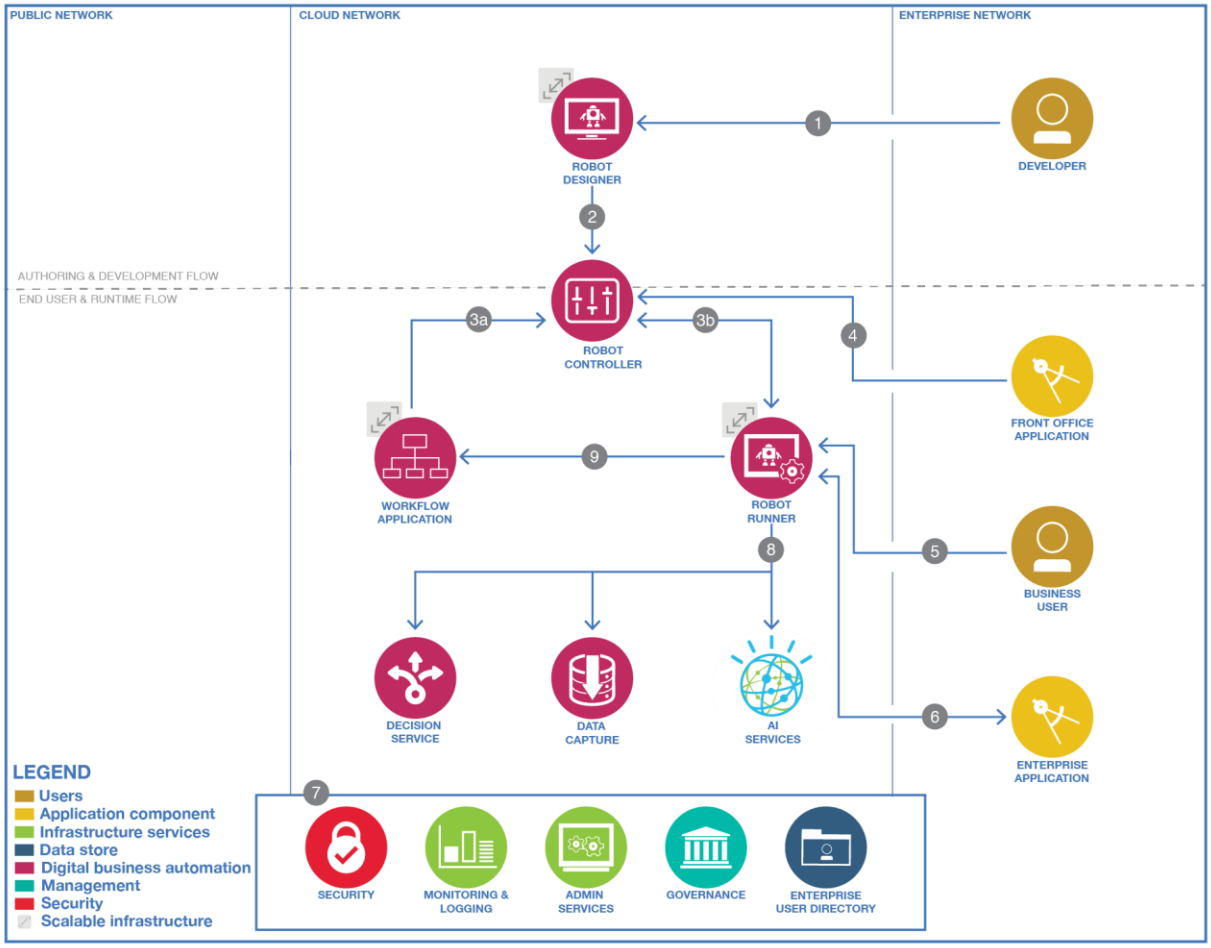

Figure 5: RPA Reference Architecture (Source[13]: IBM)

Figure 5 depicts the data flow sequences of a cloud-based RPA reference architecture. This is based on the Digital Business Automation reference architecture[14] from IBM Cloud Architecture Centre.

The activities involved in the RPA domain life cycle can be summarized in the following steps:

- Step 1: RPA developer creates an automation workflow template in a Bot designer.
- Step 2: After completing design, build, testing and validation (user/functional/business), the template gets deployed to a Bot controller that manages the RPA tasks assignment and queue control.
- Step 3A: A Bot runner can be triggered or activated by an explicit function call from a workflow application through the Bot controller, like in Unattended mode.
- Step 3B: A Bot runner can also be triggered or activated through the Bot controller by an event (e.g. arrival of a file) or a scheduled timer or on-demand, like in Unattended mode.
- Step 4: Alternatively, the Bot execution can be initiated by an enterprise application (e.g. front-office business) through the Bot controller.
- Step 5: The Bot runner can also be triggered or interactively obtain inputs as needed from Business Users during its task execution, like in Attended mode.

- Step 6: The Bot runner then executes its assigned tasks through bi-directional integration with the corresponding enterprise application.
- Step 7: Whilst the RPA task is in motion, the Bot controller monitors and records execution data that provides essential analytics to measure the performance of the bots over time. It also manages the security (e.g. provides the credentials, role-based access etc.) that give the robots access to the enterprise applications and systems.
- Step 8: RPA tasks executed by the Bot runner can be made more complex and powerful, in order to address a wider range of use cases by leveraging external capabilities such as decision services, data capture and AI services from one or more platforms, like in Hybrid/Cognitive mode.
- Step 9: For advanced exception handling while running an automated task, the bot can initiate a workflow application to handle cases requiring human intervention, additional review/inputs or escalation.

For this reference architecture and data flow, the RPA is set-up in the Cloud Network and the Enterprise Applications, Systems and Users are connected from the Enterprise network. Any third-party application interfaces or custom integrations can be present in either of the above networks or public cloud based on the specific task(s) to be executed.

Solution Implementation

A typical RPA solution implementation lifecycle would consist of 3 segments as illustrated in Figure 6. These comprise:

1. **Business Process Assessments**: This involves stakeholder discussions on Business imperatives of Intelligent Automation, feasibility study, solution requirements, brainstorming and identifying use cases, prioritizing based on impact, complexity, ROI and execution planning. Some of the key deliverables are:
    a. Establishing Automation PMO and Governance structure
    b. Establishing goals and identifying key constraints
    c. Determining organizational dependencies/gaps
    d. Determining timelines and finalizing metrics
    e. Designing maturity model and ideation

2. **Platform Set-up**: This involves RPA Tool Identification, License procurement, High- and Low-Level design, Environment set-up, Configuration and Integration. Some of the key deliverables are:

a. Mapping feasible themes and solution options
b. Conducting quick Proof of Values for shortlisted themes and assessing outcomes
c. Building a reference architecture, verifying business process change and deployment plan
d. Finalizing requirements, core team and setting up environment for solution design, build, test and deploy, ongoing maintenance

3. **Bot deployment**: This involves Automation Process Flow Mapping to use cases, Bot workflow design and development, Bot testing, Bug fixing and phase-wise production roll out. Some of the key deliverables are:
    a. Deploying validated and approved Bots into production
    b. Analysing continuous performance metrics as applicable
    c. Refining bot workflows and/or business processes to optimize automation
    d. Identifying newer areas of improvements and business process changes
    e. Documenting all design changes, issues logs, best practices and lessons learnt
    f. Funnelling feedback to CSI and Implementation teams for future planning

A rightly designed and deployed RPA solution would never overload the Bots to its full capacity of work. As a best practice, there should be ample buffer allotted to the Bot to avoid delays, crashes, system lag and other maintenance activities.

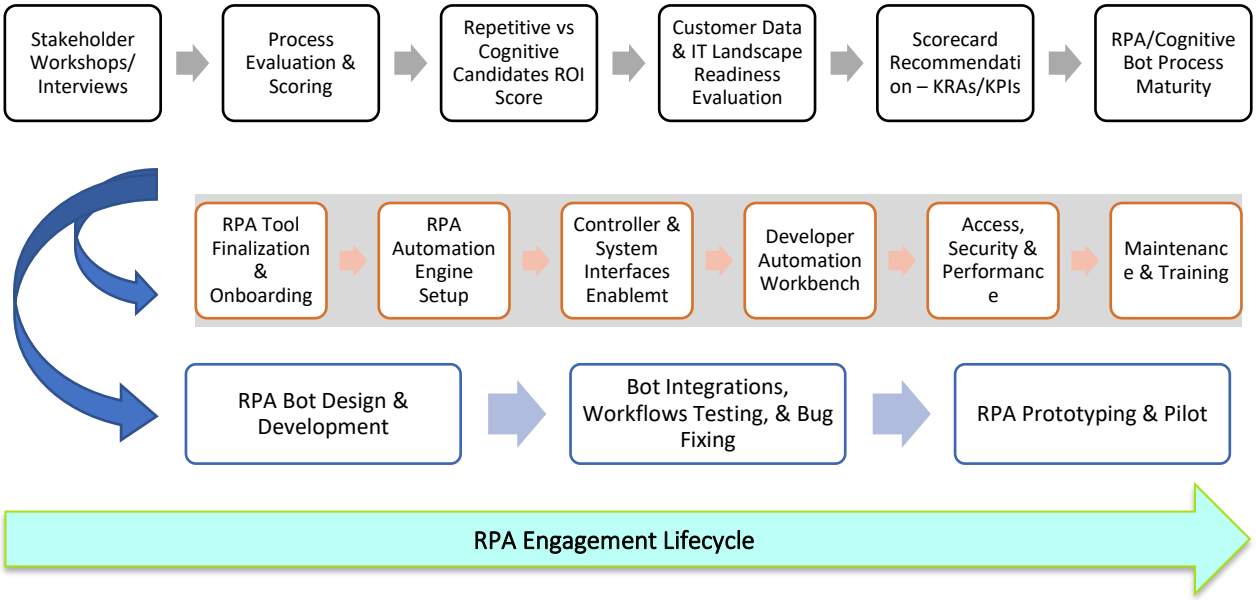

Figure 6: RPA Solution Implementation Approach

It is important to remember that Bots are not as smart as humans and do exactly what they are programmed to do. Hence, whenever they encounter a situation or an environment that is not within their pre-defined instructions, they tend to become ineffective. Adequate Exception Handling mechanisms and CAP elasticity built into the solution can address this to a significant extent. Hence, situational fluency needs to be carefully considered during the Bot design and development. This creates a strong foundation for success while targeting both short- and long-term business goals. Further, Bots need timely care and attention in the form of maintenance, upgrades, performance tuning and cybersecurity protocols, in order to plan future requirements and keep the bots scaling to continuously meet new business demands.

Critical Success Factors

Critical Success Factors (CSFs) and objectives are vital for establishing a long-term and sustainable RPA model are. These include:

1. **RPA CoE**: Automation of best practice implementation, idea generation, skill development, process assessment, reusable tools and resources are developed
2. **Right Tooling & Scaling**: Identifying the right tool set, what automation can be built in-house vs buy, Business vs IT Implementation plan for scaling, ensuring capability assessment
3. **Targeting Right Processes**: Level of process maturity, identifying and prioritizing the right processes, understanding extent of exceptional scenarios

4. **Operating Governance & Change Management**: Framework for successful Automation Implementation, Governance, Change Management and Demand fluctuations
5. **Risk & Mitigation Planning**: Robust monitoring and security governance to ensure compliance with IT security policies, regulatory provisions and risk policies. It should also involve Predictive Analytics mechanisms for forecasting and mitigating automation project risks.
6. **Focus on Continuous Value Realization**: Starting with Quick Wins and Target processes which can either lower costs, improve efficiency, provide scale or generate more revenue, Realizing Cost savings from RPA implementations through higher levels of productivity and scales.

Figure 7 summarizes the CSFs and common RPA queries and feedbacks (LHS) from customers that lead to ensuring the corresponding CSFs are practiced timely throughout the lifecycle.

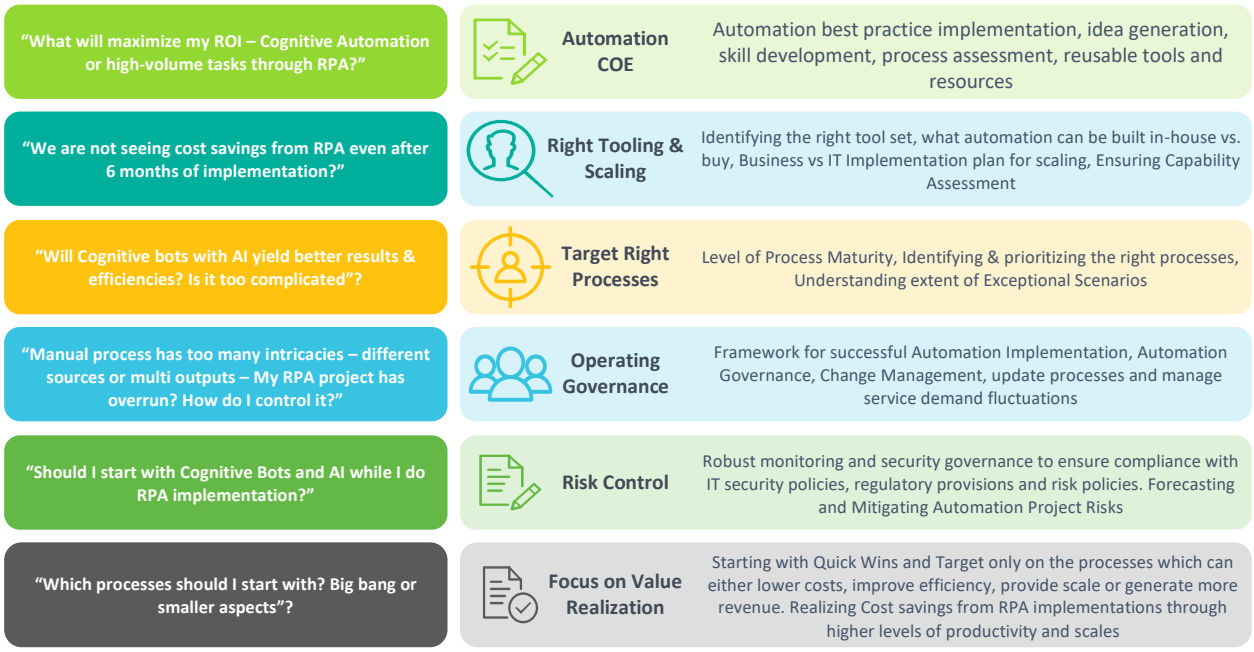

Figure 7: CSFs for Intelligent Automation

Hype vs. Reality & White-Collar Automation

Today, RPA is the most sought-after frontier for enterprises seeking to untangle people from performing mundane tasks so that they can focus on more innovative and complex business challenges. Further, the RPA market is poised to exhibit unprecedented growth in the coming years, driven by the ever-increasing business requirement for superlative operational efficiency, ease of functioning and customer satisfaction.

However, for all its ability to drive profitability and diminish physical work, RPA has been met with dread of job losses and staff decreases, leading to unwarranted presumptions about Bots. As we enter the 4th Industrial Revolution in how organizations work, it's important that each bit of data is dealt with and utilized appropriately to improve its value of digital transformation and support the newer business models related to it. Organizations can cut through the hype with native embedded capabilities by using AI algorithms enabled by human orchestration after doing a deep dive analysis of their business requirements, vision and execution strategy.

Although Hybrid/Cognitive RPA have caught the attention of CxOs and business leaders by promising the ability to accelerate and transform an enterprise, the right questions need to be addressed on how and where to implement RPA and whether there will be any disruptions to business operations, like:

1. **Labour Market Dynamics**: Addressing wages, skills gaps and labour market mismatches
2. **Regulatory and Social Acceptance**: For workers, automation will change many work processes and require closer collaboration with technology
3. **Economic Benefits**: RoI, Technical Feasibility, Cost of Developing, Deploying and Maintaining solutions

White Collar Automation is the use of AI and intelligent automation to perform complex tasks that require creative solutions, decision-making and collaboration. This is a paradigm shift from conventional RPA, that has been changing how organizations handle mundane repeatable tasks by automating them and rendering lower-skill blue-collared jobs useless. White collar jobs that were assumed to be exempt from this Bot revolution have now appeared on the radar of AI. In an interview with Forbes[15], Jeetu Patel, Chief Product Officer of Box, said that AI and automation will impact some half a billion white collar jobs. As the needs of the customer evolves so does the technology used in solutions to deliver their business outcomes. The current workforce needs to upskill rapidly which comes with high investment, time, attrition rate and opportunity cost. This completely new way of working involving massive amount of data has largely been driven by three converging trends – migration to cloud, multi-domain orchestration and cognitive abilities through AI/ML technologies. It

makes sense from a cost perspective to deploy intelligent algorithms that can complement highly skilled work but maybe not replicate it yet. AI/ML can empower employers and employees to not just scale but also to transform in ways that were not possible before, by directing focus on critical and value-added activities rather than engaging in low-value tasks such as data entry. A hybrid workforce enabled by white collar automation and driven by highly skilled individuals can open various new avenues of business and increased market share.

Gartner has predicted[16], 'By 2022, one in five workers engaged in mostly non-routine tasks will rely on AI to do a job.' According to Forrester Predictions[17], Automation will replace, on net, 1.06 Million jobs from cubicle, coordinator, and function-specific knowledge worker personas in 2020.

By contrast[18], work personas that require intuition, empathy, physical and mental agility, including cross-domain knowledge workers, teachers/explainers, and digital elites, will add 331,500 net jobs.

HFS Research[19] states that RPA is catalysing broader White-Collar automation and AI to top USD 20Bn by 2021 as depicted in Figure 8. Accordingly, RPA has opened the gateway for augmenting White Collar roles with Intelligent Process Automation (IPA), which caters to process transformation, discovery, mining, data ingestion, computer vision, NLP, etc. that truly supports broader automation and AI strategy across business silos. AI refers to the simulation of human thought processes and involves self-learning systems that use data mining, pattern recognition and natural language processing (NLP) to mimic how the human brain works, without continuous manual intervention.

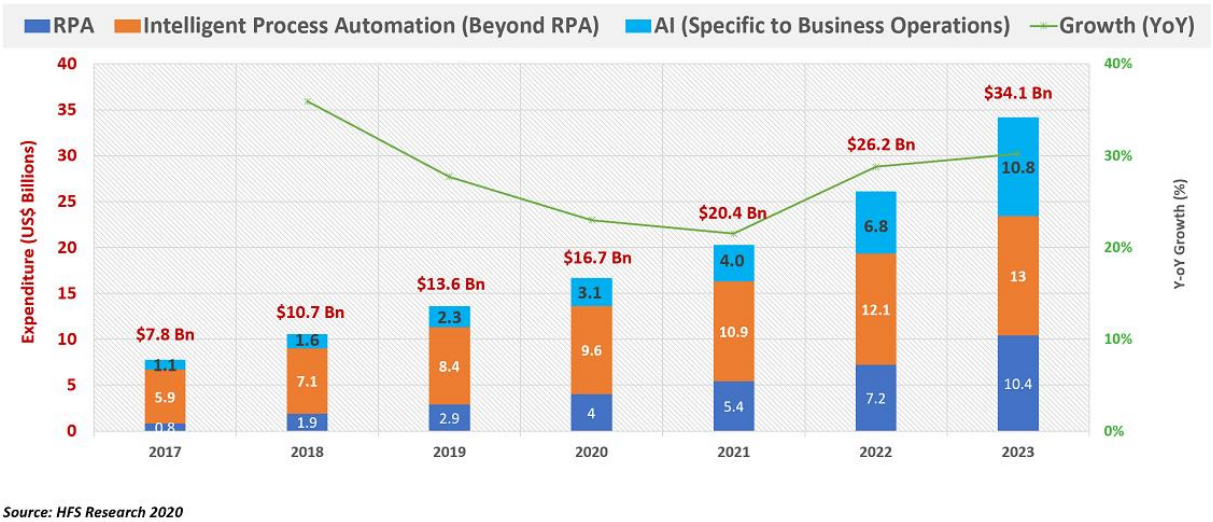

Figure 8: White Collar Automation & AI Spend 2017-2023 (Source[20]: HFS Research)

2020 and Beyond

Enterprise CIOs believe RPA is key to delivering better customer and employee digital experiences, rather than just automating repeatable mundane tasks. 2020 is being considered the breakout year for scaling RPA as enterprises plan their Intelligent Automation journey. Based on RPA Tech Trends[21] published in Dataquest January 2020, the noticeable trends and differentiation that will see faster adoption and scale in enterprise RPA over the next 2 years are:

1. **APAC Growth Engine:** Based on Grand View Research[22] and Research-and-Markets study[23], while North America and Europe garner a major share of RPA investments and spends, significant service spends have emerged from India, Japan, China, Australia and New Zealand. Accordingly, India clocks the third highest RPA spends after North America and Europe, which is approximately 10% of the global market spend. The current market spend in India on RPA services is five times that of China and approximately two times that of Japan and has delivered the highest growth rate this fiscal year. The markets in Middle East and South America saw the onset of RPA adoption and will see further traction in 2020.

   One of the primary reasons driving growth of RPA in the APAC regions – primarily India – has been large scale deployments in offshore captives and shared service centers. Beyond the global operations hub of large corporations, it's the back-office service providers, contact centers and other ITES providers that are increasingly adding RPA consulting capabilities to their forte, to continue being a valuable partner for their global clients.

2. **RPA Solution Differentiators:** RPA is revamping itself from being champions of digital workforces to accelerators of digital transformations by building differentiators such as:
   a. SaaS-based Platforms: Major RPA vendors would be launching RPA as a Service model with the flexibility of public cloud options like AWS and Azure.
   b. Automated Assessments: Automated discovery of RPA use cases for Attended and/or Unattended Bots would help enterprises jumpstart their RPA journey based on the process maturity, gaps and opportunity.
   c. RPA Stores: Ready-to-deploy templates would be available in marketplaces where citizen developers would develop and deploy reusable workflows, scripts and plug-ins.
   d. Multi-RPA Orchestration: RPA vendors would start to integrate and orchestrate with other automation tools for Workload sharing among Bots across different platforms.

e. Voice and Chat enabled Bots: Bots can be controlled through Voice or Chat for an interactive user experience across various channels.

3. **Newer Verticals**: The major adopters and drivers to date are Banking, Finance, Securities, Insurance (BFSI), Telecom and Utilities organizations. They traditionally have numerous legacy systems and choose RPA to integrate faster and quickly accelerate their digital transformation initiatives, while unlocking the value associated with past investments. BFSI is expected to maintain the top position in the coming years. Additionally, the Pharma and Healthcare, Manufacturing, Government and Educational sectors will start expanding in coming years primarily based on the advent of domain-specific RPA solutions for Risk Intelligence, Compliance Audits, Cloud Services Management, Identity Management and so on that wold be available as Self-Service based reusable/customizable templates.

4. **Artificial Intelligence Adoption**: The increasing demand for Business Process Automation (BPA) using advanced AI capabilities will be a growth driver as enterprises adopt RPA to streamline IT and business operations. This includes Predictive Risk Insights on Business and Operations with ML/DL and Advanced Data Insights by integrating AI modules to IoT and Big Data.

5. **RPA Vendors Consolidation**: Consolidation among RPA vendors and other automation players would boost RPA adoption as they build advanced AI capabilities, vertical differentiators and Intelligent platforms for enterprise digital transformations. For instance, Accenture acquired Genfour, Sykes acquired Symphony and Blue Prism acquired Thoughtonomy recently. In 2020, the trend continues with Appian acquiring Jidoka. Pega, SAP and Nintex have made acquisitions in the RPA space to complement their existing offerings and Microsoft has recently announced a foray into RPA with the Power Platform and acquisition of Softomotive.

The Automation industry estimates[24] that the RPA software market will reach US$2.9 Billion in 2021. According to Gartner[25] by 2022, 85% of large businesses will have incorporated RPA for automating a wide variety of tasks. RPA has been consistently outperforming in terms of speed and accuracy and transitioning to newer avenues. The coming years will usher RPA leading a digital revolution where success will be measured based on how Bots can perform better than Humans.

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Appendix B: Global RPA Adoption Trends

Although RPA is being adopted across industries, BFSI (Banking, Financial services and Insurance), Healthcare, Retail and CPG (Consumer Packaged Goods) are the four leading industries that are at the top of the RPA adoption maturity curve. Together they account for more than 66% of the worldwide RPA spend based on the research and analysis[26] from Zinnov. Enterprises within these industries have evolved in their automation journey and are now increasingly leveraging cognitive technologies such as ML (Machine Learning), NLP (Natural Language Processing) and AI to focus on true business transformations, as illustrated in Figure 9.

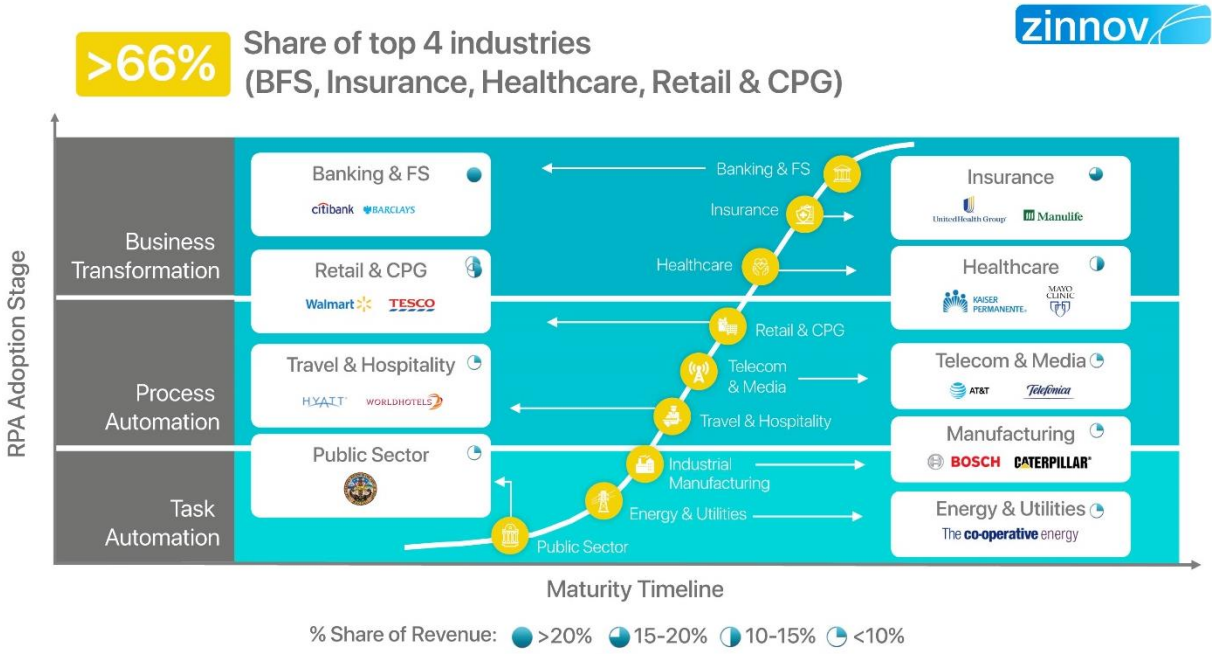

Figure 9: RPA Trends (Source[27]: Zinnov Research)

E.g. BFS giants like JP Morgan is leveraging AI-based predictive engines to advise clients on investments and whether they should buy or sell equity.

At Allianz insurance, their entire employee onboarding process is being handled completely by Bots across all departments, including HR, IT, Finance, etc.

Healthcare players are automating digitization of patient records wherein hospitals such as Mayo Clinic have implemented a voice recognition-based RPA to transcribe notes and reduce the reliance on manual processes.

Apart from these leading industries, Telecom & Media and Travel & Hospitality are going to join the next wave of industries to reach RPA maturity at scale.

Appendix C: Common Industry Use cases

All the prominent research statistics discussed thus far reveal that the global RPA industry has immense potential to bring about an extraordinary transformation over the coming years. The rising prevalence of RPA adoption across industry segment to improve operational efficiency, performance and execution capabilities of enterprises are providing a major boost to the worldwide RPA industry share. This is primarily by virtue of the tools/platforms/technology agnostic nature of RPA solutions design and deployment. Common use cases across prominent industries are mentioned in Table 2.

Banking	**Insurance**	**HR/Payroll**
• Verification / Auditing Process • Bank Reconciliation • Compliance Processing • Customer Account Management • New Application processing – Bank/Credit Cards • Data Migration between apps • Audit Trail • Statement & Reporting • Loan Processing • Payment Cancellations • Credit Decisioning	• Claims Processing and Administration • Report Automation • Updating User Info • Prioritize and Assign Claims • Adjudication Process • Audit Management • Enrolment & Eligibility • Data Integration Billing • Medicare Billing & Compliance • Data Transfer Claims • Processing Eligibility • Verification Mass Data • Provider Updates • Insurance Coverage & Policies • Reconciliation • New Premium Processes	• Maintain Master Data • Offer Letter Process • Onboarding and Exit • Appraisal-updating process • Change Payroll Status • Position Management • Reporting Line Change • Superannuation • Payment Summaries • Employment Type Updates • Service Desk Reports • Distribution • Leave Amendments
Finance & Accounting	**Supply Chain Management**	**Network & IT**
• Order to Cash / AR ○ Credit Analysis and Processing ○ Sales Order Processing ○ Customer Master Data Management ○ Order Entry ○ Reports by segments • Procure to Pay / AP ○ 3 Way Match ○ Purchase Order Issuance ○ Invoice Receipt ○ Vendor Master ○ Payment Process ○ Duplicate Payment Tracking • Record to Report ○ Monthly close process ○ Financial consolidations ○ Financial statements ○ General ledger functions ○ Journal entry processing ○ Inter-company accounting ○ Account reconciliations	• Order Prioritization • Master data management • Invoice verification • Receipt confirmation • Scheduling processes • Reporting • Production information capture • Inbound processing • Inventory management processes • Pricing management • Billing • Freight costing	• Active Directory • File Systems • FTP Management • Automated Installations • Server / Application Monitoring • Alert Management • Service Desk Management • Notification & Escalation • Data Movement • Provisioning • Configuration Management • Routine Maintenance

○ Fixed assets and project ○ Cost and inventory accounting • Financial claim processing • Financial Planning & Analysis • Tax Services		

Table 2: Platforms & Technology Agnostic RPA Use Cases

Appendix D: Integrated Digital Platform

RPA is revamping enterprises that are dependent upon repeatable processes as well as tasks involving sophisticated data analysis with Integrated Digital Platforms (IDP). A reference Information

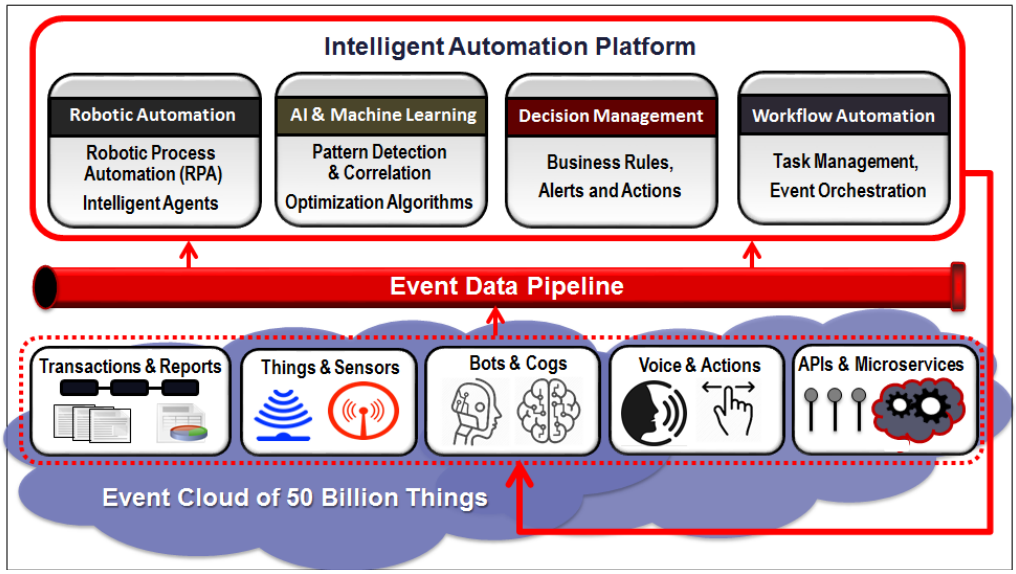

Figure 10: Integrated Digital Platform (Source[28]: Forbes Cognitive World)

Architecture model for IDP is depicted in Figure 10. This is based on low or code-less automation systems in order to drive transformation projects at speed and scale. This primarily includes automating repetitive human tasks, controlling content management, managing process workflows and capturing data when taking business decisions. Intelligent Automation combines RPA, workflow automation and data-driven machine intelligence. IDP helps enable data-driven processes adapting dynamically to the context of the work, delivering the efficiency of automation while leveraging rules and policies to steer the pathway towards the optimal outcome. Intelligent Automation further bridges the "islands of automation" where humans are the integration points between systems that otherwise cannot communicate. This is work cannot be automated any other way as it cannot be integrated through a programmatic interface.

IDP is powered by a Centralized Event Data pipeline that aggregates valid data inputs from various sources like IoT sensors, Chat/Voice Bots, Voice/Actions, APIs and micro-services and so on. It acts as the AI data lake that enable enterprises to ingest clean data, understand and contextualize that data, and enrich it with multiple other information sources, on a unified platform to scale and speed their data velocity and bring optimal business and customer outcomes to the table. As a result, businesses

that use IDPs can benefit from straight-through processing, providing faster response times for their customers and more efficient use of diverse AI resources for themselves.

Appendix E: RPA Planning & Design Frameworks

The objective of RPA Use cases should be to integrate processes and operations, rather than systems and applications, to deliver near holistic automation of work rather than requiring more expensive humans, to perform this work manually. The ideal starting point would be to assess areas of operations concentrated with repetitive human tasks. In these areas, where humans are bogged down performing tedious, repetitive steps, there are likely gains to be found with greater efficiency, quality and accuracy. Also explore areas where users are shifting back and forth between different application/system interfaces while executing the tasks.

Use case Identification & Scoring: The criteria and guidelines illustrated in Figure 11 will help determine the suitability of a business process for intelligent automation and prioritize them based on metrics. Each criterion has a plus or minus numeric score. Tally the scores that are assigned to each criterion for strategically prioritizing the processes for automation. The rile of thumb is to identify high volume processes impacting costs, revenues, speed and effectiveness leading to reduction of valuable human efforts. Additionally, stable and mature processes not subjected to frequent changes are good candidates for automation. Finally, even if a process is not fully automatable, it could possibly be split into automatable sub-processes that could yield significant benefits when partially automated.

Process Criteria		Criteria Definition	Scoring	KPIs / Metrics
Impact (Benefits)	Materiality (Scope of Impact)	▪ Process requires a high number (10+) FTEs and is performed frequently (e.g., hourly or daily)	+ 10	▪ FTE ▪ Transaction volume
	Suitability (Automation Candidate)	▪ Process has repeatable business rules that can be automated (RPA) ▪ Process involves the operation of one or more systems which require manual intervention ▪ Process includes judgment work on variable tasks and / or unstructured data (Cognitive)	+ 5	▪ Frequency ▪ Percentage of rules vs. judgments
	Regulatory / Risk	▪ Process supports high-risk, control, regulatory and compliance related requirements which would be enhanced through automation	+ 3	▪ Percentage improvement in coverage ▪ Reduction in risk
	Financial	▪ Automation of the process would drive additional revenue, grow business volumes / market share or would result in recovery of costs that can not currently be recovered	+ 5	▪ Increased revenue ▪ % of market share improvement ▪ Dollar value of cost recovered
Implementation Complexity (Cost to Achieve)	Process Complexity	▪ Process has repeatable steps that are uniformly executed, regardless of the people it takes to perform them (RPA) ▪ Process is stable and is not undergoing major change or redesign prior to automation ▪ Process has numerous variations and/or rules or relies on human judgment that would be impossible to configure one by one (Cognitive)	+ 5	▪ Number of major process variations ▪ Number of process roles ▪ Internal or external process roles
	Regional Complexity	▪ Process is controlled / governed in one location rather than across multiple regions	+2	▪ Number of locations ▪ Number of local offices
	Data Privacy	▪ Process involves PII that may cause cross-border data privacy issues	- 3	▪ DPO requirements
	Technical Complexity	▪ Data required to execute process is poorly defined and inconsistent ▪ Process requires data pulled from more than 5 systems	- 1	▪ Number of applications ▪ Number of screens ▪ Number of data sources ▪ Number of external systems
	Organizational Complexity	▪ Process is conducted across multiple disparate teams and/or is not standardized	- 2	▪ Number of teams supporting process

Figure 11: Use case Identification & Scoring (Source[29]: WorkFusion)

Use case Identification Workflow: As illustrated in Figure 12, the key activities are Identifying Opportunities, Developing RPA use cases and prioritizing them based ROI to build an Intelligent Automation blueprint.

Here, the design should lay the groundwork for horizontal scalability, integrating discrete moments of automation within a more comprehensive end-to-end process. Hence, there should be a clear model for understanding and separating concerns between Business, IT and Automation CoE. For end-to-end business processes, there is always more value to realize with greater probabilities of success by leveraging Intelligent Automation to facilitate task assignment, sequencing steps, enforcing rules and other means of work management; rather than seeking to fully replace the work otherwise performed by human beings. As a stand-alone capability, RPA is purpose-built specifically to replace work otherwise less efficient and effective when performed by humans. Yet as a component of Intelligent Automation, the combined capabilities offer a far more efficient and effective coordination of both knowledge work and automated tasks.

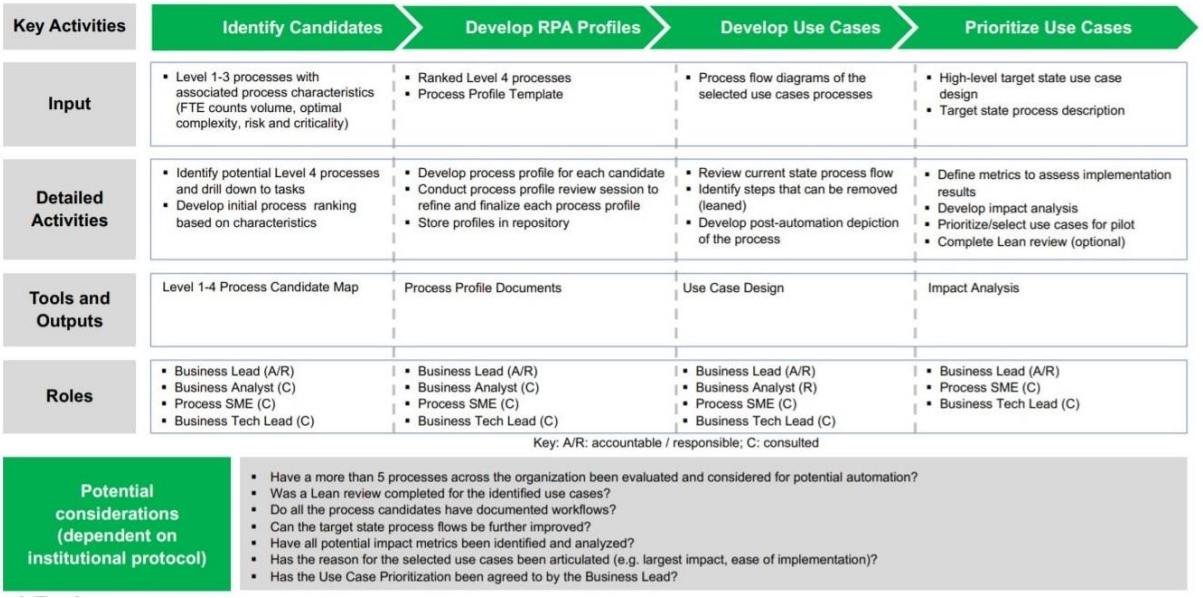

Figure 12: Use case Identification Workflow (Source[30]: Work Fusion)

Appendix F: Major RPA Players & Comparison

The RPA software market is continuously evolving with new players entering this space and mergers and acquisitions by all major players. The prominent list of players and their market rankings based on prominent analysts' research are depicted in Figure 13 and Figure-14. Although, each tool has its own positive and negative factors, the market leaders in the RPA space well known; Automation Anywhere, Blue Prism and UiPath.

Rank	Overall HFS Top 10 position	Execution				
		Scale	Functionality and ease of use	Implementation, service, and support	Security, governance, and controls	Overall execution
#1	AUTOMATION ANYWHERE	blueprism	KRYON	blueprism	blueprism	blueprism
#2	UiPath	AUTOMATION ANYWHERE	UiPath	UiPath	AUTOMATION ANYWHERE	UiPath
#3	blueprism	UiPath	AUTOMATION ANYWHERE	AUTOMATION ANYWHERE	UiPath	AUTOMATION ANYWHERE
#4	WorkFusion	PEGA	blueprism	WorkFusion	edgeverve	WorkFusion
#5	PEGA	KOFAX	softomotive	KOFAX	NICE	KOFAX
#6	ANTWORKS	WorkFusion	Jiffy.ai	Jiffy.ai	WorkFusion	PEGA
#7	KOFAX	edgeverve	INTELLIBOT	ANTWORKS	PEGA	Jiffy.ai
#8	NICE	NICE	ANTWORKS	NICE	Jiffy.ai	ANTWORKS
#9	KRYON	REDWOOD	PEGA	softomotive	ANTWORKS	softomotive
#10	edgeverve	softomotive	WorkFusion	PEGA	KOFAX	edgeverve

Figure 13: RPA Players Comparison (Source[31]: HFS Research)

The HFS Research[31] is based on how RPA vendors are supporting their clients to scale their automation programs and drive real change. The research analyses execution, innovation and voice of the customer with special emphasis on factors such as customer scale, richness of ecosystem partners, product roadmap and R&D, embedded intelligence and ability to drive business outcomes. As organizations look for ways to improve their operational efficiency and integrate legacy systems with newer enterprise applications and digital business, RPA continues to grow its footprint. The Gartner Research[32] examines these market forces and the leading enterprise RPA vendors.

Figure 14: RPA Magic Quadrant (Source[32]: Gartner)

The research reports are a quick reference for shortlisting most suitable RPA tools. The key factors to consider before finalizing a tool are assessing total cost of ownership including:

- initial setup costs
- ongoing vendor license fees
- maintenance costs
- ease of use
- security controls
- features such as system requirements, integrations, screen scraping capabilities, cognitive automation capabilities, vendor experience, support options and product roadmap.