



Global Intelligent Automation Market Report (H1 2017)

**MANAGING DISRUPTIVE CHANGE:
A NEW OPERATIONAL MODEL
ENABLED AND BUILT BY
INTELLIGENT AUTOMATION**

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EXECUTIVE SUMMARY



Most organizations are finding themselves in an Uber moment, as enormous disruption rocks their industry. For many, it's time for a wakeup call, given that underlying service lines, process execution, customer interactions, etc. have remained unchanged for decades. Virtually every area of a business model could be impacted.

Change is coming and it will impact how business is conducted in ways we are not fully able to comprehend today.

Intelligent automation (IA) has a role to play in this evolution. It is the fastest growing technology with the greatest power for disruption. At its most basic, it eliminates mundane, repetitive tasks. At the other extreme, it will begin to replace higher-level cognitive human abilities with a far greater capacity for volume, analysis, accuracy and consistency than can currently be performed by humans.

This report (the first in a 2-part series) is one of the most comprehensive you will find on this fast-changing topic. With contributing insights from independent advisor Lee Coulter, CEO of Ascension Service Center, in his capacity as Chief Intelligent Automation Officer for SSON and Chair of the IEEE Working Group on Standards in Intelligent Process Automation, the market analysis presents the broad continuum of opportunities represented by intelligent automation from the all-important perspective of "fit for purpose."

This report is not a ranking guide nor a promotional vehicle. There are plenty of other forums for that. What this report does is introduce the concept of intelligent automation across all its capacities, starting with scripting and ending with artificial intelligence. In between, it explains the value and impact of each type of tool, how to determine whether your internal landscape can support different tools, core requirements, and the crucial role the state of your data plays in choosing the right solution. Most importantly, however, it provides eight considerations for choosing the right "fit for purpose" intelligent automation solution to successfully align with, and execute, your enterprise strategy.

This report will help you choose the right solution to solve the problem at hand – but also highlight what you might be overlooking in terms of scaling up in future. In other words: you will find out how to start a conversation with a vendor, steer it towards your needs, and evaluate the options according to your objectives.

Note: The second part of this series will be released in December 2017, and will dig further into IA's continuum, including the role of blockchain, machine learning, natural language programming, natural language generation and artificial intelligence. It will also include case studies to illustrate how IA is being deployed most effectively.

Specifically, the Global Intelligent Automation Market Report will explain how to:

- ▶ Plan for a new operational model enabled by IA
- ▶ Link what we have already learned about social, mobile, analytics, cloud and customer experience – and leverage it exponentially through analytics-based, intelligence-driven automation
- ▶ Encourage a brand new way of thinking, away from traditional "roadmaps" based on sequential targets to a culture of agile learning and discovery
- ▶ Succeed where "digital" fell short
- ▶ Understand that IA's true value lies in helping to execute corporate strategy and sustain the constant adoption of change
- ▶ Unravel why IA is "real" and not just "more hype"
- ▶ Consider IA's evolving role in business services
- ▶ Solve the right problem with the right provider and the right tool.

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INTRODUCTION

A NEW OPERATIONAL MODEL ENABLED AND BUILT BY INTELLIGENT AUTOMATION

The business environment today is tough, challenging, and moving at exponential pace. But it's also full of opportunities.

Technology continues to drive the organizational change agenda, but now it's about making operations smarter and autonomous, defined primarily by the shift from *humans* consuming data, to *machines* consuming data and executing on a process. Farsighted companies are already recognizing the convergence of digital, robotics process automation (RPA or robotics), analytics, machine learning (ML) and artificial intelligence (AI) into never before contemplated organizational models that build on the awareness generated by digital; leverage automation through robotics; and rethink processing with the help of machine learning and augmented intelligence (otherwise referred to as 'cognitive').

“There is a new calculus for success for companies that recognize the opportunity to do things differently. It's the ability to infuse ML, AI, robotics, and analytics into everything they do. And the danger of not recognizing this new calculus? Falling behind and becoming obsolete.”

Weston A. Jones, Partner, Global Robotic and Intelligent Process Automation Leader, Ernst & Young LLP

As the technical landscape continues to expand, organizations are finding themselves on a transformative journey that started in the 1950s with Alan Turing, who proposed the concept of computers being intelligent, effectively spawning a new era of Computer Science. In the near future, organizations will learn to embrace ML, AI and automation in ways never before possible. The lower cost of computing, storage, and bandwidth, alongside amazing new tools, are rapidly enabling a truly intelligent enterprise.

The next chapter in digital transformation links what we have already learned about social, mobile, analytics, cloud, (SMAC) and Customer experience (CX), and will leverage this exponentially through intelligent, analytics-based, intelligence-driven automation. This requires a brand new way of thinking, however, and where the majority of organizations are still not connecting the dots is in recognizing that these free-flowing, all-encompassing, all-knowing tools no longer fit the formula of “developing a strategy – finding a vendor – implementing a solution.” That kind of finite thinking belongs to yesterday. To get the most out

of today's opportunities you need to understand the convergence of technology and process in solving enterprise challenges.

“The truth is that despite all the reports around the value of digitalization, the vast majority of enterprises do not have a digital enterprise strategy nor a digital officer in place.”

Keith Strier, Principal, Americas Digital and Customer Strategy leader, Ernst & Young LLP

How companies will set themselves up for success, in future, is by asking a completely different set of questions around how to meet their objectives. Enterprises not confronting the new disruptive reality are at great risk. The solution won't be to adopt a “cognitive” or “intelligent enterprise” strategy, but to recognize that *the objectives should drive decisions*. End-to-end business model transformation and “clean sheet” thinking are what's needed. And these *objectives* are constant: being a great company, providing excellent customer experience, and delivering value to shareholders. However, the path to achieving these is no longer a traditional roadmap based on sequential targets, but rather contingent on a culture of constant learning and discovery, and trying things out. The age of rapidly iterative experimentation is upon us. What that means, in effect, is that we need to embrace a new operating model.

This new operating model will be built on, and defined by, the new automation and intelligent technologies. While some have been talking about “digital” for years, early efforts did not really take off in large part because of needed advancement across a broad spectrum of technologies. Today, the convergence of capabilities needed to truly transform an enterprise are finally here and pressure from leading edge disruptors has created a demand for these foundational capabilities that is increasingly available and accessible to industry.

Executives who pursue IA for its own sake, however, are missing the point that its true value lies in helping to execute corporate strategy. The intelligent enterprise is not a “thing” per se, but rather a “way” of sustaining the constant adoption of change. The goal is not to *deploy* intelligent automation but to use it strategically to achieve enterprise goals.

HOW DO WE KNOW INTELLIGENT AUTOMATION (IA) IS “REAL” AND NOT JUST MORE HYPE?

For those that believe intelligent automation is just hype, consider that Robotic Process Automation (RPA) advisors and consultants have seen their revenues grow five-fold over the past year, and that projections for next year are to double again. IA exists, is delivering results, and is growing. Recent analysis estimates the Intelligent Process Automation (IPA) industry at just under US\$300million for 2016, and expected to hit US\$1.2billion by 2021 – a nearly 40% CAGR.

There has been an explosion of vendors to fill this rising demand. Whereas a few years ago there were perhaps a dozen key RPA providers, today there are around 40 to 50 and growing. (Please see SSON's vendor portal for a comprehensive list of vendors). Some – like Automation Anywhere, Blue Prism, IPsoft, NICE, Pega Robotics (formerly OpenSpan), Redwood, UiPath, or T-Plan – have been around for many years, evolving their solutions to fit the process automation needs of modern-day support services. Others, like Antworks, Arago, Celeris, Softomotive or WorkFusion have emerged more recently, with services specifically developed around the modern automation proposition. No matter their provenance, however, these providers are keenly tuned to the needs of customers and constantly recalibrating their services to deliver to market demand.

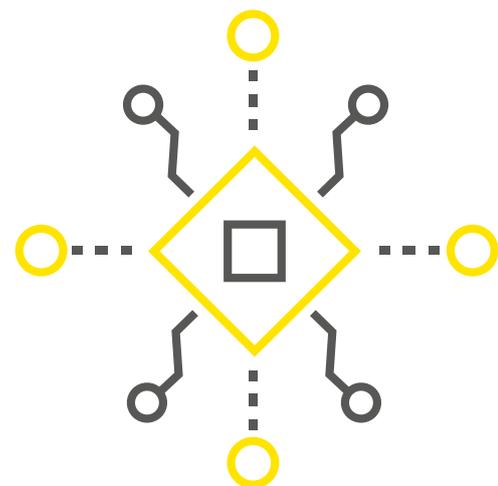
The benefits of IA are irrefutable. These include:

- ▶ **Quality:** reducing manual intervention, effective at following tedious and detailed instructions, producing work that is free of duplication and errors.
- ▶ **Speed:** working around the clock, speeding up processing times and throughput and increasing capacity.
- ▶ **Governance:** supporting better compliance (and, therefore, organizational governance) by embedding requirements into automation rules.
- ▶ **Security:** eliminating human misbehavior (intentional or not) and reducing risk of security threats and data breaches within the organization.
- ▶ **Business continuity:** allowing processes to be switched easily and smoothly to other servers, which expedites disaster recovery processes.
- ▶ **Talent retention:** intellectually challenging work leverages the potential of people.
- ▶ **Value insights:** visibility and data used to create business insights into processes.
- ▶ **Flexibility:** automated solutions delivered 24/7.
- ▶ **Agility:** ability to take on high transaction volumes and scale up/down on demand.
- ▶ **Compliance:** fully maintained audit trail and enhanced controls.

The reason intelligent automation is so powerful today is that technology's evolution has brought new opportunities well within the grasp of most corporations. The cost of computing power has been slashed, the cloud allows us to implement in days what used to take months, and “immediacy” has become a realistic expectation, with hard dollar payback achievable in under a year. Most importantly, Intelligent Automation has put these capabilities in the hands of business operators where previously, these things were the sole purview of IT. So, what does this mean for the enterprise?

It means if you don't move fast, your competitor will. Every industry is now or will very soon be experiencing their own “Uber” moment, where black or yellow taxis were surprised by a young upstart taking over more than half the market share in a matter of months. Uber used a new technology platform and engaged users directly. Corporations can take heed and leverage these learnings to their own advantage. Locational tracking works for your supply chain as it does for Uber's customers. The benefits of artificial intelligence and recommendation engines are just as applicable to procurement as they are to picking a movie on Netflix.

What is noteworthy is that we have been here before. Thirty years ago, the Shared Services model was being embraced by enterprises. Shortly after, offshoring and Business Process Outsourcing (BPO) arose. The Shared Services and Outsourcing (SSO) industry today is at US\$1T and growing. IA is transitioning along the same path that BPO did, offering a technology-based alternative to traditional, or human, transaction processing – this time replacing low-cost labor with automation. And, similar to BPO, some of the major players are choosing to focus on their core capabilities and partnering with niche solution providers to bolt on “expertise” via APIs (for example, capabilities around OCR, or turning unstructured data into structured data). Others have elected to build a comprehensive platform solution incorporating their own version of these capabilities instead of partnering with a best of breed solution provider.



There are plenty of case studies demonstrating – with clear, hard facts – Intelligent Process Automation (encompassing both Robotic Process Automation and Robotic Desktop Automation) is delivering results¹.

INTELLIGENT AUTOMATION IN PRACTICE:

- ▶ **ANZ** is running more than 1,900 bots out of 17 countries across multiple functions including Finance, HR, Payments, Trade, Mortgages, Recs, Anti Money Laundering and Sanctions.
- ▶ **Becton Dickinson** introduced Kbot to save 2.5 FTEs in Purchase Order management and delivers an enhanced audit trail and full traceability that was not available in the pre-BOT process.
- ▶ **EMC (now Dell EMC)** implemented RPA and within 2 months had already achieved US\$2 million per year cost savings, by automating HR offer letters, HR open ticket reports, renewal quotes, and tech refresh; and persuading their external service provider to use RPA, too.
- ▶ **EY** has implemented hundreds of bots and have one of the largest dynamic virtual workforces of any company. EY is automating at least one process live per week within every part of EY (tax, audit, consulting and internal operations) including tax compliance, cash applications, account and bank reconciliations, HR onboarding, learning and development. EY's goal is to release capacity by an estimated 40% of FTEs through automations.
- ▶ **Walgreens** has applied robotics to benefits and leave processing to reduce cycle time and enhance employee experience. The bots manage PTO accrual calculations, leave of absence notifications, payroll location changes, and benefit eligibility hours updates.

There are just too many bone-fide examples of real business results to conclude anything other than the benefits of IA are real.

To make the most of these new technologies, organizational leaders must challenge assumptions, take calculated risks and encourage experimentation – all while embracing the risks inherent to any technological innovation.

WHAT IS INTELLIGENT AUTOMATION AND HOW IS IT EVOLVING WITHIN SUPPORT SERVICES?

Before we examine how IA is evolving, it's important to clarify what is meant by the term. Given the relative newness of this market sector, at least for services support, there is a lot of confusion around terminology, with the tendency to sweep everything into the "RPA" moniker. Bringing some clarity to the jargon, IEEE Standard 2755™ (draft) was approved in June 2017 and will be published in September 2017. The first standard is a guide to terms, concepts and nomenclature. IEEE 2755.1 is under development and will provide a taxonomy for these new technologies in recognition of the extraordinary interest they are receiving, and explosion of solutions. This work will help practitioners compare offerings across providers as the industry falls into line behind the terminologies, and adopts common standards.

The intelligent enterprise is not a "thing" per se, but rather a "way" of sustaining the constant adoption of change. The goal is not to deploy intelligent automation but to use it strategically to achieve enterprise goals.

RDA (robotic desktop automation) generally refers to an automation running on the desktop and working with the operator automating fragments of transactions, whereas RPA (robotic process

automation) reflects a server-based, unattended process execution. Both are using already available human interfaces for applications rather than the IT centric APIs. Moving along the maturity curve,

we see the integration of cognitive and AI, as well as machine learning and data analytics. Intelligent Process Automation has emerged as an holistic description of everything from desktop scripting to artificial intelligence, as applied to process execution.

¹. Data from case study presentations at SSON events and on www.ssonetwork.com

Despite the fact that the most lucrative option for most organizations right now lies in RDA/RPA, consultants say that clients are more in spending time talking about AI and its potential applications, than robotics. This is, to use an old expression, putting the cart before the horse. As of this writing, there are just a couple dozen organizations in the world willing to publicize that they have sizable (400+ bots) RPA implementations already running. There are more that are quietly driving major automation programs, but the vast majority are just now exploring Intelligent Process Automation.

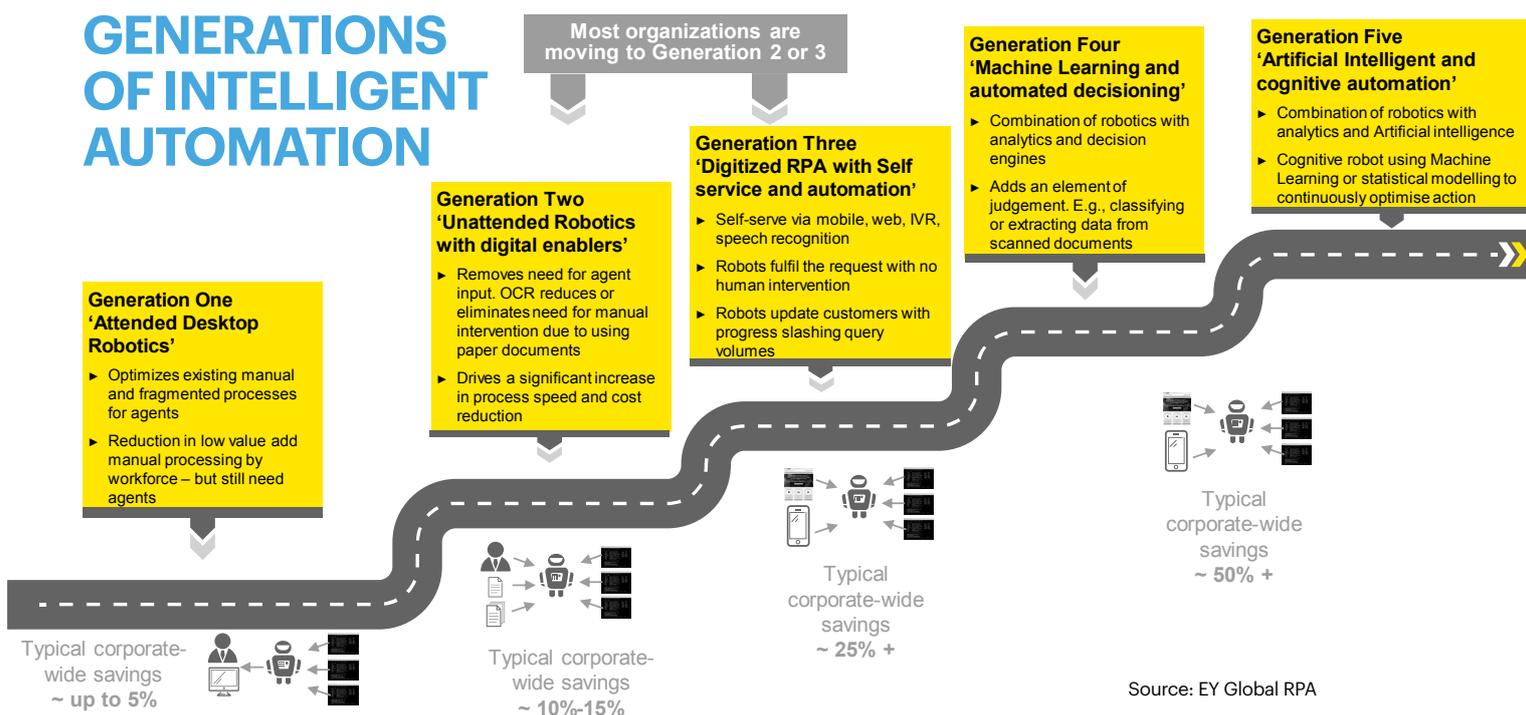
Like most transformative technologies, there are those on the leading edge, fast followers, mainstream adopters, and laggards. Most results are from leaders and fast followers, while the bulk of enterprises are just getting poised for mainstream

adoption. However, practitioners are already recognizing that the data derived from process automation can fuel machine learning to drive a cognitive capability offering massive returns. There is a major effort underway from almost all Intelligent Process Automation providers to provide not just an execution and orchestration capability, but also an intelligence engine that delivers cognitive decision making and business process insights.

The evolving capabilities of intelligent automation tools are best described as moving from:

- ▶ Robotic Desktop Automation (RDA)
- ▶ Robotic Process Automation (RPA)
- ▶ Digitized RPA
- ▶ Machine Learning
- ▶ Artificial Intelligence

GENERATIONS OF INTELLIGENT AUTOMATION



Modern-day solutions incorporate some or all of these capabilities, whereby we see a distinct trend of ambitious providers aligning themselves with the end-to-end process solutions that drive proportionately greater change, and a server based model that has the advantage of being scalable, more easily governable, and more secure from an IT perspective. A major and fundamental difference that must be stressed here is that most Intelligent Process Automation technologies rely on the already “published” or available human interface to enterprise applications. This means they can be driven by the business rather than traditional “heavy” IT. Previously, any business user wanting new capability needed to follow the long and expensive traditional IT waterfall development, investment and other processes. Today, in a matter of days or weeks, business users can configure process automation and get it into production. However, IT is still a critical partner to ensure proper governance (e.g. testing, change control, etc.).

Another way of categorizing the vast array of IA technologies is according to what kind of process they can help and what kind of information they can process. For example:

- ▶ **Robotic process automation** can work with standard processes that are rules based, with structured and predictable data. Traditional RPA represents the first stage, for repetitive transactional type work. Roughly 30-40% of exiting processes are likely to be impacted by RPA according to Gartner. Benefits range from cost savings to improved control to error rate reductions. RPA is limited, however, in its capacity to manage unstructured data, leverage natural language processing, or embed judgment. For most organizations, this is where the key focus of robotics activities is. RPA is best used where process predictability and stability is high and a majority of processing can be performed in Straight Through Processing (STP). By definition, these are standard processes that would traditionally be considered for SSCs or BPOs/ITOs.
- ▶ **Robotic desktop automation** can dynamically “pause” its automation at points in the process where human judgment or decision making is required in order to move the process forward. RDA is best used in processes that are complex or have dynamic inputs that influence how a process should be executed.

- ▶ **Machine learning** uses structured, semi-structured, and unstructured data to create high-confidence predictive and prescriptive analytics that can substitute for human decision making in process orchestration. Note however, that this emerging field has enormous dependency on data availability and curation.
- ▶ When prescriptive analytics from machine learning are combined with process execution capabilities, they form a **cognitive solution**. The data created from automated process execution, combined with other data sources, enables dynamic context sensing and decision making that enables an entirely new level of STP. Where processes were fragmented to allow for human orchestration and judgment, a cognitive solution can provide both decision making and execution.
- ▶ The use of **intelligent chatbots** supports user interaction, and improves the customer experience. Chatbots can be powered by a set of rules or machine learning, whereby the latter are referred to as intelligent chatbots and act primarily as an interface between humans and robotics.
- ▶ Finally, and eventually, **narrow artificial intelligence** will become more mainstream. AI crosses the boundaries of *what is likely to happen* and *what should be done about it* to *what might occur if...* AI produces a deductive analytic that

has been exclusively in the human domain. While there are a few limited examples of AI that get a lot of attention (and seem to dominate the press) AI, for most enterprises, is some time away. It is worth noting that for purposes of providing business value, cognitive solutions will be the workhorse of modern enterprise. Most things labeled “AI” are, in fact, limited cognitive solutions centered around a very narrowly defined knowledge domain.

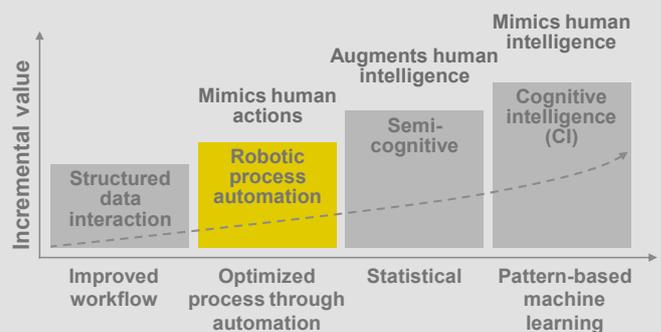
It’s conceivable that an organization could enter at any of these stages. However, many of the Intelligent Process Automation failures are due largely to entering at a stage that is too complex and where general data poverty exists. Again, it is important to emphasize that as one moves up the continuum, data dependency becomes ever more vital. A typical result of machine learning implementations is that necessary data is either discarded intentionally by legacy enterprise applications, or can only be found in the minds of operators. Starting with RPA and RDA creates a foundation of data on which more advanced solutions can be built. In essence, each generation builds on the preceding one, without the need to replace each other entirely. In this way a more advanced stage can leverage and build upon the successes achieved at an earlier stage.

WHAT IS ROBOTIC PROCESS AUTOMATION (RPA)?

Robotic process automation (RPA)

RPA is the application of a cost-effective software that mimics human action and connects multiple fragmented systems together through automation **without changing** the current enterprise IT landscape.

Process automation enables organizations to automate existing high-volume and complex, multi-step data handling actions as if business users were doing the work; it captures and interprets existing applications, manipulates data, triggers responses and communicates with other systems.



As organizations move up the IA continuum, solutions become more sophisticated, and the complexity and cost of projects increases. Despite the obvious attraction of the more evolved approach, the majority of efficiencies or savings are still derived from basic RPA and RDA. However, for those organizations with the foresight to build cognitive and AI-based processing capabilities into their plans, benefits will be exponentially higher. While the tip of the evolutionary pyramid is narrower and more specialized, the inherent value-adds of these activities are greatly multiplied via IA – though frequently more *qualitative* than *quantitative* or financial in nature.

At the very top level is where the enterprise experiences a step change in its modus operandi, which can propel it ahead of its competition. However, in the initial phase, the financial benefits of basic RPA can be used to demonstrate the value of intelligent automation and thereby gain support for moving along the curve. In addition, RPA and RDA are a necessary precursor to utilizing more advanced solutions. Think of RPA and RDA as the hands that do the work, while ML, AI, etc. are the brains that cannot, as of today, execute on a process. Unless something changes fast, the brains will need the hands for quite some time.

IT'S A STRATEGY – NOT A TACTIC

Faced with emerging IA opportunities, most enterprises are jumping straight to the technology question. In fact, the opportunity around IA and robotics is not actually a question of technology but a question of strategy, say the experts. The problem is that when IT takes the lead it tends to take a traditional approach: anchor itself to a specific vendor, apply waterfall development, and go from there. IA specialists suggest that what's needed are strategic-minded – not tactical – people to drive these projects.

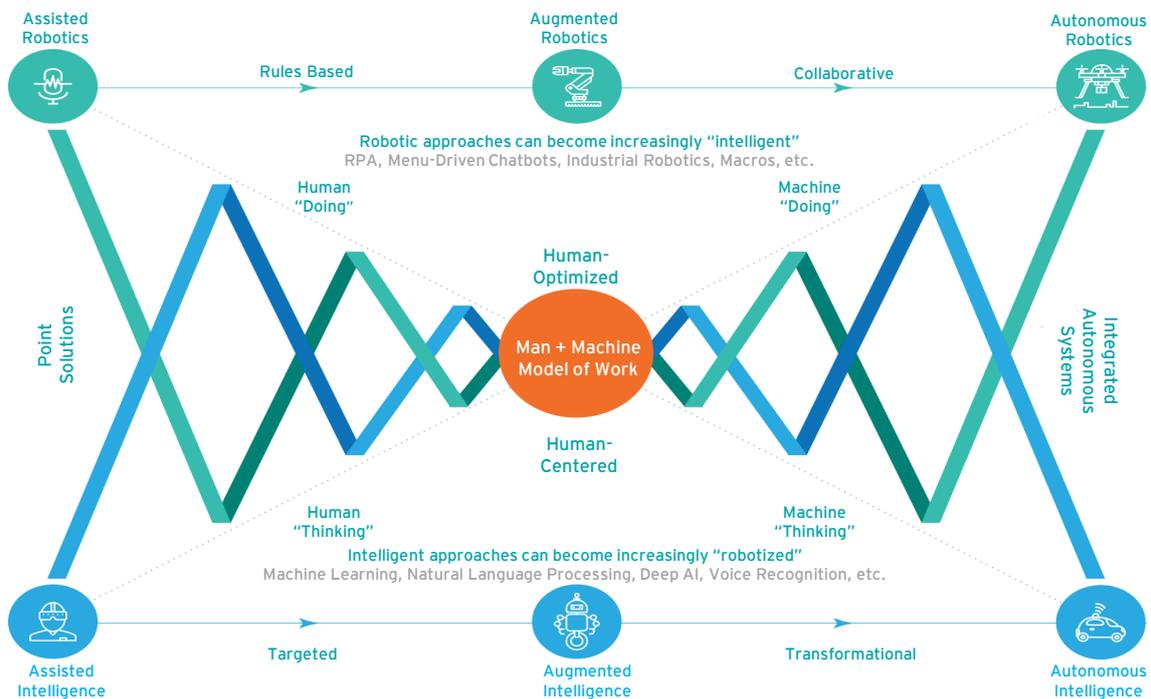
Another concern is that many executives are confusing robotics, intelligence, and autonomous capabilities. In fact, the convergence of robotics and intelligence leads to autonomous solutions. What sets all these activities apart is that information is being consumed by machines, rather than by humans, and that these machines are able to 'learn', 'read', 'think' and 'decide' on the optimal course of action. Autonomous systems don't just operate without human intervention, but will increasingly move human operators out of the workflow.

To maximize the value of intelligent automation, organizations should pay close attention to enabling effective interactions between different IPA 'generations'. Without the ability to interact with each other, different solutions or platforms will be limited in terms of their influence. The stop-gaps that emerge inevitably mirror the inefficiencies of traditional processing – albeit within an automated environment, which, in turn, is less flexible. True, scaled, benefits of robotics will accrue to those who build holistic automation across the enterprise. Here again, the IEEE 2755.X efforts are planned to develop interoperability standards and metalanguages intended to simplify how these solutions work together.

Eventually, artificial intelligence will effectively apply the same recommendation engines that we are used to in our personal, online engagements, to the corporate environment. Its impact will be felt across the enterprise in HR, marketing, risk, finance, regulation, etc. Enterprises of the future will be run by complex layers of algorithms that reach across enterprise operations. Regulators will become increasingly dependent on these algorithms for the purpose of compliance. It also means gaining a better grasp and transparency over workflows as companies shift towards cross-functional process management. However, this also opens the door to a new type of risk, because resulting dependencies – based on interactions between algorithms – and mistakes can grow exponentially out of control.

FUNDAMENTALS OF DESIGNING AI SYSTEMS

Intelligence and autonomy are not organic attributes, they must be designed into systems with purpose.



FIT FOR PURPOSE

To evaluate a good fit, the important thing is to understand the difference in solutions. A fully autonomous intelligent system may not be the answer to every problem and it is certainly not the entry point for most enterprises. The solution is to design a system that solves the problem at hand, while taking into account the type of process, its maturity, dynamics, trust, existing skills, maintenance requirements, and data sets.

These nuances are getting lost in many of today's conversations, however, as practitioners fixate on one solution or the other. And despite the current feeding frenzy, many consultants predict that, within a few years, RPA will fall back into the overall enterprise landscape as "just one of many" tools that support intelligent automation.

The first thing to consider, then, when evaluating IA's potential, is "purpose". This means identifying the objectives or desired outputs for which intelligent automation may be a solution. Identifying the problem, analyzing the 'as is' steps, recognizing where human intervention is creating blocks, and rethinking process flow ... those are the logical starting points. Only then can you begin to consider which automation tool will deliver the right solution. Like many new technologies, it is best to start simply, learn, and progress to more complex use cases and processes.

Another vital point of differentiation is what a given type of automation technology's capability, or purpose is. There is a general confusion around this that should be clarified.

There are two fundamentally different families of automation that can be described as follows:

Process specific automation tooling

- ▶ These tools provide automation in a very specific process area or knowledge domain. A good example here is optical character recognition/ image recognition (OCR/IR). These tools are absolutely automation, but are more typically an "IT" solution and perform a specifically defined function that is typically not highly configurable by the user.

Automation platforms

- ▶ RPA: These are server based, unattended process agnostic automation platforms that are configurable by the business user and can leverage the human interface for access to enterprise systems. These are best fit for processes where transactions have low levels of variation, business rules are easily encoded, and straight through processing output for a given population of transactions is 80% or better.
- ▶ RDA: This is an agent running in cooperation with, and simultaneous to, other desktop executables. The key difference to RPA is that RDA tools can be configured to stop and pause for cognitive contribution by the operator. They can also be configured to pre-fetch the decision support knowledge assets that are typically relegated to an operator's domain. For processes with high levels of variation, where business rules are complex to code, and which don't easily fit into an "if-then-else" scenario, RDA tools are a good fit.

Many RDA solutions emerged in customer engagement settings, where the need to enquire with users for additional or new information sources were the initial challenges the tools were built for. Now they often appeal to processes like purchasing, when requisitions are out of stock, to make alternative arrangements considering approvals necessary, cost difference, etc – all conditional steps typically provided by a human agent. These kinds of knowledge assets can be pre-fetched and presented to an operator for appropriate decision-making within seconds.

INLINE PRESCRIPTIVE ANALYTICS

Analytics are key in terms of their impact on better decision making, particularly within the context of intelligent automation. The continuum of analytics, from least to most complex are:

- ▶ Discovery – What happened?
- ▶ Descriptive – Why did it happen?
- ▶ Predictive – What is likely to happen?
- ▶ **Prescriptive – What should be done?**
- ▶ Deductive – What would happen if?

The continuum is presented here with Prescriptive bolded due to two factors: its ability to provide process orchestration in a production environment; and the simple fact that machine learning and computational horsepower have made it a reality today.

Typical business analytics present a “rear view mirror” analysis. Predictive and Prescriptive offer a “windshield” view.

“Predictive and Prescriptive offer a “windshield” view.”

The ability to deliver near real-time (within 3-15 seconds) prescriptive analytics mean that they can be used in place of human judgment and decisioning. Prescriptive analytics tools require enormous amounts of curated data, however, and that is currently the limitation. Taking as an example a purchasing agent determining the right course of action where an item is out of stock, advanced analytics tools could ensure an automatic threshold of 95% confidence – based on characteristics and similarities to previous events – in determining that the next best step would be to substitute item x. This activity requires no pause for cognitive contribution by an operator, as steps are automatically taken. As each occurrence is either identified as correct or incorrect, the system gets smarter and more confident. When in-line prescriptive analytics are combined with an automation capability (whether process specific or agnostic) a cognitive automation is possible.

Considered broadly, these steps are more often than not sequential and complement each other: **process specific automation** provides not just specific outcomes but also the ability to observe a previously analog task in a digital fashion, and provides the “digital exhaust” for advanced analytics and machine learning. **Robotic process automation** combines easily described business rules, as provided by a rules engine, and the ability to leverage somewhat static decision criteria, to interrogate other systems real-time and pull out the condition criteria necessary to proceed with straight through processing on a highly confident basis. **Robotic desktop automation** tools apply where it is not so clear what the business rules are and there is a high level of interdependence or entanglement between business rules, which make it difficult to encode these into a rules engine. They provide an opportunity to concentrate the cognitive load of a processor by considering which information would be needed by an operator at a given ‘fork in the road’, to determine the next best step, and automate this activity. Finally, **advanced prescriptive analytics** help to fill in the gaps in both RPA and RDA processes to improve straight through processing for an ever greater population of transactions.



HOW DO YOU KNOW YOU ARE SOLVING THE RIGHT PROBLEM WITH THE RIGHT PROVIDER AND THE RIGHT TOOL?

CONSIDERATION #1: CHOOSING A VENDOR

Despite what vendors may say, there are more similarities between them than differences, at least at the upper end of capability within the same family of solutions (RPA, RDA, process specific). Where vendors do show differences is in their pricing structure and licensing model.

Vendors are increasingly extending offerings to encompass preconfigured best practice process capabilities and extending their ability to interact with other applications to include the human interface and already published APIs. This translates into enabling more end-to-end automated process capabilities within a given process domain and can accelerate deployment.

The choice of a vendor partner, in the end, may say more about their plans than anything else. RPA firms like Automation Anywhere and Blue Prism are working with IBM Watson, and Pega is integrating its Business Process Management capability with the RPA and RDA capabilities it acquired with OpenSpan. UiPath has begun working with other partners in the unstructured to structured data areas among other things. It will be interesting to see what comes out of these efforts. On the other hand, given the free availability of open source coding like Python, TensorFlow from Google, CNTK from Microsoft and R, which offer access to Watson's cognitive capability, there are plenty of opportunities for ambitious enterprises, digital disruptors, or practical solution providers to take an alternative route to artificial intelligence.

KEY FINDINGS FROM SSON'S RESEARCH ON IA VENDORS (FROM THE "IA UNIVERSE" DATA TOOL)

- ▶ **67%** of included vendors claim to provide cognitive capabilities (41% solely using proprietary technology, 26% partnering with a 3rd party).
- ▶ **64%** of included vendors claim to provide both **desktop and server-based IA** solutions.
- ▶ **77%** of included vendors service clients from **Banking, Financial Services & Insurance (BFSI)** making it the most serviced industry.
- ▶ **42%** of included vendors had their **first client implementation in the last 5 years.**

Source: Intelligent Automation Universe H1 2017 – Software Vendors Market Footprint, SSON Analytics

INTELLIGENT AUTOMATION VENDOR COMPARISON

TECHNICAL CAPABILITIES

In assessing the capabilities of intelligent automation vendors, SSON Analytics identified six core tasks that support process automation, ranging from "extracting physical data" over "interpreting and learning" to "analyzing activities". Based on SSON Analytics' research with 27 leading IA solution providers, the most obvious variations emerge in terms of a vendor's ability to *extract physical data* or *deliver limited cognitive capabilities*. We also note that while most vendors have developed their own proprietary technology for many of these tasks, the exception, again, is in the areas of *extracting physical data* and *cognitive capabilities*, where up to a quarter of the vendors are partnering with best-of-breed solution providers.

Notably, only 5 vendors have the capability to perform all these steps using only proprietary technology.

It should be noted that today, there are defined standards as to what a "cognitive capability" is, and this claim has been shown to be highly variable based on the providers' own definition. IEEE standards in this area will bring clarity to the industry.

The relative "newness" of this sector is reflected by the fact that nearly half of the vendors interviewed had their first client implementation within the last five years.

SERVER DRIVEN SOLUTIONS

Given the increased appreciation of the value derived from server-based intelligent automation or RPA solutions, there has been significant development across the IA vendor base: at present, two-thirds of the solution providers SSON researched say that they provide desktop-based as well as server-based IA solutions.

WHICH VENDORS PROVIDE DESKTOP &/OR SERVER-BASED SOLUTION? (25 OF 27 VENDORS ANSWERED)



DEFINITION OF SERVER-BASED IA SOLUTION:

- ▶ Software is written and designed in a data center to execute the task autonomously without human interaction i.e. the software, the process, and the robot is run only on server.
- ▶ Human interaction is not required, as this is 'Unattended RPA'.
- ▶ Often there are trigger-based rules, which initiate the RPA.
- ▶ When the software is being run on a desktop, it consumes the entire PC thus the PC cannot be used to perform other regular tasks simultaneously.
- ▶ Software is often used to automate long end-to-end tasks entirely without human interaction.

DEFINITION OF DESKTOP-BASED IA SOLUTION:

- ▶ Software is designed to help user interface on desktop, replaces the individual workstation, and is run on individual desktops.
- ▶ Software can be run on a PC/desktop while also using the PC/desktop to perform other regular tasks simultaneously.
- ▶ Software is often referred to as 'Attended RPA' where it requires human interaction in order to initiate a task, as well continue the process.
- ▶ Software is often used to automate multiple small micro-tasks within a larger end-to-end process.

Source: Intelligent Automation Universe H1 2017 – Software Vendors Market Footprint, SSON Analytics

CUSTOMER DEMOGRAPHICS

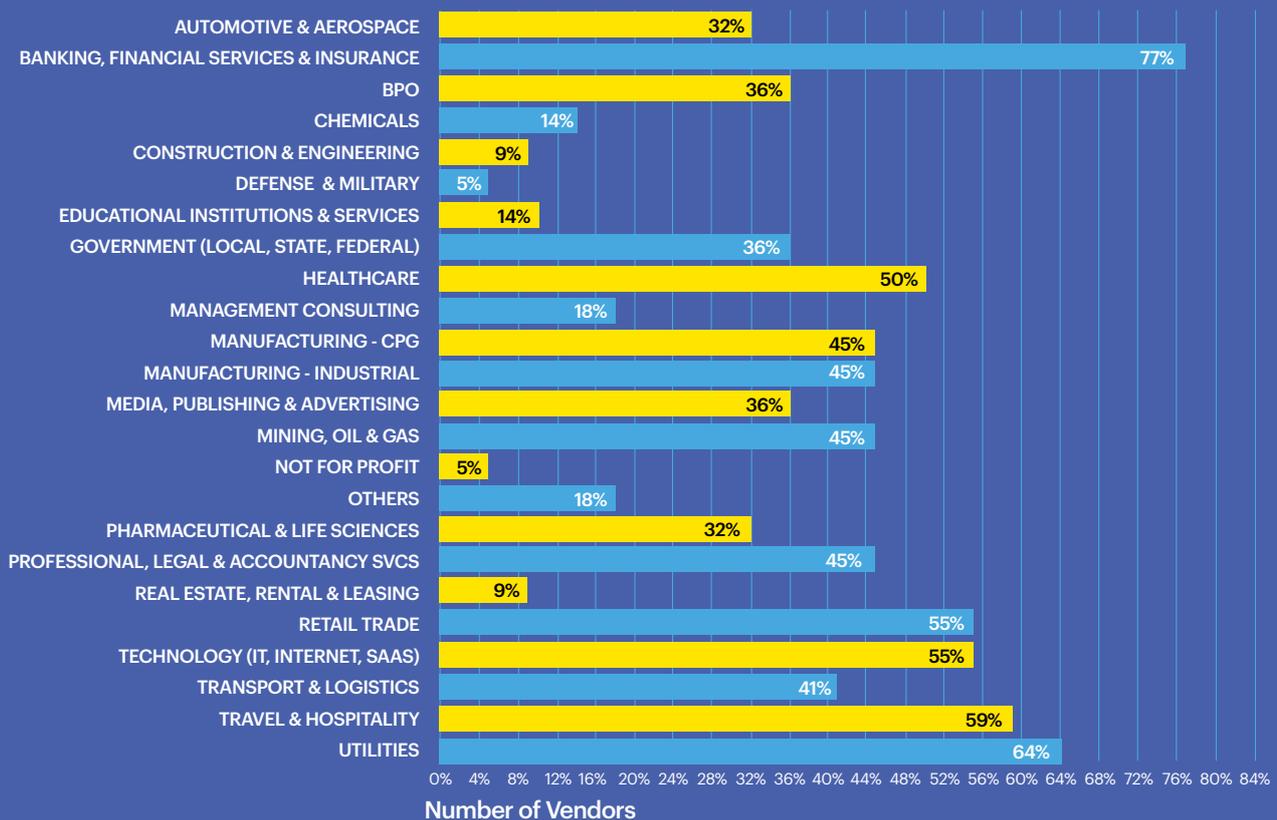
The majority of implementations today are taking place in North America and Asia, with Europe in third place.

The industry that has most enthusiastically embraced robotics is banking, financial services and insurance, which represents more than two thirds of vendors' clients. This correlates with the volume of suitable processes that are most appropriate for mega-scale automation.

Other sectors that are strongly represented include utility, travel and hospitality, and healthcare.

WHO ARE THE VENDORS SERVICING AND WHERE? (22 OF 27 VENDORS ANSWERED)

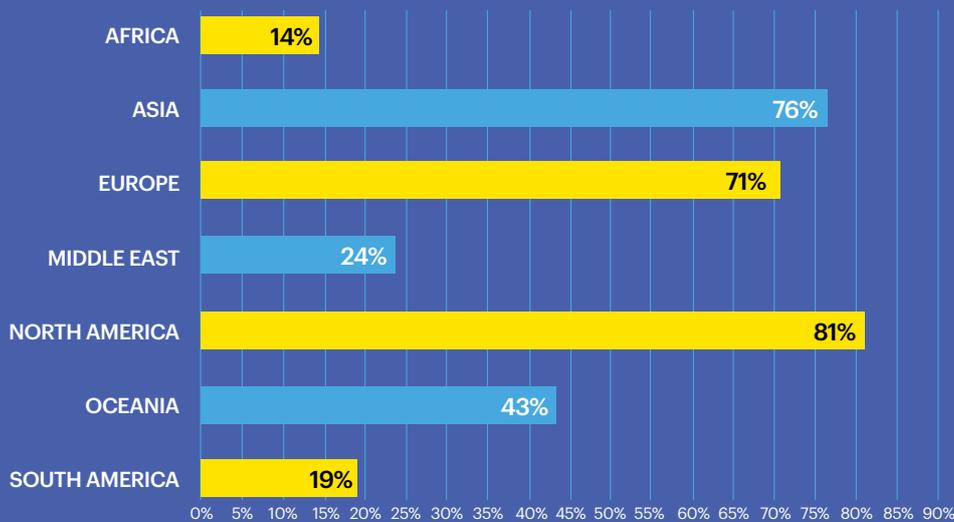
How many vendors have clients in the following industries?



Number of Vendors

Source: Intelligent Automation Universe H1 2017 – Software Vendors Market Footprint, SSON Analytics

How many vendors have clients in the following regions?



Source: Intelligent Automation Universe H1 2017 – Software Vendors Market Footprint, SSON Analytics

SSON Analytics' Intelligent Automation Universe offers a comprehensive knowledge database of software vendors that provide technology within the Robotic Process Automation to Artificial Intelligence spectrum to business support services. It also showcases the types of organizations that have implemented this technology, including their locations, industries, company size, functions and processes automated. This tool is being continuously updated as more vendor and customer data is contributed.

CONSIDERATION #2: ATTENDED (RDA) VERSUS UNATTENDED (RPA)

While the desire to eliminate manual tasks is the common denominator, it's important to distinguish between the two primary types. In both types of platforms, the technology can leverage the already published human interface, which is why *speed to deploy* and *agility* to react to *changing process requirements* are so high. In general, providers of both RPA and RDA are increasingly extending legacy application interaction to additional interface types. These include application APIs and user configured feeds from data-mart and data-lake front end tools.

While the advantages of the server-driven approach include the ability to scale, build in improved governance, and align with enterprise IT, the challenge is how to clearly define and identify each stage of the process. Where these processes are already supported by Shared Services or BPO/ITO, they have generally been well-defined, standardized and designed as a part of the transition.

In other words, someone, somewhere has laid out the rules and activities necessary to execute the process in a standardized fashion across the enterprise, or at least across a major portion of the enterprise. It is for this reason that automation has found such fertile ground in the SSO industry, where it is easier to transition to an automated processing environment, and with better business case results. However, a challenge is often that, as a result of outsourcing or otherwise delegating work, the necessary process 'intimacy' or specific process knowledge, has gone missing – particularly where the original process experts have been redeployed. In this case, the required definitions or intimate understanding of process steps can be hard to come by or need to be recreated. However, RPA and RDA can also be another way to start developing comprehensive process documentation through the process logs developed by these tools.

One of the first questions to consider before making a decision, therefore, is, *how far do you want to go with intelligent automation?* RPA solutions are excellent for the short term and, indeed, particularly for industries still characterized by legacy mainframes (banking is a good example), can provide an excellent 'bridge' as a means of saving human resources, speeding up cycle time, and ensuring adherence to rules and regulations. However, if the strategy is subsequently to scale up and build on the successes, these siloed solutions lose their sheen as the total cost or experience of ownership becomes untenable. Often attributed as *failures*, these situations are, rather, the result of bad planning, execution and lack of strategic roadmap. Tactical solutions around a user interface have their place and value, but are limited in terms of their ability to drive strategic transformation.

It's frequently only in coming up against the limitations of user interface-based solutions that practitioners recognize the value of a server-driven model. The 'modified re-buys' that then occur generally shift towards process centric solutions, as practitioners understand more about what can and what cannot be done the second time around.

It should also be noted that a common error enterprises make is to treat Intelligent Process Automation (IPA) tooling like an IT tool, where weeks-long workshops develop hundreds of requirements; then a bad use case might be selected, with more weeks-long workshops to attempt to transform a highly complex process, with dozens of exception paths. IPA is more of a collection of "business tools," and should be focused on solving specific and rationally chosen business processes that fit the tool type.

CONSIDERATION #3: BALANCING THE HUMAN AND ROBOTIC WORKFORCE

The IPA “revolution” is having a major impact on the human workforce, so no organization should travel too far down this path without devising a strategy that encompasses both the digital (sometimes called synthetic), as well as human, element. From a shared services perspective, what this means is that an intelligent automation strategy should align with a longer-term staffing strategy for business services. For example, how should you retrain employees to perform new value added tasks – i.e., how do you help an AP Clerk become a spend analyst? Or should your next hire in Finance be an accountant or a RPA Developer?

Current headlines frequently reference the “hollowing out” of jobs, and the replacement of significant segments of the global workforce by machines. While there are many concerns around the “risk” to traditional organizational structures as a result of intelligent automation – specifically robotics and artificial intelligence – a more accurate description is a new organizational model that combines digital technology and workflows with the unique attributes that humans bring to the table. The truth is that the goal is not automation per se, but the optimization of tasks by blending human and machine capabilities. In the vast majority of Intelligent Process Automation implementations, the goal is not to displace people, but rather redeploy those resources to higher value work. While this is not always possible, and some displacement is occurring, enterprises are reserving much of the productivity to invest in business value accretive work.

As enterprises adopt intelligent automation across their operations, it is important that they clearly define and plan how the human element will differentiate services. Some leading multinationals are already taking the initiative to set up “human” strategies that focus on enabling productivity, understanding and preparing for the skill requirements of the future, emphasizing the more fulfilling nature of work, and inspiring employees to stretch for better business results. The question that needs to be addressed, therefore, is: in a digital world, how can being more human become the key to unlocking greater growth?

The advent of robotic process automation and artificial intelligence is just one of the trends impacting today’s workforce. Others include:

- ▶ Shift in demographics, as Millennials join a generation of employees that is retiring later, with the latter often feeling pushed aside, while the former struggle to gain acceptance and respect from older colleagues.
- ▶ Work is becoming less permanent and increasingly flexible, with some estimates of one in five US workers having a “contingent” (not permanent) role by 2020. That’s not necessarily a bad thing but it marks a significant change from the traditional model.
- ▶ New business models leveraging the “sharing economy” are rapidly outgrowing traditional business models.
- ▶ Social instability, political instability, Brexit, suspicion of immigration, a new approach to foreign trade, etc.
- ▶ Humans may be best placed to address the expanded risk profile that can result from automated systems.

To counter this, organizations will need a robust plan. Already, 67% of CEOs believe technology, not people, is the key to survival.² The onus is on today’s leaders, therefore, to plan for the digitized workplace, leverage automation to benefit humans as a whole, and position human value add center stage, by:

- ▶ Ensuring organizations reflect a more connected world – business silos propped up by traditional hierarchies are outdated; digital connectivity and collaboration on a global scale have changed the game completely.

² “Korn Ferry Global Study: Majority of CEOs See More Value in Technology Than Their Workforce”, Business Wire, 17 November 2016

- ▶ Taking a broader approach to the human ecosystem beyond the own workforce – with more workers becoming “contingent” this begs the question, what will organizations actually offer employees, beyond a basic contract? Being valued and respected, having opportunities to learn and grow, and feeling that work is purposeful and significant remain key. Organizations will have to figure out how to provide this support in the face of virtual teams, the gig economy, and automated enterprises.
- ▶ Being aware of the downside of the “always on” culture. Already, illness based on digital dementia and digital stress as a result of 24/7 availability are emerging. Organizations need to protect their employees and help them survive in the always connected world.

- ▶ Supporting humans in developing new skills in a world defined and driven by the Internet of Things, robotics, and artificial intelligence. The B Team’s Ariella Huffington predicts that the two most essential skills in the new world order will be “creativity” and “empathy”.

To support and develop humans in the workforce, organizations should explore new ways of working that inspire individuals, embed continual learning and education strategies into career plans, and actively strive for a balance between technology and the people who humanize the work experience. In the near term, there is already a talent gap and a need to grow and develop these new skills to help ensure a smoother transition to the workforce of the future.

ADDRESSING PAIN POINTS

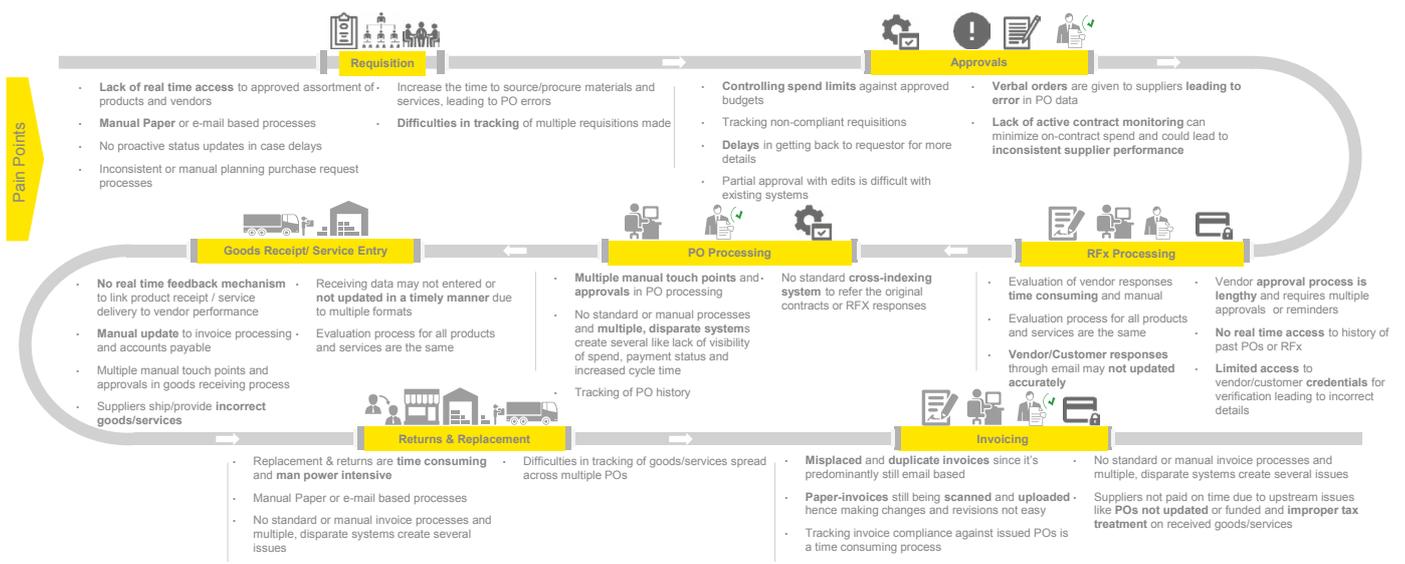
Example: Procurement

Across any given process, specific activities contain a range of unique challenges which themselves need to be addressed. The procurement process, for example, contains a number of “operational pain points” exacerbated by manual processing, lack of transparency, and handoffs, or lack of integration.

“Technology will act as a pain reliever across the procurement value chain, while at the same time making traditional procurement operating models irrelevant”

Liz Bryant
EY Asia-Pacific Advisory Procurement Leader

The Procurement organization of today experiences pain points in a world without technology – example

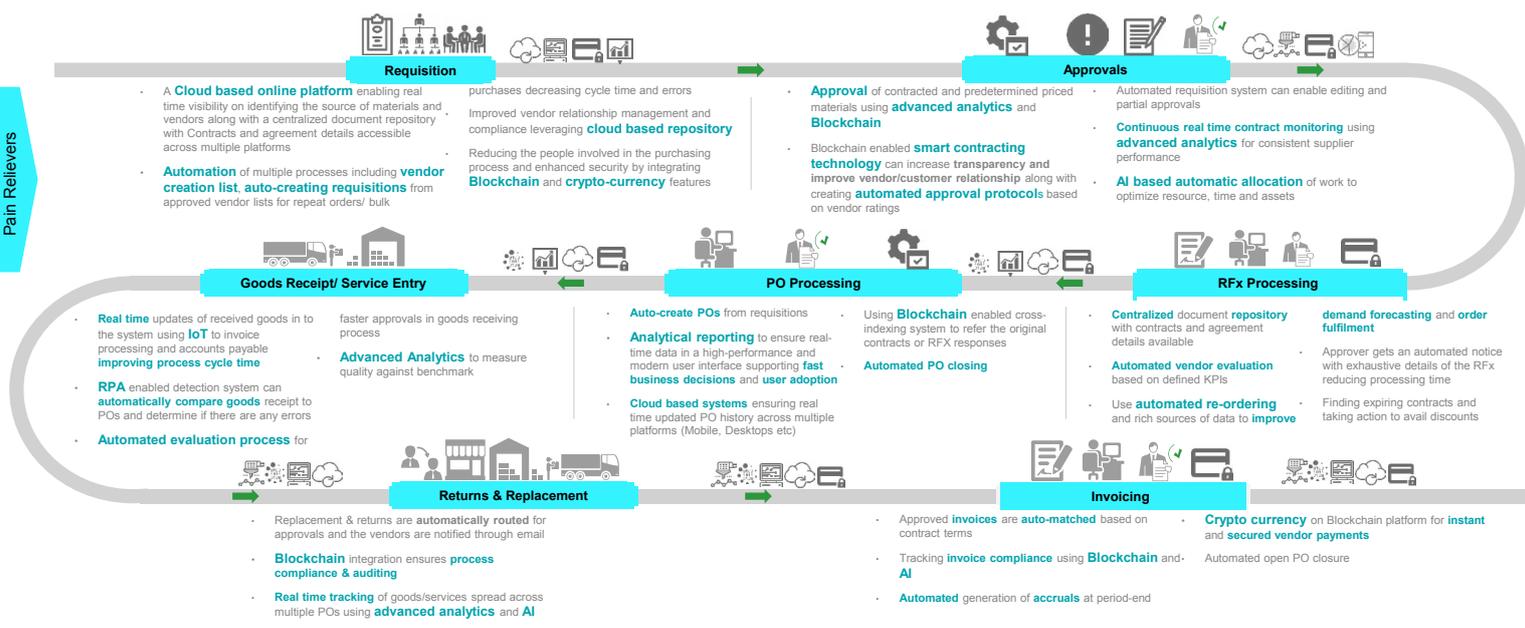


Source: EY Global RPA

Robotic solutions, along with other tools, can be leveraged as a “fix”, or pain reliever, to many of these challenges.

The Procurement organization of tomorrow experiences pain relief through the use and adoption of technology as an enabler across the organization

Pain Relievers



Source: EY Global RPA

The application of IA solutions will lead to traditional end-to-end processing evolving into collaborative models where relevant information is shared real-time, and policies, rules, and controls are built into smart technologies.

The objective is, eventually, to devise a digital process that optimizes intelligent automation and incorporates capabilities like artificial intelligence and blockchain to optimize performance.

Automation "hot spots" for Supply Chain – Source to Pay



Source: EY Global RPA

Supply functions face repetitive work effort with peaks in demand that could be supported through the use of robotic assistants. Automation of a range of core procurement activities has the potential to improve quality, and shift focus from tactical activities to strategic.

CONSIDERATION #4: BIG DATA

The capitalization of Big Data should not be confused with big data. These are entirely different things. Having a huge warehouse of data is not at all the same as having a Big Data strategy and capability. Technologically, these two things are *apples and an apple orchard*.

The *big* hurdle here is that the value lever for machine learning and prescriptive analytics is data – but with the vast majority of data still unstructured (it's estimated 70-80% of all organizational data is unstructured) and corporations generally not yet having cracked that nut, their ability to fully leverage AI is, and will remain, limited. What's really slowing down intelligent automation's adoption, therefore, is, predominantly, data. Advanced automation can only execute as fast as it can consume the data. Paper, you might say, is the key constraint in digitalization – public enemy number one.

The algorithms that are taking over activities, processes, and, eventually, perhaps the whole organization, are dependent on Big Data. The challenge is its lack of structure, cleanliness and the multiple forms it takes today. Taking big data, moving it into data lake, seeding it and providing the correlations needed for machine learning to

occur is the first step (and a big one) to creating a data fabric or data corpus that will someday feed AI. Organizations that have grown by acquisition know only too well how many different data models they maintain. In fact, the bigger the company, often, the worse the state of its data. Data management has also not been a priority for investment, and few have the appetite to redesign data from scratch, at least not until they are forced to.

All this might be changing now, as the enterprise recognizes data as the fuel for automation. Finally, almost every legacy application running today's enterprises were specifically designed to maximize the use of computing and storage resources. Why is that important? Because they were written to discard the very data needed for advanced ML.

Where an organization has partnered with a BPO/ITO, it can lean on the outsourcer to help them cleanse unstructured data; or they can elect to do it themselves, although most organizations are heavily under-resourced in this regard. The challenge is that under conventional BPO/ITO agreements there is little to no incentive for the outsourcer to support such an initiative. Indeed, with intelligent automation perhaps foreshadowing the “death of offshoring as we know it”, BPOs/ITOs may be feeling the heat. (Many organizations today are thinking twice before considering a BPO/ITO arrangement, as IA seems to promise similar results much closer to home.)

CONSIDERATION #5: HOW LIMITED, OR SCALABLE, ARE IA TOOLS?

Some of the more integrated, server-based solutions, while still having the capability to operate through the human interface layer, are largely API driven platforms. These kinds of solution providers are leveraging their experience with specific knowledge domains to bring together rule sets, rule engines, connections with the human interface layer, and direct, application-to-application, API connections to provide a holistic, BPM-type capability. BPM solution provider Pega's acquisition of OpenSpan (now “Pega Robotics”) provides an indication of where the industry is going in terms of integrating robust RPA/RDA tools (OpenSpan's) and highlights the investment of firms like Pega in robotic process automation. Given this trend, it's conceivable that we will see the emergence of a field of capabilities, based less on what a given tool “is” than on what a given tool “has” in terms of capabilities or characteristics. Said differently: customers will be able to evaluate tools on the basis of which features they have (something that will become easier as IEEE industry standards provide consistent descriptions). For example, some tools do not have the ability to utilize the human interface

layer; others do, but cannot support app-to-app conversations through an API. As solution providers solidify their go-to-market strategies, we will presumably see more multi-tool solutions emerge in the near future.

However, expanding IA's value proposition via analytics, for example, is only useful if you can act on this. If the connectivity, via meta-languages, does not exist such that fulfillment engines can receive those prescriptions and act on them, then IA's impact is limited by existing capabilities.

Across the board however, most providers have already released, or are scheduled to release, cloud based delivery of these capabilities. This means even more scalability and cost efficiency as costs for automation will scale with utilization of the automation.

CONSIDERATION #6: WILL CUSTOMIZATION DRIVE OUT SYSTEM AGNOSTICISM?

RPA, in itself, is process and industry agnostic, but in attempting to meet the needs of specific use cases – the needs of a newspaper corporation, for example, differ from those of a manufacturing enterprise – the market is narrowing its focus, a trend that is exacerbated as we move towards AI, where the definition of the knowledge and data domain becomes critical. To provide use-case specific tools, IA solution providers are leveraging partnering strategies to meet this demand without diluting their core capability. This leads however, to the kind of fragmented specialization that, on the one hand, resolves the specific need at hand, but on the other, is vulnerable to ERP and other integrated system upgrades, and limits future leveraging.

As IA implementations move up the continuum, the danger is loss of system agnosticism – meaning the data and prescription becomes specific to the environment, so the implementations begin to look more and more like “traditional IT”. In addition, in accessing various already published APIs, either to get data or feed data into a field, straight through processing capability is improving, but its agnosticism, in terms of the platforms it works with, is narrowing. Some solution providers are trying to remain agnostic and focus on logical processing, allowing for last mile integration, but it takes deliberate development to separate logical from actual processing. Others are developing digital portals to allow for a continued agnostic approach.

If IA solutions evolve to the same levels of complexity in custom coding as ERP, then practitioners will find themselves facing upgrade challenges, with too many changes required.

CONSIDERATION #7: ARE YOU READY FOR CHANGE?

The truth is nobody likes change, so you need strong management backup. And that means, first and foremost, an Automation Evangelist – a leader who will push through the idea, with the influence to make it happen. Never has the Chinese definition of *crisis as an opportunity* rung truer. If anyone is looking for a reason to take on large-scale digitization driven by intelligent automation, it is today's disruptive economic environment. The question is really one of *how aggressive you want to be* – and whether you have the stomach to reengineer processes to fit the solutions, or prefer to patch up the gaps.

Consider, for example, the fact that no company would today design a car that could not be built by robots. By contrast, most internal processes are designed to be managed by hand. Brave companies looking towards the future will take a red pencil to their current process charts and redesign them to be managed by bots. That, of course, is only half of the problem. The other challenge is to re-educate humans to work with these redesigned processes.

Finally, consider that there are literally thousands of startups around the world that are starting with a clean sheet of paper and building an entirely new delivery model around almost everything: for example, AirBnB, which became the largest purveyor of lodging in just five years via an app on your phone.

There is also the issue of “automation anxiety” that is plaguing enterprises. The key factor here is that IA implementation needs to be closely controlled through a robust change management framework, and that any concerns around security or job losses should be addressed early. This is not only a question of organizational readiness, but perhaps predominantly one of a mindset change. Organizations like ANZ Bank have cleverly presented bots as “virtual assistants” to their workforce. Emphasizing technologies’ ability to safely and reliably remove mundane work, in order to free up individuals for more “interesting” and value adding work is key.

CONSIDERATION #8: CYBER SECURITY RISK AND CONTROLS

The possibility of robotics managing enterprise processes has given rise to the concern of robots going “rogue”. As robotics will only ever execute according to a prescribed formula, there is a strong upside in terms of shifting away from the risk associated with human errors and therefore an improved level of security. A secure robotics ecosystem promotes trust via integrity, traceability, confidentiality, and control. In large part, after all, the risk profile of an enterprise is the sum total of the potential for human misbehavior, either intentional or not.

Robotic process automation is implemented at many, if not most, of the largest financial services organizations in the world and to date there have been no known cyber issues. In fact, cognitive learning is an attractive option for organizations to improve their security positions. Securing robotics platforms and managing cyber operations more effectively are two means of protecting an enterprise from cyber attacks. In some respects, RPA can be a

partner with Cyber Security teams, allowing for rapid analysis between dozens of different cyber security systems, which is all but impossible to do during a time sensitive attack. That said, there are a number of addressable items which should be resolved early as these tend to be critical path items during implementations. Organizations should consider monitoring and issue management, security, processing integrity, RPA development and change management, RPA integration and maintenance, resiliency, secure computing platform design, governance, risk and control, benefits realization, digital and identity access, data identification and protection, security operations, software and product security.

For CIOs, cyber security presents an enormous headache, particularly regarding employee turnover, time to detect and respond to incidents, and managing the talent gap. Robotic automation can help to resolve some of the biggest concerns around these issues.

WHAT CHALLENGES DEFINE FIT FOR PURPOSE?

Intelligent Automation Tool Family	Drivers (type of problems to be solved) or Benefits	Data (structured/unstructured) What's required?	Considerations	Type of Providers
RPA	Expensive but stable processes made up of easily defined steps and rules with little variation	Mostly structured	End to end process visibility and ownership	Blue Prism, Automation Anywhere, UiPath
RDA	High volume of processes with frequent segmentation of STP micro processes and human judgment	Structured and unstructured	Percentage of total process that can be automated, context and decision support, asset access	Pega Spice CSM
Process Specific Automation Tool	Keenly defined process space with specific and consistent rules	Unstructured and structured	IT prioritization, change management	Kofax, Redwood

WHAT ARE COMMON BARRIERS TO IA INTEGRATION?

WHAT LIMITS SUCCESS?

Many of the barriers to IA integration lie firmly within the existing IT landscape of the enterprise. Defining an end-to-end solution and then leveraging the appropriate enabling technologies against it, is a complex process and one that requires consideration of target operating models, tools, and underlying data. In combination, these implementations are powerful. But where the necessary integrations are lacking, problems emerge. The lure of lights out processing has been dangled before practitioners for two decades, and although intelligent automation is getting us closer, there is still plenty of work ahead. Even if the technology wasn't an issue, many organizations still remain siloed making it difficult to gain agreement across functional areas on process ownership and design for an IA program.

The key hurdle for enterprises right now is integrating solutions into their existing environment. Particularly where these solutions come from the smaller startups that are driving much of the innovations, a valid concern is often whether that company will still exist next year. And if not, what happens to the investment?

Perhaps the greatest stumbling block is the fact that many corporations are still struggling with the rollout or upgrade of their existing ERP platform, so touting the "next level" of intelligent automation to build on top of that only highlights the current mismatch between expectations and deliverables (although, in terms of bridging the gap between ERP and applications, simple RDA/RPA are good solutions). Additional challenges concern the lack of bandwidth, and whether the business case really supports the desired outcomes – and let's not forget that ERP providers themselves are busy developing additional capabilities, like SAP's S4/HANA, which already incorporate many cognitive services through Leonardo and eventually, perhaps, may replace some of the innovative solutions that are making headlines today.

The decision around where to invest will also, to a large extent, be guided by where the enterprise has spent heavily on IT to date, reflecting its underlying commitment and priorities. Other factors include whether the knowledge to implement the new applications exists in house, along with the appetite for disruption.

Access and availability of Subject Matter Experts (SMEs) is an important consideration and one that is often overlooked. In most enterprises, the true SMEs are overworked and asked to lead almost all process management and transformation work. Specific consideration should be given to the availability of these resources and plans put in place to free them up. To date, there is a shortage of available IA SMEs considering the demand. This talent gap is a major hurdle to adoption and successful implementation of IA, which organizations will need to address even if they can free up their internal process and transformation SMEs.

Finally, with the future of what we might still call digital transformation firmly focused on cloud-based services, the question of server-based IA may itself become redundant or expose a corporation to future risk. The speed and the agility of the cloud is a huge attraction, especially in contrast to ERP's regular and clunky maintenance and update requirements. Today's enterprises want quick solutions that integrate fast. IA is part of this, but the vehicle through which it is delivered will need to be as flexible as the solutions themselves.

IA is a transformation enabler – but the technology might be the easiest aspect of the project. The changes it drives internally can be unexpected.

For example, once EY developed its bots, they needed to gain system access. The issue was that there was no policy in place on how to give bots access rights. Therefore, a policy had to be developed. Once the policy was developed the process had to change, because giving bots access rights in the PeopleSoft system automatically triggered a new computer, badge, payroll and other process steps.

Other considerations included the impact to the control framework, organizational structure due to setting up a COE, talent management programs had to adjust for new skill sets required, etc.

A thoughtful process, including a broad stakeholder group, is a requirement for success.

TIPS ON STARTING WITH INTELLIGENT AUTOMATION

As with any change management, preparedness and planning are key. Here are some suggestions:

- ▶ Start by talking to someone who has actually had the benefits delivered. Don't just rely on a vendor's promises. Get proof.
- ▶ Consider the total cost to build, maintain, and even grow your robotic aspirations. The total cost of ownership is far more than the original cost of the bot. Something that seems cheap in the early stages may not end up cheap in the long run if it requires lengthy and complex workarounds.
- ▶ Do not assume you have to automate the "as is" process. Take a critical review and consider how robotic automation may consume data differently to humans. Many manual steps can be eliminated completely and don't even require automation.
- ▶ Before you build up a large center of specialist experts to run a robotic initiative, consider how many people you actually need. There are three basic models for an Intelligent Automation COE: Inside, Hybrid and Outside. Decide what your company wants before you begin.
- ▶ Consider the scalability of your automation even if in the short term you have no greater plans. It's important to be aware of the limitations of scaling within a siloed environment. Desktop practices cannot be scaled.
- ▶ Consider how the planned automation strategy allows you to exploit innovations from your incumbent ERP vendors. If you are locked into one version of your ERP, because you are locked into one version of the user interface and your robotic IP is tied up in the relevant keystrokes, mouse moves, etc. generated from the current version, you are effectively locking in obsolescence. Consider the implications of updating your ERP. For example, most of SAP's productivity improvement is in the user interface. This means you may find yourself in a bind as desktop innovations are integrated into the underlying systems.
- ▶ An end-to-end automated solution connects the process to the technical functionality you need beneath it. The separation of business process and rules from the technical approach allows you to execute journals in Oracle or SAP upgrades if your process does not change, because you are just updating the parameter that tells you where to source the data. You cannot change the underlying standardized APIs because everything else would break.
- ▶ Every time you have a maintenance upgrade, automation maintenance must be considered. Without good planning and "unitization" of automation, updating configuration can be cumbersome.
- ▶ Machine-to-machine options are generally more stable than the user interface
- ▶ Start small, and grow your capabilities over time.
- ▶ Look at automation for things other than cost, such as CX, quality, consistency, speed.
- ▶ Consider establishing a pilot program that draws on the strength of an experienced partner. Professional services firms are acquiring experience with technology providers, and the specialized skill set needed to make RPA processes work in tax, accounting, administration and other specialized workflows.
- ▶ Involve your team. Employees hear about the threat of robotics replacing white-collar workers but the real-world experience has been that robotics allow workers to focus on more valuable tasks and help employers build higher-functioning teams.
- ▶ Make RPA a business-led initiative, not an IT-led initiative. Bots can be configured within the teams, close to the business processes and expertise required to make them work.

If you have your sights set on the top end of the continuum, then it's important to build the right team around you. In order to set yourself up for the best outcome, it's advisable to establish working teams that combine multiple skill sets, including data architects, who can build the required structure; BPM experts, who understand the principle of automation and process management; data engineers, who manage the transfer of data; data scientists, who understand the learning implied in ML or NLP; data visualization experts, who are able to tell the story; and those with the consulting skills to understand the business, know what the issue is, and how to solve it with technology.

WHY DO PROJECTS FAIL?

Implementation consultants frequently quote 30-50% of RPA projects “failing”. Why? What defines failure? And how can you avoid it? The reason automation strategies fail is often because executives only see the technology aspect of robotic automation and don’t consider its implications. In truth, it’s a transformational play with significant implications for control frameworks. As a result, due consideration needs to be given to appropriate changes in policies, process, controls, talent management, IT landscape, organizational structure, data management, performance management, and of course change management. Overlooking any of these will cost the project its success.

Overpromising and under delivering is not unique to intelligent automation. And yet, overblown claims and exaggerations around “no IT involvement” and the ability to drive change “through the back door” continue. The fact is, you cannot drive revolutionary process efficiency, or change, without engaging all dependent stakeholders. Solution providers are constantly challenged by the market’s inability to comprehend this. In addition, many successful automation projects are not about saving money, but are driving different value measures, for example, by eliminating controls. Around 80% of an organization’s controls are there to enforce segregation of duty and eliminate human error or fraud. This in itself presents fertile ground for automation.

This level of change has a fundamental impact on all stakeholders. So, from the start, it is important to consider the wider implications, get all parties on board, and prepare the enterprise for the changes ahead. In some cases, the business plan for automation software may result in only thousands of dollars of savings – not something IT would prioritize – and yet have an enormous impact on staff roles and activities.

Many failures have the common component of treating all problems with a single tool. The wrong choice of use case can lead to failure; or a complex series of success criteria will set an unrealistic bar. In many cases, just starting too high on the ladder is a recipe for failure. It’s best to start with the simplest activities – what Lee Coulter, CEO of Ascension Shared Services and SSON’s Chief Intelligent Automation Officer describes as: “Show me the stupid stuff we do, and let’s start there.”

One of the greatest problems practitioners face is defining the “as is” process. Most organizations *think* they know how something gets processed. Almost never is the documentation consistent with what operators really do. While already dreaming up the “to be” scenario, process automation will fall short if you cannot define your starting point, and the individual steps. Many implementers confirm that the actual technology is not the hard part, but it’s the planning, documenting of rules, identifying and defining activities, identifying data sources, confirming reports, etc., that is the most complex and challenging aspect of an implementation – one that can derail the initiative. Consider a mix of process improvement and automation of “as is”. Taking on a full process transformation with automation together can be risky until you’ve learned the right balance of “good-enough-to-automate”.

In addition, a lot of complexity is built into current “as is” activities because that is the only way humans are able to navigate them. So taking the status quo and automating it is generally not the optimal solution. Much of the activity does not actually need to be done in its current form, but human involvement makes the process steps more complex.

The obvious solution would be process reengineering, but few people have the appetite for that these days. Instead, for those on steep implementation curves, the tendency is to simply automate the “as is”. More farsighted companies, however, are already reconsidering what’s possible with a fresh eye – for example, Procter & Gamble’s Next Generation Services group, which is evaluating “exponential technologies” for their ability to disrupt the status quo for improved outcomes.

Some of the most common causes of failure in intelligent automation projects:

- ▶ **Treating robotic automation as an IT-led rather than a business-led project:** Robotic automation is about leveraging a virtual workforce. And just as IT would not manage your human workforce, it should not manage a virtual one, at least not alone. The business needs to own and lead this implementation with a clear view of desired objectives. IT has a crucial role, however, in delivering infrastructure and software support, as well as governance and managing change.
- ▶ **Lack of an RPA business case and failure to plan ahead of time:** Proof of concepts or pilots prove that robotics delivers, but don't necessarily prove a successful large-scale implementation. A smart approach is to manage scale and start with Shared Services based opportunities alongside a proof of concept.
- ▶ **Not considering what happens once processes are automated:** Who will run the workforce, and what happens when you go live? A well-planned skills building initiative will help.
- ▶ **Treating robotics as a series of automations as opposed to an end-to-end transformation:** Automation should be a continuous practice, and measuring benefits along the way is key.
- ▶ **Targeting RPA at the wrong processes:** Highly complex processes are appealing but that is the wrong approach. Even if these are more painful for human employees, their complexity may delay the big cost-savings that result from low hanging fruit.
- ▶ **Applying traditional delivery methodologies:** Robotics differs from traditional technologies and rarely changes existing systems, so over-engineered delivery methods are not necessary. Agility and speed are what count.
- ▶ **Automating too much of a process or not optimizing for RPA:** The target is not necessarily to eliminate human input but to change existing processes to allow RPA to work as effectively as possible. A good benchmark is to automate 70% of low value activity leaving 30% high-value work to humans.
- ▶ **Overlooking IT infrastructure:** Most robotics tools operate on virtualized desktops that require scaling and business continuity plans. However, IT does not always have the time to create a production infrastructure.
- ▶ **RPA alone is not enough:** Automating numerous sub-processes still requires some human intervention. Extending robotics into digital self-service, for example, reaps far greater returns.
- ▶ **Insufficient skills:** The skills needed to create a proof of concept are not the same skills needed to establish production automations. Driving scalable and resilient automated processes is significantly more complex than building a simple process fix. Investing in classroom training is key.



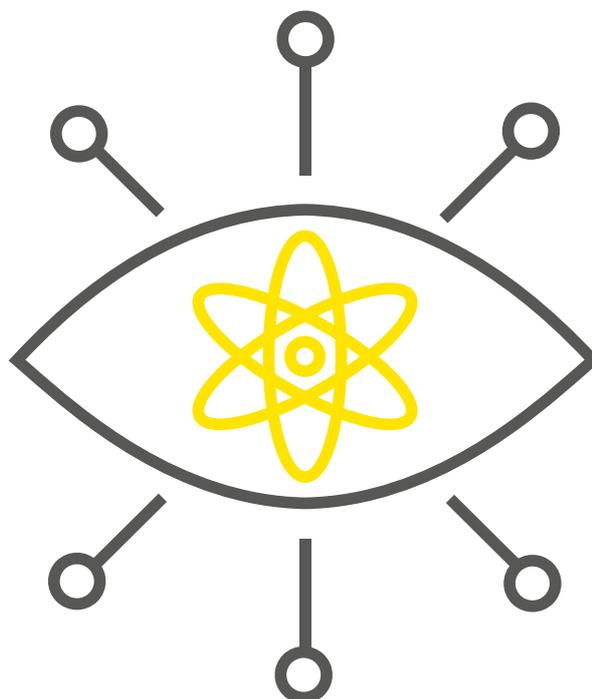
WHERE WILL IA TAKE US?

The frequently quoted high rate of robotic process automation failure is, as already discussed, not due to faulty technology but faulty implementation. When we shift our focus to intelligent automation, the same mistakes emerge. Particularly on the artificial intelligence end of the IA spectrum, where much of the interest is focused right now, there is a notable lack of understanding of its scope, use, and implementation. Even behemoths like Facebook confessed, in February 2017, that 70% of their chatbots (TenCent's WeChat) were failing as a result of an overly aggressive strategy to incorporate artificial intelligence broadly.

Along the evolutionary road that connects desktop automation, process automation, cognitive abilities, machine learning, and, finally, artificial intelligence ... most practitioners are currently hypnotized by the upper echelons despite not yet having established basic robotic capabilities. And although the pioneering game changers of our time, like Chris Boos at Arago, are already telling us that all processes will eventually be taken over by artificial intelligence, we are certainly not there yet. This is a marathon, not a sprint.

The truth is that RPA started out as a stopgap to enable integration with legacy systems and software. And while there will still be an opportunity for RPA to achieve promised features of upgraded underlying systems, some believe RPA may become a commodity. Some RPA providers have already read the writing on the wall and are focusing on AI and/or end-to-end process automation as a true value adding differentiator. ERP updates are already leading the way with automation solutions embedded. Many industry observers, in fact, are wondering why ERP providers have not already bought some of the existing RPA players? The truth may be that they are busily building their own solutions and algorithms to incorporate in future versions. Time will tell, but the developments at Microsoft [Cortana] and SAP [Leonardo] give us an idea of where things are heading.

Self learning, and the ability to identify problems that humans could not are game changers in the world of intelligent automation. And yet it takes a lot of training and case studies or examples to develop the capability. In some respects, therefore, the hype around artificial intelligence remains. The one exception are chatbots, which have successfully incorporated machine learning and AI to demonstrate enormous progress in a relatively short time. Voice, as already shown by Alexa and Siri, presents significant opportunities and may lead the way in AI application to service processing. The current 95% voice recognition capability will grow to 99% in the next 3-5 years according to the Wall Street Journal (2017) which will make the difference between barely using Siri to never not using it. The AI-driven environment is particularly interesting to companies who manage enormous workforces and who have recognized just how much time, money, and effort is invested in servicing them – these systems are immensely complex and have hundreds of millions of dollars invested.



SUMMARY

Industries that find themselves challenged by stringent regulatory or compliance requirements are finding that advances in robotic automation provide greater security as rules-based processing improves execution. There are plenty of other challenges, however, such as shrinking product life cycles, accelerating pace of globalization and complexity, environmental and ethical requirements, and the need to be more transparent, all of which can be made easier by the application of intelligent automation in its various forms.

IPA solutions are generally industry agnostic, but the banking and financial services sector has taken a definite lead in implementations. This may be partly because of its strictly regulated environment, which fits neatly with robotics' assurance and ability to automate processes already "locked down" by regulators; or because this industry has the capital available upfront, compared to others that have theirs locked up in working capital. In addition, considerations around efficiency, cost cutting, compliance and risk makes robotics a perfect solution for BFSI enterprises. Nevertheless, although highly regulated industries may naturally be inclined towards the reassurance that robotic technology provides, these solutions are at their core both industry and function agnostic.

One trend is emerging, however. Sectors whose core business operations are largely manual experience more hot spots, for which robotic automation is a perfect solution. This applies to service industries like telecoms, insurance, banking, and underwriting ... all of which are finding that IPA solutions support their core business, and therefore are gaining more support from the C suite over "back office" efficiency solutions.

The truth is that the technology works. But partial, inconsistent, and faulty implementations will not. A key first step is to prove the concept. Then, senior stakeholders have to buy into it. In order to do so, they will need to be presented with a proposition that balances cost-reduction with other less measurable value drivers such as improved service, transformation, compliance, and scale. Above all, intelligent automation needs to be presented within the context of the digital enterprise and all that it embodies. And you cannot stop there. We are already seeing proof of concepts regarding blockchain's application to processes like procurement [supply chain management] delivering impressive performance via seamless processing.

New intelligent automation solutions reduce effort and improve results, rather than simply replace resources. But while many of these newly emerging solutions are exciting and portend step change, in limited application they still only represent interim technology solutions on the path to true digital transformation.

The autonomous version of the future enterprise – that still lies ahead.

“For executives to take an IA-driven step in the right direction will require them to be comfortable with being uncomfortable.”

Weston A. Jones, Partner, Global Robotic and Intelligent Process Automation Leader, Ernst & Young LLP

Look out for the H2 Global Intelligent Automation Market Report, which will be published in December 2017, and will analyze the impact and opportunities around Natural Language Programming, Blockchain, and additional Intelligent Automation elements like Machine Learning and Natural Language Generation.

INTELLIGENT AUTOMATION GLOSSARY

Selected glossary definitions adopted from the IEEE P2755™ Draft Guide to Terms and Concepts in Intelligent Process Automation

IEEE P2755™ Draft Guide to Terms and Concepts in Intelligent Process Automation

The IEEE standards project aims to build a framework for terminology to help advance related standards efforts. Sponsored by IEEE's Board of Governors Corporate Advisory Group, the newly formed IEEE P2755™ Working Group is defining initial terminology that addresses a range of applications spaces, including Robotic Process Automation, Artificial Intelligence (AI), Cognitive Computing, Autonomics, Machine Learning and related technologies that enable businesses and governments to improve performance and lower costs.

Automation Concepts

automation: Independent machine-managed choreography of the operation of one or more digital systems.

batched automation: Process automation execution of intentionally segregated work processes that are able to be processed irrespective of their contextual placement within a service.

descriptive analytics: Insights, reporting, and information answering the question "Why did something happen?" Information useful to understand the cause(s) of an event(s).

diagnostic analytics: Insights, reporting, and information answering the question "Why did something happen?" Information useful to understand the cause(s) of an event(s). (syn: discovery analytics)

digital labor: Digital automation of information technology systems and/or business processes that successfully delivers work output previously performed by human labor or new work output that would typically or alternatively have been performed by human labor. Syn: dFTE, eFTE,

digital workforce: The collective suite of automation technologies delivering existing or new work output as applied in a business; the manifestation of digital labor.

intelligent process automation: Preconfigured software instance that combines business rules, experience-based context determination logic, and decision criteria to initiate and execute multiple inter-related human and automated processes in a dynamic context. The goal is to complete the execution of a combination of processes, activities, and tasks in one or more unrelated software systems that deliver a result or service with minimal or no human intervention.

provisioning: The granting of access rights and executional privilege to an agent (human or machine) within an application(s) or system(s).

robotic desktop automation (RDA): computer application that makes available to a human operator a suite of predefined activity choreography to complete the execution of processes, activities, transactions, and tasks in one or more

unrelated software systems to deliver a result or service in the course of human initiated or managed workflow. Syn: agent-assist automation, assistive automation, in-line automation.

robotic process automation (RPA): 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.

scalability: The ability to increase or decrease the computational resources required to execute a varying volume of tasks, processes or services.

sensory digitization: The conversion of typically analog or human sensory perception (e.g. vision, speech, etc.) to a digital format useful for machine to human interaction or machine processing of traditionally analog sensory information (e.g., optical character recognition or OCR).

Service Intelligence Concepts

artificial general intelligence (AGI): Complex computational artificial intelligence (AI) capable of providing Descriptive, Discovery, Predictive, Prescriptive and Deductive analytics with relevance and accuracy equal to or exceeding human experts in multiple general knowledge domains. AI system capable of interacting naturally with humans and machines in a way undetectable to expert observers and consistently pass the Turing Test for artificial intelligence.

artificial intelligence (AI): The combination of cognitive automation, machine learning, reasoning, hypothesis generation and analysis, natural language processing and intentional algorithm mutation producing insights and analytics at or above human capability. NOTE—This is distinct from artificial general intelligence (AGI)

artificial intelligence (AI) learning: The ingestion of a corpus, application of semantic mapping and relevant ontology of structured and/or unstructured data that yields inference and correlation leading to the creation of useful conclusive or predictive capabilities in a given knowledge domain. In strong AI learning it also includes the capability of creating unique hypotheses, attributing data relevance, processing data relationships and updating

its own lines of inquiry to further the usefulness of its purpose.

cognitive computing: Complex computational systems designed to:

- Sense (perceive the world and collect data);
- Comprehend (analyze and understand the information collected);
- Act (make informed decisions and provide guidance based on this analysis in an independent way); and
- Adapt (adapt capabilities based on experience) in ways comparable to the human brain.

contextual learning: A computing system with sufficient knowledge regarding its purpose that it understands the source, relevance and utility of data and inputs.

deductive analytics: Insights, reporting, and information answering the question "What would likely happen IF?" Evaluation of causes and outcomes of possible future events.

human-enabled machine learning: Detection, correlation, and pattern recognition generated through machine based observation of human operation of software systems capturing successful

or unsuccessful operations to enable the creation of a useful Predictive Analytic capability.

machine learning: Detection, correlation, and pattern recognition generated through machine-based observation of human operation of software systems along with ongoing self-informing regression algorithms for machine based determination of successful operation leading to useful Predictive Analytic or Prescriptive Analytic capability.

machine observation: Machine detection and interpretation of relevant and meaningful events and conditions that impact operation of the computer system itself or other dependent mechanisms or processes essential to the purpose of the system.

predictive analysis: The organization of analyses of structured and unstructured data for inference and correlation that provides a useful predictive capability to new circumstances or data.

predictive analytics: Insights, reporting, and information answering the question "What is likely to happen?" Analytics that support high confidence foretelling of future event(s).

prescriptive analytics: Insights, reporting, and information answering the question “What should I do about it?” Information providing high confidence actions necessary to recover from an event or fulfill a need.

self-aware system: A computing platform imbued with sufficient knowledge and analytic capability to make useful conclusions about its inputs, its own processing, and the use of its output such that it is capable of self judgment and improvement consistent with its purpose.

self-healing system: A computing system able to perceive that it is not operating correctly and, without human intervention, make the necessary adjustments to restore itself to normalcy.

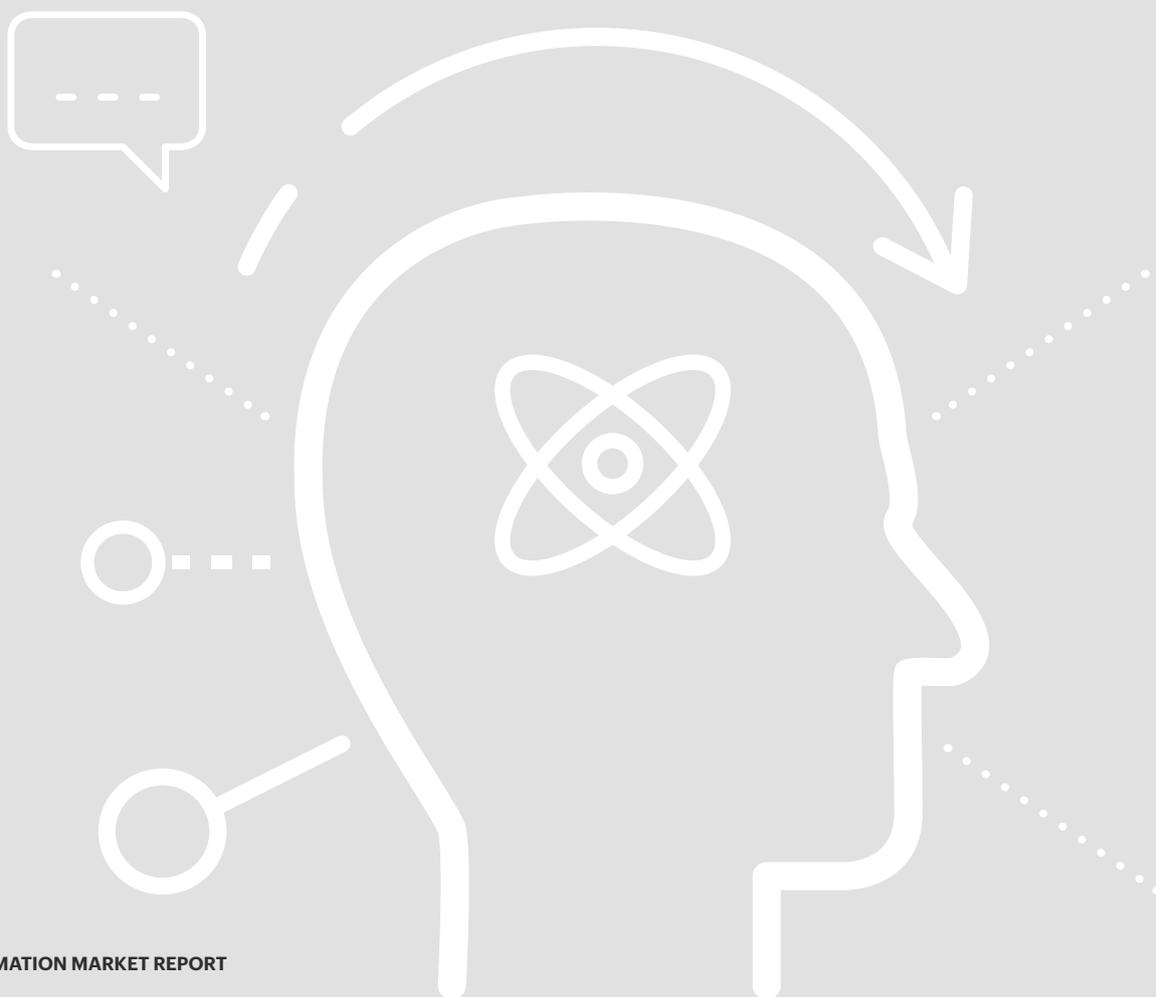
narrow artificial intelligence (Narrow AI or Weak AI): Complex computational AI system capable of providing descriptive, discovery, predictive and prescriptive analytics with relevance and accuracy equal to or exceeding a human expert in a specific knowledge domain. (Also known as Weak AI).

broad artificial intelligence (AI): Complex computational cognitive automation system capable of providing Descriptive, Discovery, Predictive, Prescriptive and limited Deductive analytics with relevance and accuracy exceeding human expertise in a broad logically related set of knowledge domains. (Also known as Strong AI).

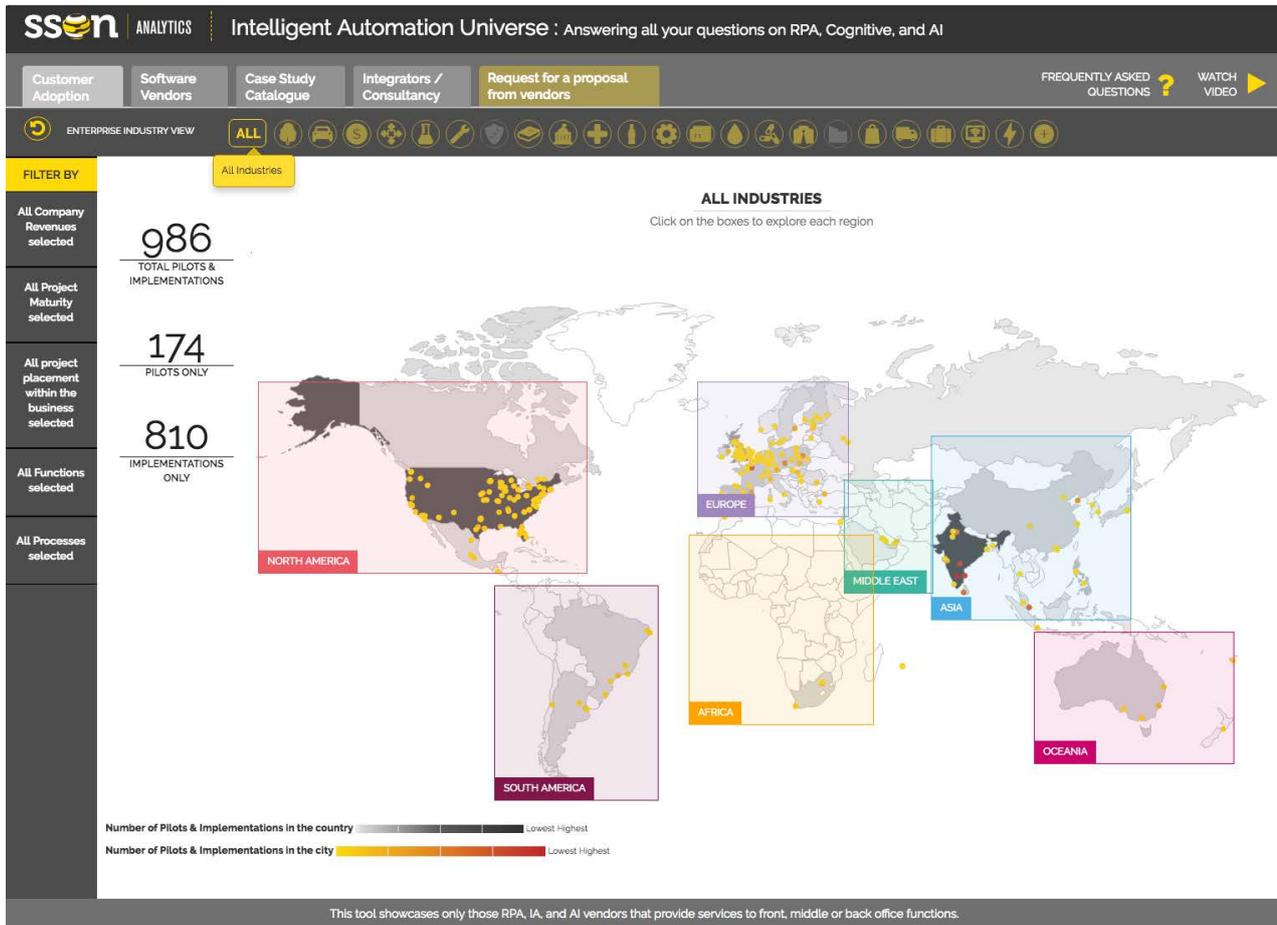
cognitive automation: The identification, assessment and application of available machine learning algorithms for the purpose of leveraging domain knowledge and reasoning to further automate the machine learning already present in a manner that may be thought of as cognitive. It results in the system performing corrective actions driven by knowledge of the underlying analytics tool itself, iterating its own automation approaches and algorithms for more expansive or more thorough analysis enabling it to fulfill its purpose. The automation of the cognitive process refines itself, dynamically generating novel hypotheses that it can likewise assess against its existing corpus and other information resources.

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