

IDC MarketScape: Worldwide Robotic Process Automation Software 2021-2022 Vendor Assessment

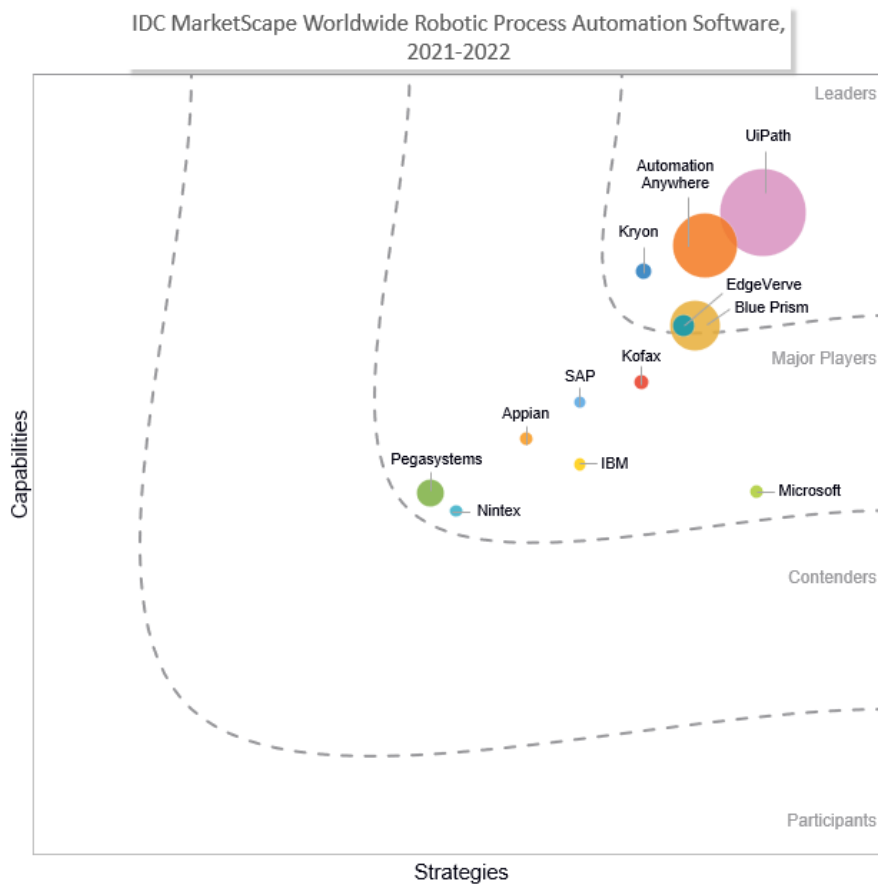
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THIS IDC MARKETSCAPE EXCERPT FEATURES UIPATH

IDC MARKETSCAPE FIGURE

FIGURE 1

IDC MarketScape Worldwide Robotic Process Automation Software Vendor Assessment



Source: IDC, 2021

Please see the Appendix for detailed methodology, market definition, and scoring criteria.

IN THIS EXCERPT

The content for this excerpt was taken directly from IDC MarketScape: Worldwide Robotic Process Automation Software 2021-2022 Vendor Assessment (Doc # US45922220). All or parts of the following sections are included in this excerpt: IDC Opinion, IDC MarketScape Vendor Inclusion Criteria, Essential Guidance, Vendor Summary Profile, Appendix and Learn More. Also included is Figure 1.

IDC OPINION

The goal of this assessment is to answer the question: "When robotic process automation (RPA) software is critical to our automation strategy, which vendors should we consider for adoption?"

Given the new entrants in the markets and the increasingly expansive capabilities of RPA platforms, selecting vendors to evaluate is an increasingly complicated question because the answer depends on several factors, including breadth of capabilities needed, ease of use, security, runtime efficiency, pricing, whether adoption is strategic or tactical, which developer roles need to be supported, interoperability with other automation technologies already in place, and relationships with professional services providers.

This IDC MarketScape evaluated 12 vendors with RPA offerings, including pure-play RPA software platforms and RPA capabilities of multimodal automation platforms, which offer several different automation technologies as part of a larger platform or portfolio. We focused on evaluating vendors that offer broadly horizontal capabilities rather than ones more narrowly concentrated into an industry or specific domain. And for the multimodal vendors, we only factored in RPA capabilities. Our assumption is that RPA is strategic automation technology that warrants a head-to-head comparison of capabilities across the vendors regardless of other technologies in the portfolio.

Not only does this assessment serve as a way to help identify vendors that should be considered for adoption, but also it provides a basis of comparison for already adopted RPA software to determine whether capabilities of existing vendors are sufficient and fully utilized across the organization. This is especially true for organizations that are considering consolidating RPA efforts onto a standard platform.

The evaluation is based on hands-on learning, using many of the products evaluated, extensive demos, Q&A, and feedback from customers. In particular, the following areas were assessed:

- Ease and speed of development
- Architecture that supports speed and scalability in production
- Features that improve automation resilience
- Depth of codeless capabilities and point-and-click configurability
- Deployment breadth and flexibility
- Manageability and security
- Breadth of task automation and augmentation use cases supported currently and as part of the overall platform strategy

This assessment also looks at customer satisfaction and pricing. Reference interviews were supplemented by a worldwide survey, with 292 responding to questions about RPA adoption and

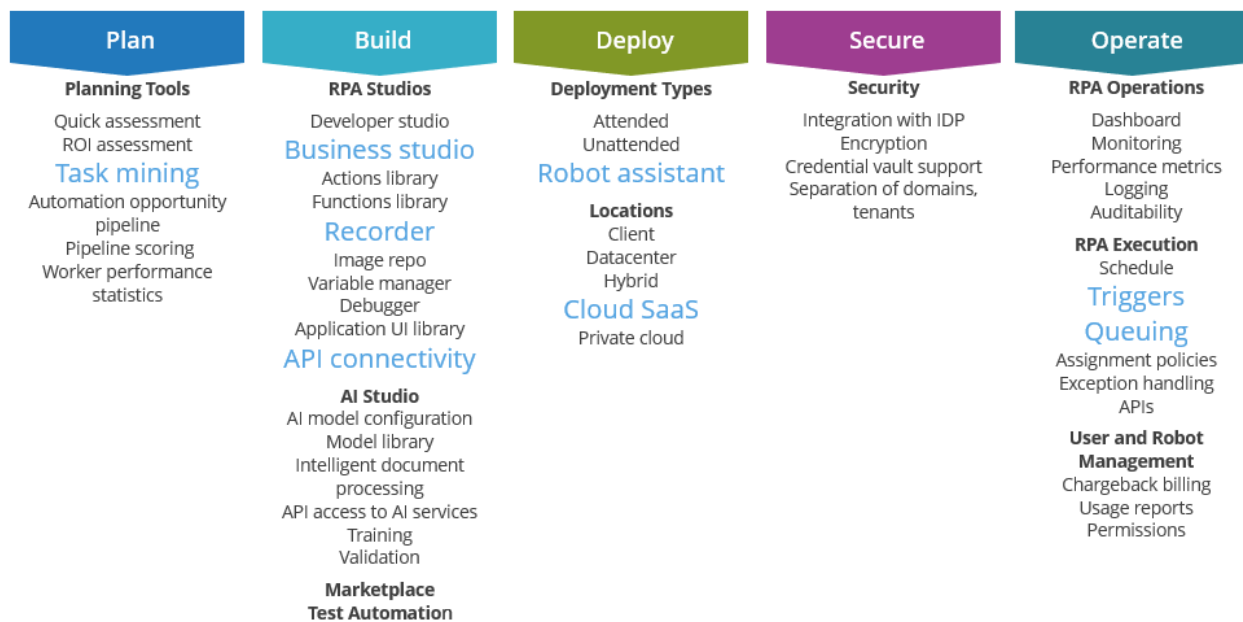
customer satisfaction. The latter information was combined with the customer satisfaction ratings from the reference customers.

Since RPA began to be popularized five years ago, capabilities have significantly expanded. There are now a variety of packaged capabilities supporting different aspects of automation as well as supporting third-party applications both through the user interface (UI) and through APIs – hundreds out-of-the-box automated actions and rich ways to declare variables, make automated decisions, build and customize AI models, and interact with end users. Figure 2 organizes these into five capability segments and classes of features within each segment.

Not all vendors have capabilities in all areas, and the blue text in Figure 2 highlights emerging areas of innovation. For example, not all vendors have task mining capabilities. And task mining itself varies across products. The same with a robot assistant, which is an interface between human workers and bots working interactively to complete work. We're also seeing more support of event-driven design with the emergence of triggers and queues as capabilities offered in the RPA studio. These collections of capabilities advance RPA to support more sophisticated and scalable orchestrations across workers and bots, supporting long-running workflows.

FIGURE 2

RPA Platform Capabilities



Source: IDC, 2021

In a large sense, RPA is not simply supplementing existing processes with automation but transforming how work is performed and disrupting common technologies used for process improvement. As more depth and richness is added to RPA, we are seeing an evolution in design that broadens focus, creating overlays across enterprise applications that simplify and transform how work is performed and orchestrated without the need to change how applications operate. In fact, tasks that

were performed manually with training using applications are being displaced by RPA and robot assistants, effectively obsolescing application UI for many types of workers. The focus shifts from an end user going to individual applications to perform work to a task coming to end users just-in-time via their robot assistants.

As RPA platforms make progress simplifying the development experience, we will see far more enterprises support line-of-business digital enablement, utilizing RPA to drive automation-based innovation more broadly in narrower ways that are helpful to individual workers and smaller teams working together.

IDC MARKETSCOPE VENDOR INCLUSION CRITERIA

The vendor inclusion list for this document was designed to accurately depict the vendors that are most representative of any given RPA buyer's selection list. Vendors were then surveyed and further investigated to ensure that the offerings qualified with both capabilities and strategies related to the RPA market.

Critical to this research effort was for the vendor to meet the inclusion criteria. Any vendor participating in this IDC MarketScape had to showcase that it met the following:

- Offers RPA capabilities as part of a sustainable business, whether RPA is offered standalone or is part of a larger technology portfolio
- Operates in North America and at least two additional regions
- Goes to market horizontally across industries and across horizontal processes of an enterprise
- Aligns with the target audience of the software (If targeted toward departmental adoption, the technology must align with the ability for business users to successfully adopt; if targeted toward a center of excellence (COE), it must support and scale to meet the needs of large to enterprise-sized organizations supporting 1,000+ employees with approximately 50% of customers in this range.)

ADVICE FOR TECHNOLOGY BUYERS

Many factors go into making decisions about RPA adoption. This assessment was heavily focused on technology. In our worldwide survey that included RPA adopters, 89% of the respondents said RPA met (54%), exceeded (26%), or significantly exceeded (9%) expectations. Individual vendors that exceeded or significantly exceeded expectations tended to offer RPA platforms that were optimized for business users meaning that there was higher satisfaction with simpler development experiences. That said, this misses the nuances of sophistication that often require more advanced capabilities that are more appreciated by developers with more advanced automation skills.

The following four areas are worth careful assessment:

- Evaluating architecture and RPA runtime capabilities
- Finding the right RPA studio fit
- Process innovation by mixing intelligent document processing (IDP) with RPA
- Disruptive benefits of robot assistants

Evaluating Architecture and RPA Runtime Capabilities

RPA vendors are in different stages of reengineering their platforms to support a cloud-native architecture, built around on microservices, containerization, and Kubernetes-based orchestration. The deeper a vendor is into this changeover, the better able the platform to elastically scale and speed up the introduction of new performance improvements and rapidly deliver out-of-the-box features.

This also means that the client-side architecture changes. In a cloud architecture, RPA products offer downloadable agents that manage communications between the client agent and the cloud service to run automation scripts locally. This supports both attended and unattended use cases operating client side. When the agent runs locally connected to a private or public cloud service, different forms of caching are used or in development to pre-position scripts to execute locally at low latency. That also means there is a need to manage versions of locally pre-positioned scripts to ensure the correct script is always the one run in production.

This is an area of differentiation. Deploying on a public cloud or adopting RPA as a service is an attractive option, particularly as we continue to maintain workforces that connect by home Wi-Fi rather than high-speed connections from a centralized headquarter or regional office. The agent architecture provides a mechanism to run both private automation scripts locally and supports work-at-home scenarios. However, the latency rates are uncomfortably high without a caching-based architecture to manage local automation.

This means there are two tiers of assessment. The first tier compares scalability and performance, running unattended in the cloud. The second compares latency, running automation scripts locally using an agent-based architecture with caching as well as assessing the management of distributing updates to local networks of caches and RPA agents.

These features were factored into IDC's assessment and should be considered as part of the proof of concept for adoption.

Finding the Right RPA Studio Fit

We've noticed a trend across all development-oriented technologies that biases adoption to ease of adoption and ease of use. Developers are increasingly measured by time to market SLAs, and as a result, speed of development is becoming far more important. In fact, organizations are trading off performance in favor of time to market advantages, assuming security is at parity across competing products under consideration.

Ease of use differs based on whether the developer works full time on RPA projects and is a professional developer or whether the developer is a trained subject matter expert (SME) working in a line of business. Ease of adoption also factors in runtime operations, focusing on ease of configurability as well as how much of the management functions are automated, thinking about development, testing, and deployment and how the platform is operated.

Purely looking at studios, high productivity development is critical for professional developers where they are looking for techniques that will allow them to build quickly and manage the complexity of what they're building through modularity. And they're likely to want to use data techniques when they see the need to apply logic to what they would view as a data structure, such as treating an Excel spreadsheet like a data table, and to write code when it's simpler or to plug a gap in out-of-the-box capabilities.

Professional RPA developers may also need to simplify development activities for line-of-business developers by:

- Creating reusable components, particularly to interact with application UIs
- Embedding capabilities that make business user-driven automation operate safely and reliably
- Creating templates that require filling in and light configuration
- Supporting testing automations developed by end users

This is exactly the opposite of what business users generally need to be successful as part-time or occasional automation developers. While many business users may be comfortable with technology and may have had computer science classes, they work in a job that does not require them to be developers and need to build automations in using a faster and simpler studio that aligns with how they would perform a task manually.

When they see a data structure, many business users are likely to think about how Excel works and want to replicate this through the use of keyboard shortcuts or invoking functions assuming they're a power user of Excel. They need out-of-the-box drag-and-drop actions that reduce the need to create variables and support complex logic. They're comfortable scraping data off a website using recorders. They're also comfortable recording tasks that are saved into the studio as the steps in an automation flow and playing back the recording as automation when invoked.

While developers can be involved in building reusable components that simplify business user development using the same studio environment, it is clear that there are conflicting needs. The question that needs to be evaluated is whether one RPA platform can support both professional developer and business user personas.

How Important Are Line-of-Business Developer Programs?

We've had the opportunity to measure the frequency of business user automation programs across different surveys to identify what percentage of RPA adoption involving business users doing their own automation development. The response ranges from 18% to 32%. In our customer references for this assessment, customers commonly planned to offer RPA to business users and the effort generally failed, creating dissatisfaction and the need to retool and reorient to professional developers. Meanwhile, client inquiry trends and IDC primary research indicate that line-of-business developers will grow in importance across enterprises over the next several years.

When we look across automation technologies, we see a much stronger trend than in the past toward institutionalizing programs that teach business users how to use build capabilities for their own digital enablement. RPA is not an exception to that trend. That means, many organizations have to support both professional developers and business user developers and must optimize RPA adoption to support both developer personas. That means it is especially important to look at the features that are immediately usable to business users as well as what developers can build to simplify development for business users while simplifying governance of business user development.

With this multipersona developer use case, it is critical that business users are involved with adoption decision making as peers. That will require pretraining. It is also important to adopt with an eye toward the methodology to assist business user adoption. In this case, part of the vendor evaluation criteria is the strength of the vendor's adoption methodology backed by customer references.

In addition, documentation with examples, snippets, and even spot training is critical for both developer audiences. Strength of active community support in vendor-sponsored forums is also a core part of RPA adoption decision making.

We factored these points into our evaluation and called out multipersona-optimized studio environments in the accompanying profiles. We also called out studio environments that are optimized for business users.

Process Innovation by Mixing IDP with RPA

The point of view in assessing IDP capabilities of RPA vendors is the need to support both the role of developer in training a model and subject matter experts training specific document types and instances. RPA software vendors provide support for IDP with one or more of the following options:

- IDP and AI capabilities are embedded in the RPA platform.
- IDP services are part of a larger multimodal automation platform, trained separately and callable from an RPA automation script.
- An RPA vendor OEMs AI and IDP solutions or components from one or more IDP or AI vendor.
- An RPA vendor offers platform-neutral options that support their own IDP and AI capabilities but provide choice to customers to use a preferred vendor for specific use cases, such as document extraction.

In our demo to evaluate IDP capabilities across RPA vendors, we assumed the RPA vendor had a trained invoice model. We wanted to see how well trained the model was as evidenced by how well new invoices were processed using the model.

Our use case assumption in the demo was that an onboarding specialist in procurement is assigned to support a new supplier where there is a need to receive an invoice from that supplier through email, email attachment, or fax. The onboarding specialist works with the new supplier that roughly parallels how suppliers are onboarded using EDI technology. In the IDP use case, the procurement onboarding specialist would receive example copies of documents from suppliers or the initial invoices that would then be uploaded and trained against the invoice model to the point where the automation successfully processes the document.

During the demo, vendors showed us many ways to improve the accuracy by extracting and comparing the results with existing data through lookups callable by API or SQL query, improving the data quality by standardizing fields into a form compatible with the target application, customizing complex embedded tables to improve extractability as well as the option of training a version of the model and linking that model to the document type by supplier.

In other words, there are a variety of techniques needed to preprocess, classify, extract, validate, and perform post-processing of the invoice – or any other type of business document.

For anyone looking at IDP, they need to evaluate how accurate the AI is along with creating and applying new versions as well as fallback mechanisms that revert back to data rather than AI to increase accuracy. Routing an incoming document to the appropriate automaton script or model is a critical feature.

While we've applied this to invoices, there are many use cases for IDP and should support multiple ways to improve accuracy.

What we realized as we were doing this research is that there is a real benefit of IDP in combination with automation to combine extraction, data quality, validation, and other aspects of verifying the accuracy of documents into a multistep process, improving overall efficiency, speed, and accuracy.

AI embedded in RPA is also expanding scope, and vendors are increasingly applying different AI technologies to solve problems, such as email categorization and routing in addition to IDP capabilities. Deep learning techniques are also being applied to do pattern recognition between the source application (the application that originally generated the document) to predict fields and capture the data correctly.

It is critical to carefully look at both the AI and additional capabilities that fully support accurate extraction using different techniques to reduce manual validations. It is also important to discuss in detail the IDP and AI road map of vendors that are under evaluation as well as use cases in production that utilize automation in combination with AI to improve the overall process.

Disruptive Benefits of Robot Assistants

Many RPA platform vendors now offer an interactive human-bot interface that we call "robot assistants," which provide the ability for a business user and bots to work interactively to complete a task. These assistants receive tasks in a queue and also support long-running workflows. Meanwhile, vendors that acquired RPA capabilities to supplement process automation technology already offer long-running human task workflows.

We believe robot assistants should be evaluated separately from existing human task workflow for several reasons:

- With growing adoption of monitoring that, in combination with machine learning models, predict problems and opportunities, there is a need to assign tasks to workers to determine how to respond. In an IDC 2021 survey, customers are looking for a way to more closely link an insight from business monitoring to an action that can be taken to respond. Assigning a task to a worker to resolve or figure out next steps is needed. This type of single-step task assignment does not align well with process automation optimized for long-running workflow but aligns closely to the capabilities of a robot assistant.
- Organizations are just now beginning to use AI to identify work obligations from unstructured sources, such as email, transcripts of recorded meetings, and chat. This represents an opportunity to convert implicit unstructured tasks to structured tasks that can be managed in a task inbox and supported by automation, making it easier for users to remember they need to complete the task and work on the task more productively. This is another example of working on a single-step task individually rather than working as part of a team on a long-running workflow.
- A third consideration is the use of a robot assistant to initiate a largely automated workflow, whether it is scheduling travel, automating expense reports, interactively scheduling meetings, or other administrative workflows that can be automated.
- Organizations also have an opportunity to redesign how work is performed across teams using the lighter-weight approach of a robot assistant that pushes tasks to workers without the need to upgrade an application or build a new one.

These trends are tied to larger issues of speed of insight and speed of response. Work assignments configured for rapid completion coming to you, rather than you going to the different applications to perform the work, is an example of a major changeover in automation design. As conversational AI is

added to a robot assistant, this has the potential to be a center of gravity for workers and how they do their jobs.

For this assessment, we factored in robot assistants as a high-value capability and pointed out vendors with robot assistants in the profiles.

VENDOR SUMMARY PROFILES

This section briefly explains IDC's key observations resulting in a vendor's position in the IDC MarketScape. While every vendor is evaluated against each of the criteria outlined in the Appendix, the description here provides a summary of each vendor's strengths and challenges.

UiPath

UiPath is positioned in the Leaders category in this 2022 IDC MarketScape for RPA software.

UiPath's strengths are in its broad and deep RPA capabilities, innovation, and market momentum. One challenge is UiPath's pricing, which is premium priced until customers approach a level of adoption that warrants an enterprise license agreement.

UiPath is the largest RPA software platform provider and was the first automation platform vendor to make its initial public offering. UiPath is also classified as a multimodal automation platform with expansion of capabilities that are not typically part of a core RPA platform.

Founded in 2005 in Bucharest, Romania, UiPath pivoted to RPA in 2012 and moved its headquarters to New York, New York. The company's core platform includes a studio optimized for professional developers and a studio optimized for business user development. Both have embedded task recording capabilities. There is a third studio for AI and IDP model development. UiPath's management and orchestration capabilities are heavily focused on ease of configuration, along with full logging, a real-time health dashboard and reporting, and robot utilization and performance metrics.

The company is well capitalized and, over the past few years, has been both adding depth to its core RPA capabilities and extending into newer areas, such as IDP and AI, through acquisitions. The first acquisition, StepShot in 2019, formed the foundation for its task mining capabilities. ProcessGold was also acquired in 2019 to expand into process mining. In early 2021, Cloud Elements was acquired for its API-based connectivity platform to extend automation to headless services.

More recent organically developed capabilities include a robot assistant for interactive human-bot automation supporting both single-task automation and long-running event-driven workflows, a codeless application builder that can initiate tasks and actions from a web-based UI, and a test automation suite.

Quick facts about UiPath are:

- **Founded:** 2005
- **Employees:** 3,000
- **Global footprint:** 9,100 customers in all global regions
- **Industry focus:** Financial services, healthcare, government, technology, telecom, and retail
- **Ideal RPA customer size:** Midmarket to large enterprise

- **Product name:** UiPath Platform
- **Software robot types:** Attended and unattended RPA (The platform is available as a software subscription for deployment in datacenters and hosted on public cloud infrastructure and RPA as a service running on Microsoft Azure. It includes a client-based robot assistant for human-bot interactive task automation and long-running workflow as well as a web app to initiate tasks.)
- **Pricing model:** Annual subscription by named user/role and entitlements assigned to the user
- **RPA partner ecosystem:** 4,700+ partners in multiple countries, including Accenture, Deloitte, KPMG, PwC, and Cognizant

UiPath Studio

We spent time trying to learn the studio environment, testing the task recorder and the easier-to-use capabilities, and trying to build a more complicated automation. There are a lot of elements on screen to learn and keep track of.

The studio provides a library of standard actions, which UiPath calls "activities" and an even deeper library of installable actions, and supports a wide range of variable types.

Developing an automation script is heavily dependent on VB expressions, defined as a collection of two or more terms that perform a mathematical or logical operation. The terms are usually either variables or functions that are combined with an operator to evaluate to a string or numeric result. VB expressions appear contextually on right mouse click to complete or supplement business logic. While a powerful feature, ease of use depends on whether the developer is trained in VB or knows where the expressions are documented.

An example we struggled with was how to count the number of columns in the row of an Excel spreadsheet that contained data, where the number of columns may vary row to row. The VB expression to do that is `chartRow.Count`. `Count` is essentially a function that figures out how many values are in an array, with the array being the row.

Use of VB expressions is a feature of UiPath that we didn't find with other RPA studios, which meant we underestimated how important the right mouse click capability is for simplifying development. For a trained developer familiar with VB, this speeds up development and significantly expands out-of-the-box capabilities. We learned this when we failed at building the standard automation for this assessment using UiPath. During the follow-up demo from an experienced UiPath developer, it was clear how important these expressions are as shortcuts and added functionality. We believe these should be better documented and searchable from within the UiPath environment.

The studio also supports a flow-based designer, which is object based and understandable to professional developers but more difficult for nontechnical developers.

Variables are assigned to the object where they are created as a default or can be declared to be global. To pass data between two objects, you have to invoke through a formula. Again, not difficult if you use UiPath all the time but not easy when you use part time. And not easy when an automation becomes increasingly complicated. There is no consolidated place to show how the value of variables change as they are used across the modules. Granted, the debugger shows this in motion, but it would improve productivity to have this offered centrally in some form.

Studio X for business users is focused primarily on recording, common office productivity applications such as Windows 365 and other Windows-based applications.

UiPath and IDP

UiPath has a separate codeless studio to build AI-based capabilities, including categorizing, capturing, and extracting machine readable data from a semistructured or unstructured document. The IDP studio is designed to be used by professional developers for document model training and by subject matter experts for training document instances.

UiPath supports the ability to train a document instance – such as an invoice from a supplier – and link it to a version of the invoice model that works best for that particular invoice. Developers can also build custom lookups to improve the output, including using the extracted results to look up data and update the form before manual validation as well as to normalize the extracted results.

UiPath documentation is easily searchable through a web search and has good explanations. The forum is active, with members readily answering questions. Automations in the marketplace are simple to download and use to extend UiPath out-of-the-box capabilities.

Strengths

- **Overall technical capabilities:** UiPath showed differentiation in multiple areas of its platform, and some of the newer features, such as the event-driven architecture of its long-running workflow capability, have the potential to disrupt the larger process automation market.
- **Strong capitalization structure for extending the platform:** With UiPath's fundraising from private equity and the proceeds of its initial public offering, UiPath is poised for expansion through both organic development and the potential to make technical or strategic acquisitions.

Challenges

- **Pricing model:** UiPath is much more affordable on a per unit cost basis under an enterprise licensing agreement (ELA) but is relatively expensive until adoption grows to the point where it makes sense to sign an ELA. While UiPath offers bundled starter packs to accelerate adoption, the low inbuilt RPA pricing from other multimodal automation platform vendors means that UiPath must continue to build innovative and necessary features to justify its premium value.
- **Need for a full-featured business developer studio:** UiPath has a productive studio environment for professional developers and a narrower studio for business users. While the business user studio is focused primarily on automating common office productivity tasks, it would benefit from being enhanced to support broader and more sophisticated automations driven by trained business users.

Consider UiPath When

Consider using UiPath when RPA platforms are a strategic part of an enterprise automation program and when you are planning to consolidate RPA under a single, standard offering. UiPath is also suitable for enterprise departmental use cases and for midmarket adoption.

APPENDIX

Reading an IDC MarketScape Graph

For the purposes of this analysis, IDC divided potential key measures for success into two primary categories: capabilities and strategies.

Positioning on the y-axis reflects the vendor's current capabilities and menu of services and how well aligned the vendor is to customer needs. The capabilities category focuses on the capabilities of the company and product today, here and now. Under this category, IDC analysts will look at how well a vendor is building/delivering capabilities that enable it to execute its chosen strategy in the market.

Positioning on the x-axis, or strategies axis, indicates how well the vendor's future strategy aligns with what customers will require in three to five years. The strategies category focuses on high-level decisions and underlying assumptions about offerings, customer segments, and business and go-to-market plans for the next three to five years.

The size of the individual vendor markers in the IDC MarketScape represents the market share of each individual vendor within the specific market segment being assessed. For details regarding the vendors and size of the RPA market, see *Worldwide Intelligent Process Automation Market Shares, 2020: Solid Growth Across Cloud Segments* (IDC #US47469221, June 2021).

IDC MarketScape Methodology

IDC MarketScape criteria selection, weightings, and vendor scores represent well-researched IDC judgment about the market and specific vendors. IDC analysts tailor the range of standard characteristics by which vendors are measured through structured discussions, surveys, and interviews with market leaders, participants, and end users. This IDC MarketScape comparing RPA software included briefings and demos of RPA management, automation planning tools, and vendor road maps and was demo intensive in two main areas: a standard build-a-bot demo covering RPA studios and an intelligent document processing demo. We also used a customer reference survey to ask questions of references supplied by vendors as well as a worldwide survey sent to RPA adopter decisions makers.

Excel-to-PowerPoint Bot Builder Demo

We spent time prior to the larger evaluation using a cross section of the RPA products, learning how to use the studio environments and built – or attempted to build – the same bot across several of the platforms. We then sent out requirements to all participating vendors to show us how they would build same bot based on our requirements. We evaluated whether each vendor was able to complete the bot using out-of-the-box capabilities, whether there was a need to supplement with scripts or code to complete, or whether the bot was outside the scope of current capabilities.

The bot itself converted variable column and row length data tables in an Excel spreadsheet and generated charts based on number of rows and columns, then copied the chart, data table titles, and chart metadata onto individual slides in the correct sections of a two-column PowerPoint format.

This was used to assess core capabilities, ease of use, and differences in studio features that were used to build the bot. Vendors also demonstrated additional capabilities that demonstrated strengths and capabilities they considered to be differentiating.

IDP Invoice Demo

For this demo, we asked participating vendors to send us three sample invoices that we would pool, sending three invoices from the pool to a vendor a few minutes before each demo. Vendors demonstrated IDP capabilities and also showed how the invoices were processed and validated. There was substantial variation in features shown in the demo, which resulted in follow-up questions to develop

a feature set that could be compared across RPA platforms. We also did follow-ups to better understand additional AI-based capabilities as vendors began evolving to natural language processing.

Market Definitions

Robotic Process Automation Software

Robotic process automation (RPA) is software that helps end users become more productive by automating all or parts of repetitive manual tasks. RPA mimics the keystrokes and mouse clicks of workers as they use applications to perform each step of a task. In essence, RPA captures these actions into scripts and plays them back robotically to perform the automation.

RPA also provides capabilities to apply logic, such as rules, to support complex repetitive tasks. Each step of a task and the business logic needed to perform each step is joined into a workflow that ensures automated work is executed in the correct order.

These individually packaged automations are often called "bots" but can also be called automation scripts. Two or more bots can be joined to orchestrate automation across a group of automated activities that, prior to being automated, were often performed manually by different team members or even different groups in an organization. Increasingly, AI is used with RPA to accomplish work that requires an understanding of semistructured and unstructured content, such as processing an invoice or categorizing an email. When AI is used in combination with RPA, that is often called "intelligent automation," and it can also be called "intelligent robotic process automation."

Deployment components of RPA platforms include:

- **Attended automation:** Robotic desktop automation (RDA) is client-side software that performs an automation on behalf of an end user. When invoked, RDA typically takes over the end-user machine while performing the task, although some products run RDA as a background process. The end user typically initiates the automation by selecting an onscreen action.
- **Unattended automation:** Asynchronous, headless server-side task automation invoked or triggered by a variety of mechanisms, including a browser submit button, through scheduling, by email, and by moving a file into a designated folder, through an external API call or triggered by an event.
- **Agents:** Software agent is downloaded to a machine (server or PC) to run locally. This is typically part of a cloud architecture, where the cloud control manager maintains the library of automation scripts or packages. On local demand for an automation, the control manager downloads the automation package to the local machine, where it begins to run. The agent does not store scripts locally, although vendors offer caching options to pre-position scripts for immediate access.
- **Robot assistants:** An RPA software extension that acts as an interactive broker between an end user and a bot. The assistant:
 - Maintains a task inbox and a forms-based UI for interactive task completion
 - Can forward a task to other end users, to an end-user work queue, and to an unattended automation queue
 - Can invoke an automation via response to a prompt from an end user
 - Executes long-running workflows

The assistant can be client software, a browser plug-in or cloud based, depending on vendor.

Naming conventions used in this assessment:

- Automation that can be run attended or unattended is called an "automation script" interchangeably with the term *bots*.
- The runtime capabilities that run an automation script can be called "digital workers," "software robots," and "bots."
- We call the embedded development environment of RPA software "studios." These may be called by more distinct names, but we neutralize this to studio through this assessment. Some vendors have multiple studio environments, which we modify with the purpose of the studio. For example, IDP and AI capabilities are developed in an AI studio separately from the automation studio and are packaged as actions usable in the developer studio.
- We use the term *codeless* to refer to low code, no code, autogenerated code, and so forth. We modify the term *codeless* by the developer persona for which the studio is optimized, typically using "professional developer" and "business user" or "line-of-business developer."
- We call the collection of out-of-the-box capabilities used to mimic how workers interact with application UI "actions" and may refer to the collection of out-of-the-box actions as a "library."
- Some of the environments provide packaged custom single-purpose custom code. We call these "functions." Some environments leverage Windows functions and VBScript from within their studios. We try to keep these distinct but may also call them "functions." In essence, actions are higher-level automation capabilities, and functions are low-level capabilities that also assist in automation.

LEARN MORE

Related Research

- *Worldwide Intelligent Process Automation Software Market Shares, 2020: Solid Growth Across Cloud Segments* (IDC #US47469221, June 2021)
- *IDC TechBrief: Robotic Process Automation Software* (IDC #US45412420, December 2019)

Synopsis

This IDC study represents a vendor assessment of the robotic process automation (RPA) software market through the IDC MarketScape model. The goal of this assessment is to answer the question: "When RPA software is critical to our automation strategy, which vendors should we consider for adoption?" Given the new entrants in the markets and the increasingly expansive capabilities of RPA platforms, selecting vendors to evaluate is an increasingly complicated question because the answer depends on several factors, including breadth of capabilities needed, ease of use, security, runtime efficiency, pricing, whether adoption is strategic or tactical, which developer roles need to be supported, interoperability with other automation technologies already in place, and relationships with professional services providers.

"We sometimes read or hear that RPA is becoming more commoditized, but this assessment, which focuses heavily on the technology and especially on differences in how automation is developed, shows that this is not true at all," according to Maureen Fleming, program vice president, Intelligent Process Automation research at IDC. "This assessment identified RPA products that deliver state-of-the-art highly sophisticated capabilities that are disruptive to the larger automation market and designed for professional developers as well as highly functional codeless offerings that simplify development for business users who want to build their own automation."

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