The Forrester Tech Tide™: Intelligent Automation, Q1 2020

Nineteen Technologies Underpin Intelligent Automation

by Craig Le Clair
January 8, 2020

Why Read This Report

Automation is increasingly critical to every organization's ability to win, serve, and retain its customers. To accelerate their performance in automation, companies are evaluating and adopting a range of contributing technologies. This Forrester Tech Tide™ report presents an analysis of the maturity and business value of the 19 technology categories that support intelligent automation. Enterprise architects should read this report to shape their firm's investment approach to these technologies.

Key Takeaways

IA Is Gaining Momentum

Enterprises are taking a fresh look at automation and circling around a set of practical and emerging technologies.

Customers Expand Beyond Task Automation

Experimental technologies embrace the practical components of AI, which combine with or extend from robotic process automation (RPA) investments to text analytics, conversational intelligence, and machine learning.

Enterprises Experiment With Automation Orchestration

The success of point solutions, particularly RPA, has created a new area: orchestration in the context of automation.

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Nineteen Technologies Underpin Intelligent Automation

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Table Of Contents

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Leverage IA To Bolster Operational Efficiency

There's no question that automation, AI, and machine learning are all hot business initiatives.[1] As these technological worlds collide, enterprises are finding competitive advantages in adding IA solutions to their portfolios. Data and analytics decision makers report that their top benefits for adopting automation technologies are cost savings, higher levels of quality, and increased profit margins.[2] With so many fresh and exciting technologies saturating the market, it's time to weigh your priorities and invest in the most pragmatic solution that meets your business demands. This analysis helps enterprise architecture professionals grasp the most relevant IA solution for their specific needs.[3]

Curate A Set Of Technologies That Enable Intelligent Automation

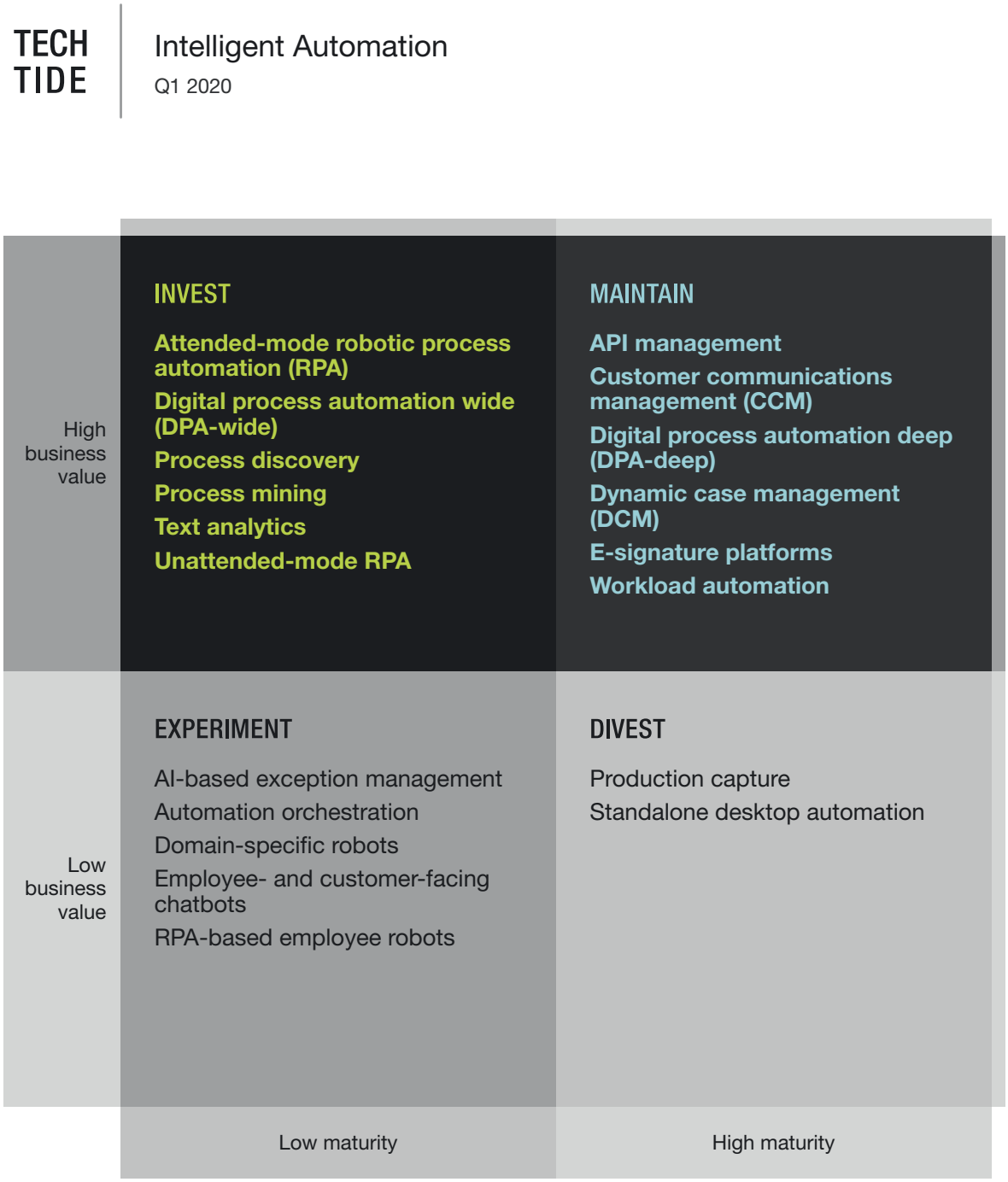
Forrester surveyed technology decision makers, suppliers, and other subject-matter experts in our search for the most important IA technologies. Each of the technology categories analyzed in this Forrester Tech Tide meets three criteria and:

- **Is an important contributor to human-machine coexistence.** Each technology is fundamental in automating routine tasks in business processes. These technologies help minimize costs and risks associated with human error, freeing up employees to attend to more-complex tasks.
- **Is commercially available at enterprise scale.** Vendors we've included in this report are both established and recent market entrants. They offer products that vary in size, technical scope, regional focus, and market approach.
- **Has (or will have) market traction.** The products we've listed in this report vary in market maturity. We included both technologies that clients are using today and those they should be using in the future.

Select IA Technologies That Offer High Business Value

The central 2x2 graphic offers a summary of the state of the technology categories that comprise IA (see Figure 1).[4]

FIGURE 1 Tech Tide™: Intelligent Automation, Q1 2020



Evaluate Business Value And Maturity For Each IA Technology

We plot the categories on two dimensions:

- **Business value.** Many IA categories and technologies are operational or tactical in nature. Cost savings via expedited administrative tasks and/or reduced customer-handling times drive measurable business value. Added business value occurs in strategic IA areas that help discover and improve on how work is done or add advanced analytics to drive insight, make better decisions, or accelerate an enterprise's automation roadmap.
- **Maturity.** The current state of IA technology is characterized by variables such as rate of product innovation, nature of the dominant vendors, adoption by customers, number of production deployments, and other relevant indicators of readiness or ripeness. While RPA has been a trigger for organizations to implement broad automation strategies, the level of scale and overall maturity for RPA and adjacent AI deployments is low. Other categories have been helping with automation and digital transformation for decades.

Determine Strategies For IA Based On Business Value And Maturity

The business value and maturity dimensions, in turn, position each category in one of four quadrants:

- **Experiment.** Low maturity and low business value characterize technologies in the Experiment zone. Most enterprises should limit their exposure to these technologies to bounded experiments, waiting for the expected business value of these newer categories to improve before investing.
- **Invest.** Low maturity and high business value characterize technologies in the Invest zone. These new technologies have ripened to the point where enterprises can confidently invest.
- **Maintain.** High maturity and high business value characterize technologies in the Maintain zone. These are the bread-and-butter technologies that most enterprises rely on to run their business. They're generally stable, well-understood technologies that continue to have high returns to the business. Most enterprises should maintain their installations and usage of these technologies.
- **Divest.** High maturity and low business value characterize technologies in the Divest zone. These older technology categories have reached a point where their business value has dropped. Most enterprises should be looking for newer, higher-value replacements and divesting from these categories.

Invest In And Maintain IA Technologies With High Business Value

Enterprises are stepping up the focus on automation. Operating models and automation strike teams are emerging and want to build pipelines that queue and feed automation candidates into the enterprise at a consistent clip. The first step is to get a handle on the relevant technologies that help prevent business stakeholders from being out-automated by peers. In mapping the futures of the technologies in the IA ecosystem, we found that:

- **Process mining and discovery show accelerated interest.** These two categories have different goals and origins but now work together to advance automation. Process mining, for example, has been a lagging area for decades, considered too academic and difficult to extract productive gains.[5] Process discovery sprang from the RPA market to become an important distinction among vendors RPA vendors. The goal? Use analytics to find candidates for task automation. Both strive to help with the persistent pain point of finding the right process to automate (i.e., one that warrants investment).
- **Low-code platforms have gaps to close for real innovation but are productive.** Both digital process automation (DPA)-wide and RPA need more evolution for business-led innovation, but they're highly productive for the right use cases. Text analytics for document and unstructured content use cases has the advantage of applying machine algorithms within a narrow context such as a recurring set of documents or emails. Likewise, employee-facing chatbots can meet many needs due to narrow conversation and resolution paths that are typical of many jobs.
- **Domain robots are becoming a thing.** The first phase of robots attacked "rule of five" processes for simple task automation.[6] Tomorrow's robots must have a bit more on the ball. And for this to happen, they need to have broader context and handle recurring variations better. RPA service providers — enabled by robot communities built by the major RPA vendors — are wrapping their IP around the core technology and will deliver robots for specific use cases like invoice management, HR reporting, or GDPR assessment.[7]

Experiment With Automation Orchestration And Others

Five of the IA technologies fall into the Experiment quadrant of the Tech Tide, with low maturity and low current business value. Many of the Experiment technologies embrace the practical components of AI and are at the core of what IA means. The reason? Customers have expanded their goals beyond the isolated task automations of RPA. They now want to combine RPA with AI components like conversational intelligence or machine-learning-based decision management and to attack broader use cases.

AI-Based Exception Management

RPA's success at task automation is beyond question. But the IA story (i.e., the RPA plus AI story), by contrast, is still developing. The ability to create smarter digital workers that can handle task variations (exceptions) or productive linkage with conversational intelligence is as yet unproven (see Figure 2).

FIGURE 2 Experiment: AI-Based Exception Management

Strategy:
EXPERIMENT

MATURITY
↓ Low

BUSINESS VALUE
↓ Low

LIFECYCLE COST
$$$

SAMPLE VENDORS
Cloudera; DataRobot; GoodData; IBM; Microsoft; SAS Institute

AI-based exception management

Definition
Exception analytics uses machine learning software tools to analyze data and build predictive models using statistical and machine learning algorithms and to handle variations in processes (e.g., identify exceptions), predict their severity, and make decisions to support customer self-service, employee, or system actions.

Maturity rationale
Decisions and next best actions will direct RPA-based digital workers, chatbots, or other process elements to get work done. Vendors are just beginning to reveal pilots and early production of AI-based decision management to support digital work.

Business value rationale
These solutions will significantly transform business processes by extracting meaningful insights, combining data buried in their systems of record with real-time data from a running process, and building data models that can be improved through active learning. In this way, the digital workforce can become smarter over time.

Automation Orchestration

IA progression requires that RPA link with more advanced analytics, such as a chatbot for conversational intelligence or a machine learning environment to make decisions. But as automation islands emerge as a pain point, enterprises will want an automation orchestration layer that coordinates various RPA bots and other AI building blocks (see Figure 3). Islands of automation are a real problem that companies must address.[8] Providers fall into three categories: domain-focused, AI platforms, and custom-built solutions.[9] Experiment with options that include control towers from RPA vendors, broader AI automation platforms, and internally constructed solutions.

FIGURE 3 Experiment: Automation Orchestration

Strategy:
EXPERIMENT

MATURITY
↓ Low

BUSINESS VALUE
↓ Low

LIFECYCLE COST
$$$

SAMPLE VENDORS
Automation Anywhere; Cognizant; Infosys

Automation orchestration

Definition
Automation orchestration is technology to coordinate diverse automations based on process insight. It provides access to advanced analytics, such as support of conversational intelligence, machine learning, task automation digital workers, and all forms of intelligent automation (IA) categories.

Maturity rationale
This is an emerging tech landscape and an area of concern and early discussion for enterprises.

Business value rationale
Enterprises are seeing islands of automation cropping up and are concerned. But it's unclear exactly how to solve the problem and from which of the competing automation platforms to do it.

Domain-Specific Robots

The RPA market is maturing. Domain-specific robots that come pre-scripted for a business domain are an indicator of maturity. RPA vendors are rapidly building communities and marketplaces that allow integration partners to post these robots. Enterprises will search these marketplaces, download automations, and try them out (see Figure 4).

FIGURE 4 Experiment: Domain-Specific Robots

Strategy:
EXPERIMENT

MATURITY
↓ Low

BUSINESS VALUE
↓ Low

LIFECYCLE COST
**$$**$

SAMPLE VENDORS
Accenture; EPAM Systems; WorkFusion

Domain-specific robots

Definition
Systems integrators, consultancies, and RPA vendors offer prepackaged automations to help their clients train, build, and deploy a digital workforce. Many of these platforms blur the lines between product and service, packaging repeatable frameworks and accelerators that require client-specific customization.

Maturity rationale
Technologies that make up domain robots are at different stages of maturity. Vendors have offered domain-specific workers for invoice management, IT testing, and contact-center agent automation. Robot communities provided by RPA vendors are gaining traction for mass distribution of domain robots.

Business value rationale
Domain-tailored roots will change the nature of work, as more and more cubicle staff in back offices and contact centers must now work side by side with digital counterparts that are growing in intelligence.

Employee- And Customer-Facing Chatbots

Chatbots communicate with humans through natural language processing (NLP)-based systems or with simple keyword queries that pull search results. Combine this power with RPA, and you match the brains with the brawn. Chatbots are a reliable way to understand intent (e.g., to change that flight or order). RPA helps with the need to integrate with existing knowledge sets and core systems to complete a transaction; the chatbot sends a command to the RPA platform control tower that dispatches a bot to complete an action. Supporting internal employees is gaining traction today and should be at the top of the list for investment (see Figure 5).

FIGURE 5 Experiment: Employee- And Customer-Facing Chatbots

Strategy:
EXPERIMENT

MATURITY
↓ Low

BUSINESS VALUE
↓ Low

LIFECYCLE COST
$$$

SAMPLE VENDORS
EdgeVerve; IPsoft; NICE Systems; Nuance Communications

Employee- and customer-facing chatbots

Definition
Chatbots are software applications that use either deterministic decision trees or natural language processing and AI to provide automated assistance by simulating a two-way conversation with customers or employees via speech or text.

Maturity rationale
Today, many chatbots are still rules-based and focused on narrow use cases. Vertical and use case functionality remains a deficiency. Reporting and analytics don't grasp the complete employee or customer experience (CX).

Business value rationale
Chatbots may offer 24x7 convenience but are disappointing customers today. Many customers seek emotional support and reassurance that chatbots don't provide. In the long term, however, their business value is certain.

RPA-Based Employee Robots

Attended-mode RPA tools can support human-to-robot communication (see Figure 6). But this interaction is currently a simple call and response (i.e., no text or voice support) and is built only by professional bot programmers. RPA vendors will introduce low-code designers to build employee-controlled and -enhanced robots. These will act as data and application intermediaries and will leverage the original data and permission structures of an employee's intranet, CRM, email, enterprise resource planning (ERP), and line-of-business applications.

FIGURE 6 Experiment: RPA-Based Employee Robots

Strategy:
EXPERIMENT

MATURITY
↓ Low

BUSINESS VALUE
↓ Low

LIFECYCLE COST
**$$**$

SAMPLE VENDORS
Automation Anywhere; Blue Prism; UiPath; various conversational intelligence platforms

RPA-based employee robots

Definition
An RPA-based robot acts as a data and application intermediary that leverages the original data and permission structures of an employee's intranet, CRM, email, enterprise resource planning (ERP), or line-of-business applications. It provides employee access via web, mobile, or text with self-service features such as task design and status of available and running automations.

Maturity rationale
Many providers of RPA platforms are investing in this capability, often referred to as low-code or no-code robot design. This is a very early and nascent area of research. For example, the appropriate user interfaces, including whether to embed conversational intelligence for robot commands, are all in requirements development.

Business value rationale
Potential value is high. At some point, most employees will have multiple digital assistants and robots to help with work.

Invest In Attended-Mode RPA, DPA-Wide, Text Analytics, And Others

Six of the IA technologies fall into the Invest quadrant of the Tech Tide, with low maturity and high current business value. Low-code platforms (RPA and DPA-wide) have gaps to close for real business-led innovation but are proving highly productive in the process. Text analytics for document and unstructured content use cases applies machine algorithms within a focused context such as a recurring set of documents or emails. Employee-facing chatbots meet many needs due to narrow conversation and resolution paths. Advancing these technologies offers strong immediate results.

Attended-Mode RPA

RPA bots can work in attended mode, with potential to deliver efficiencies and enhance customer goodwill (see Figure 7). Agents and customer service staff can reduce repetitive, manual tasks and develop their customer-centric skills. Typically targeted toward front-office activities, attended bots are useful where an entire task can't be automated. In other words, humans must help. Unattended RPA bots execute tasks and interact with applications independent of human involvement. They make simple decisions, open and close apps, enter data, and cut and paste data fields, but they work without a human in the loop.

FIGURE 7 Invest: Attended-Mode RPA

Strategy:
INVEST

MATURITY
↓ Low

BUSINESS VALUE
↑ High

LIFECYCLE COST
**$$**$

SAMPLE VENDORS
EdgeVerve; Kryon; NICE Systems; Pegasystems

Attended-mode RPA

Definition
This is automation that interacts in real time with humans who initiate and control robot tasks, often embedding functions within apps. It's generally associated with front-office, agent-led activities.

Maturity rationale
Providers of attended-mode RPA have focused on simple repetitive tasks in customer service, e.g., simple address updates. These simple robot tasks will be enhanced with virtual agent interaction, ML-based exception frameworks, more sophisticated human and robot interactions, and real-time guidance for humans.

Business value rationale
Attended-mode RPA may reside on thousands of agent desktops and offer small productivity gains. Use cases that enhance customer experience are growing; e.g., pooling data to answer more questions in real time, using bots to reduce time authenticating a customer, and linking with chatbot tasks to complete more customer requests that need core system access.

DPA-Wide

Digital transformation is difficult to achieve with central application development teams supported by central process organizations. Transformation must occur in an agile way, led by employees in the business domain. DPA-wide supports this distributed or federated digital transformation (see Figure 8). It's a pared-down workflow tool suitable for hundreds of applications in a single company and for nonprogrammers of many backgrounds.

FIGURE 8 Invest: DPA-Wide

Strategy:
INVEST

MATURITY
↓ Low

BUSINESS VALUE
↑ High

LIFECYCLE COST
**$$**$

SAMPLE VENDORS
AgilePoint; Appian; Bizagi; EasySend; HighGear; Nintex

Digital process automation wide

Definition
DPA-wide simplifies business users' ability to define, orchestrate, and manage complex business processes with the help of low-code platforms.

Maturity rationale
Demand for rapid development, fast realization of value, and deep participation from business stakeholders has led to a merger between process and low-code providers, with both mature and fledgling vendors bringing legitimacy to this space.

Business value rationale
DPA-wide brings flexibility and speed to enterprise digital transformation efforts. Business stakeholders can use customer and employee journey maps in conjunction with DPA-wide to map, orchestrate, and maintain processes with minimal coding.

Process Discovery

Aligning the right automation with the right use case is the first milestone on the roadmap to success. RPA task automation is often a good place to start (see Figure 9). Recording human inputs and outputs when accessing a machine can combine with analytics to isolate automation candidates. Process mining data can provide an incrementally more complete picture. Process discovery is expanding to create an end-to-end pipeline that starts with ideas from the business that pass through validation steps, including a business case assessment.

FIGURE 9 Invest: Process Discovery

Strategy:
INVEST

MATURITY
↓ Low

BUSINESS VALUE
↑ High

LIFECYCLE COST
**$$**$

SAMPLE VENDORS
EdgeVerve; Kryon; NICE Systems; UiPath

Process discovery

Definition
Process discovery is a collaborative process that identifies candidates for automation, pushes them through a pipeline, gathers human and machine inputs and outputs to validate, and uses various forms of machine learning and analytics to isolate automation potential.

Maturity rationale
RPA products and services are in early release of process discovery. Simple recording of human input and output is table stakes and well supported. Analytic frameworks, integration with design studios, and linkage to process mining are developing rapidly.

Business value rationale
Enterprises have found process discovery to be a huge benefit. Finding the right use case is highly correlated with success in an automation project.

Process Mining

Organizations have mostly directed AI at external data, IoT sensor data, customer journey events, or digital data sets that they can classify. Directing AI at data that's internal to a process is an opportunity, and process mining is part of the solution (see Figure 10). Data from the system logs of ERP, CRM, and line-of-business applications can be visual and actionable.

FIGURE 10 Invest: Process Mining

Strategy:
INVEST

MATURITY
↓ Low

BUSINESS VALUE
↑ High

LIFECYCLE COST
$$$

SAMPLE VENDORS
Celonis; FortressIQ; Minit; UiPath

Process mining

Definition
Process mining is a set of tools to gather and analyze event logs of enterprise applications to understand and help optimize an end-to-end process.

Maturity rationale
This space is a mix of established vendors and new entrants. Mature offerings began by diagnosing inefficiencies in ERP and other enterprise systems. Recent capabilities for desktop analytics, RPA integration, machine learning assessment, and simpler configuration are less mature.

Business value rationale
These tools traditionally provide value only in the largest of enterprises with significant back-office ERP installations. Value has increased in recent years to include smaller use cases and linkage to human and machine inputs and outputs. Access to customer journey analytics will further add value.

Text Analytics

This category uses text mining, natural language understanding (NLU), and NLP (see Figure 11). Typical documents in scope include insurance, medical claim forms, invoices, purchase orders, and resumes. These documents include unstructured text fields for claim descriptions, product descriptions, and instructions. To make these text fields actionable and useful, a process must extract structures, both simple ones like names, times, and locations and complex ones like sentiment, effort, and intent. Extracting data from structured and unstructured fields allows RPA bots to apply smart routing, enter data into a system of record, and pool data at the point of need.

FIGURE 11 Invest: Text Analytics

Strategy:
INVEST

MATURITY
↓ Low

BUSINESS VALUE
↑ High

LIFECYCLE COST
$$$

SAMPLE VENDORS
ABBYY; Expert System; Kofax

Text analytics

Definition
Text analytics identifies structures and patterns in text and transforms this into meaningful and useful information to enable more effective strategic, tactical, and operational insights and decision making.

Maturity rationale
Organizations invest in text analytics to analyze their massive stores of unstructured data. But these platforms still need considerable training and tuning to be effective. Vendors now incorporate machine learning and rules-based approaches to achieve better precision.

Business value rationale
Text analytics has wide value across the business. IPA use cases focus on incoming documents, invoices, and emails. This technology is also applied in cognitive search to facilitate information retrieval and in robotic process automation to scale automation.

Unattended-Mode RPA

Unattended-mode RPA often replaces a complete human function in a "lights out" or "batch oriented" manner, creating a virtual workforce (see Figure 12). Primarily for back-office use cases, the unattended robot strips hours of low-value work from employees. Finance and accounting, HR, and line-of-business employees have been the initial targets.

FIGURE 12 Invest: Unattended-Mode RPA

Strategy:
INVEST

MATURITY
↓ Low

BUSINESS VALUE
↑ High

LIFECYCLE COST
**$$**$

SAMPLE VENDORS
Automation Anywhere; Blue Prism; UiPath; WorkFusion

Unattended-mode RPA

Definition
Unattended-mode RPA is automation that replaces a complete human function in a "lights out," batch-oriented manner, creating a virtual workforce, and is generally associated with back-office activities.

Maturity rationale
Back-office use of RPA for scheduled bots has been the primary focus of the initial RPA market. The environments, technology, scale, and process understanding are still developing.

Business value rationale
Unattended RPA reduces low-value tasks and the hours they consume. It will shift staff resources from the back office to more customer-facing tasks but won't materially transform the customer experience. Task automation can make employees more productive, although there's a risk of automating bad processes.

Maintain DPA-Deep, DCM, Workload Automation, And Others

Five of the IA technologies fall into the Maintain quadrant of the Tech Tide, with high maturity and high current business value. Maintain technologies are a mix of broader process stars, such as DPA-deep and workload automation, along with supporting cast members that specialize or enable parts of a process, such e-signatures or API management solutions.

API Management

Forget the API versus RPA debates: Both have a significant role in automation.[10] API management solutions help enterprises create and publish web APIs, enforce their usage policies, control access, collect and analyze usage statistics, and report on performance (see Figure 13).[11] Increasingly, RPA and APIs will work in harmony, the former to connect to core systems that lack APIs and the latter to connect to cloud and more modern automation building blocks.

FIGURE 13 Maintain: API Management

Strategy:
MAINTAIN

MATURITY
↑ High

BUSINESS VALUE
↑ High

LIFECYCLE COST
**$$**$

SAMPLE VENDORS
Google; IBM; Rogue Wave Software; Software AG; WSO2

API management

Definition
API management solutions help enterprises create and publish web application programming interfaces, enforcing their usage policies, controlling access, nurturing the subscriber community, collecting and analyzing usage statistics, and reporting on performance.

Maturity rationale
The API management solutions market is maturing as APIs to support automation for customer engagement, operational excellence, digital transformation, and business agility become an essential part of the automation roadmap.

Business value rationale
API management solutions are a foundation for secure and controlled connections within and across enterprise boundaries. Via mobile apps, chatbots, kiosks, websites, or other engagement channels, APIs are an important part of an enterprise CX strategy.

Customer Communications Management

Adoption of electronic delivery for service communication, often regulated, remains alarmingly low, still approaching only 10% to 20% in mature industries like insurance and banking. Enterprises should be looking to replace monolithic legacy document-generation systems with a set of communication services that support multichannel communications, support mobile viewing of content, and deliver a more personalized and contextual customer experience (see Figure 14).[12]

FIGURE 14 Maintain: Customer Communications Management

Strategy:
MAINTAIN

MATURITY
↑ High

BUSINESS VALUE
↑ High

LIFECYCLE COST
**$$**$

SAMPLE VENDORS
Messagepoint; OpenText; Pitney Bowes; Quadient; Smart Communications

Customer communications management

Definition
CCM is software used to compose, format, personalize, and distribute content to support physical and electronic customer communications and improve the customer experience. CCM software supports content types such as letterhead, invoices, correspondence, marketing materials, policies, statements, and welcome kits.

Maturity rationale
CCM has been around for years, managing service communications between companies and customers and delivering correspondence and recurring statements based on data stored in systems of record.

Business value rationale
Much CCM content is regulated and must be reliably sent and archived. Yet all call-customer touchpoints can add to customer experience. Communicating the right information, at the right time, through the right channel, will vastly improve the experience for customers.

DPA-Deep

Formerly called business process management (BPM), this mature category has been a steady productivity producer. Making programmers more efficient with a full set of integrated developer environments (IDEs) for API connectivity, UI creation, organizational models, task design, and reporting helps construct full and complex process applications (see Figure 15). Headwinds are simple: Long, slow, expensive progress has been the norm for too many efforts. DPA-wide and RPA cloud platforms with process capabilities will gradually chip away at DPA-deep investments.

FIGURE 15 Maintain: DPA-Deep

Strategy:
MAINTAIN

MATURITY
↑ High

BUSINESS VALUE
↑ High

LIFECYCLE COST
$$$

SAMPLE VENDORS
Appian; Bizagi; Hyland; IBM; OpenText; Pegasystems

Digital process automation deep

Definition
DPA-deep is the evolution of traditional business process management (BPM) solutions that handle complex, long-running processes like claims management and that require extensive process routing with the support of specialized teams of developers.

Maturity rationale
Enterprises have long used DPA-deep tools to serve myriad business processes, primarily for structured and production areas such as customer onboarding and invoice processing. Vendors are now adding support for decisioning capabilities or AI and are moving to cloud-first architectures.

Business value rationale
DPA-deep can speed up claims processing by enabling collaboration and information exchange among multiple stakeholders, though process complexity and the high price tag remain challenges to realizing ROI.

Dynamic Case Management (DCM)

DCM is a variant of BPM in that the primary providers are, first and foremost, BPM or DPA-wide providers. But case management is different. It focuses on common patterns for the case lifecycle that are more state transitions than task maps. DCM also introduced the role of "runtime" behavior, which allows case workers more human flexibility rather than being locked down by the software. Predictive analytics to guide state transition has helped case management in areas such as predictive maintenance, government service, and investigations (see Figure 16).

FIGURE 16 Maintain: Dynamic Case Management

Strategy:
MAINTAIN

MATURITY
↑ High

BUSINESS VALUE
↑ High

LIFECYCLE COST
$$$

SAMPLE VENDORS
Appian; IBM; Pegasystems

Dynamic case management

Definition
Case management is a highly collaborative but structured process driven by outside events that require incremental and progressive responses within a business domain (e.g., a lawsuit or an insurance claim).

Maturity rationale
DCM derives from the DPA-deep or the former BPM market. Case management became a real focus in 2010, pushed by the need for more human, as opposed to software, control of process steps. This space is occupied primarily by established enterprise vendors that now use machine-learning predictive analytics for state transitions.

Business value rationale
These tools traditionally have provided value only in select enterprise segments, particularly government and financial services. Management of a case lifecycle as a series of state transitions that allow human direction at prescribed stages has driven value.

E-Signature Platforms

These help with digital transformation, with a focus on the last mile of a transaction that requires formal acknowledgement (see Figure 17). These platforms, in addition to handling basic signing process and required electronic evidence and authentication, have expanded to include forms management, workflow, and other digital transformation aids. Broader process aspirations often stall due to lack of process depth like rules management or expectations for low-code workflow design.

FIGURE 17 Maintain: E-Signature Platforms

Strategy:
MAINTAIN

MATURITY
↑ High

BUSINESS VALUE
↑ High

LIFECYCLE COST
**$$**$

SAMPLE VENDORS
Adobe; Conga; DocuSign; Dropbox; Namirial; OneSpan

E-signature platforms

Definition
This set of tools allows electronic signing of documents and provides setup and administration of the signing process, secure electronic evidence, and prebuilt integrations (APIs) for connection to enterprise applications like Salesforce and to proprietary business systems.

Maturity rationale
E-signature software has become generally accepted for business transactions. It relies on basic and advanced forms of authentication. The area of biometrics is advancing, which will make electronic signatures reach even greater acceptance.

Business value rationale
E-signature reduces paper handling and mail expense and has a customer experience value, particularly for well-implemented mobile solutions. It will raise overall CX.

Workload Automation

More automation exists within systems of record than outside of them. This is no surprise, as that's where the important data resides and where many workers spend most of their time. This software will help schedule, initiate, run, and manage tasks related to business transactions (see Figure 18). It also includes tactical automations; for example, in core banking systems, ERP, CRM, and thousands of custom-built systems. Often added ad hoc, they reduce flexibility yet form the bedrock of the automations we depend on.

FIGURE 18 Maintain: Workload Automation

Strategy:
MAINTAIN

MATURITY
↑ High

BUSINESS VALUE
↑ High

LIFECYCLE COST
**$**$$

SAMPLE VENDORS
Advanced Systems Concepts; ASG Technologies; BMC; CA Technologies; HelpSystems

Workload automation

Definition
Workload automation is software to schedule, initiate, run, and manage tasks related to business processes and transactions often used for batch processing. It also includes tactical automations used within enterprise applications apps such as ERP and supply chain, built with tools provided within those environments.

Maturity rationale
These evolved from older job-scheduling tools and have been played and used for decades. The category also includes core system automation within systems, such as ERP, CRM, and custom-built systems, that have provided value for decades.

Business value rationale
Enterprises maintain these process extensions to address specific productivity gains and pain points, but they're unlikely to result in process innovation. Over time, organizations will need some other form of automation to replace them to move to more real-time and event-based processing.

Divest From Production Capture And Standalone Desktop Automation

Two of the IA technologies fall into the Divest quadrant of the Tech Tide, with high maturity and low current business value. These technologies have helped reduce paper and analog processes for decades and provide low but consistent value. We're seeing the gradual digitization of processes that require less inbound or outbound paper with attendant human support.

Production Capture

Digital acceleration has pushed legacy capture solutions to their limits. The page- and paper-centric pixel mindset of the past three decades has given way to smarter solutions that manage more channels, formats, and pricing models. Capture-on-demand, renewed interest in e-forms, linkage to RPA bots, and mobile capture now define the future (see Figure 19). Capture volume will migrate from batch systems to dynamic and intelligent capture delivered as a consumable cloud service, which we're calling capture-as-a-service (CaaS).[13]

FIGURE 19 Divest: Production Capture

Strategy:
DIVEST

MATURITY
↑ High

BUSINESS VALUE
↓ Low

LIFECYCLE COST
**$$**$

SAMPLE VENDORS
Hyland; IBM; Kofax; OpenText

Production capture

Definition
Production capture is a centralized business solution that uses optical character recognition, scanning technologies, indexing, and image recognition to extract data and meaning from paper and other types of input.

Maturity rationale
Capture and imaging have been around for more than 30 years, evolving from paper to digital inputs. Established vendors and new entrants have innovated with deep learning and natural language understanding to enable greater document intelligence.

Business value rationale
Mature enterprises still abound in paper documents. With capture, enterprises can extract more meaning and higher accuracy than ever before, enabling them to analyze documents at scale and automate existing manual processes.

Standalone Desktop Automation

Before the RPA market exploded and developed central management, there were thousands of small standalone automations built to automate simple tasks on individual desktops and in small workgroups (see Figure 20). These were fine (and are still adding value), but they often use crude screen scraping and lack central control or full design studios for maintenance. As RPA tools mature and enterprises build shared services, they should replace many of these with more scalable and manageable automation.

FIGURE 20 Divest: Standalone Desktop Automation

Strategy:
DIVEST

MATURITY
↑ High

BUSINESS VALUE
↓ Low

LIFECYCLE COST
**$**$$

SAMPLE VENDORS
Microsoft; Option3; Rocket Software

Standalone desktop automation

Definition
Standalone desktop automation is an application that provides simple automations, generally around office productivity tools such as Microsoft Excel or Word macros or standalone automation tools for individual desktops or workgroups.

Maturity rationale
This automation type has high maturity and has been around consistently for decades, with thousands of installations worldwide.

Business value rationale
Standalone desktop automation does provide productivity gains, but over time, it becomes difficult to maintain. Enterprises should replace it with RPA platforms that can provide scale and central management of automations.

Supplemental Material

Methodology

The purpose of the lists of sample vendors we include in the figures about each category is to further clarify the nature of the category — not to serve as a vendor selection shortlist for readers seeking to choose a vendor in that category. The fact that a vendor isn't included in a list doesn't indicate that Forrester believes it isn't worth considering. For guidance about vendor selection, Forrester publishes separate research (Now Tech and Forrester Wave™ reports) in which Forrester analysts offer customized advice to our clients.

Endnotes

[1] For example, we predict that RPA technology will continue to grow rapidly, reaching $12 billion by 2023. See the Forrester report "The RPA Services Market Will Grow To Reach $12 Billion By 2023."

[2] Source: Forrester Analytics Global Business Technographics® Data And Analytics Survey, 2019.

[3] Help your organization determine its own automation maturity level. See the Forrester report "Gauge Your RPA Maturity."

[4] In the table figures (for this category and all others), the purpose of the lists of sample vendors is to clarify the nature of each category, not to serve as a shortlist for guiding vendor selection decisions. Forrester offers other, more in-depth research to guide vendor selection. See the Methodology section of this report for more detail about this.

[5] See the Forrester report "Process Mining: Your Compass For Digital Transformation."

[6] See the Forrester report "Use The Rule Of Five To Find The Right RPA Process."

[7] RPA service providers are made up of global SIs, automation pure-play services companies, and industry-specific platform providers. For a review of these companies, see the Forrester report "The Forrester Wave™: Robotic Process Automation Services, Q4 2019."

GDPR is the EU General Data Protection Regulation.

[8] Forrester has provided two reports on automation strike teams. These are developing in enterprises to reduce redundancy in AI and RPA platforms and provide critical checkpoints for advancing automation. See the Forrester report "Architect Your Automation Strike Teams To Accelerate Transformation" and see the Forrester report "Staff Your Automation Strike Teams With Forrester's Framework."

[9] The market for vendors providing orchestration for diverse automation is nascent. Forrester believes three categories will emerge. For a description of this developing area, see the Forrester report "Architect Your Automation Strike Teams To Accelerate Transformation."

[10] RPA is often used to get to data quickly and doesn't use APIs. It's also used for apps that don't have APIs or use older ones. Enterprise architects argue that APIs are better in the long term to connect across data and that RPA introduces vulnerabilities to applications changes and should be viewed as a short-term solution only.

[11] API management solutions are an important part of any automation strategy. For the latest review of these platforms, see the Forrester report "The Forrester Wave™: Global API Strategy And Delivery Service Providers, Q2 2019."

[12] The future of CCM is not the page-centric approach of the past but rather one that adopts to modern communication tasks. See the Forrester report "The Future Of CCM: Communications-As-A-Service."

[13] For a discussion of capture, see the Forrester report "Vendor Landscape: ECM Providers Gobble Up Capture Technology."

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