451 Research® | PATHFINDER REPORT

Process Discovery, Automation & Intelligence

ESSENTIAL TECHNOLOGIES FOR DIGITAL BUSINESS

COMMISSIONED BY

nintex

JUNE 2019

About this paper

A Pathfinder paper navigates decision-makers through the issues surrounding a specific technology or business case, explores the business value of adoption, and recommends the range of considerations and concrete next steps in the decision-making process.

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Executive Summary

In a recent cross-industry research survey of 362 global business and IT leaders, we asked about their technology plans to enable digital business. Among the questions were, 'How important is a unified digital automation platform capable of user interface design, application development, workflow and process automation, rules and policy management, deployment/runtime, and ML/AI to your digitization efforts?' Of the respondents, 51% said it was very important and absolutely needed, while 19% said they already had such capabilities.

A digital automation platform (DAP) is a set of tools and resources structured within a uniform framework to enable developers and business professionals to rapidly design, prototype, automate, deploy, manage and monitor business process applications – from simple task-related workflows to dynamic unstructured collaborative activity streams, and even highly structured cross-functional enterprise business processes. DAPs are likely to be the 'go to' platforms for much line-of-business application development and process automation due to their low-code/no-code configurability, relative ease of use and rapid time to deployment.

Aiding DAPs will be innovations in workforce productivity tools. The confluence of cloud, mobile, artificial intelligence (AI) and machine learning (ML) is disaggregating traditional business systems and recomposing their constituent parts into new products and new market segments. With this shift has come the fundamental rethinking of workforce productivity tools, of the user experiences they are enabling, and of the business outcomes they achieve. It's more than a shift to the cloud; it's the reformatting of the work management and planning, content management, collaboration and communications, asset creation and workspace market segments. The resulting new types of work execution tooling will provide many of the integration points and context for work automation through DAPs.

Automation and productivity tools will be supplemented and enhanced with new methods and technologies that treat business processes as strategic assets and analyze them for effectiveness and efficiency to reveal new opportunities for improvement and automation. Among them are process asset management tools used to document and manage essential requirements of process design, execution and outcomes. Process mining technology and business process analysis software will enable detailed visualization and examination of process structure, hierarchies, decisions, policies, rules and tasks to improve the quality and efficiency of process flow and outcomes. They will feed ML/AI technologies to expose previously unforeseen patterns or insights to enable contextual, predictive and intelligent process automations.

Robotic process automation (RPA) technology has recently emerged to create software robots 'bots' that automate repetitive human activities within business processes, calling upon ML/AI tools to interpret unstructured data, automate intersystem data exchange and help guide automation results. RPA will bring intelligent skills that supplement human workforces with 'digital workers' – bots that aid in visual perception, learning, planning and problem solving. They will coexist and interoperate with DAPs charged with more comprehensive enterprise automations and outcomes.

In the current digital business era, the need to quickly respond to customer expectations and the actions of determined rivals demands a persistent transformative approach – one that discovers and automates efficiencies, crafts intuitive user experiences and intelligently adapts when needed. These will be the roles of the emerging generation of discovery, automation and intelligence tools – essential technologies to better engage customers, continuously improve and adapt operations, and support new business models – modern phenomena that many now refer to as 'digital transformation.'

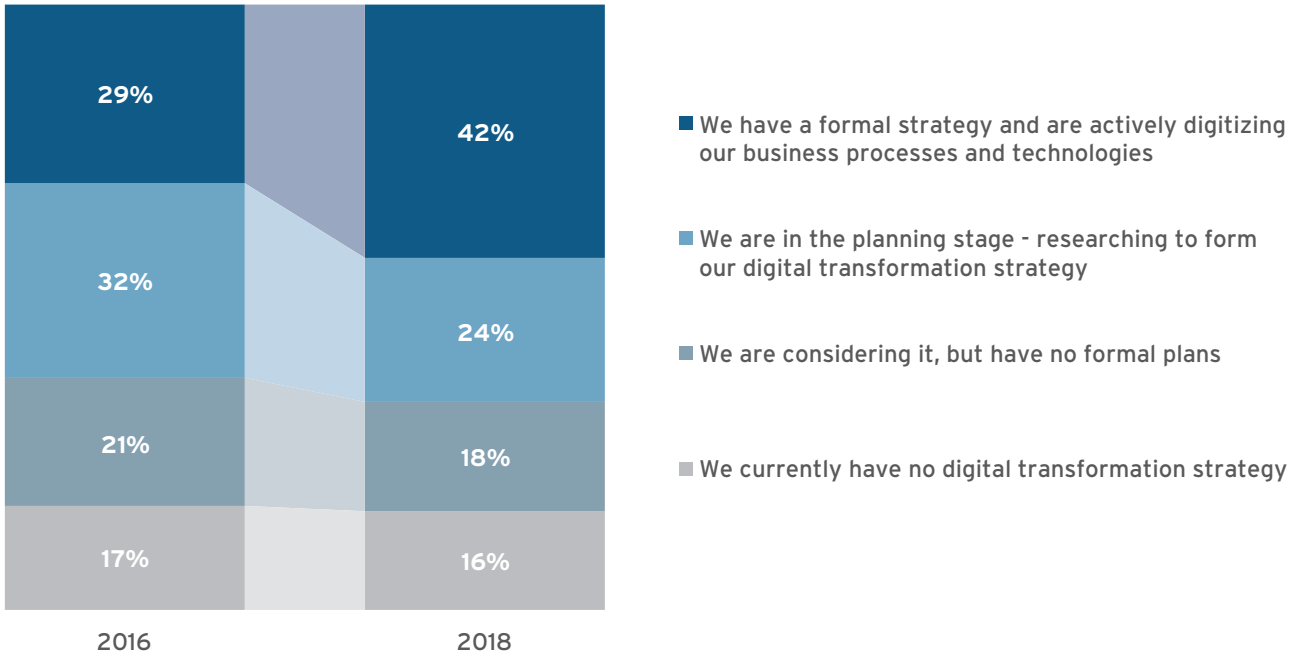
The Era of Digital Business

Today's modern enterprises are under persistent threat of digital disruption. All now seek ways to transform to digital businesses that exploit innovative technologies to improve the customer experience, enhance workforce productivity, increase operational efficiency, and adapt when threatened by rivals and new market entrants. The era of digital business is driving tectonic IT shifts toward process automation, agile cloud- and mobile-first application development, continuous integration and delivery (CI/CD), and the assimilation of IT operations into more efficient DevOps organizations, among others.

Leading enterprises now seek an ongoing transformative approach – one that exploits these tectonic IT shifts, automates the delivery of customer value, and crafts new and unique competitive advantages over rivals. In fact, the pace toward transformation has been accelerating. Figure 1 illustrates that of the 518 enterprises polled in a recent survey, 42% have a formal digital transformation strategy in place, up from just 29% two years prior.

Figure 1: Strong shift in businesses with formal digital transformation strategies

Source: 451 Research's Voice of the Connected User Landscape, Digital Transformation Survey, 2H 2018
Q: Which of the following best describes your organization's status regarding a digital transformation strategy? (n=518)



The State of Digital Transformation

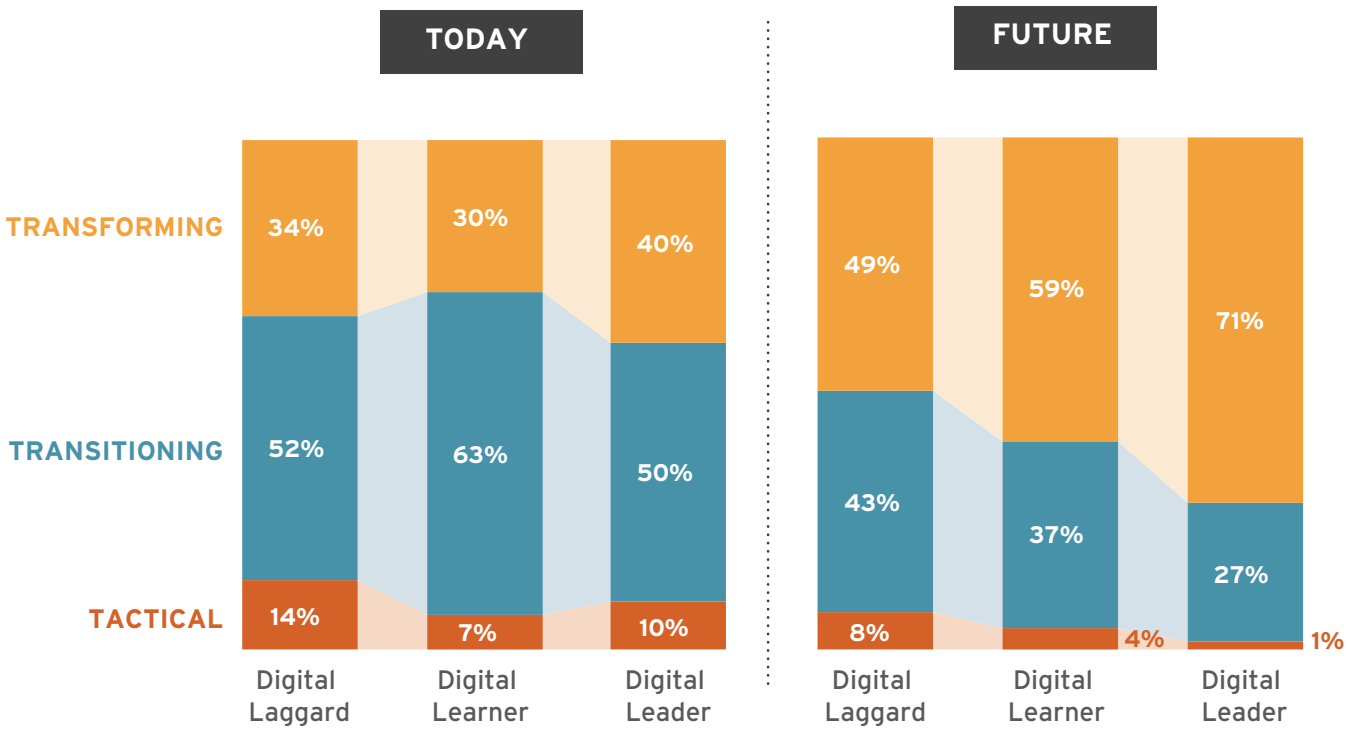
Enterprises can pursue digital transformation strategies in several ways. A 'transforming' approach is one that seeks to innovate new businesses and new business models. A 'transitioning' approach enables new efficiencies using modern technologies and methodologies. A 'tactical' approach is one that responds to specific opportunities posed by customers or responds directly to the challenges of rivals.

Among the key priorities of Digital Leaders is the need to reduce if not eliminate manual processes. In the same survey, we asked respondents to estimate the current level of manual processes today vs. what they expect in the future as a result of their company's digital transformation strategy. Figure 2 reveals that Digital Leaders pursuing a transforming approach seek to eliminate as much as 71% of their manual processes in the near future. Regardless of the approach, all enterprises – even Digital Laggards – seek to aggressively eliminate manual processes.

Figure 2: Powerful motivation to eliminate manual processes

Source: 451 Research's Voice of the Connected User Landscape, Digital Transformation Survey, 2H 2018

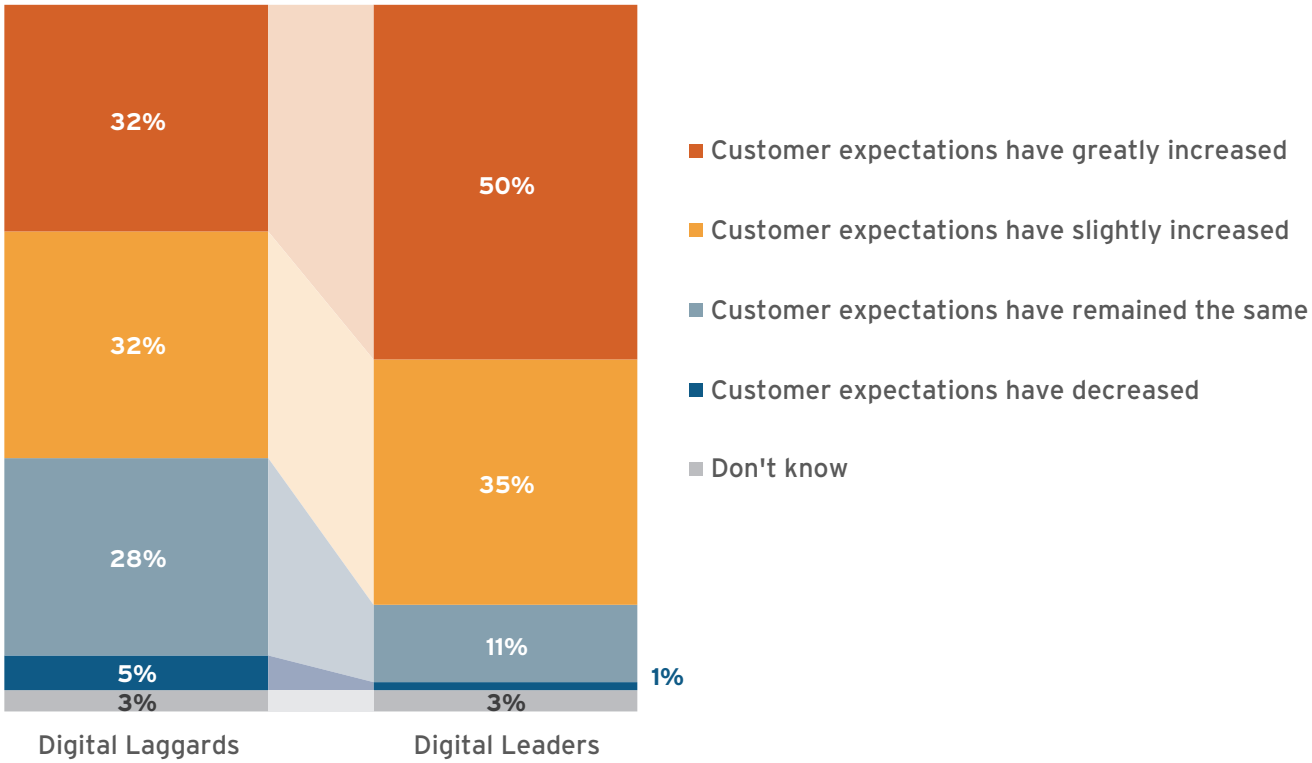
Q: On a scale of 1-10, estimate the current level of manual processes today vs. what you expect in the future as your company embraces digital transformation strategies. (n=518)



Another common goal for all enterprises, whether they are Digital Leaders, Learners or Laggards, is to respond to ever-changing customer expectations. Figure 3 illustrates that half of the Digital Leaders acknowledge that customer expectations are greatly increasing. Even one-third of Laggards acknowledge that their customers expect more from them.

Figure 3: Rising customer expectations drive change

Source: 451 Research's Voice of the Connected User Landscape, Digital Transformation Survey, 2H 2018
Q: Has your organization faced rising customer expectations over the past few years? (n=518)



There are many reasons why customer expectations change. Among the most threatening, though, is when customers' buying criteria are influenced or outright changed by the actions of market rivals. When this occurs, incumbents must engage a retaliatory response to gain new competitive advantages.

COMPETITIVE ADVANTAGE AND MANAGING PROCESSES AS ASSETS

While there are many ways to create competitive advantage, the study of modern industry-leading enterprises reveals a common denominator. These firms do the same things as their rivals – but differently, or they do different things that customers acknowledge as superior to rivals and, thus, award those firms their business. In other words, 'how' an enterprise delivers value that customers recognize as superior determines its competitive advantage and thus market success (or lack thereof) – and another word for 'how' is 'process.'

From this one might conclude that enterprises would manage business processes as strategic assets. Sadly, this is often not the case. Business processes are codified in and across applications, but rather than treating the processes as assets, enterprises treat the applications used to execute the processes as assets. Indeed, under these circumstances, appropriate process behavior, performance and outcomes can get lost, become invisible and consequently difficult to analyze and improve, especially when processes transcend multiple distributed applications and execution venues (e.g., runtime environments – on-premises, in and across clouds).

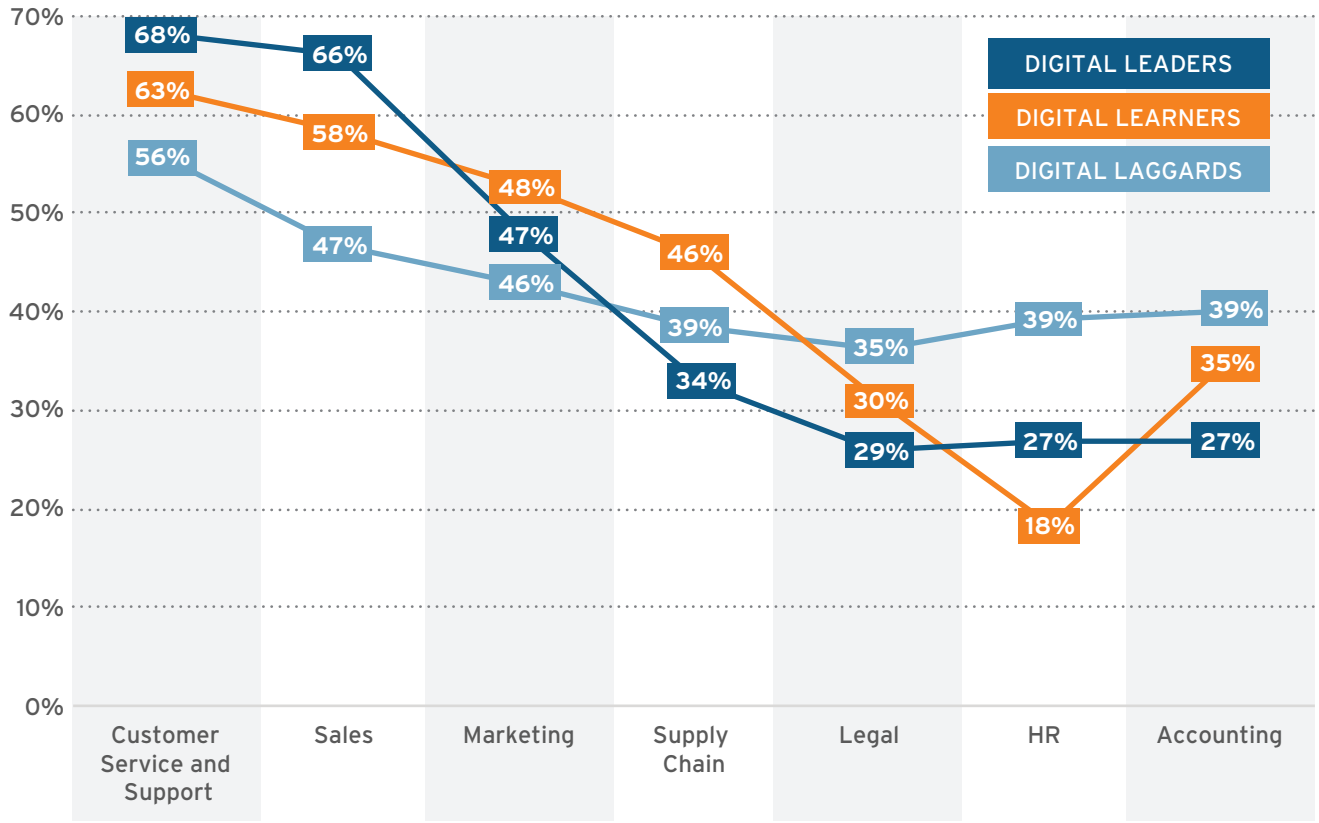
This is particularly relevant for customer-facing processes and systems that need to be engaging and intuitive, certainly more so than those of rivals. It is also true for the systems and processes that must help the workforce and partners work smarter to become more effective and efficient at what they do. We believe enterprises engaged in digital business strategy must now think and manage processes as core strategic assets designed to continuously enable new competitive advantages.

The Power of Empowered Customers

We are encouraged to report that this is beginning to occur. Figure 4 reveals that all Digital Leaders, Learners and Laggards rank customer service and support as the top priority. Indeed, what self-respecting company would have it any other way.

Figure 4: Customer-facing processes lead digital transformation initiatives

Source: 451 Research's Voice of the Connected User Landscape, Digital Transformation Survey, 2H 2018
Q: As you plan your digital transformation strategy, please rank in order of importance the company processes most important. (n=518)



While many transformative initiatives extend digital services to existing and prospective customers, the role and capabilities of the workforce behind the digital devices will also change when equipped with new and essential technologies for digital business.

The New Forces of the Workforce

The emergence of new ways to automate and manage processes and derive new types of value from other workforce tools offers new ways to think about what work actually looks like. Greater connectivity, integration and automation across application platforms and workforce tools are giving rise to the prospect for more seamless and continuous execution of many work scenarios that are fragmented across different systems, are full of friction, or are currently not structured in any way. We call this WorkOps and believe it will transform how businesses think about designing and automating work and the kinds of experiences and outcomes that will become possible.

This will necessitate new types of product value for the workforce. Our research indicates that topping employees' list of desired improvements in their work experience are better ways to plan and organize their work and better ways to collaborate around that work. Interest is growing, for example, in finding new ways to better visualize work, to model it, contextualize and personalize it. New ways to automate work – especially work that is unstructured or poorly structured – is a key basis for how to better plan, visualize and model around it. These changes are also driving a renewed focus by enterprises to support a positive employee experience. Going forward, WorkOps tooling must emphasize and enable new ways to motivate, connect, support and represent all manner of workforce users.

Essential Technologies for Digital Business

Several essential technologies to enable agile and adaptive digital businesses are becoming widely used by leading enterprises. Among them are process asset management tools; process discovery and analysis software; digital automation platforms and workforce productivity tools; and robotic process automation technologies.

Process Asset Management

Industry-leading enterprises make a concerted effort to manage processes as assets. Their approach includes taking stock of processes – inventorying, documenting and managing them within business process portfolios where they can be properly classified, prioritized, documented and examined for continuous improvement. However, until recently, the practice of process asset management (PAM) typically required manual exercises to diagram visual models of 'as is' process workflows. Tools to do so were either too narrow (e.g., spreadsheets, Visio) or too complex (enterprise architecture management software). From there, experimentation with design alternatives eventually led to 'to be' process improvement, but often only temporarily. Things change over time, and the entire effort is likely to repeat, making the exercise fraught with inefficiency and redundancy.

A variety of PAM software has emerged to document and keep pace with changes, helping to manage processes as a portfolio of assets. They offer collaborative process mapping capabilities designed for non-technical users and process stakeholders to document, control and govern processes. They assist with education, training and coaching, version control and change management, and they can be used to craft improved process redesigns.

The use of PAM tools is accelerating, driven by the need for enterprises to transform to digital businesses and the increased use of DAPs, workforce productivity tools and RPA technologies to modernize existing and craft new business processes. However, some legacy business processes are deeply embedded in multiple applications and systems, making them difficult to document, analyze and modernize. New means have emerged to better automate process discovery.

Process Discovery and Analysis

Over the years, mature enterprises have procured, developed and implemented countless software applications. Codified in and across these applications are business processes. But, as noted earlier, when applications – rather than the processes themselves – are treated as assets, process behavior, performance and outcomes become invisible and difficult to analyze for improvement.

Process mining technology (PMT – also referred to as process discovery technology) is used to automate the tasks needed to visualize and understand how current business processes execute and perform. They track, capture and aggregate the event logs recorded and stored by operational systems used to execute business processes. They then organize the data to create a visual map of the process.

PMT offerings usually include analysis tools that expose critical paths (the most common and efficient means to execute the process) and can reveal variances or deviations that affect process performance and outcomes. PMT enables process owners and stakeholders to examine process structure, hierarchies, decisions, policies, rules and tasks to improve the quality and efficiency of process flow and outcomes.

In general, there are two types of mining tools: process mining and device mining. Process mining tools visualize business processes as they execute within or across distributed applications. Device mining tools monitor user behavior and interactions with multiple systems via desktops or other devices. The former can help automate business processes using digital automation platforms while the latter aid in robotic process automation project discovery and task automation.

The output of PMTs can be consumed by business process analysis (BPA) tools and ML/AI models to expose insight into execution, performance and outcomes that can drive improved alternative process and bot designs. BPA tools can instrument, monitor, measure and analyze processes as they execute. Routine capabilities of BPA help expose and examine process cycle times, lapse times, idle times, bottlenecks and path diversions, among other metrics needed for troubleshooting, root-cause analysis and remediation efforts.

BPA can reveal which processes are automated, what functions they perform, when and how often processes run, who's involved in the process, what content is accessed, how effective the processes are when compared to key performance indicators, and how they might be improved. BPA tools equipped to examine data payloads within workflows can also be useful for higher-order business activity monitoring or for aiding in business intelligence gathering.

Digital Automation Platforms and Workforce Productivity Tools

In recent years, various workflow, business process management (BPM) suites, enterprise content management (ECM) software and other application development environments began to transform and converge into smarter process- and content-oriented application development and runtime platforms. They now enable a 'low-code/no-code' approach that uses graphical drag-and-drop tooling and preconfigured templates to compose, rather than code, applications. Some add analytic tools to interpret context and make recommendations. These next-generation development environments we now call digital automation platforms.

A DAP is a set of tools and resources structured within a uniform framework to enable collaboration among developers and business professionals to rapidly design, prototype, automate, deploy, manage and monitor business process applications – from simple task-related workflows to dynamic unstructured collaborative activity streams, and even highly structured cross-functional enterprise business processes.

DAPs include new resources to assist in user interface and application design; synthesize the use of new and emerging technologies found in next-generation devices; and simplify the means for collaboration among business and IT professionals to jointly design, prototype and develop applications. They can make applications 'smarter' using ML/AI technologies that can learn from process execution to improve automation of tasks and decisions, and extract insight from data payloads. In doing so, they enable intelligent process automation – an application development discipline focused on intuitive user experiences, contextual awareness and transparent (instrumented, measured and controlled) execution. While DAPs were evolving from earlier BPM and ECM systems, a new type of workforce productivity software – which we call a workforce intelligence platform (WIP) – was evolving as a subset of the DAP market.

Two macro trends have upended the traditional assumptions about workforce productivity technologies. First, as businesses look to implement their own digital transformations, they are looking for greater strategic and operational agility. One of the terms we use to describe this is 'the liquid enterprise.' As a result, ownership of work execution is being decentralized – moving away from IT and toward teams of specialists, business teams and individuals. The second macro trend is the techno-empowerment of individuals – rapid advances in smart devices, software, applications and connectivity open new possibilities and expectations in the personal lives of all. 'WorkOps' describes how this empowerment will play out across the workforce; it engenders new possibilities for collective and connected yet highly personalized work execution that allow individuals to fulfill their potential. This radically different future for work is big enough for us to have to rethink how to understand and describe it. The WorkOps approach and the WIP technology that we believe are needed to do so must more closely balance employee productivity with organizational execution.

Architecturally, a WIP will be composed of integrated tools and systems capable of constructing a common Work Hub for all workforce types (employees, partners, contractors); a Work Graph acting as a common database and metadata repository for all productivity tools and systems; Work Streams designed to execute enterprise and various line-of-business functions; and a Work Mesh that provides hybrid integration and automation of Work Streams. Such a framework must be crafted to motivate, connect, support and represent all manner of workforce users and, thus, enable a WorkOps approach to business. A new technology has emerged that we believe can facilitate WorkOps and perhaps also assist workers to fulfil their potential.

Robotic Process Automation

Robotic process automation is a relative newcomer to the digital business. RPA technology creates software bots that supplement business processes by automating repetitive human tasks, such as interpreting unstructured data, and automating cross-application data exchange not otherwise enabled within DAPs or other workforce productivity software. RPA platforms use ML/AI technology to add intelligent skills to bots that can aid in visual perception, learning, planning, problem solving and revealing insights to unstructured and semi-structured data (e.g., images, video and audio chat dialogs). Bots so equipped are sometimes referred to as 'digital workers.'

RPA is designed to improve operational performance of the digital business by reducing errors, cost and cycle times; to improve business performance toward desired outcomes; and to perform tasks at scale that otherwise might overwhelm a human workforce. Some believe RPA is intended to supplant rather that supplement the workforce. On the contrary. Savvy C-level executives understand the growing importance of having a 'smarter' workforce, especially those threatened by aggressive digital business rivals. We believe when properly implemented, the skills embodied in bots will empower the workforce to engage customers and perform operations differently – or in different ways – that fulfills their potential and simultaneously creates new competitive advantages.

Future State of Digital Business Technologies

The lightspeed pace of business and IT toward digital business today requires enterprises to accelerate the development and deployment of intuitive, contextual and intelligent applications. In the near term, DAPs will be used to automate workflow and improve upon more complex structured processes and unstructured collaborations. Moreover, they will evolve to include PAM capabilities to document processes and manage them as a portfolio of strategic assets. RPA technology will be used to automate repetitive manual tasks and supplement workforces with digital skills. DAPs and RPA will coexist and interact with one another.

However, longer term, we believe RPA vendors are less likely to survive as stand-alone platforms. Many are likely to be subsumed into other platforms, including application development environments, DAPs and potentially platform-as-a-service offerings. RPA vendors with adaptable tooling to support a broad range of ML/AI models and algorithms stand a better chance as viable independent vendors. Such RPA vendors are likely to merge with or acquire DAP vendors to create more holistic automation offerings.

The use of PMT and BPA for automated process discovery, visualization and analysis will continue to accelerate. Enterprises need automated means to rapidly determine how best to improve processes to enable competitive advantage.

DAPs will continue to to evolve to make processes more contextual, predictive and in some cases autonomous. Such intelligent process automation will be enabled by DAPs that support decisioning and predictive modeling technologies. Some DAPs are beginning to include support for standards such as decision model and notation (DMN) and predictive modeling markup language (PMML). DMN separates decision-making tasks from process designs so the two can be codified and modified independently. It will be used in complex process design subject to many rules, policies and compliance requirements. PMML enables the definition and sharing of predictive models between applications. A predictive model is a statistical model (algorithm) that is designed to predict the likelihood of events given established variables or factors. They enable applications to become contextual while being executed and predict probable events.

Workforce productivity tools also will evolve from simple file share, workflow and collaborative activity streams. Their course will be guided by a WorkOps strategy that empowers individuals and personalizes work. The tools will be enabled by a fluid and adaptable WIP architecture that will support, interoperate and complement DAP and RPA platforms. In so doing, these technologies will enable what our research foretells as the coming 'liquid enterprise.' All the technologies are essential to enable a digital business, but unless business processes are truly managed as a portfolio of strategic assets, competitive advantage in the eyes of customers may not be realized.

Digital Business Use Cases

What follows are the processes that enterprises commonly seek to improve and automate via a digital transformation strategy.

By Horizonal Functions

- Customer service and support processes include request-to-resolve (respond to and manage customer order requests/inquiries/complaints); solicit, measure and analyze customer satisfaction data and identify improvement opportunities; and provide customer feedback to product management.
- Sales and marketing processes include demand generation (linking sales, marketing and analysis efforts); order acquisition (for customer onboarding and order capture); order-to-cash (ensuring accurate and timely delivery, settlement and payment); opportunity management; discount approvals; and sales support requests.
- Supply chain processes include source-to-pay for direct and indirect material procurement; capital asset requests and provisioning; engineering changes; and logistics and transportation.
- IT processes include helpdesk support, equipment requests/provisioning, service requests/provisioning, device management and compliance policy management.
- Human resource processes include employee recruitment, employee onboarding, training and performance review.
- Finance processes include purchase requests, budget forecasting, invoice processing, and accounts receivable.

By Vertical Market

- Insurance industry processes include policy underwriting, claims processing, payment delinquency and customer services.
- Banking industry processes include client onboarding, loan origination, compliance and account closure.
- Healthcare industry processes include physician contacting, patient onboarding and medical asset services.
- Manufacturing industry processes include regulatory approvals, product quality, equipment service and supplier onboarding.
- Public sector processes include public records management, license application, proposal management and incident management.

Conclusion and Guidance

In today's markets, digital business is all about enabling new competitive advantages. Competitive advantage can be achieved by conducting business in ways that prospects and customers recognize as superior to rivals and, as a result, they award you their business. 'How' an enterprise delivers customer value determines its competitive advantage, and another word for 'how' is 'process.'

The essential technologies needed for digital business treat business processes as a portfolio of strategic asserts. They include next-generation capabilities that enable process discovery, mapping/documentation and analysis, process and robotic automation tooling, and means to extract intelligence from process automation and execution to improve outcomes.

We believe enterprises need to do to a better job of managing business processes as strategic assets, rather than just managing the applications that run processes where process behavior, performance and outcomes can get lost. Enterprises must:

- Inventory and evaluate business processes for risk and value to their customers and operations.
- Categorize them by user groups such as customers, the workforce and business partners.
- Select those processes core to customer value creation and assess their ability to do so.
- Correlate the applications that compose each business process (many processes transcend multiple applications).
- Determine those processes and applications that need modernization and begin redesign (i.e., digital transformation).

Enterprises that have not already done so should examine the new crop of discovery, automation and intelligence technologies discussed in this report. They should then compare their respective capabilities to the current IT tools used to fulfill a digital transformation strategy. Finally, they should refactor and modernize using these essential technologies to empower their digital business to continuously create new competitive advantages.

About 451 Research

451 Research is a preeminent information technology research and advisory company. With a core focus on technology innovation and market disruption, we provide essential insight for leaders of the digital economy. More than 100 analysts and consultants deliver that insight via syndicated research, advisory services and live events to over 1,000 client organizations in North America, Europe and around the world. Founded in 2000 and headquartered in New York, 451 Research is a division of The 451 Group.

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