

Market Guide for Process Mining

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New forms of automation (e.g., robotic process automation) and knowledge of the underlying processes/interactions are key to digital transformation. Process mining helps enterprise architecture and technology innovation leaders assess operations and performance, increasing these initiatives' value.

Key Findings

- Traditional process discovery and modeling is costly and time-consuming, because of gaps in business knowledge, a lack of objective validation techniques and poor formalisms.
- Formal standard operating procedures, policies, work instructions or best practices baked into enterprise applications are often compromised by informal behavior that bypasses governance.
- The business value of process automation initiatives is often unclear. The assumption is that the actual operational data is available only after automation, leading to a business case based on estimated or poor operational data, and an initiative with limited sustainable business value.
- Task-level automation (e.g., robotic process automation and Internet of Things capabilities), can deliver short-term success, but without an understanding of the process or operational context, these initiatives lose their relevance.

Recommendations

To drive business transformation and optimization through technology innovation, enterprise architecture and TI leaders must:

- Improve visibility and understanding of the actual performance of business operations and processes, by investing in process mining.
- Create awareness and inspire business and operational colleagues on the benefits, capabilities and use of process mining, by introducing small, short-term pilots to create valuable insights.
- Explore use cases that go beyond traditional, internally focused process discovery, process validation and model enhancement by targeting business operations and interactions with

external parties, such as customers. This can be seen as “customer journey mining,” opening up an entire new audience, and aligning customer journey maps with internal process maps.

- Assess the required scalability of the process mining initiative by defining the intended users of the process mining results, and defining the volume, frequency pattern and concurrence of the mined operational data. This will help tool selection, because vendors target different scalability.

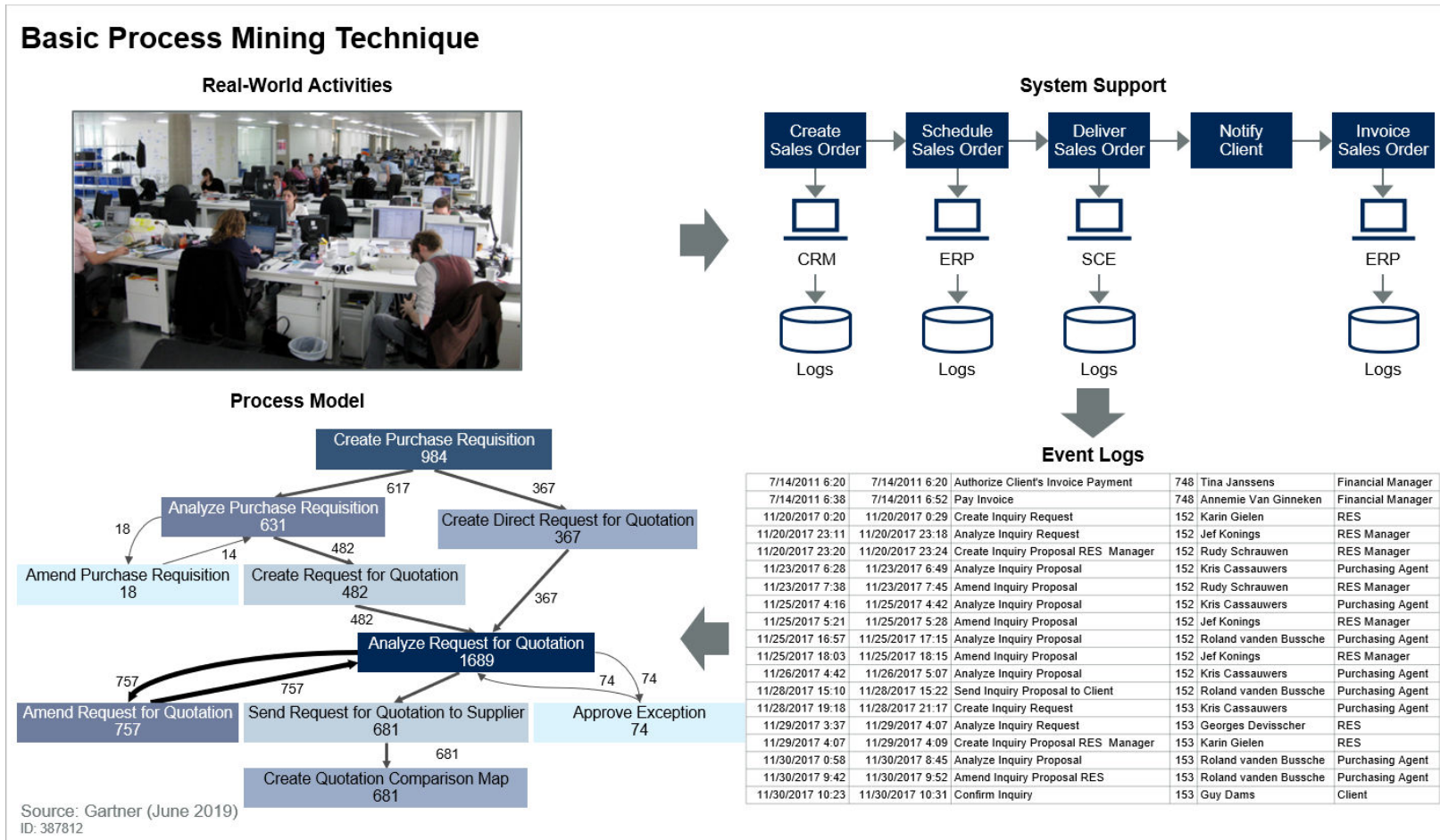
Market Definition

Process mining is designed to discover, monitor and improve real processes (i.e., not assumed processes) by extracting knowledge from event logs readily available in today’s information systems. Process mining includes automated process discovery (i.e., extracting process models from an event log); conformance checking (i.e., monitoring deviations by comparing model and log); social network/organizational mining; automated construction of simulation models; model extension; model repair; case prediction; and history-based recommendations.^{1,2}

Market Description

The starting point for any process mining task is an event log. Each event in such a log refers to an activity (i.e., a well-defined step in some process) and is related to a particular case (i.e., a process instance). The events belonging to a case are ordered and can be seen as one “run” of the process. The sequence of activities executed for a case is called a trace. Figure 1 reflects a simplified representation of the basic process mining technique.

Figure 1. Basic Process Mining Technique



Based on well-supported constructs in academic research, these techniques have moved beyond the boundaries of academia. Software vendors have packaged the techniques in easy-to-use graphical toolsets. Vendors often provide these toolsets with additional services, featuring opportunity detection, implementation, interpretation and best-practice approaches.

In 2009, the Institute of Electrical and Electronic Engineers (IEEE) has established a Task Force on Process Mining. In 2011, it published a manifesto to promote the topic. In the context of this task force, a group of more than 75 people involving more than 50 organizations created [“The Process Mining Manifesto.”](#) By defining a set of guiding principles and listing important challenges, this manifesto serves as a guide for software developers, scientists, consultants, business managers and end users. Its goal is to increase the maturity of process mining as a new tool to improve the redesign, control and support of operational business processes.

At approximately the same time, one of the fathers of process mining, Professor Wil van der Aalst, published the first book on the subject in 2011. In 2016, an updated and extended version of the book appeared, entitled [“Process Mining: Data Science in Action.”](#) Wil van der Aalst also presented a successful massive online open course (MOOC), with more than 115,000 people from more than 190 countries participating.

We have included responses from our interview with Professor Wil van der Aalst (see Note 3), discussing the process mining market. The biggest value accelerator for process mining was the collaboration of process mining vendors with well-known enterprise applications, such as SAP, Oracle and Salesforce. These vendors have heavily promoted process mining to improve the efficiency of these applications. Finally, process mining has moved into areas other than process discovery, such as conformance checking, productivity improvement, customer interactions and social networks. It has even spread into areas of the Internet of Things (IoT), manufacturing and logistics distribution networks, which have demonstrated the sustainable value-creating capabilities of process mining. Recently, we have seen evidence of process mining providing one of the cornerstones of a companywide digital transformation initiative.

Gartner started to report on process mining in 2008 as automated business process discovery (ABPD). We pointed out that ABPD can complement traditional business process discovery, help process analysts better understand the dynamics of business processes and improve the quality of process models. It consisted of two steps:

- One phase focused on process selection and prioritization, which clearly sets the improvement goals
- A second process-information-capturing step

At that time, we argued that business modeling should precede business process modeling. Determining why an organization performs certain activities is often neglected between scoping process improvement initiatives and beginning process modeling and analysis. Developing a complete business operating model based on the optimization of value and asset utilization can provide a reference model for business processes. Such a model indicates where enterprise value is created in different parts of the organization and how high-level processes affect that value creation. This will lead to quicker savings and more long-term business value than the traditional approach of

first creating a detailed business process model (see “Automated Business Process Discovery Improves BPM Outcomes”).

During the past few years, we have had extensive interaction with end-user clients, have had many contacts with the academic researchers (yearly academic business process management [BPM] conferences) and have conducted a survey with most of the process mining vendors. Given this background, we had identified 10 capabilities for process mining in the previous version of this process mining guide. Because this market is evolving rapidly as the awareness of process mining increases exponentially, we have adapted common characteristics and have identified 10 revisited capabilities for 2019:

- **Models of processes, exceptions and process instances (mostly referred to as “cases”), and employee interactions** — automated discovery of process models, exceptions and process instances, together with basic frequencies and statistics
- **Support for customer interactions, customer journey maps and related analysis** — automated discovery and analysis of customer interactions, as well as alignment with internal processes
- **Support for activities that have no structured transactions or log files (productivity tools, such as email and Microsoft Excel) and manual activities** — extending the data capture capabilities beyond structured log files
- **Conformance-checking and gap analysis capabilities** — capabilities to check conformance, not only graphically through overlays, but also through data analysis and performing gap analysis
- **Intelligent support for process model enhancement** — enhancing or extending existing or a-priori process models by using additional data from the recorded logs
- **Data preparation and data cleansing support, supporting big data** — different ways to handle data
- **Real-time dashboards with support for key performance indicators (KPIs) that are continuously monitored and enable decision support** — real-time or near-real-time connections to continuously monitored and adapted KPIs in dashboards for specific roles in the organization
- **Predictive analysis, prescriptive analysis, scenario testing and simulation** — advanced analysis capabilities that use contextual data
- **A platform that extends process mining capabilities across different processes with advanced analytic and decision management capabilities offering APIs to create process mining apps** — enables organizations/partners in the process mining vendors to create applications (e.g., financial auditing tools)
- **Support for the interaction of different processes (not instances of the same process) and how these processes (or cases) interact at the same workstation, workplace or desktop**

- interdependencies of tasks on workstations, workplaces or desktops or for knowledge workers

Enterprise architecture (EA) and technology innovation (TI) leaders should realize that not all process mining vendors will support all features. Because of the emerging nature of some of the use cases and the underlying discipline, many suppliers have gaps in their process mining offerings. Some of these process-related capabilities and features may be available as part of other types of products, such as enterprise business process analysis platforms and automated testing tools. However, here, we consider only vendors and tools that provide process mining as a stand-alone offering capable of addressing all or most of the use cases.

Market Direction

Adoption

Gartner sees four main drivers for the adoption of process mining.

First, digital transformation drives growth in business users' awareness of the benefits of analyzing and understanding their own processes and business operations in a broader enterprise context (see "A CIO's Guide to Gartner's Digital Business Research"). This is occurring as digital business and digital transformation become major themes, and because processes are important constituents in the operationalization of these digital business initiatives. Furthermore, in this era of digital business, EA and TI leaders need a way to reflect on how these new technological capabilities can provide value to the business and, ultimately, to the customer. Again, it's here that analyzing business operations, processes and customer interactions can show how and where to activate these capabilities to create business value.

The initial, critical discipline of BPM provides, from a business perspective, the visibility needed to gain a shared business understanding of the process. This understanding can become a springboard to making processes more effective and allowing them to be changed more rapidly. In enterprisewide digital transformation initiatives, it's important to align and adapt these processes with client interactions to attain the targeted business outcomes.

Second, algorithms and several waves of artificial intelligence (AI) have been at the core of computing for decades. However, the ability to develop algorithms that act on vast amounts of data to identify patterns creates new opportunities (see "Maximize Digital Business Value Creation Through AI Algorithms"). In the digitalized economy, business algorithms deliver new sources of value in business ecosystems. With the use of AI and advanced machine learning algorithms, data acquires meaning, and new and powerful insights can be derived from it.

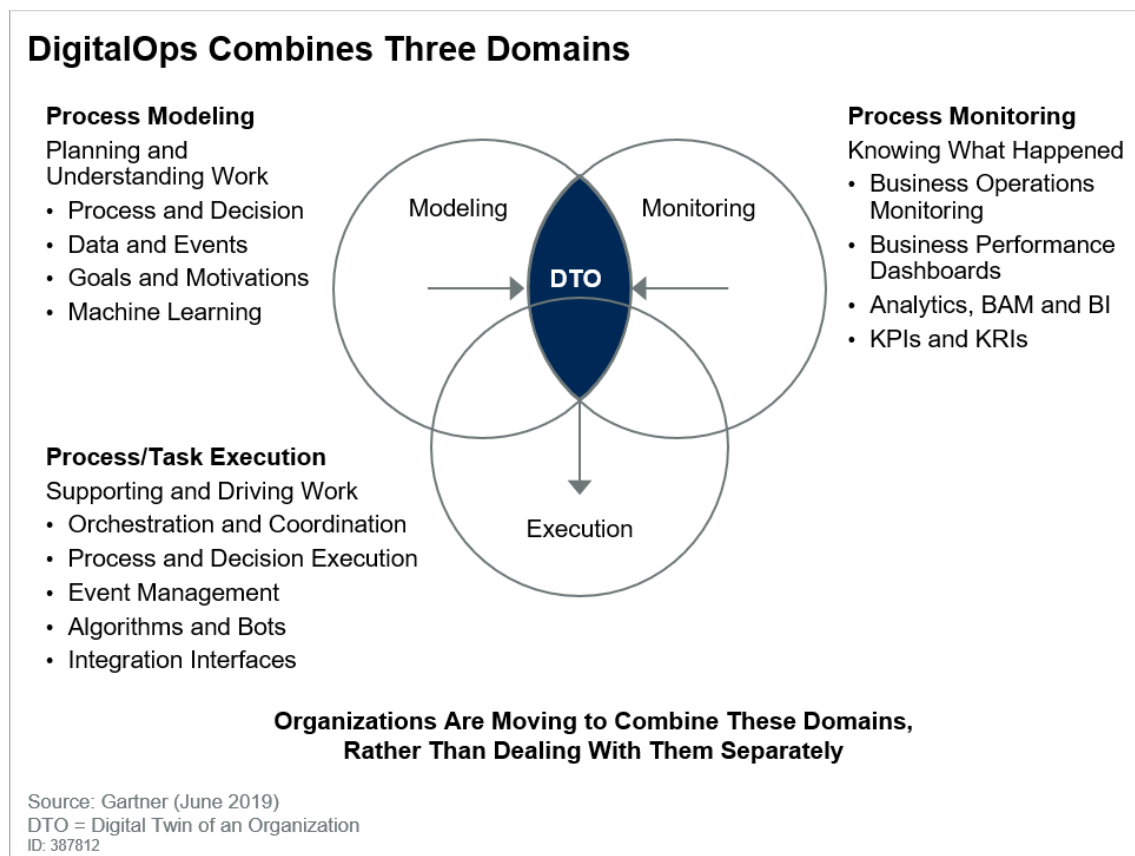
A powerful example of this data science in action, process mining shows how algorithms can be used as mechanisms to capture knowledge and insight in a packaged form that can be simply reused in a consistent fashion. EA and TI leaders must focus more precisely on those instances in which algorithms are providing the insight, and have become pivotal to competitive differentiation. They are recognized for their value contribution.

Third, the current hype around task-level automation, such as robotic process automation (RPA), has resulted in large one-off cost savings. Usually, this is related to specific conditions in which people work on repetitive, data-centric tasks, mostly because of the lack of APIs for old legacy systems. Preferably, these tasks are embedded in processes that are fixed for the next five to 10 years. However, in most cases, tasks are part of processes and operations for which change is the most common characteristic.

By accurately assessing the processes to which these tasks belong, we can identify “hot areas” in the organization, where a lot of effort is wasted in repetitive tasks. Then, we can see whether these tasks can be partly or fully automated via RPA. This is where process mining can complement RPA perfectly to offer a wider context and help implement this task automation. This results in long-term sustainable business value and averts the shortcomings of a short-term perspective focused on large, one-off cost savings.

Finally, a rather new driver for process mining can be seen in the emerging area of DigitalOps (see “DigitalOps Helps Connect Business Models to the Digital Business Platform”). Leading organizations are carefully managing the different process models and past performance data. Combining these process and decision models (see “Develop Good Decision Models to Succeed at Decision Management”) with the situational context of work helps control and optimize the execution of work in real time. It’s this combination — the blending of process modeling and performance monitoring to support direct execution and real-time optimization on the digital business platform — which Gartner calls “DigitalOps.” Process mining can provide these process models and measurements continuously and accurately.

Figure 2. DigitalOps Combines Three Domains



Five Common Use Cases for Process Mining

Process mining can be applied in different areas of an organization. Therefore, it can have many use cases, and a multitude of stakeholders may depend on the use case and the scope of the process mining initiative.

The process mining market can be segmented along five types of use cases, and each of which has its own stakeholders, roles, objectives, and related features and functionality.

Improving Processes by Algorithmic Process Discovery and Analysis

Process mining provides visibility and understanding on actual business operations and processes by applying a set of algorithms to events, resulting in highly adaptable, highly maintainable and validated process models. Besides identifying process inefficiencies, this technique delivers insight into where to improve operations — e.g., in a digitalization initiative — and how to attain targeted business outcomes. By supporting process efficiency and effectiveness, process mining tools are key enablers of process improvement initiatives and their related disciplines. In this use case, data scientists typically support process improvement teams to discover, analyze, improve and optimize processes using methodologies such as kaizen (lean); plan-do-check-act (PDCA) and total quality

management (TQM); or define, measure, analyze, improve and control (DMAIC [Six Sigma]). It complements traditional business process analysis, enabling business process analysts to document, analyze, streamline and redesign complex processes at a conceptual and logical level, regardless of any planned automation.

Direction

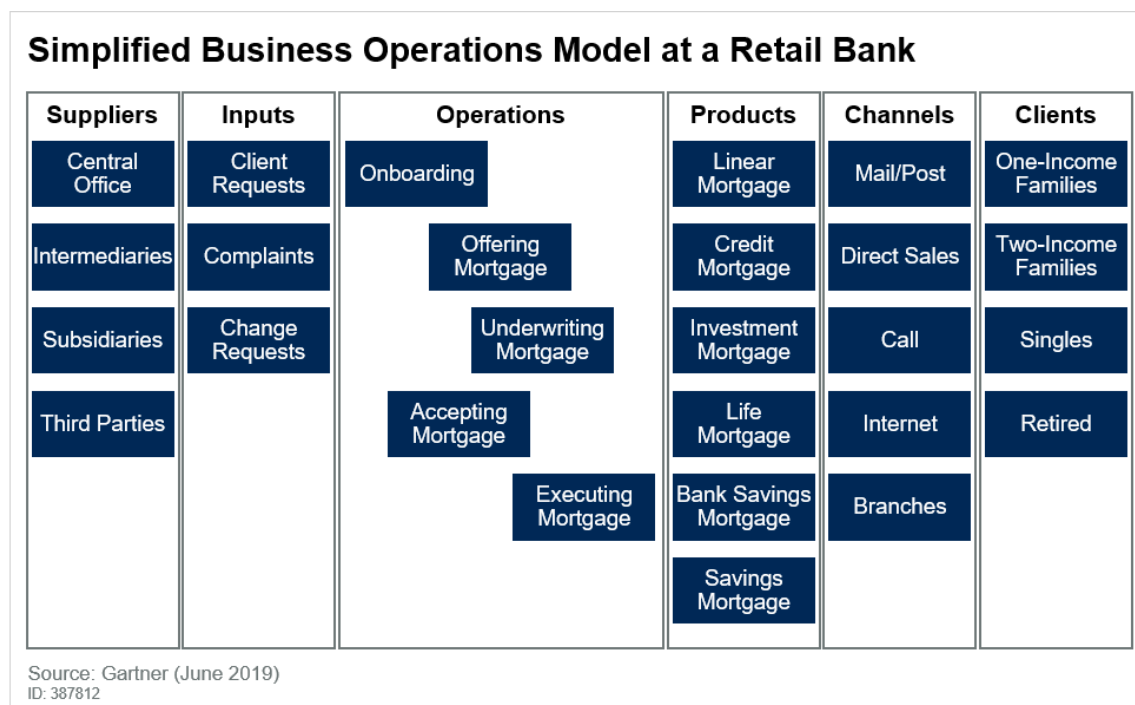
Recently, we've seen a shift in the scope level at which process mining is being applied. This different level of scope also affects users and stakeholders in process mining initiatives.

From a generic overview, the scope of a process mining or process initiative can be on three possible levels:

- A single process level
- An operational level
- An end-to-end organizational level

Figure 2 shows a simplified business operations model³ to illustrate these different scopes (see “Create a Digital Twin of Your Organization to Optimize Your Digital Business Transformation Initiative”).

Figure 3. Simplified Business Operations Model at a Retail Bank



Business operations models connect internally focused operational models with processes and external operations to a segmented model of market interactions. This segmentation shows combinations of products, services, channels, regions and clients. Processes take a central role in these models.

As shown in Figure 3, process mining could be applied by this retail bank on three levels:

- **A single process level** — The focus of the initiative would be in-depth on a particular process, such as offering a mortgage, or on client onboarding for certain products such as a linear mortgage.
- **An operational level** — The focus would be on how customer interactions with certain customer segments, such as two-income families, are aligned with the bank's complete operations (onboarding, offering, underwriting, accepting and executing). Or the focus might also be on how complaints by a certain client segment would be handled across the different life cycle stages of a product.
- **An organizational, end-to-end level** — The focus would be on the end-to-end operations across different products — mortgages, as well as savings, leases, investments, and other products and services.

Depending on the scope, process mining tools can be used by other roles in the organization, such as line-of-business owners, departmental staff and operations staff. The large interest in advanced analytics has driven many of the vendors focusing on this use case to provide enhanced capabilities related to process intelligence targeting business users.

Furthermore, we also see a scope change toward customer journeys and customer interactions, and how they align with internal business operations and processes.

Process mining tracks clients and their interactions, as well as their touchpoints with the organization as main object, rather than an order, an invoice or a request. This can be viewed as “customer journey mining,” which opens up a whole new audience.

Improving Auditing and Compliance by Algorithmic Process Comparison, Analysis and Validation

Most organizations have internally defined standard operating procedures, policies, work instructions or best practices baked into enterprise applications, such as ERP and CRM. In practice, many of these predefined operations are often complemented by “shadow operations.” Process mining helps validate or audit whether actual operations are in conformance with these defined operations. More accurate assessments of process deviations and compliance issues, such as segregation of duties, help manage these risks and communicate findings in an audit report. This also helps ensure the reliability of external financial reporting and compliance with external laws and regulations. In these cases, the stakeholders of process mining can be found in financial management and in risk and compliance teams.

Another variation of this use case is the comparison and analysis of the same processes across different business units, subsidiaries or even countries (comparative process mining).

Direction

Large, external auditing companies have applied process mining techniques to their auditing services. Most of them have been experimenting for a while; however, some have recently begun to partner with process mining vendors to build platforms on which they can run their auditing activities and reports in a more automated fashion. These observations are in line with the reflections of Professor van der Aalst in the interview (see Note 3).

Improving Process Automation by Discovering and Validating Automation Opportunities

Process automation initiatives have been delivering highly improved efficiencies, but they have resulted in limited sustainable business value, because of the dilemma presented by the assumption that the actual data is available only after automation has been completed. Process mining delivers the actual operational data before running into automation and supports making a more accurate business case on the improvement of business outcomes. Process mining will help business analysts discover and assess opportunities for process automation. Task-level process automation, such as RPA, has often missed the process context and failed to provide awareness of the changes that occur to the processes in which these tasks are embedded.

Moreover, process models are often used to configure enterprise applications and their integrated processes, such as ERP and CRM (see “Use Enterprise Business Process Analysis to Improve Postmodern ERP Execution”). However, traditional process models based on interviews often provide only a limited or biased picture of the truth, and highly abstract results can be interpreted in many ways. Process mining — as a complementary approach to traditional business process modeling — provides process visibility by generating highly adaptable, highly maintainable and validated business process models.

Direction

Because of the hype around RPA, which is task automation, process mining draws a lot of attention from this community. Process mining improves the success rate of task-level automation, such as RPA, through visualizing and understanding the process context, so that, when processes change, the automated tasks can adapt without losing their relevance. Moreover, process mining helps spot and prioritize opportunities for task-level automation. We still see several partnerships being established by the most well-known RPA vendors and some of the process mining vendors.

Some of the RPA vendors, as well as some new companies have capabilities that apply neural networks and deep learning to data captured from screens and desktops to derive the process of how an end user completes a task. Although these vendors call this process discovery, this should not be regarded as process mining, and we suggest calling it “task mining.” It captures the process of a task based on key strokes, mouse clicks, opening and closing of applications, and entering data into fields. This is a valuable capability that can even automate the configuration of RPA bots, which is highly complementary to process mining.

Another promising trend is the inclusion of operational technology (OT) into the collection of event logs by using Internet Protocols or IoT. The combination of IoT events and other events will support the discovery and validation of the value of enabling things to cooperate in processes.

Supporting Digital Transformation by Linking Strategy to Operations

If we shift the scope of process mining to the operational and organizational level, it is a small step to link these operational insights to the big strategic initiatives, such as digital transformation or digital business. This is still a fairly new use case that is getting more attention because of the theme of digital business and, more recently, digital transformation. It provides visibility, analysis and understanding around business operating models that represent a way of doing business by providing (near) real-time information to all end users on how they are performing and what could be improved. Furthermore, it supports finding opportunities for improvement. In some cases, it has been reported that it even helps end users think about digitalization opportunities. Gartner describes process mining as one of the technologies used to discover and exploit business moments (see “Get Out of Strategic Limbo: How to Discover and Exploit the Business Moments That Drive Digital Transformation”).

Direction

The use case around linking strategy to operations or focusing on business change and digital transformation can deliver a component of the new concept we have described as the digital twin of an organization (DTO). Process mining could grow into an essential part of any business transformation initiative. It could help guide digital business initiatives with the data connection part of this DTO (see “How a Business Operating System Can Guide CIOs to Digital Business Success” and “Market Guide for Technologies Supporting a DTO”). This use case has shown that, from an operational perspective, process mining can radiate into an organization’s wider end-user community.

Improving IT Operations Resource Optimization by Algorithmic IT Process Discovery and Analysis

This use case is not a direct goal or result of business-outcome-driven process improvements. However, the discovery, analysis and optimization of IT operations and processes is a new use case that can certainly deliver quite a few benefits to IT organizations and widely adopted practices such as DevOps. Consider its use in the improvement of development and testing processes, preparation of migration processes, system error diagnostics, technology usage and post-implementation/transformation stabilization. This stabilization centers on usability issues, client service delays and reproduction scenarios.

Direction

Although this use case emerged recently, we expect a lot of uptake, especially from vendors and system integrators with strong IT backgrounds. Many connections to IT service management (ITSM) offerings, such as ServiceNow, Atlassian, BMC and CA Technologies reinforce this category of use cases.

Market Size

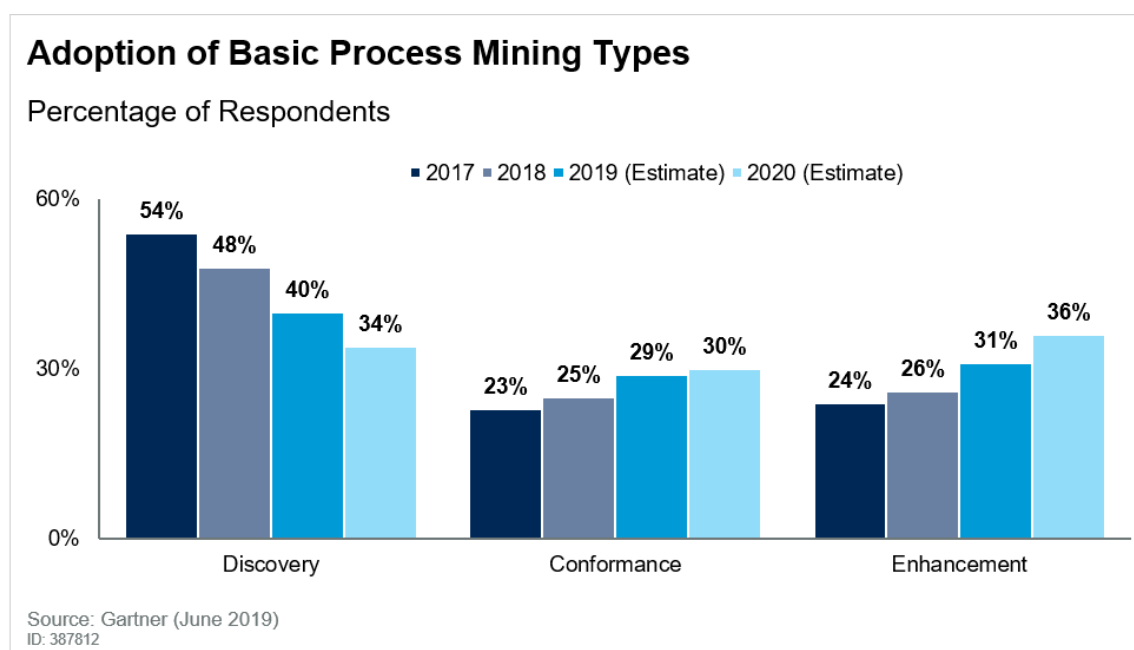
In 2018, Gartner's process mining market estimate for new product license and maintenance revenue was approaching \$160 million. The U.S. market entered the game in 2018. Many organizations became aware of the benefits of process mining, and, last year, we projected that this market could easily triple or quadruple in size during the next two years. However, because most vendors are not catching up fast enough with the huge demand, we expect a delay in the realization of this growth. A large follow-on market also exists for consulting and services in implementing these tools and the methods for using them. When calculating process mining market revenue, we did not include consulting or service revenue. For some vendors, this add-on consulting and service revenue significantly exceeds its software revenue. Again, these observations were echoed by Professor Wil van der Aalst in the interview (see Note 3).

Market Analysis

In a short market survey, we questioned the process mining vendors about the adoption and importance of the different basic types of process mining (see [“The Process Mining Manifesto”](#)¹) and the adoption of the different scope areas. We also asked for an assessment of their future expectations on both topics.

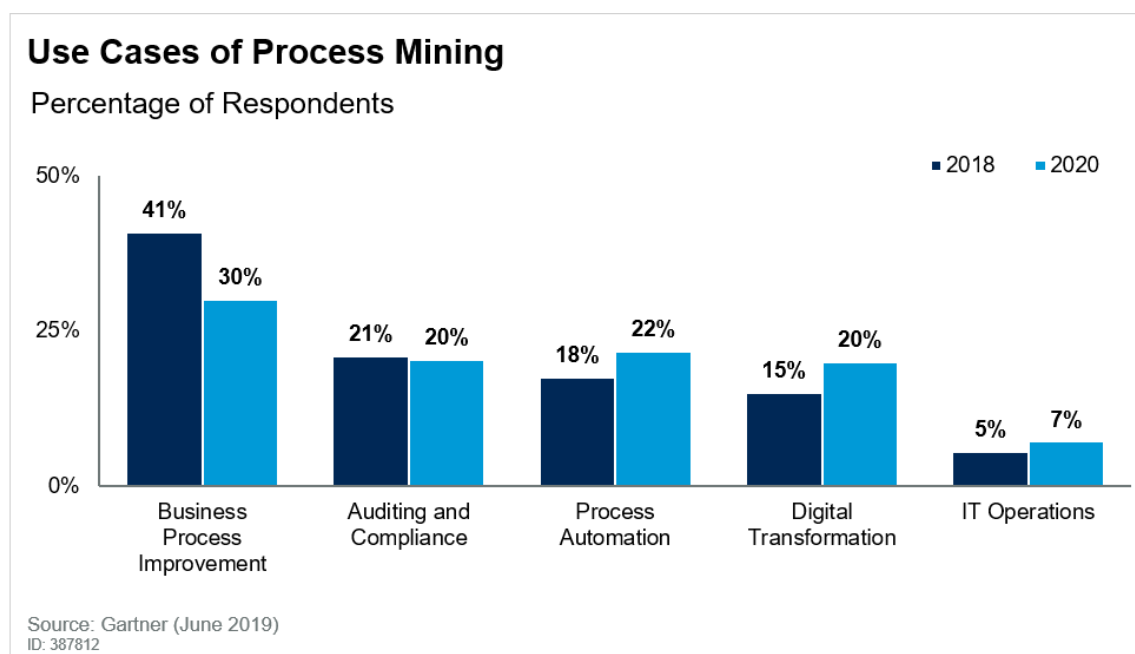
The survey results on basic process mining types confirmed that most implementations still focus on discovery. However, we see a significant trend toward an increased focus on conformance and enhancement process mining types (see Figure 4). In this chart, we combined the data of the survey from last year's market guide with this year survey data.

Figure 4. Adoption of Basic Process Mining Types



Another question in the survey asked for the predominant use cases in which process mining has been applied. These data confirm that most process mining initiatives in 2018 have been targeting business process improvements. However, by 2020, we expect use cases targeting process automation — business process automation (BPA), as well as RPA, and use cases targeting digital transformation — to increase (see Figure 5).

Figure 5. Process Mining Use Cases



Combining this use case data with the process mining capabilities data, we were able to cluster the importance of the capabilities based on the use cases (see Table 1). This delivers clusters around the perceived importance of the different capabilities only. It doesn't say anything about having or not having the capability.

Table 1. Process Mining Capabilities Focus per Use Case

| Capabilities | Business Process Improvement | Auditing and Compliance | Process Automation | Digital Transformation | IT Operations |
|---|------------------------------|-------------------------|--------------------|------------------------|---------------|
| Models of processes, exceptions and process instances (usually referred to as “cases”); employee interactions | | | | | |
| Support for customer interactions, customer journey maps and related analyses | | | | | |
| Support for activities with no structured transactions or log files (productivity tools, such as email and Excel) and manual activities | | | | | |
| Conformance-checking and gap analysis capabilities | | | | | |
| Intelligent support for process model enhancement | | | | | |
| Data preparation and data cleansing, supporting big data | | | | | |
| Real-time dashboards with support for KPIs that are continuously monitored and enable decision support | | | | | |
| Predictive analysis, prescriptive analysis, scenario testing and simulation | | | | | |
| A platform that extends the process mining capabilities across different processes | | | | | |
| Support for the interaction of different processes and how process instances interact at the same workstation, workplace or desktop | | | | | |
| Blue (+) = Providing significantly more focus on this capability, compared with the average of all the use cases. | | | | | |

Source: Gartner (June 2019)

See the Market Description section for descriptions of the 10 capabilities listed in this table.

Representative Vendors

The vendors listed in this Market Guide do not imply an exhaustive list. This section is intended to provide more understanding of the market and its offerings.

Market Introduction

Table 2. Representative Vendors in Process Mining

| Vendor | Product, Service or Solution Name |
|---------------------------------------|-----------------------------------|
| Apromore | Apromore |
| Celonis | Celonis Process Mining |
| Cognitive Technology | myInvenio |
| Everflow | Everflow |
| Fluxicon | Disco |
| INTEGRIS | Explora |
| Lana Labs | LANA Process Mining — Magellanic |
| Logpickr | Logpickr Process Explorer 360 |
| Mehrwerk AG | MEHRWERK ProcessMining (MPM) |
| Minit | Minit |
| Process Analytics Factory | PAFnow |
| Process Mining Groups at TUE and RWTH | ProM, ProM Lite, RapidProM, PM4Py |
| ProcessGold | ProcessGold |
| Puzzle Data | ProDiscovery |
| QPR Software | QPR ProcessAnalyzer |
| Signavio | Signavio Process Intelligence |
| Software AG | ARIS Process Mining |
| StereoLOGIC | StereoLOGIC Process Analytics |
| TimelinePI | Process Intelligence Platform |

Source: Gartner (June 2019)

Vendor Profiles

The survey revealed the use cases that each vendor focuses significantly more on than the average of all vendors. Keep in mind that all vendors active in the process mining market provide features

and functionality for most of the use cases. However, the focus, breadth and depth of these features and functionality will vary a great deal, depending on the predominant use case marketed and implemented by the different vendors.

Apromore

Based in Melbourne, Australia, [Apromore](#) provides Apromore, Version 7.0.

- Apromore was developed from R&D by the BPM team at the University of Melbourne. It is an open-source process mining tool that implements the full spectrum of process mining functionality, from automated process discovery to performance mining, conformance checking and predictive monitoring.
- It is based on an advanced algorithm for process discovery (Split Miner). Apromore supports instantaneous switching between a “process map” view, which shows an informal view of dependencies among tasks in the process, and a business process model and notation (BPMN) view. This enables users to see detailed control-flow structures (e.g., decisions, loops and parallel branches). Frequency and performance enhancements can be applied to process maps and BPMN views.
- Apromore’s predictive monitoring engine uses machine learning models to produce predictions in real time, based on event streams. It enables users to discover and explain process drifts — i.e., changes in the execution of their business processes.
- According to our survey, Apromore focuses more on the business process improvement, and the audit and compliance use cases. Our survey revealed that it focuses significantly more than its competitors on intelligent support for model enhancement, and on predictive analytics.

Celonis

Based in Munich, Germany, and New York, NY, [Celonis](#) offers Celonis Process Mining Version 4.5 and Celonis Intelligent Business Cloud.

- Celonis has implementations in more than 30 countries. It has more than 120 consulting and implementation partners and more than 600 clients. This results in more than 2,000 customer projects — the largest is more than 6,000 users, the largest data volume is 15 billion records and a daily reload of 72 million datasets. Celonis is a more than 500-person organization, and is the market leader in process mining.
- In 2018, Celonis has launched its Intelligent Business Cloud, a containerized, micro-services-based cloud platform. Beyond all the common process mining functionality, this cloud solution provides a machine learning workbench, guidance to management KPIs, and an engine that operationalizes insights and proactively steers actions.
- Deployments of the Celonis product can be on-premises, hybrid or in the cloud (e.g., Amazon Web Services [AWS] or Microsoft Azure). It supports Microsoft Windows and Linux. Technical differentiators are native application integration, such as plug-ins for SAP HANA, Salesforce and ServiceNow, as well as the scalability of the platform. (At one client, Celonis handles a data size larger than 25 TB.)

- According to our survey, Celonis focuses more on the digital transformation and the IT operational resource optimization use cases. Our survey revealed that it focuses significantly more than its competitors on new innovative capabilities, such as predictive analytics, real-time dashboards and the interaction of different processes.

Cognitive Technology

Based in Sliema, Malta, [Cognitive Technology](#) provides myInvenio, Version 1.9.

- From the outset, myInvenio has had advanced capabilities for checking conformance and certification with predefined models and procedures via an easy-to-use graphical interface. This has been used by some of its first reference clients in automotive and banking to compare business operations in plants or subsidiaries throughout Europe to detect performance variations and best practices in a corporate group.
- Cognitive Technology provides an integrated BPA solution to analyze the process with a top-down approach within the wider context of derived processes from myInvenio. Starting from this unified repository, Cognitive provides a dynamic model of the process that considers the wider organizational context and leads to the representation of a digital twin of an organization (DTO). The latest version of myInvenio supports multilevel process mining and the mining of decision rules — it is Decision Model and Notation (DMN)-compliant.
- Most deployments of myInvenio are SaaS offerings. The largest client is an on-premises banking environment with continuous analysis of 40 processes.
- According to our survey, Cognitive Technology focuses more on the IT operational resource optimization use case, and on improving process automation opportunities. Our survey revealed that it focuses significantly more than its competitors on predictive analytics, intelligent support for model enhancement and conformance checking.

Everflow

Based in San Francisco, California, [Everflow](#) offers Everflow, Version 2.0.

- Everflow was born as a spin-off of Icaro Tech's Everflow product, which was mentioned in last year's Gartner Market Guide. It is aimed at democratizing the use of process mining in big data scenarios. Icaro Tech is still one of the main consulting and system integration (C&SI partners), covering the Brazilian and North American markets. Everflow also is actively engaging with new partners in these markets, as well as in Europe, the Middle East and Africa (EMEA) and Australia/New Zealand.
- Everflow uses a combination of filtering, customized dashboards, different visualization perspectives, drill-downs, partitioning (machine learning algorithm), etc., to explore process-related data. It also uses advanced mining algorithms, such as an Inductive Miner variation to generate process trees and BPMN models, even in big data scenarios. It maps regular expressions that enable conformance checking to be run at large, in parallel and in a scalable mode.

- Everflow has been built to handle large datasets by using state-of-the-art infrastructure, such as Apache Hadoop and Spark. This means that one can horizontally scale its infrastructure to process big datasets without requiring the use of huge servers or even dedicated appliances, such as SAP HANA, Vertica, Netezza and Teradata.
- According to our survey, Everflow focuses more on the business process improvement, and the audit and compliance use cases. Our survey revealed that it focuses significantly more than its competitors on data preparation and data cleansing, supporting big data and conformance checking, as well as activities that have no structured transactions or log files.

Fluxicon

Based in Eindhoven, the Netherlands, [Fluxicon](#) produces Disco Version 2.2.1.

- Disco is the most popular stand-alone, analysis-focused process mining tool on the market. Its visual appeal and usability are intuitive and understandable to business users. Therefore, no on-site professional services need to be delivered at the customer site. Disco is in the toolboxes of the digital professionals, and it can be used to quickly analyze all kinds of process problems.
- The Disco founders developed the first mining algorithm that was able to deal with complex processes and pioneered the “slider” approach for interactive process map simplification. As pioneers, the team at Fluxicon has focused on building its process mining tool and invested in the process mining community by spreading the word and developing the methodology for applying process mining in practice. The founders have compiled their knowledge into a comprehensive process [mining guide](#) for every process mining practitioner.⁴
- Fluxicon has also built a large community among others through its annual process mining conference, and 170 consulting companies worldwide have a partner agreement with Fluxicon.
- According to our survey, Fluxicon focuses more on the business process improvement, and the digital transformation and the IT operational resource optimization use cases. Our survey revealed that it focuses significantly more than its competitors on data preparation and data cleansing in support of big data, and support for customer interactions, customer journey maps and related analysis.

INTEGRIS

Based in Rome, Italy, [INTEGRIS](#) offers Explora Process, Version 1.1.0.

- INTEGRIS is one of the new entrants in this market. It is a product, consulting and system integration company that has added process mining to its data analytics and cognitive solution offerings. INTEGRIS completes its product offering with Explora Text, an advanced text-mining component that includes semantic and sentiment analysis, as well as Explora Speech, which provides automatic speech recognition and analysis.
- Explora Process provides advanced reporting functionalities based on Microsoft Power BI (embedded). This enables users to quickly and easily design and build customized reports and

dashboards, using a large amount of custom field data incorporated in the data ingestion process.

- From a technical perspective, most Explora Process deployments are SaaS-based on the Microsoft Azure platform, but it can also be installed on-premises. The Explora Process architecture is designed to address the analysis of huge logs without affecting performance.
- According to our survey, INTEGRIS focuses more on improving process automation opportunities, and on the audit and compliance use cases. Our survey revealed that it focuses significantly more than its competitors on support for activities that have no structured transactions or log files, and conformance-checking and gap analysis capabilities.

Lana Labs

Based in, Berlin, Germany, [Lana Labs](#) provides LANA Process Mining — Magellanic, Version 3.6.9 and LANA Process Mining ETL — and Rockhopper Version 1.1.9.

- Lana Labs, another innovative recent entrant in this market, offers an analysis-based stand-alone process mining tool. Most of its revenue is based on subscription, and it offers consulting, data transformation, development of connectors and training services for its global customer base.
- LANA Process Mining has a high degree of analysis automation, with automated root cause analysis based on machine learning and automated actual target analysis against BPMN. This explains its focus on conformance checking and its capabilities to analyze complex end-to-end processes.
- From a technical perspective, LANA Process Mining has a strong focus on integration, exemplified by its open APIs and multisource transformation, and the introduction of a separate extraction, transformation and loading (ETL) tool for process mining (Rockhopper). The product can be deployed on-premises or in a SaaS mode.
- According to our survey, Lana Labs focuses more on improving process automation opportunities, and on the audit and compliance use cases. Our survey revealed that it focuses significantly more than its competitors on data preparation and data cleansing in support of big data, and conformance-checking and gap analysis capabilities.

Logpickr

Based in Cesson Sévigné, France, [Logpickr](#) offers Logpickr Process Explorer 360 Version 1.2.

- Logpickr is a new entrant in this market. It has developed new process mining algorithms in a large European telecom provider for a solution combining machine learning and big data. Logpickr was founded with the ambition to become the process intelligence leader in France, and it is now expanding into the rest of Europe.
- Logpickr has created its own process mining algorithms, which deal with complex processes and contain concurrent tasks in a process instance. Furthermore, it has developed process-

clustering techniques that allow users to group different variants by common objectives, such as similarity, resources, amount and time. Logpickr also has its own prediction engine.

- From a technical perspective, Logpickr has a distributed and scalable architecture. It can deal with high volumes of data in real time, and it collects data from comma-delimited flat file (.csv), database or streaming events via a REST API or Kafka.
- According to our survey, Logpickr focuses more on the business process improvement and the IT operational resource optimization use cases. Our survey revealed that it focuses significantly more than its competitors on process modeling capabilities, and predictive analysis capabilities.

Mehrwerk AG

Based in Karlsruhe, Germany, [Mehrwerk AG](#) offers MEHRWERK ProcessMining (MPM), Version March 2019.

- Mehrwerk AG, a software and services company, is one of the new entrants to this process mining market. The process mining component is part of its offerings around business intelligence (BI), supply chain management (SCM), and SAP cloud solutions. In this market, Mehrwerk AG combines BI software and services with process mining technology.
- MEHRWERK ProcessMining (MPM) runs natively in Qlik's BI platform (Qlik Sense) and includes the Extension bundle for Qlik, the process mining engine (implemented with Qlik technology), and a rule engine for automated event log generation. Therefore, MPM enjoys all the platform capabilities of Qlik, such as the data model, the visualization, application connections, data governance and its associative engine, allowing rapid change of analysis perspective. Every perspective on processes and data can be analyzed, due to the in-memory engine, which doesn't require preaggregated cubes
- For large scalability, MPM supports enterprise deployment by cloud or hybrid cloud deployments (e.g., with Kubernetes/Docker).
- According to our survey, Mehrwerk AG focuses more on the business process improvement, and the digital transformation use cases. Our survey revealed that it focuses significantly more than its competitors on a platform to extend the process mining capabilities across different processes, and process modeling capabilities.

Minit

Based in Bratislava, Slovakia, [Minit](#) provides Minit Version 4.0.

- Minit, a process intelligence vendor, brings an easy-to-use, enterprisewide basic tool to the process mining market. Minit offers robust functionality and collaboration around process performance dashboards.
- Minit builds on proven process mining technology and combines this with related fields, such as customer journey interactions, social mining and organizational mining. It has also been on the forefront in recognizing the limitations — and, therefore, the opportunities — of task automation (e.g., RPA) and is developing RPA-specific features such as transaction-level task processes

with some of the major RPA vendors. Furthermore, Minit is actively involved in supporting the visualization and analysis of how processes contribute to business value (such as in DTO models).

- Minit is one of the few .NET-based, process mining vendors, and its predominant deployment architecture is an on-premises, server-based implementation that also offers a cloud version in Microsoft Azure. From a services perspective, Minit prepares an offering setting up a center of excellence (COE) designed to make process mining an integral technology for large corporations.
- According to our survey, Minit focuses more on improving process automation opportunities, and on the IT operational resource optimization use case. Our survey revealed that it focuses significantly more than its competitors on real-time dashboards, with support for KPIs, as well as support for customer interactions, customer journey maps and related analysis.

Process Analytics Factory

Based in Darmstadt, Germany, [Process Analytics Factory](#) provides PAFnow 2018.2.3.

- Process Analytics Factory is a recent entrant to the process mining market. The process mining component is part of its offering around process intelligence. Process Analytics Factory combines BI software and services with process mining technology.
- PAFnow is embedded in Microsoft's Power Platform and it extends Microsoft Power BI with process mining capabilities, allowing Power BI users to enhance their current BI infrastructures with process mining. Because Power BI is a key component of Microsoft Office 365, users can use other Microsoft components, such as SharePoint for collaboration, Quick Insights for AI and Flow for workflow automation. Customers are required to license PAFnow Process Mining and Microsoft Power BI.
- PAFnow is implemented mostly on a desktop (single instance) or an on-premises server (distributed architecture), and it is offered as SaaS by Process Analytics Factory partners. Process Analytics Factory generates most of its revenue through services; however, as its client base grows, this is expected to change in favor of licenses.
- According to our survey, Process Analytics Factory focuses more on the business process improvement and the audit and compliance use cases. Our survey revealed that it focuses significantly more than its competitors on data preparation and data cleansing support, enabling big data and real-time dashboards with support for KPIs.

Process Mining Groups at TUE and RWTH

The [Process Mining Groups](#) at Eindhoven University of Technology and RWTH Aachen University, offers various open-source platforms, including ProM Version 6.9, ProM Lite Version 1.2, RapidProM 4.0 and PM4Py 1.1.13.

- The Process Mining Group at the Eindhoven University of Technology was created by Wil van der Aalst. In 2018, he moved to RWTH Aachen University to create a new process mining

group. Together, both groups support a range of open-source process mining tools. The process mining framework (ProM) is an open-source initiative targeted at researchers that supports the integration of new process mining capabilities into the platform. ProM Lite is a stripped-down, end-user version. RapidProM exposes ProM functionality in the context RapidMiner. Process Mining for Python (PM4Py) is a novel Python process mining library.

- ProM is the leading process mining research platform, providing more than 100 packages of standard and advanced process mining functionality to extend the core, which can be freely chosen from and combined. ProM's more than 1,500 plug-ins provide a range of analysis approaches that are unsupported by other systems. It excels in analyses, where the quality of the analysis needs to be quantifiable through formal measures, and in multistage analyses requiring an interplay of multiple process mining and data mining functions.
- ProM is a proprietary pluggable framework. It is usually installed as a single instance. In 2018, ProM has been downloaded more than 28,000 times, which brings the total number of downloads to more than 188,000. ProM also supports designing a certain analysis only once and performing it several times using different datasets. RapidMiner has been downloaded 56,000 times. PM4Py has been downloaded 35,000 times in just the past six months.
- According to our survey, ProM focuses more on the business process improvement and audit and compliance use cases. Our survey revealed that it focuses predominantly on modeling, conformance checking and new process mining capabilities, such as predictive analysis, prescriptive analysis, scenario testing and simulation.

ProcessGold

Based in Eindhoven, the Netherlands, [ProcessGold](#) provides ProcessGold Version 15.0.

- ProcessGold was founded by some of the same people who were involved in the first commercial process mining offering (see "Cool Vendors in Business Process Management 2009"). It packages its offering as a method to embed process mining in its processes in a structural way. The ProcessGold platform is used to build applications for use by business users and analysts. An application is a rich, self-contained, click-and-play combination of several dashboards/views that provide users with the capability to answer questions without development or ETL.
- ProcessGold can "tag" cases such as "invoice routed incorrectly" and "segregation of duties violation" that have relevant properties based on predefined rules and patterns. In this way, analysis and conformance checking are automated. The multidimensional process mining approach of ProcessGold makes it possible to look at all attributes on two or more related processes in a single model to analyze their interactions and influence, and to change perspective, widening the scale of process mining.
- ProcessGold is fully in-memory, and this applies to both data-processing and process mining algorithms. The implementation of the platform can be on-premises, as a service and single instance. ProcessGold is a multitenant platform, allowing partners to use this functionality to easily bring their process mining apps and new versions to their customers.

- According to our survey, ProcessGold focuses more on the business process improvement and audit and compliance use cases. Our survey revealed that it focuses significantly more than its competitors on real-time dashboards, with support for KPIs, and on support for the interaction of different processes.

Puzzle Data

Based in Pohang, Republic of Korea, [Puzzle Data](#) provides ProDiscovery Version 2.1.

- Puzzle Data is one of the new entrants in the process mining market, developing process mining solutions and conducting process consulting based on them. Closely connected to POSTECH, one of the top universities in South Korea, Puzzle Data develops practical products using a balanced approach that satisfies customer needs, while considering the latest theory.
- Puzzle Data introduces “puzzles” as kinds of widgets — small apps that run on a device’s interface that provide extensibility. This feature allows a snippet of an app to run within another app. Any artifact in process mining, such as process map, process pattern analysis, social network analysis, workload analysis and case search, is represented as a puzzle. Each puzzle can be used in a dashboard, and, once filters are applied to a dashboard, all puzzles on that dashboard inherit these filter conditions.
- ProDiscovery has been developed with a cloud-first strategy in mind. Although it is still a small company, Puzzle Data has some process mining implementations that are not trivial, such as long-lasting processes in a ship construction company, and fraud detection in the online gaming industry.
- According to our survey, Puzzle Data focuses more on the digital transformation use case, and on improving process automation opportunities. Our survey revealed that it focuses significantly more than its competitors on support for customer interactions, customer journey maps and related analysis, and on process modeling capabilities.

QPR Software

Based in Helsinki, Finland, [QPR Software](#) offers QPR ProcessAnalyzer Version 2019.3.

- QPR, one of the oldest and leading offerings in the market, also provides a comprehensive set of performance management, BPM, and EA-related software products and consulting services. The process mining offering is integrated as part of a more-complete QPR Business Operating System offering. It uses the input from process mining analysis results to form a DTO (see “Optimize Digital Business Transformation by Creating a Digital Twin of Your Organization”).
- QPR ProcessAnalyzer extends the process mining concept with advanced features, such as automated root cause identification. This reveals the actual case attributes that affect the process deviation, advanced influence and clustering analyses, and machine learning and predictions, which identify case-level problems before they happen. It also includes a proprietary KPI engine for deeper understanding.

- Besides traditional on-premises deployments, QPR administers a multitenant cloud infrastructure, based on AWS computing and storage instances. Corporate customers may also choose a dedicated cloud environment that offers secure integration with their own federated authentication or lightweight directory access protocol (LDAP) service, as well as secure firewall settings allowing port-level access configuration for data integrations.
- According to our survey, QPR focuses more on improving process automation by discovering and validating automation opportunities, and the business process improvement use case. Our survey revealed that it focuses significantly more than its competitors on real-time dashboards with support for KPIs, and data preparation and data cleansing support, supporting big data.

Signavio

Based in Berlin, Germany, [Signavio](#) provides Signavio Process Intelligence Version 12.12.0.

- Signavio, a cloud vendor that specializes in innovative, easy-to-use products in the BPM/BPA and decision management markets, is a recent entrant in process mining. Signavio offers process mining capabilities within its broader process-based Signavio Business Transformation Suite. The prime value of its process mining component is in providing automated discovery of system processes and conformance analysis technology for compliance violation detection.
- Through its integration with the other components, Signavio Process Intelligence combines intelligence with modeling, processes, decisions and customer journeys. Based on its highly collaborative approach to process improvement, Signavio introduced an “Investigative Notebook Approach,” providing an easy way to create an action-oriented report that combines dashboard, process and tabular data about issues identified into a single logical document. This approach helps process analysts and data scientists work together with business managers.
- Signavio is a cloud-based company. As with other areas in which Signavio operates, the company’s objective is to democratize process mining. This is aimed at making it more accessible to a broader audience, using intuitive interfaces that enable clients to use its products with as few professional services as possible.
- According to our survey, Signavio focuses more on improving process automation by discovering and validating automation opportunities, and the business process improvement use case. Our survey revealed that it focuses significantly more than its competitors on intelligent support for process model enhancement, and platform capabilities that extend the process mining capabilities across different processes.

Software AG

Based in Darmstadt, Germany, [Software AG](#) delivers ARIS Process Mining 10.4.

- Software AG offers ARIS Process Mining as part of the ARIS platform, which is Software AG’s offering for business transformation and process excellence initiatives. As one of the early commercial process mining offerings in the market, Software AG and global partners have implemented hundreds of process mining projects.

- ARIS Process Mining does not depend on predefined process models in ARIS, but can make use of them for process conformance checking, enabling ARIS customers to make the next step toward process maturity. It includes ARIS Aware, delivering intuitive visualization, deeper understanding, and enriching process and organizational models with external and internal operational data. The ARIS platform supports a fully governed process life cycle, involving all stakeholders.
- In addition to its many process mining capabilities, ARIS shows another huge potential of process mining through visualizing and relating process mining results side-by-side and interactively with contextual models. Customer journey maps, business rules and decision models enable customers to offer multiple views on the actual performance of an organization's business operating model. They also empower the ARIS platform to become a DTO (ARIS Enterprise Management System).
- According to our survey, Software AG focuses more on the business process improvement and audit and compliance use cases. Our survey revealed that it focuses significantly more than its competitors on process modeling capabilities, and real-time dashboards, with support for KPIs and continuous monitoring.

StereoLOGIC

Based in Toronto, Canada, [StereoLOGIC](#) provides StereoLOGIC Process Analytics Version 6.0.

- StereoLOGIC is one of the oldest and leading offerings in the market. It has developed its own mechanisms and algorithms for process discovery, analysis and conformance checking from the ground up.
- StereoLOGIC Process Analytics has captured system-based events, as well as the information on the users' screens and the users' or employees' activities in their workplace, without the need to install anything on the employee workstation. It recognizes that most employees perform tasks belonging to several processes, and these tasks interact many times. StereoLOGIC offers a more complete picture of the reality, and can handle employee productivity comparisons or workload optimization over different processes and related tasks. This allows StereoLOGIC to capture the detailed interaction of employees with productivity applications (e.g., Excel and email), remote desktops or even interactions on mainframe terminals. This valuable information can be used as input specification for the configuration of bots (RPA).
- StereoLOGIC Process Analytics is installed on-premises, or in a private or external cloud.
- According to our survey, StereoLOGIC focuses more on the digital transformation use case, and improving process automation by discovering and validating automation opportunities. It focuses significantly more than its competitors on capabilities supporting the interaction of different processes, and on support for activities with no structured transactions or log files (productivity tools such as email, Excel).

TimelinePI

Based in Springfield, Pennsylvania, [TimelinePI](#) delivers TimelinePI Process Intelligence Platform Version 4.1.

- TimelinePI, a new entrant in this market, was founded by two veterans of the IT industry who have built successful companies in the application integration, BPM and BI spaces. This U.S.-based company started around reconstructing entire process structures and in-depth visualization and analysis of highly variable, ad hoc business processes.
- TimelinePI offers support for the full spectrum of process types, especially the ad hoc process patterns common to case management. TimelinePI offers specific analysis modules optimized for unique process styles not possible with schema-centric approaches. TimelinePI supports real-time data integration, using its bidirectional message queuing or web services integration methods. This enables users to monitor high-volume event sources with zero latency. Finally, its analysis approach leverages neural networks to learn the subtle variations and behavioral patterns between process instances to support prediction beyond traditional statistical techniques.
- TimelinePI's architecture is made up of a collection of stateless micro services deployed via an elastic container services environment. This enables TimelinePI to support all SaaS customers with a single multitenant instance.
- According to our survey, TimelinePI focuses more on improving process automation by discovering and validating automation opportunities and the audit and compliance use cases. Our survey revealed that it focuses significantly more than its competitors on predictive analysis capabilities, and conformance checking and gap analysis.

Market Recommendations

To drive business transformation and optimization through TI, EA/TI leaders should:

- Improve visibility and understanding of the actual performance of business operations and processes, by investing in process mining. This will improve the business outcomes of any automation initiative, whether at a task, workplace or process level.
- Create awareness and inspire business and operational colleagues on the benefits, capabilities and use of process mining, by introducing small, short-term pilots. This will create valuable insights and fuel the acceptance, enthusiasm and demand for larger process mining projects.
- Explore use cases that go beyond traditional, internally focused process discovery, process validation and model enhancement by targeting business operations and interactions with external parties, such as customers. This can be seen as customer journey mining opening up a new audience, and aligning customer journey maps with internal process maps.
- Assess the required scalability of the process mining initiative by defining the intended users of the process mining results, and defining the volume, frequency pattern and concurrency of

operational data to be mined. This will help with tool selection, because not all vendors target the same scalability.

Gartner Recommended Reading

Some documents may not be available as part of your current Gartner subscription.

“Automated Business Process Discovery Improves BPM Outcomes”

“A CIO’s Guide to Gartner’s Digital Business Research”

“Maximize Digital Business Value Creation Through AI Algorithms”

“Optimize Digital Business Transformation by Creating a Digital Twin of Your Organization”

“DigitalOps Helps Connect Business Models to the Digital Business Platform”

“Develop Good Decision Models to Succeed at Decision Management”

“Get Out of Strategic Limbo: How to Discover and Exploit the Business Moments That Drive Digital Transformation”

“Market Guide for Enterprise Business Process Analysis”

“Magic Quadrant for Intelligent Business Process Management Suites”

Evidence

Excellent research and books have been published on the topic of process mining. Some of these extensive materials include:

- [“Process Mining: Data Science in Action”](#) — MOOC
- W. van der Aalst. “Process Mining, Data Science in Action.” Springer Verlag. 2016
- “Process Mining: A Database of Applications (118 case studies).” HSPI Management Consulting. 2017
- [“Process Mining”](#)

¹ [“The Process Mining Manifesto,”](#) IEEE Task Force on Process Mining.

² W. van der Aalst. “Process Mining, Data Science in Action.” Springer Verlag. 2016.

³ **Business Operations Model:** A business operations model is the operationalization of the business model through the identification, representation and measurement of the business model constituents, as well as the interactions among these components to deliver the expected stakeholder value. Examples include detailed value chains, demand-driven value networks, dynamic

capability models and enterprise suppliers, inputs, process, outputs and customers (SIPOC) models.

⁴ The founders have compiled their knowledge into a comprehensive [process mining guide](#) for every process mining practitioner.

Note 1 Representative Vendor Selection

Gartner sizes the market at about 25 vendors, offering most of the process mining capabilities. For the 19 vendors profiled here, Gartner used client interactions, vendor briefings and academic research to verify that these offerings were in the market for at least a year, and that they represent examples of this market. In terms of revenue, we estimate that these vendors represent more than 95% of the total market.

Note 2 Gartner's Initial Market Coverage

This Market Guide provides Gartner's initial coverage of the market and focuses on the market definition, rationale for the market and market dynamics.

Note 3

Interview With Prof.dr.ir. Wil van der Aalst, Lehrstuhl für Informatik 9/Process and Data Science, RWTH Aachen University

How do you reflect on the developments in process mining?

"In 2018, one could clearly see an acceleration in adoption and attention for process mining. I started to work on process mining over 20 years ago, and it is great to see that over 25 vendors have adopted the initial ideas to serve a rapidly growing group of customers. Initially, the focus was on process discovery. However, as the 10 capabilities and the five common use cases described in the Market Guide clearly show, the process mining discipline expanded in several dimensions. Tools have become much more mature, scalable, and easy to use. Moreover, the first International Process Mining Conference (ICPM 2019) in Aachen and several successful vendor-related conferences like Celosphere and the Process Mining Camp illustrate the development of the community. I started to work on process mining in the late nineties, almost 20 years ago. At the time, many people were surprised that I stopped working on workflow automation to focus on the process-centric analysis of event data. There was hardly any event data, and people still believed that process modeling was the key toward better processes. On the one hand, adoption of these ideas was slower than I expected. On the other hand, there have been amazing breakthroughs in discovery and conformance checking. Moreover, in recent years one can clearly see an acceleration in the adoption of process mining. This acceleration is nicely reflected in this Market Guide."

What kinds of developments do you see in the current market?

"Process discovery is just one of many forms of process mining. Conformance checking and comparative process mining are now supported by several vendors. Although conformance checking is very important for auditing and compliance analysis, it is not widely used yet. Another

trend is the shift from “backward-looking” process mining (analyzing performance and compliance problems in the past) to “forward-looking” process mining (e.g., predict delays and deviations) before they actually happen. Several vendors offer machine learning and artificial intelligence capabilities to further analyze the process after discovery. Note that machine learning and artificial intelligence (in the sense of deep learning) play no role in process discovery and conformance checking. Machine learning and artificial intelligence can be used to diagnose and predict process-related problems, but only after applying conventional process mining techniques.

Process mining is much more than process discovery, and both vendors and users started to realize this. It is great to see that several vendors finally implemented conformance checking capabilities. This is very important for auditing and compliance analysis. I also see a trend toward predictive process mining. It is not enough to diagnose problems; tools should also be able to predict delays and deviations before they happen. Combining process mining with other machine learning techniques is very well possible, and I expect that soon more vendors will start to support this. One of the challenges I see is that for advanced forms of process mining (e.g., conformance checking and prediction) process models need to have semantics. Some vendors solve this by using two types of models (formal and informal) depending on the use case. In the long run, this is not a viable solution; we need tools that support hybrid process models that are precise when needed and informal if not (to avoid adding complexity). There are process mining techniques supporting such hybrid process models, but these still need to be adopted by commercial vendors.”

What are the biggest hurdles?

“There are two main hurdles: (1) people and (2) data. Still, large groups of consultants, auditors, quality managers, and process owners are unaware of the capabilities of today’s process mining tools. One can still become a certified Six Sigma Black Belt or Certified Internal Auditor, without being able to apply process mining. Moreover, due to the machine learning and artificial intelligence hype, people are unable to see that process mining is something different. Finally, middle managers are often afraid of process mining results. The increased transparency of processes may reveal mismanagement, inefficiencies, and compliance problems. Not everyone is happy to address these problems. Data quality and access to data form another hurdle. Typically, 80% of the efforts and time are spent on locating, selecting, extracting, and transforming the process. The time needed to apply process mining is short (say 20%) when the data are there. Moreover, process mining often reveals data quality problems that need to be dealt with urgently.”

What will the process mining market look like in 2025?

“The market will be much larger than today. I guess that it will be at least 10 times the current size. Process mining will become a standard tool for analyzing and improving processes. Currently, there are over 25 process mining vendors. I expect that several vendors will disappear, but, given the many use cases and different types of processes, there is a need for a diversified landscape of process mining tools. For example, some vendors will offer the software for free and do mostly consulting. Other vendors may focus on specific application domains. Some will focus on real-time analytics. Process mining tools will have tightly integrated interfaces to related software tools, e.g., RPA tools, BPM/WFM systems. I anticipate a convergence of such tools. For example, today’s

organizations still use business process modeling tools to document and discuss their processes (e.g., using the BPMN notation). These modeling tools are disconnected from the traditional process mining tools. This is the reason why conformance checking is not used more often. Seamlessly integrating process mining and process modeling is a necessity. The range of applications will become even broader, and any operational processes. I anticipate that, in 2025, the primary focus of process mining tools will be on “forward-looking” capabilities also supporting “prescriptive analytics” (e.g., automatically solving optimization problems and directly influencing the process).”

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