NEAT EVALUATION FOR CELONIS:

Process Discovery & Mining

Market Segment: Ability to Accelerate Process Change

Introduction

This is a custom report for Celonis presenting the findings of the NelsonHall NEAT vendor evaluation for *Process Discovery & Mining Technology* in the *Ability to Accelerate Process Change* market segment. It contains the NEAT graph of vendor performance, a summary vendor analysis of Celonis for process discovery & mining, and the latest market analysis summary.

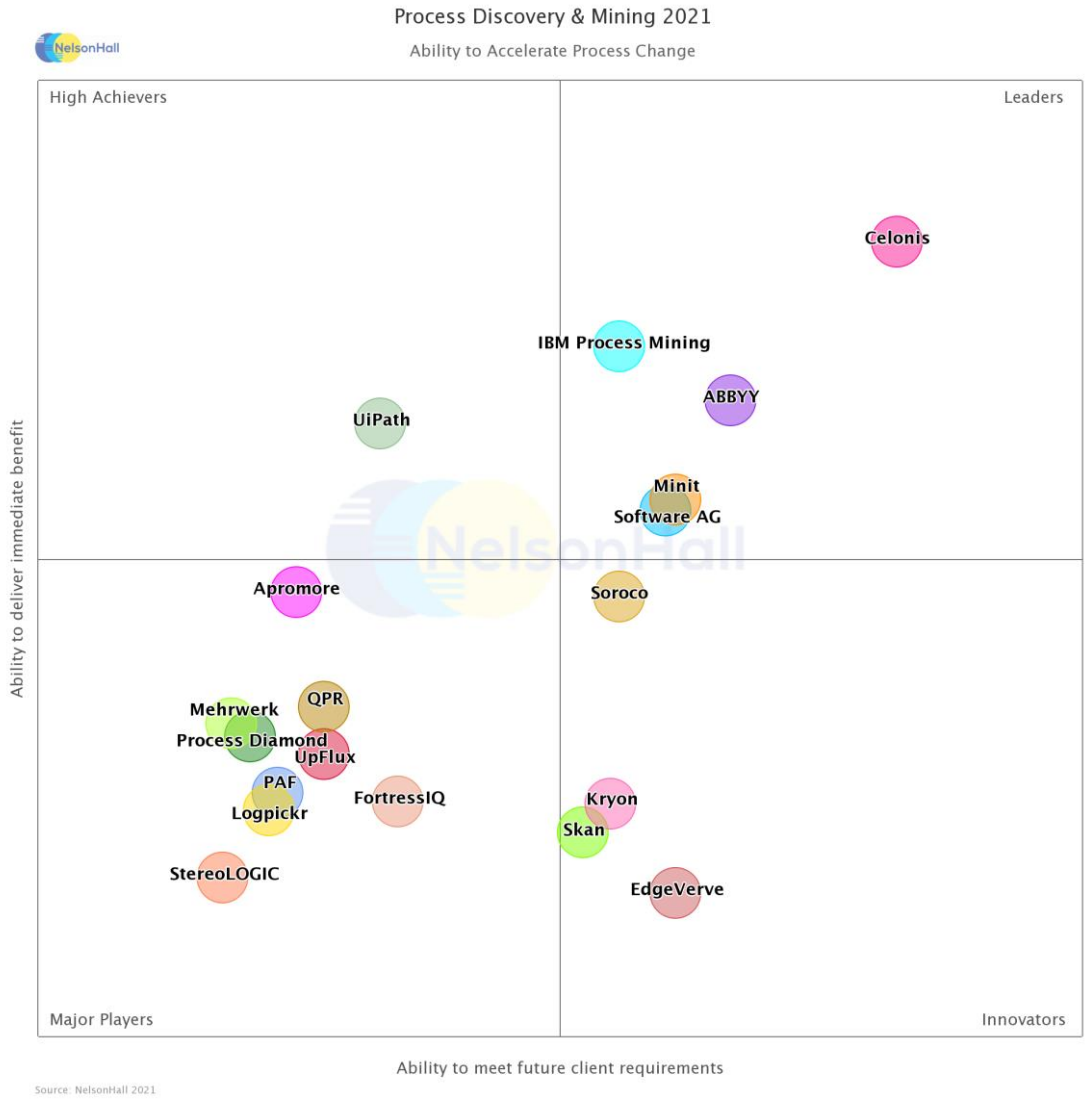
This NelsonHall Vendor Evaluation & Assessment Tool (NEAT) analyzes the performance of vendors offering process discovery & mining technology. The NEAT tool allows strategic sourcing managers to assess the capability of vendors across a range of criteria and business situations and identify the best performing vendors with dual focus on process discovery & mining, specific focus on process mining, focus on desktop process discovery, as well as the ability to plan and accelerate process change.

Evaluating vendors on both their 'ability to deliver immediate benefit' and their 'ability to meet client future requirements', vendors are identified in one of four categories: Leaders, High Achievers, Innovators, and Major Players.

Vendors evaluated for this NEAT are: ABBYY, Apromore, Celonis, EdgeVerve, FortressIQ, IBM Process Mining, Kryon, Logpickr, Mehrwerk, Minit, PAF, Process Diamond, QPR, Skan, Software AG, Soroco, StereoLOGIC, UiPath, and UpFlux.

Further explanation of the NEAT methodology is included at the end of the report.

NEAT Evaluation: Process Discovery & Mining (Ability to Accelerate Process Change)



NelsonHall has identified Celonis as a Leader in the *Ability to Accelerate Process Change* segment, as shown in the NEAT graph above. This market segment reflects Celonis' ability to meet future client requirements as well as delivering immediate benefits to its clients with specific focus on helping them accelerate digital transformation initiatives.

Leaders are vendors that exhibit a high ability relative to their peers both in delivering immediate benefit and also in meeting client future requirements.

Buy-side organizations can access the *Process Discovery & Mining* NEAT tool (*Ability to Accelerate Process Change*) here.

Vendor Analysis Summary for Celonis

Overview

Founded in 2011 as a spin-off from the Technical University of Munich (TUM), Celonis today has dual headquarters in Munich and New York and operates out of 16 offices in Europe and the U.S. and one in Tokyo. The company has raised $1.4bn in funding to date, including most recently:

- $290m in its Series C round in November 2019, at a valuation of $2.5bn
- $1bn in Series D round in June 2021, giving it a valuation of $11bn.

Celonis has rolled out several new functionalities and programs over the past year, including:

- *Task Mining*, first announced in October 2019, released for general availability at Celosphere 2021
- *Action Flows*, which fully integrates the automation and integration technologies from Integromat, acquired for over $100m in October 2020
- *Celonis for Consulting* (C4C+), a free program for consulting partners to support them in landing new client engagements using Celonis. It also encourages them to build Execution Apps through their domain expertise and monetize on it.

In October 2021, Celonis acquired Lenses.io, a London/Athens-based software developer specializing in real-time streaming data tools.

Celonis has been expanding its offerings beyond process mining to include what it calls 'execution management', with an increased emphasis on tools that provide users with real-time views of processes and a concomitant ability to push through recommended improvements or changes directly. This will significantly increase its addressable market.

Key Offerings

Celonis offers the Execution Management System (EMS), an all-in-one platform that includes process & task mining and Execution Apps for managing and automating process execution.

EMS functionality is covered in the following sub-sections:

Data collection, extraction, transformation & loading (ETL)

Celonis offers 80+ prebuilt connectors for IT systems that support extraction and transformation capabilities; where prebuilt connectors are unavailable to cloud or on-premise systems, it offers a low-code tool, Extractor Builder, for building connectors. All data is encrypted in transit and at rest. Data can be extracted and loaded incrementally into the Celonis platform as processes are executed so that monitoring and periodic analysis of processes can be performed more quickly, for some use cases in real-time. With its acquisition of Lenses.io in September 2021, Celonis can stream data from Kafka directly into EMS in real-time for real-time data sources. To collect task data, a desktop software agent passively records user desktop interactions. It interrogates the user's system to gather information on the current task, including cursor location, keyboard/mouse button presses, application-level control IDs, and optionally screenshots. Data filtering occurs on user desktops before uploading to Celonis servers for privacy and security. The sensor runs on any modern

desktop/business laptop and Microsoft Windows. Celonis uses AI and OCR to extract process information from desktop task data and cluster desktop actions into business activities

Process analysis

Celonis EMS supports the following type of analyses: benchmarking; duration analysis; event type; flowchart analysis; influence analysis; path analysis; resource/role analysis; trend analysis. It includes:

- Process Query Language (PQL), allows analysts to ask process-related questions by creating specific KPIs without needing developers to write code during the ETL phase
- Process Explorer, a customizable UI for showing discovered as-is processes. KPI information overlay on nodes and paths can be configured. It includes an app, Social, for analyzing organization units to understand their functioning and impact cases
- A conformance checking app
- Automated root cause analysis, uses ML to determine the cause of process violations by finding, for each case attribute (data column), the values with the highest correlation to the violation. Each root cause is reported with the coverage of the attribute amongst the afflicted cases, and the set of afflicted cases can be analyzed in other apps within the same workspace. Automated root cause analysis can also be performed on violations in the conformance app, looking specifically at a process violation
- Task mining. Has a top-level view and a detailed task view that shows percentages of time spent across different categories of applications. Additionally, cost/impact-related details per resource can be analyzed.

Process improvement

Celonis EMS offers process simulation of to-be process data, using process models which can be auto-generated from data, created using the built-in modeler, or imported from a third-party modeler with BPMN 2.0 support. Models are saved to a centralized version-controlled repository that can be used for documenting proposed scenarios. From to-be process models, data can be simulated and compared against as-is process models. The process simulation functionality is currently manually driven but Celonis is looking to introduce automated what-if scenario simulation.

Process monitoring

The visual and daily management components help organizations measure, prioritize and monitor the business objective, and objective milestones/goals can be defined with a target date and KPI value or left open-ended. KPIs can be dynamic (i.e., computed from existing data) or loaded from a logbook that Celonis automatically generates when an IT system does not capture the information by default. KPIs can be assigned to owners to clarify the responsibilities of employees. Additionally, KPIs can also be split by a parameter (e.g., department or geography) to track the change across the parameter separately. Reports can be configured to be sent out daily, weekly, or monthly and can be configured to include only select KPIs. Operational users can also collaborate within the Transformation Center using the task assignment functionality.

Process collaboration

Celonis has a set of Execution Apps for automating routine decisions and, where necessary, triaging work to the right people. There are currently 18 Execution Apps in six categories (opportunity management, order management, inventory management, accounts receivable, procurement management, accounts payable). Each Execution App package has persona-specific views, including steering view, action views, automation view. Building, configuring,

and maintaining Execution Apps is done through Studio, Celonis' low-code development environment.

Corrective action enablement

- The Steering Views and Action Views aim to enable organizations to take action on open cases based on findings from Skills. Skills leverage ML or business logic to identify trends and patterns to make predictions on the outcome of clients' processes. A signal is routed to the appropriate robot/person to take action
- Action Flows, the online automation platform developed by Integromat, now fully integrated into EMS. Has around 10k prebuilt automations across 900 enterprise applications that can be performed on behalf of an individual user or organization for auditability governance and other operational purposes
- Action Flows enables users to automate tasks (e.g., updating the priority of a PO and notifying the relevant persons by email) that are activated through triggers (e.g., ML-driven skills, email, and webhooks to third-party apps). Workflow can be built without code using the drag-and-drop workflow builder
- Machine Learning Workbench. Users can leverage ready-to-use Python packages built specifically to handle process mining use cases, including late delivery prediction, free-text order processing, and duplicate invoices avoidance.

Celonis' EMS Store is a platform aimed at accelerating time to value, featuring point-and-click install of prebuilt connectors, analyses, skills, and objectives or KPIs. The store includes 80+ connectors, 400 analyses, and 40+ skills.

Packages

Celonis offers multiple packages for different client needs:

- *Celonis Free Plan*: free access to EMS for clients looking for one-time process mining, support for prebuilt process connectors and real-time data extraction but not transformation. For one source only. Includes process repositories and BPMN modeling
- *Celonis Discovery Edition*: package aimed at continuous process mining that removes the ETL limitations of the Snap and adds process simulation and machine learning
- *Celonis Enterprise Edition*: package for clients looking to leverage EMS with no restrictions
- *Execution Apps*: prebuilt solutions that packages best practices, aimed at clients looking to move beyond process mining to execution management.

Partnerships

The company has ~120 partners in its network. These notably include:

- *Analytics*: Databricks, Splunk
- *BPM*: Appian, K2 (Nintex), Pega, Winshuttle
- *RPA*: Automation Anywhere, Blue Prism
- Integration: Microsoft, Oracle, Salesforce, SAP, ServiceNow
- *Security*: CyberArk

- *C&SI and BPS*: Accenture, Capgemini, Deloitte, EY, IBM, Infomotion, KPMG, Protiviti, Tech Mahindra, Wipro, and many others.

Client Examples

Client examples include:

- *A global computer technology company* looking to catch and resolve bottlenecks in customer service processes that were causing long case resolution times and with reactive case management practices. Celonis was engaged for real-time process monitoring. It designed a predictive case intelligence solution to anticipate bottlenecks and send support agents proactive alerts to intervene and move cases away from negative outcomes. Within six months, the client saw faster resolution in 30% of its cases, 10% reduction in cycle times, and 24% reduction in misdiagnosed cases
- *A large U.S. electronics company* struggling to standardize accounts payable processes across multiple systems and to track and enforce SLAs with its outsourcing partner. It was also unable to identify high-priority invoices for work or identify duplicate invoices. The client used EMS to prioritize duplicate payment prevention, capture cash discounts and automatically cascade strategic goals to its outsourcing partner. In the first three months, the client saw a 40% increase in on-time payments, a 20% increase in cash discounts taken, and prevented $622k in duplicate payments.

Strategic Direction

Celonis' roadmap over the next 12 to 18 months is structured around five pillars:

- *Real-time data ingestion*, with higher performance in EMS source system connectivity and next-level data security & enterprise integration
- *Process & task mining*: easy & intuitive process data exploration; a new alignment algorithm for conformance checking; and strengthening core process mining functionality
- *Planning & simulation*: sensing when & which action to take based on real-time analytics: making the digital twin creation easier and faster
- *Visual & daily management*: embedding Celonis Views in third-party tools, adding new components for daily management; consolidation of all tasks
- *Action Flows*: automating SAP as easily as Google Sheets; setting up new clients for execution from the beginning; automating arbitrary on-premise systems.

Outlook

Celonis has rolled out several valuable new capabilities in the past year with Task Mining and Action Flows. Task Mining is necessary for organizations to get a truly 360-degree view of their processes as there continues to be a substantial portion of work being done outside of IT systems and cloud platforms. It was made generally available earlier this year. The full integration of Integromat into the EMS platform as Action Flows is a big value-add to clients as they can more easily leverage their data using Celonis' ML decision-making to automate work that occurs outside its platform. It will complement well with Execution Apps.

The company is more focused on large enterprises as they typically already have process improvement initiatives and have vast amounts of data to power detailed analysis. While the

company also has mid-market and small companies using the platform, including the Celonis Free Plan, it can require more effort compared to competitors. The company's Extractor Builder is improving in this area.

The new Celonis for Consulting (C4C+) program is a fantastic strategy for supporting partners in bringing in new client engagements while encouraging them to bundle domain expertise into Execution Apps. It is no doubt a win-win for all parties involved.

Strengths

- 360-degree process view with full capabilities of both process mining and task mining
- A wide array of prebuilt analysis tools from partners in EMS Store
- Outcome intervention: Action Engine brings work to user attention or triggers workflows; Action Flows uses AI/ML decision-making to automate work on third-party systems
- Execution Apps: outcome-driven views to support different personas, from execs and managers to individual contributors
- Empowered partner network: partner network that is supported through C4C+ program to bring their domain expertise to client engagement and empowered to monetize on packaging domain expertise through the EMS Store.

Challenges

- Data transformation for non-standard connectors requires SQL: not democratized to business users
- Lack of automated solution suggestions to root causes, outside of Execution apps and prebuilt apps
- Lack of general automated what-if scenario simulation; current implementation is limited to specific use cases in finance processes.

Process Discovery & Mining Market Summary

Overview

The convergence of process discovery and process mining accelerated in 2020/21 as the market recognized the need to combine their strengths to overcome their challenges – not all work is done within IT systems and not all work is done on desktops.

Both segments aim to help organizations to gain process understanding but from different perspectives:

- *Process discovery* (end-to-end task mining) provides an understanding of work execution through the lens of workers on desktops. It captures all work performed on desktops, including that done outside of IT systems, e.g., Excel, Outlook, Notepad, etc. The segment is traditionally driven by desktop automation and workforce optimization
- *Process mining* provides an understanding of work from an end-to-end perspective through to the final business outcome. Process mining started from a narrow definition of visualization and analysis of event logs from IT systems using algorithms and mathematical procedures. The sole reliance on IT system logs means work performed outside of them is not captured.

Process discovery vendors are integrating process mining technologies to help clients quantify the impact on work to give recommendations that will lead to more significant overall business impact. Similarly, process mining vendors are integrating process discovery technologies to fill in the gaps in IT system logs to provide more reliable and actionable insights with quantification of the potential business impact.

Process discovery & mining solutions typically feature:

- *Connector capabilities* – to extract, transform, and load transactional data from IT systems for analysis and integration to third-party platforms for enabling automation and proactive interventions
- *Desktop capabilities* – to collect streams of desktop work that includes application data, environmental variables, and user interactions, and uses AI/ML to parse work from streams of recordings
- *Conformance checking* – to understand how work is performed against organizational policies and best practices
- *Root cause analysis* – to find factors that are contributing to certain process behaviors and outcomes
- *Data simulation* – to simulate scenarios of process transformation and to understand potential impacts before making changes
- *Proactive intervention* – leveraging ML and heuristics to trigger automations (workflows and RPA bots) and real-time process guidance on desktops.

Buy-Side Dynamics

Benefits sought (ordered by importance) by buyers for engaging a vendor for process discovery & mining are:

- Improve overall visibility and transparency of process flows
- Reduce average process cycle times
- Reduce effort to identify process steps and variations
- Improve identification of root causes in process variations, outcomes, non-compliance
- Improve identification of KPI impact in process variations, outcomes, non-compliance
- Improve identification of processes to be automated
- Improve upskilling or retraining efforts with precision training for individuals or teams
- Improve business agility.

Key inhibitors for buyers looking to adopt process discovery & mining solutions relate to stakeholder buy-in, data, and privacy.

Market Size & Growth

The current global PDM market size is estimated by NelsonHall at ~$670m and will grow to ~$4.3bn by 2025, a growth of 45% CAAGR.

Europe accounts for 43.3% of the PDM market, followed by North America at 42.5% and APAC at 9.7%. Strong growth in North America will cause it to overtake Europe by 2025.

BFSI is the largest sector, accounting for 28.7% of the market. The ongoing impact of the pandemic on global supply chains has boosted adoption in transport/logistics and manufacturing that will continue through 2025. Similarly, healthcare (having been a top growing sector in 2020) will continue to grow due to continued rising costs and deficiencies exacerbated by the pandemic.

Success Factors

The key success factors for process discovery & mining vendors include:

- *Actionable insights*: providing insights that drive impactful changes with just enough information without overwhelming users. This is also not limited to historical data but ongoing data using predictive analytics to intervene in open cases
- *Adaptive and transparent pricing*: offering flexible pricing for organizations to adjust to current and changing needs. At the same time, pricing is transparent so clients can predict how costs will change to budget accordingly
- *Balancing flexibility and ease of use*: some vendors have designed UI/UX with customizability and flexibility in mind. However, during that process, it has become overwhelming and less intuitive to use. Successful vendors are using design thinking to build their platform with the right balance to improve user-friendliness
- *Data governance at scale*: architecting their platforms with organization and process data governance in mind. When scaling adoption from a single business unit to multiple ones

in the same company, platforms need to be designed to handle the increased complexities of data and process ownership

- *Empowering partners*: recognizing they are first and foremost software companies rather than domain experts, these vendors are frequently going hand-in-hand with partners into client engagements so they can speak the same language. They also develop programs to work with partners across geographies and industry verticals
- *Enabling transformations*: going beyond the immediate mapping and assessment needs of clients and enabling them to plan, execute, and monitor process transformations. Provide capabilities to support building business cases with insights on the impact of process changes, standardizing work by templating best practices, generating bots to accelerate their rollout, and knowledge sharing for cooperation and collaboration.

Outlook

Over the next few years:

- Drivers for continued deployment will include continuous or iterative improvement efforts and to improve outcomes of connected processes that support the initial key processes
- Solutions will fully integrate not only business and desktop data but increasingly include additional data modalities like IoT to enable planning process changes with more actionable and impactful insights and to accelerate implementations of process changes
- Machine learning will play a more significant role in enabling the planning of process changes in addition to the current trend of enabling implementation efforts with predictive and prescriptive analytics
- Healthcare will continue being one of the strongest growing sectors, outpaced only by the adoption rate of the transportation and logistics sector
- Process discovery & mining deployments will become 80% cloud-based, with an increasing number of vendors offering PDM-as-a-Service and freemium options to build their client base as part of a land-and-expand strategy.

NEAT Methodology for Process Discovery & Mining

NelsonHall's (vendor) Evaluation & Assessment Tool (NEAT) is a method by which strategic sourcing managers can evaluate outsourcing vendors and is part of NelsonHall's *Speed-to-Source* initiative. The NEAT tool sits at the front-end of the vendor screening process and consists of a two-axis model: assessing vendors against their 'ability to deliver immediate benefit' to buy-side organizations and their 'ability to meet client future requirements'. The latter axis is a pragmatic assessment of the vendor's ability to take clients on an innovation journey over the lifetime of their next contract.

The 'ability to deliver immediate benefit' assessment is based on the criteria shown in Exhibit 1, typically reflecting the current maturity of the vendor's offerings, delivery capability, benefits achievement on behalf of clients, and customer presence.

The 'ability to meet client future requirements' assessment is based on the criteria shown in Exhibit 2, and provides a measure of the extent to which the supplier is well-positioned to support the customer journey over the life of a contract. This includes criteria such as the level of partnership established with clients, the mechanisms in place to drive innovation, the level of investment in the service, and the financial stability of the vendor.

The vendors covered in NelsonHall NEAT projects are typically the leaders in their fields. However, within this context, the categorization of vendors within NelsonHall NEAT projects is as follows:

- Leaders: vendors that exhibit both a high ability relative to their peers to deliver immediate benefit and a high capability relative to their peers to meet client future requirements
- High Achievers: vendors that exhibit a high ability relative to their peers to deliver immediate benefit but have scope to enhance their ability to meet client future requirements
- Innovators: vendors that exhibit a high capability relative to their peers to meet client future requirements but have scope to enhance their ability to deliver immediate benefit
- Major Players: other significant vendors for this service type.

The scoring of the vendors is based on a combination of analyst assessment, principally around measurements of the ability to deliver immediate benefit; and feedback from interviewing of vendor clients, principally in support of measurements of levels of partnership and ability to meet future client requirements.

Note that, to ensure maximum value to buy-side users (typically strategic sourcing managers), vendor participation in NelsonHall NEAT evaluations is free of charge and all key vendors are invited to participate at the outset of the project.

Exhibit 1

'Ability to deliver immediate benefit': Assessment criteria

Assessment Category	Assessment Criteria
Offerings	Ease to aggregate logs into processes Desktop process discovery capability Integration between business and desktop data Process visualization Range of prebuilt/templated process analyses Ease (UI-based) of conformance/compliance checking ML-based root cause analysis Recommendations for process improvement and re-engineering Proactive process intervention Integrated automation capabilities Analytics reporting and insights No/low-code development
Delivery Capability	Maturity of partner base Desktop process discovery pricing model available Process mining pricing model available Training
Client Presence	Overall PDM presence North American presence LATAM presence Europe presence MEA presence APAC presence
Benefits Achieved	Visibility and transparency of process flows Reduced effort to identify process steps and variations Identify root causes of process variations and outcomes Identify KPI impact of process variations and outcomes Reduced average process cycle times Identify process activities to be automated Upskilling or retraining efforts Business agility Overall business impact

Exhibit 2

'Ability to meet client future requirements': Assessment criteria

Assessment Category	Assessment Criteria
Level of Investments	Level of investment in PDM
	Level of investment in core desktop process discovery
	Level of investment in data connectors, integration, and models
	Level of investment in prebuilt (templated) process analyses
	Level of investment in analytics, insights, and simulations
	Level of investment in accelerating automation development
	Level of investment in proactive process intervention

For more information on other NelsonHall NEAT evaluations, please contact the NelsonHall relationship manager listed below.

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Sales Enquiries

NelsonHall will be pleased to discuss how we can bring benefit to your organization. You can contact us via the following relationship manager:

Guy Saunders at guy.saunders@nelson-hall.com