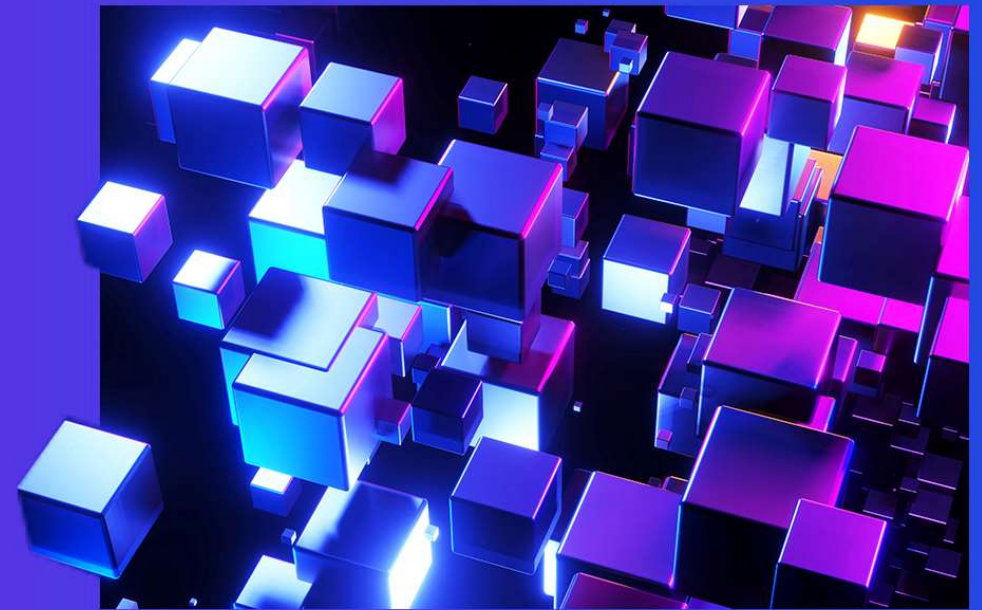




# Internal Audit powered by process mining

April 2023



# Today's agenda

- 1  What is Process Mining and how does it work ?
- 2  Business Case for Process Mining
- 3  Process Mining and Audit transformation
- 4  How to get started ?
- 5  Q&A

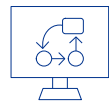
**01**

**What is process  
mining and how does  
it work?**

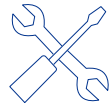
# What is process mining

## What is it?

Processes are reconstructed and visualized based on process protocols as they actually occur



Reconstruction of processes happens automatically without previous process modeling



Insights are entirely based on real facts



Enable continuous evaluation and monitoring of processes



## How it works?

### IT-based work

Every process is supported by underlying IT systems.

### Digital Footprints

Process Mining tools find and reconstruct digital workflow traces as they actually occur.

### Full Transparency

Actual process flows are visualized in real time. Processes are compared and monitored with leading practices supported by pre-defined metrics.

### Optimization

Start improvement measures and help increase performance.

## Potential benefits





Successful process improvement projects are based on well selected improvement points, followed by concrete actions




Fact-based insights into your processes by working with experts in the process mining field

Continuous comparison with leading practices to reduce gap with industry benchmark

Increased transparency, reduce costs, increase quality and competitiveness

# The key features of process mining

-  **Process Discovery** Fact based discovery of 'as-is' process
-  **Benchmarking** Compare processes against internal dimensions and common industry practice
-  **Process Monitoring** Continuously track and monitor KPIs
-  **Process Intelligence** Discover process deficiencies and enable root cause analysis

-  **Conformance Checking** Automated compliance analysis
-  **Organizational Analysis** Workload distribution and social network analysis
-  **Process Prediction** Predict outcomes and enhance control through predictive analytics

# Process mining insights



How do you know what really happens in your processes?

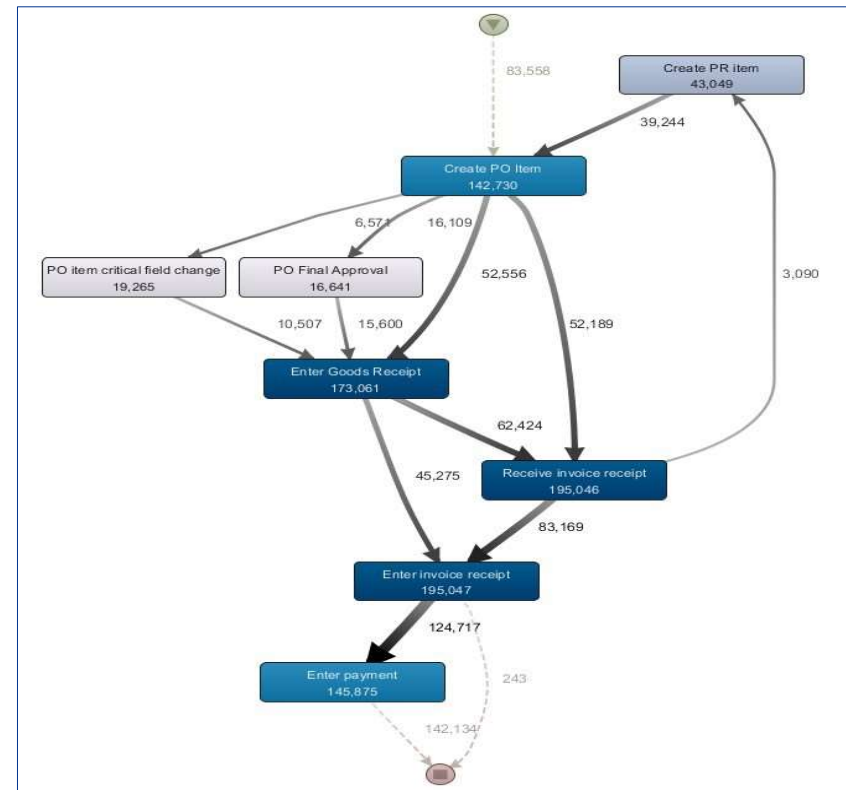
How do you learn about harmful bottlenecks, inefficiencies and compliance issues?



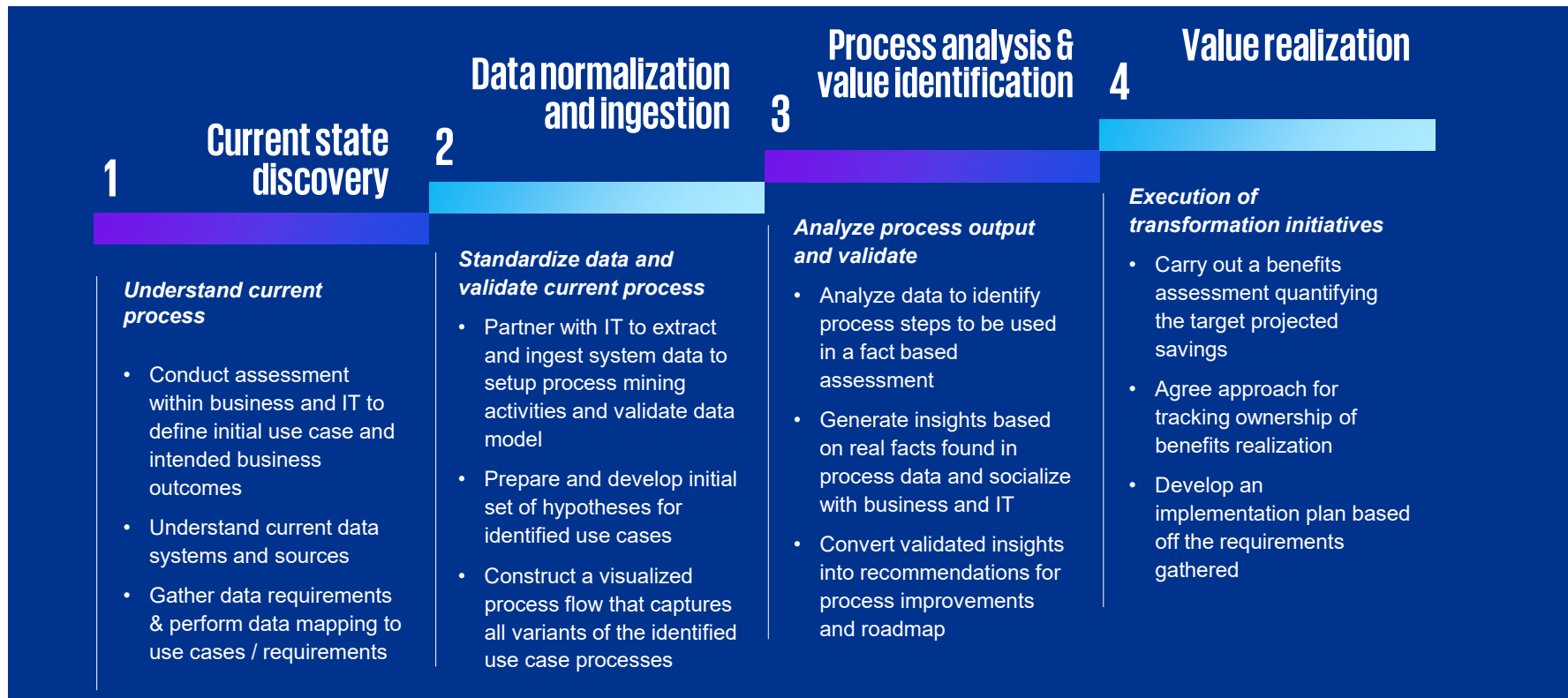
How fast can you get insight into your processes?



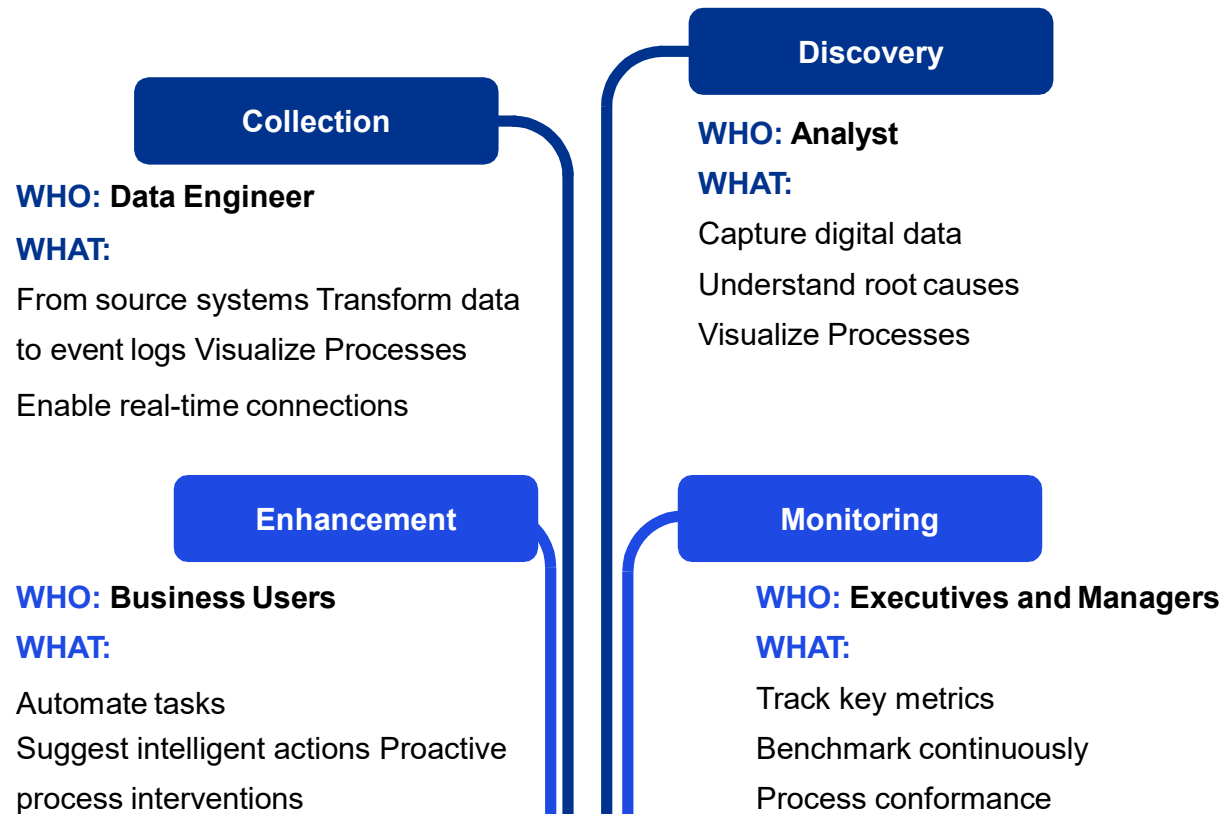
How do you find out where to improve your processes?



# Process mining approach overview



# Process mining activities

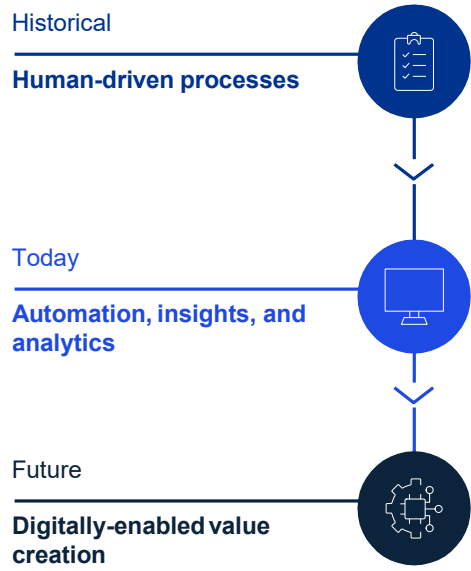




# The digital landscape is rapidly changing

The Digital Revolution has been enabled by...

- +  
Increased computing power
- +  
Better data
- +  
Improved algorithms
- +  
Mobile omnipresence



Digital leaders performed significantly better than their competitors across several key business metrics.



Harvey Nash/KPMG CIO Survey 2020

*“For a majority of U.S. CEOs, the pandemic has meant an acceleration in digital transformation by months or even years. The move to digitization has accelerated and the potential benefits are expected to be permanent. There is no going back.”*

– Carl Carande, Global Vice Chair for Advisory at KPMG



# The digital agenda for risk management

Leading organizations have developed an agenda to help deal with disruption across their risk management functions

## ***Stakeholder engagement and trust***

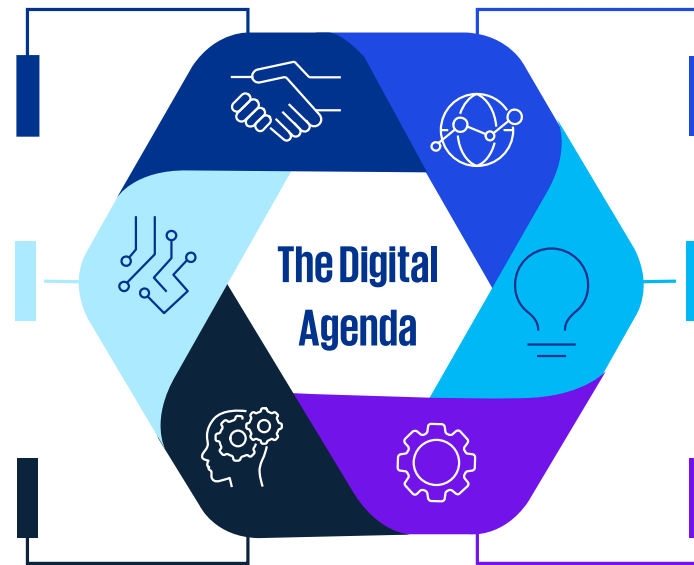
Risk management professionals know their top stakeholders and take the time to foster a relationship of trust attuned to their needs.

## ***Digital acceleration***

Leverage technology with organizational goals in mind, and use it to enable program and project level work.

## ***Data, analytics and insights***

Enterprise data is available and used, and new data is curated by all three lines of defence. This data is used to provide risk insights and enhanced assurance through holistic coverage.



## ***Methodology and value management***

Risk management methods and models consider a mix of risk insights and business improvement metrics attuned to stakeholder needs. Strategically important and future-focused emerging risks are prioritized.

## ***New ways of working***

Where services are delivered, the competencies that enable that delivery and the way risk management teams want to work has to be revisited to help retain the right talent.

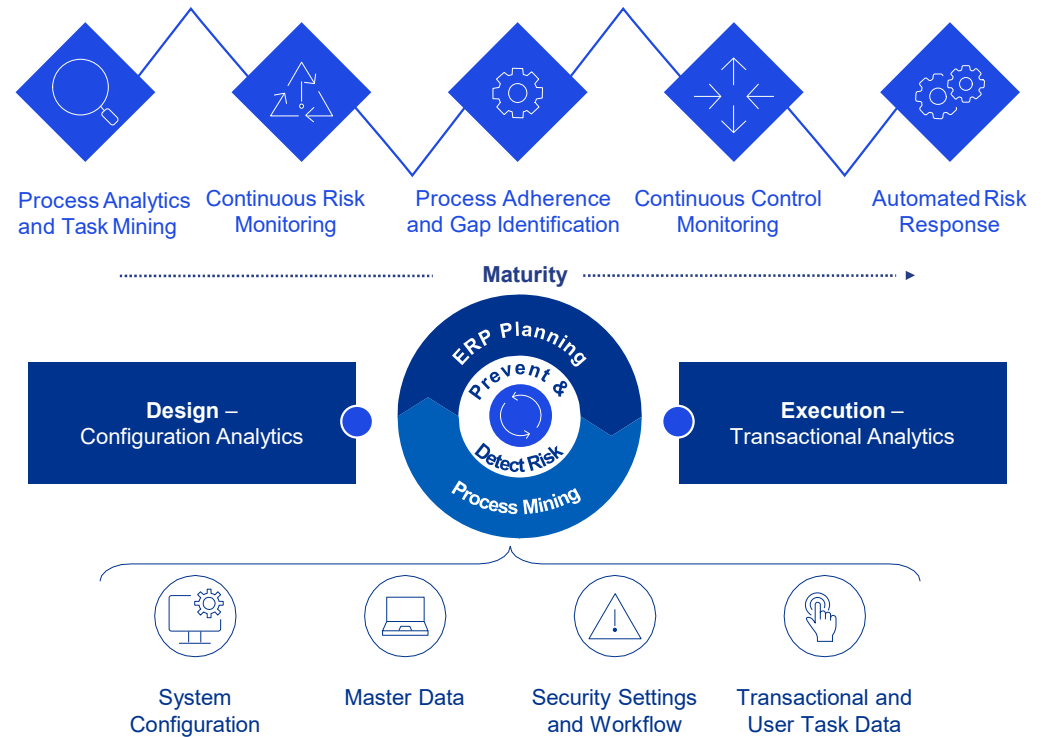
## ***Operating model agility***

Risk management activities are responsive to disruption, flex with the business strategy throughout the year, and are seamlessly enabled across the lines of defense.

# The 360° view of risk

To accelerate this transformation, KPMG has developed a **powerful analytical platform** that harvests the power of process mining technology and advanced ERP analytics to enable **continuous monitoring, automated preventive controls, and detective analytics** for near real-time risk response. Providing a 360° view of risk that is **foundational** across the 1st, 2nd, and 3rd lines of defense.

KPMG's Intelligent Risk Analytics Platform



# Industry analysts confirm – Process mining market is maturing... and directly supports audit and compliance

“Process Mining enables *faster, smarter decisions*, and *stronger performance* on organization’s *most critical priorities*.”

Gartner 2021 Market Guide for Process Mining

*According to Gartner, a robust market has formed for process mining. The market is rapidly maturing to help drive a number of strategic initiatives and functions across enterprises:*

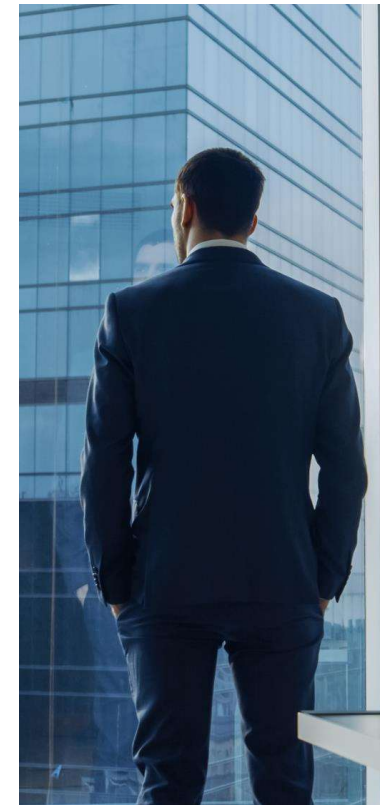
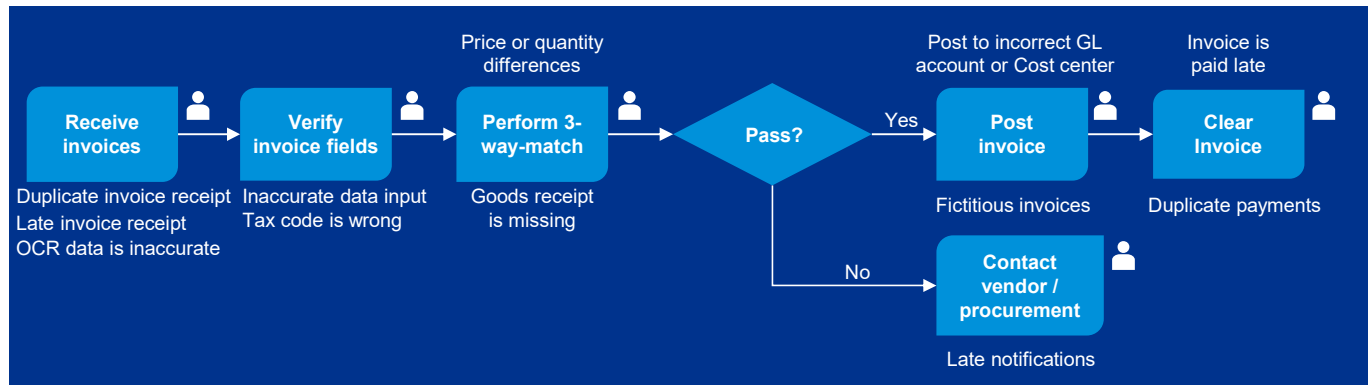
- Discovery and analysis
- Auditing and Compliance
- Automation
- Digital Transformation
- IT Processes

*Process mining enables Internal Audit with Data Driven Insights*

**02**

# **Business Case for Process Mining**

# Process mining provides proactive, near real-time, data driven view of risks and controls



## What should you be thinking about?

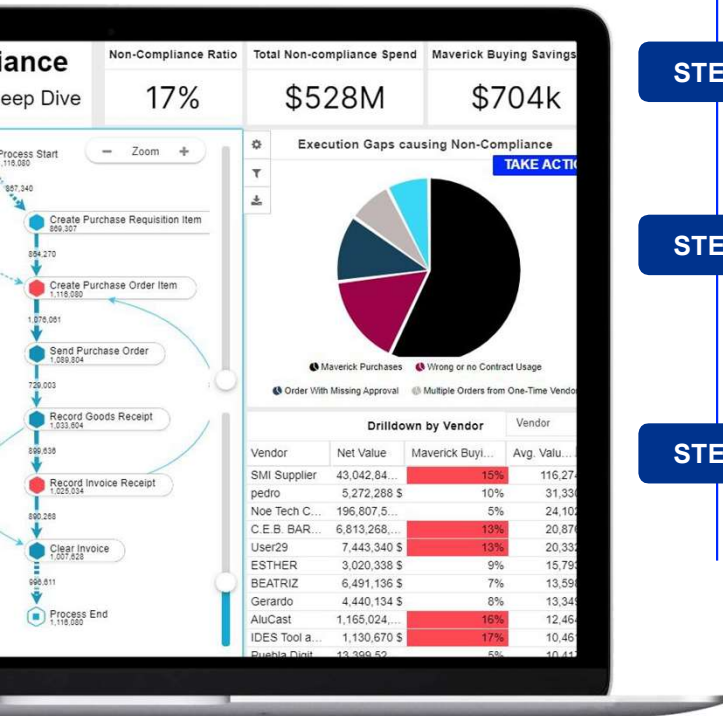
Who is entering, verifying and posting invoices? Are they the same persons or different? How do we reduce the risk of **fraud** or processing errors?

What **critical skills** and **competencies** are needed to identify violations and improve compliance? What are the **key metrics** that we should monitor?

How are we **utilizing digital solutions** to improve Labor Productivity? How do we **standardize** our processes and monitor **adoption**?



# Process Mining equips you to measure inefficiencies and identify their causes



## How it works

### STEP 1

Find out how your process is executed in reality.

### STEP 2

Identify and eliminate weak spots and violations. Use proactive insights to prioritize actions leading to process improvement.

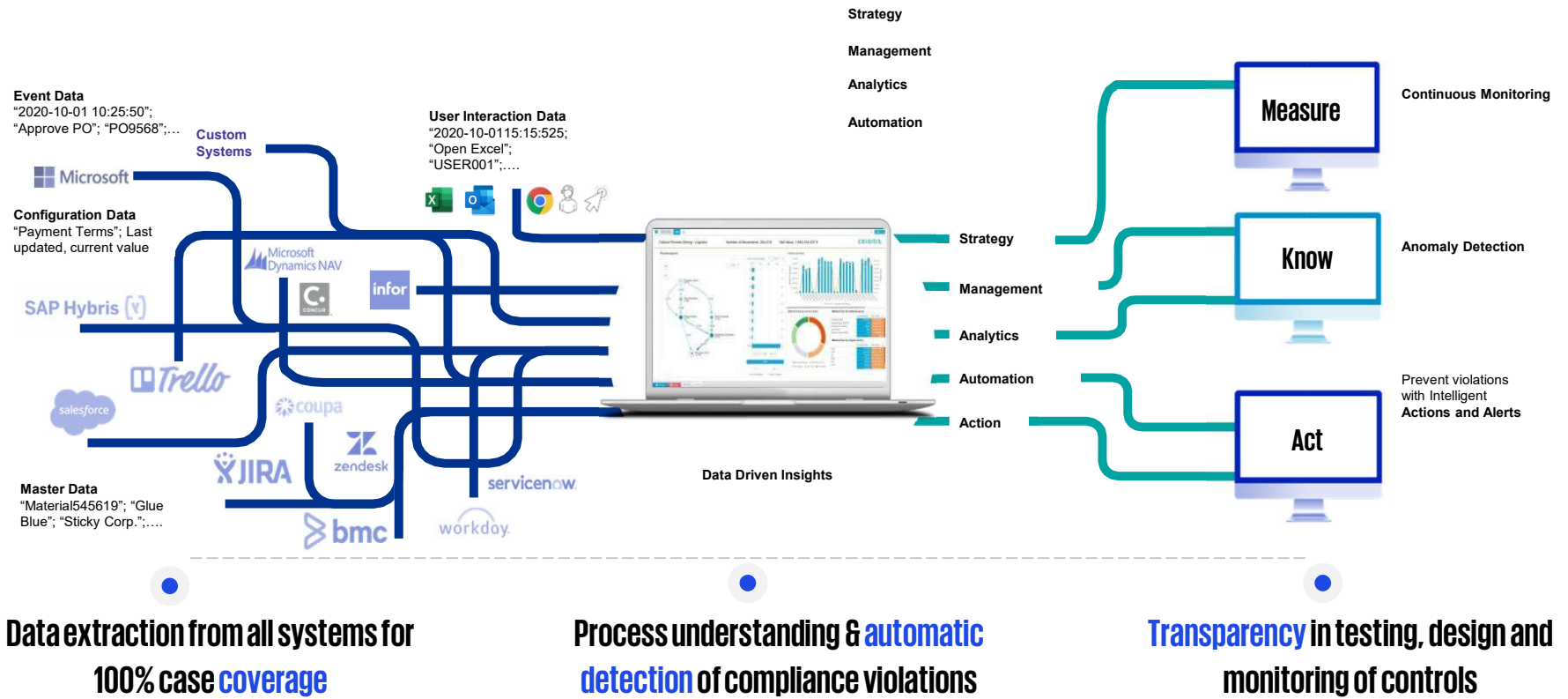
### STEP 3

Find your "happy path" and ensure continuous process efficiency, compliance, and quality.

## Example









- Process discovery & KPIs
  - Identify critical cycle times
  - Missing approvals
  - Segregation of duties
  - Activities outside normal working hours
- Intelligent root cause analysis
  - Maverick buying
  - Identify fraud
  - Process conformity
  - Duplicate payments

# Data driven insights to risk target specific area





# Key process areas for process intelligence (Illustrative)

Procure to pay 	Travel & expense 	Accounts payable /receivable 	Product lifecycle management 	Schedule to fulfill 	Master data processing 	IT service management 	Order to cash 
<p><b>COST</b></p> <p><b>EFFICIENCY</b></p>	<p><b>EFFICIENCY</b></p> <p><b>COMPLIANCE</b></p>	<p><b>COST</b></p>	<p><b>COMPLIANCE</b></p> <p><b>EFFICIENCY</b></p>	<p><b>EFFICIENCY</b></p> <p><b>COST</b></p>	<p><b>EFFICIENCY</b></p> <p><b>COST</b></p>	<p><b>EFFICIENCY</b></p> <p><b>COST</b></p>	<p><b>EFFICIENCY</b></p> <p><b>COMPLIANCE</b></p>
<ul style="list-style-type: none"> <li>• PR to PO Cycle time analysis</li> <li>• PO rework rate</li> <li>• Price / Schedule changes</li> <li>• Complex PR/ PO release strategy</li> <li>• PO Bundling</li> <li>• Open PO</li> <li>• PO vs Non-PO</li> <li>• Supplier reliability</li> <li>• Supply chain risk</li> <li>• Vendor SLAs and Contract usage</li> </ul>	<ul style="list-style-type: none"> <li>• First time right</li> <li>• Processing TAT</li> <li>• Policy exceptions</li> <li>• Non company card transactions</li> <li>• Duplicate claim candidates</li> <li>• Mandatory receipts missing</li> <li>• Pending Open advances</li> <li>• Charged to incorrect cost centers</li> </ul>	<ul style="list-style-type: none"> <li>• Early/ Late Payments</li> <li>• Missed cash discounts</li> <li>• Payment terms analysis</li> <li>• Maverick Buying</li> <li>• Optimize DPO/ DSO</li> <li>• Payment Run behavior</li> <li>• Changed baseline dates</li> </ul>	<ul style="list-style-type: none"> <li>• Harmonize Product Data</li> <li>• Reduce Cost of Quality</li> <li>• High time for Approval</li> <li>• Rework – Missing information - insufficient details</li> <li>• Market lead time Analysis</li> <li>• Shareholder Value</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory sustainability</li> <li>• Optimize inventory replenishment</li> <li>• Quality Control</li> <li>• Process rework</li> <li>• Manual touchpoints</li> <li>• Inventory Visibility</li> <li>• SKU optimization</li> <li>• Manufacturing conformance rate</li> </ul>	<ul style="list-style-type: none"> <li>• Process rework</li> <li>• Work note analysis</li> <li>• Time to assign</li> <li>• First time right</li> <li>• Time taken to resolve issues</li> <li>• Resource/ team utilization and training needs</li> <li>• Reopened / rejected cases</li> <li>• Workload distribution</li> </ul>	<ul style="list-style-type: none"> <li>• SLA monitoring</li> <li>• FTR analysis</li> <li>• Multi-hop analysis</li> <li>• Re-opened tickets</li> <li>• Pending reason analysis</li> <li>• High severity tickets</li> <li>• Service completion rate</li> <li>• Cancelled workflows</li> <li>• Automation opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• First time right orders</li> <li>• Manual delivery blocks</li> <li>• Oder rejection</li> <li>• Zero touch orders</li> <li>• On Time In Full delivery</li> <li>• Order bundling</li> <li>• Customer credit blocks</li> <li>• Invoice cancellation</li> </ul>

Reusable Models, functions and Extraction Templates

# Order-to-cash – Segregation of duties

The term “segregation of duties” is being used when more than one person is necessary to complete and fulfill an activity or task. It decreases the power one individual person has. The segregation provides a barricade to fraud as it would demand a collusion with another person to perform a fraudulent act.



**Company:** Internationally leading technology enterprise located in the DACH region with over 20,000 employees worldwide.

## Status at Time

In 55% of all 240,000 cases, the credit check and the creation of the invoice were executed by the same employee. This violates compliance guidelines.

**55% of noncompliant credit checks**

## Target Goal

The goal is to include the segregation of duties in this process step.

**0% of noncompliant credit checks**

Estimated Business Potential:  
**100% risk avoidance**

# Purchase-to-pay – Segregation of duties

The term “segregation of duties” is being used when more than one person is necessary to complete and fulfill an activity or task. It decreases the power one individual person has, and accordingly the risk of potential fraud. It is thus essential for effective internal control.



**Company:** Leading service provider in the telecommunications industry with over 100.000 employees

## Status at Time

Many POs had SoD violations.

**0.03 % of POs with SoD violations (=600 cases)**

## Target Goal

SoD shall be avoided completely to avoid subsequent problems.

**No POs with SoD violations**

Estimated Business Potential:  
**100% risk avoidance**

# Purchase-to-pay – POs without approval

Serious problems in purchasing occur if no purchase order was set up, or if incorrect and unapproved purchase orders lead to error-prone buying activities. Approval of purchase orders is important to adhere to compliance standards and assures correct subsequent process steps.



**Company:** Leading service provider in the telecommunications industry with over 100,000 employees

## Status at Time

Many POs had SoD violations.

**0.03 % of POs with SoD violations (=600 cases)**

## Target Goal

SoD shall be avoided completely to avoid subsequent problems.

**No POs with SoD violations**

Estimated Business Potential:  
**100% risk avoidance**

# Duplicate invoices – Actionable insights

Action can be taken on items to improve compliance by identifying the root causes. Based on guidelines, actions can be configured to improve efficiency and reduce risk.

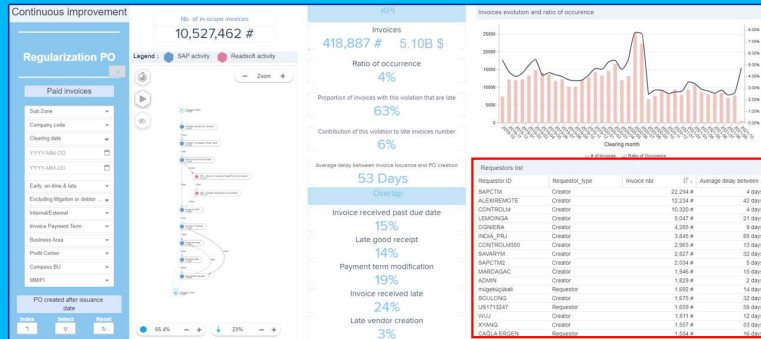
Task Overview shows the status of all the signals received. We can see there are 2 signals for “Duplicate Invoice Detected”.

Subject	Total	Open	In Progress	Awaiting Confirmation	Snoozed	Recently Created
Correct Invoice Details	2	2	0	0	0	2
Duplicate invoice detected	2	2	0	0	0	2
Request missing Goods Receipt	4	4	0	0	0	4

Signals show the details of 2 invoices for which “Duplicate Invoice Detected” was received and action need to taken on them.

Subject	Created	Ts	Status	Assignee	Sort	IT
Duplicate Invoice Detected	10/12/21, 16:46		Open	Assign To Me	Document Number L: 9340252055	Potential Double Pa- 712.9M USD
Duplicate Invoice Detected	10/12/21, 16:46		Open	Assign To Me	Document Number L: 9340807758	Potential Double Pa- 628.9M USD

## Organizational Analysis



Action can be taken to block payment for those invoices and notify the vendor. This task can be assigned to another person based on discretion.

**Duplicate invoice detected**

Open | Created 10/12/21, 16:46 | Last updated 10/12/21, 16:52

Invoice #9340252055, created on 2019-02-22, from vendor Azur Inc. of value \$ 712.9k has been detected as a duplicate invoice. Please immediately block the processing of the invoice in case of suspected duplicate payment.

Document Number (BELNR)	Potential Double Payment	Company Code	Fiscal Year (GJAHR)	Document Date (Timestampt)	Reference (XBLNR)	Vendor Name
9340252055	712.9M USD	A003	2019	2019-02-22	R0A-FEB19	Azur Inc.

Today: Tue, 12 Oct 2021 00:00:00

**Actions**

- Trigger Payment Block Of Invoice
- Notify Vendor

**Assignee**

No User Assigned

Assign To Me | Assign To User

# Reduce three-way match errors

Automatically resolve three-way match errors by solving root causes such as price and quantity mismatches between PO and invoice.

## Challenge



- Three-Way match is required in order to prevent fraud and carelessness, which otherwise results in non-compliance to SOX
- Root Causes, such as price mismatches between PO and invoice or missing goods receipts, lead to three-way match errors
- Resolving these errors typically requires significant effort from multiple departments

## Solution



- Tools such as Celonis Process Analytics helps detect root causes for frequent mismatches and missing goods receipts
- Action Engine allows purchasers to update PO prices or confirm pending goods receipts with a click of a button

## Benchmark



**30%\***

\*Per American Productivity & Quality Center (APQC), 30% of invoice line items fail 3-way match the first time.

## Expected Improvement



**20%\***

\*Based on Celonis customer achievements.

## Success Story

Utilities Client

**20%**

of formerly reworked invoices  
now without exceptions

“On-time payment could be improved by 20%. Also - one fifth of formerly reworked invoices now follow the process without undesired process steps.”

**P2P subject matter expert**

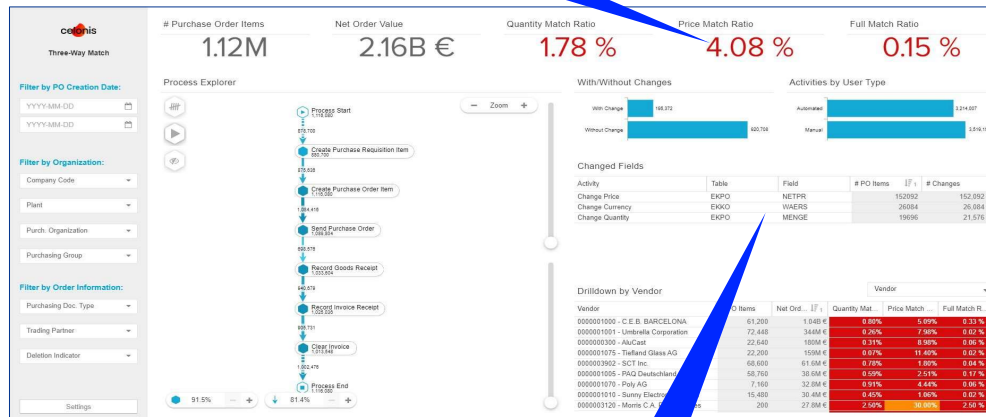
# Reduce three-way match errors – How Process Mining helps



## Process Explorer

### 1. Identify Three-Way match impact and evolution

Both Price and Quantity mismatches are at a very high rates ranging from 0.15% to 4.08% and automated actions are also causing match errors.



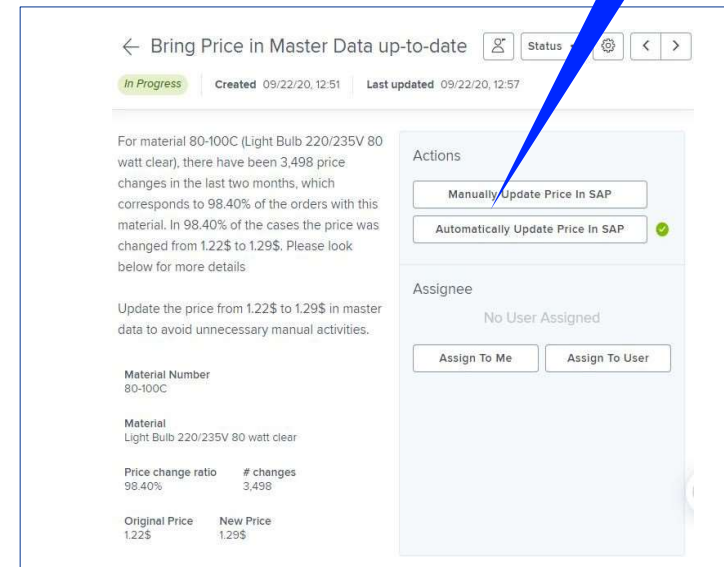
### 2. Find specific relevant vendors with high match errors rate

Root Cause: This is a systematic error but there is one Vendor that has the highest Purchase Order value and a high Three-way match error: C.E.B Barcelona.

## Process Automation & Action Engine

### 3. Resolve with automated actions

Standardize prices and quantities that are generating Three-Way errors among documents.



**03**

# **Process mining and audit transformation**



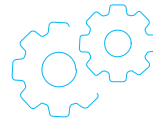
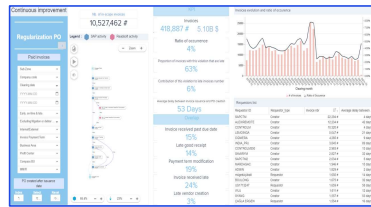
# Where can process mining support internal audit?

	<b>Corporate Audit Planning</b>
	<b>Preparation</b>
	<b>Execution</b>
	<b>Reporting</b>
	<b>After Care</b>

# Internal audit process mining use cases



Rapid data driven visualizations of multiple current application state/financial processes across multiple locations and departments



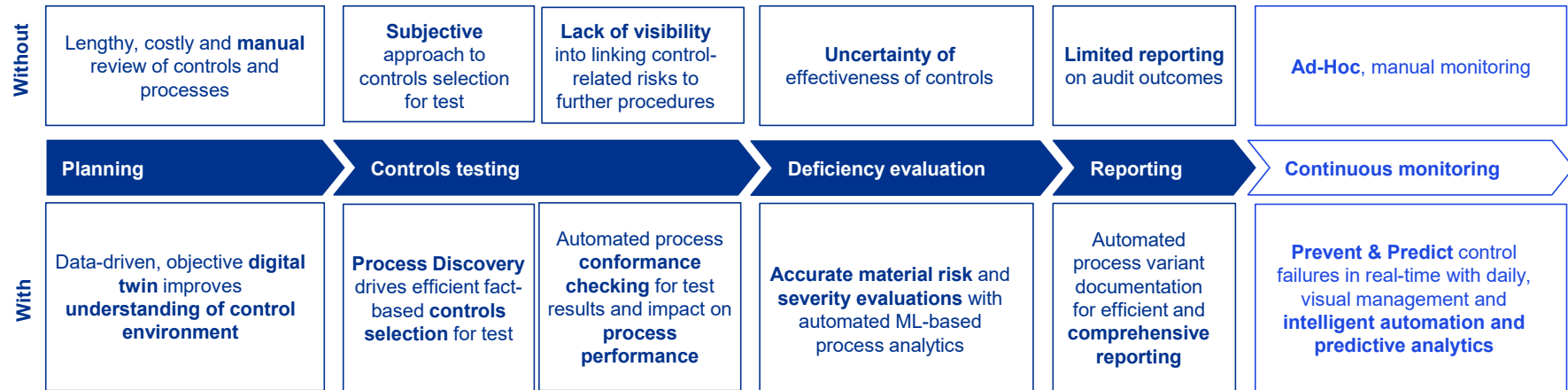
Define your "should be" process flow or target operating model and compare it to the "as is" process discovered from your data



Assign optimizing actions to your team and identify which teams have the best outcomes and which interactions result in the biggest improvements



# How does process mining fit in the audit lifecycle?



## Benefits

100% Case Coverage



Fact-Based Control Assessment



Anomaly Detection



## Business outcomes

Reduced Compliance Costs



Increased Speed



Improved Quality



“Quantifying performance issues and patterns of problem areas helps auditees understand what needs to be addressed and improved.”

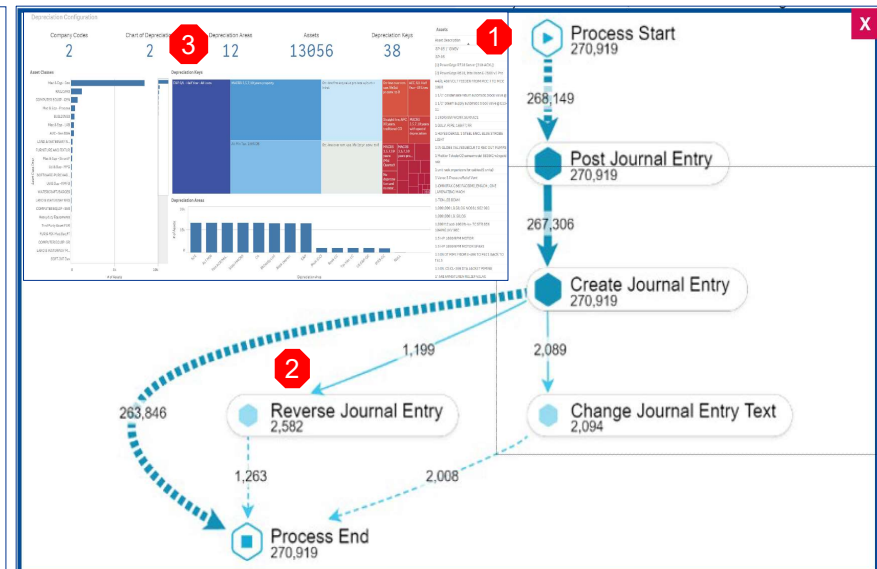
**Audit IT Senior Manager**

# How does process mining fit in the audit lifecycle? (continued)



**Client example**

A utility client is using process mining to identify journal entries deviated from a defined process and based its sample on a specific population of JEs



- 1** Assess journal entries and identify manual versus automated entries.
- 2** Identify reasons for rework (manual adjustment entries) and manual recurring entries. Identify opportunities where manual journal entries volume can be reduced.
- 3** Analyze key risk indicators: conflicting GL account combinations for debits and credits, round amounts, miscellaneous account postings, and other entries.

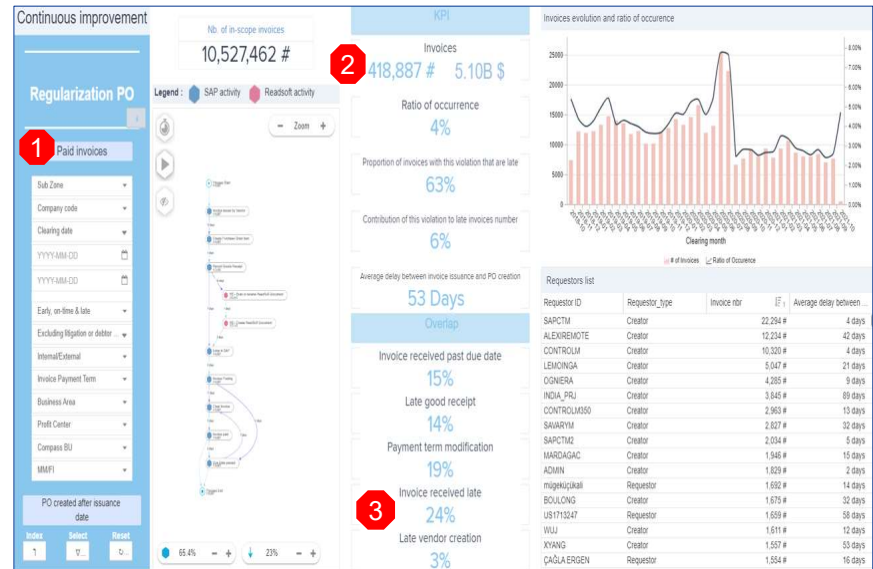
# How does process mining fit in the audit lifecycle? (continued)

**Audit execution**

- Achieve **Process Understanding**
- Identify **deviations** compared to previous audit
- Analyze **control throughput** and its **conformity**
- Continuous controls **monitoring**

**Client example**

Understanding the root causes of late invoice payments of a global pioneer in the area of industrial digitalization and high-tech with over 100.000 employees worldwide.



- 1** Custom filters on the left of the sheet provides easy filter options to be applied on the analysis
- 2** There are 418k invoices with value of \$ 5.1 B for which PO is created after issuance date
- 3** 24% of invoices are received in which 15% of invoice received are past due date

# How does process mining fit in the audit lifecycle? (continued)

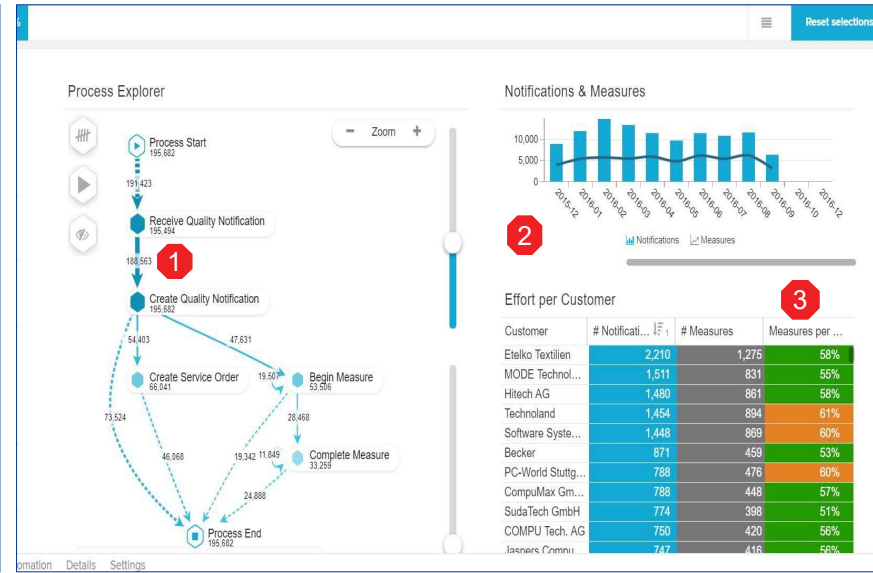
**Walkthrough preparations**

Measure **Business Performance** after the Transformation

Continuous **Process Optimization** and **Automation**

**Client example**

Credit card and loan application process of a leading worldwide bank with over 90.000 employees. Process varies significantly between branches with respect to the targeted ideal throughput time. The percentage of cases within the desired throughput time is a good indicator of process excellence and compliance.



- 1 The target throughput time for loans was only achieved in 65% of all loans (branch interval: 55% to 83%) and 70% for all credit card applications
- 2 Only 65% (loans) and 70% (credit cards) reached performance target
- 3 Within 6 months reach 90% KPI fulfillment with estimated business value: \$9.2M p.a.



# What will be expected from IA?

Transformation of a business to a more of a real time audit than quarterly. Auditors enhance the quality, transparency and granularity of the audit report, audit execution, communication with management and insights. Auditors talking more regularly with management, communications becoming easier, and audit effort being spread over the year rather than concentrated at the year end. Management wants more than the data it provides presented back in a different format.

- 1 Views on control gaps
- 2 Process mining
- 3 Root causes of exceptions
- 4 Internal benchmarking
- 5 Visualization
- 6 Comment on integrity of management information 6 weeks after year end

# Next-gen internal audit using Process Mining

	Traditional way	“intelligent” way
Pre-work	<ul style="list-style-type: none"> <li>Numerous FTE hours spent querying and pulling data- export to excel for review</li> </ul>	<ul style="list-style-type: none"> <li>100% of process variants automatically mapped out for complete case coverage and minimizing pre-work</li> </ul>
Audit walkthrough	<ul style="list-style-type: none"> <li>Samples of data tested to piece together risks and control failures</li> <li>Walk-throughs with business stakeholders to understand business process performance and anomalies</li> </ul>	<ul style="list-style-type: none"> <li>Pre-defined analyses automatically identify instances of control failure and assess severity</li> <li>Data-driven review of high-priority process anomalies with automated root cause using ML</li> </ul>
Remediation	<ul style="list-style-type: none"> <li>Control gaps manually reviewed with stakeholders and assigned for action/feedback in Excel</li> </ul>	<ul style="list-style-type: none"> <li>Trigger automation or next-best actions to close control gaps in real-time based on process activities or exceptions</li> </ul>
Continuous monitoring	<ul style="list-style-type: none"> <li>Quarterly/Monthly ad-hoc reporting to monitor ongoing KRI trends</li> <li>Manual follow ups to track action items in Excel and via email</li> </ul>	<ul style="list-style-type: none"> <li>Automatically inform auditors when control gaps are not addressed within expected timeframes</li> <li>Real-time monitoring of KPIs and prescriptive process improvement</li> </ul>



# Impact of process mining on internal audit

## Save Costs -25%

Reduce compliance costs by uncovering hidden inefficiencies, deviations and bottlenecks as well as cost for auditing itself.



## Boost Efficiency +30%

Making use of pre-defined analyses for an easy and professional, industrialized reporting. Make improvements and monitor in real time.



Analyze approvals, timelines, exceptions, and violations in order to improve processes and avoid business risks.

By standardizing the audit execution and making use of pre-defined analyses the audit efficiency is increased.

## Increase Speed +37%

Real-time surveillance of all business transactions and fast results due to proactive insights and fast root-cause analysis.



## Ensure Quality +100%

High precision and full transparency of all running processes enables the detection of all non-compliant processes and fraud.



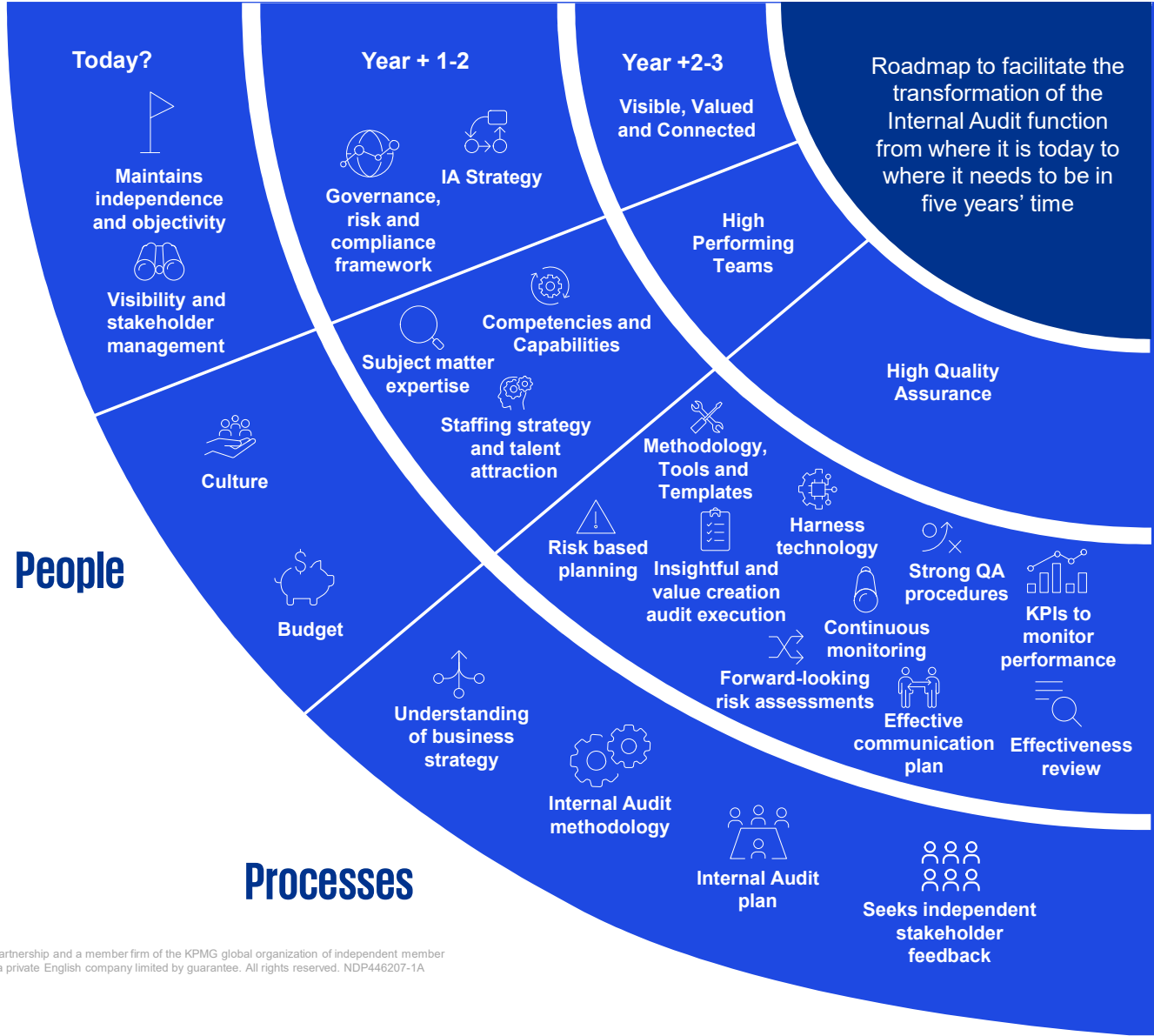
**04**

**How to get started?**

# Positioning

# People

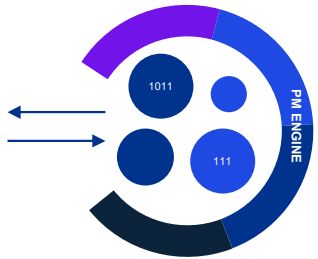
# Processes



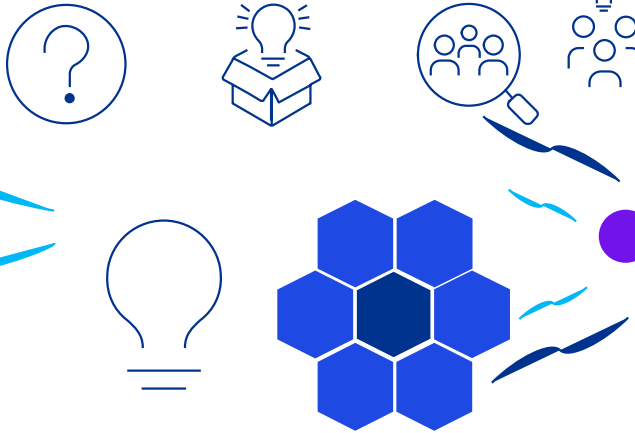
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# Opportunity Prioritization

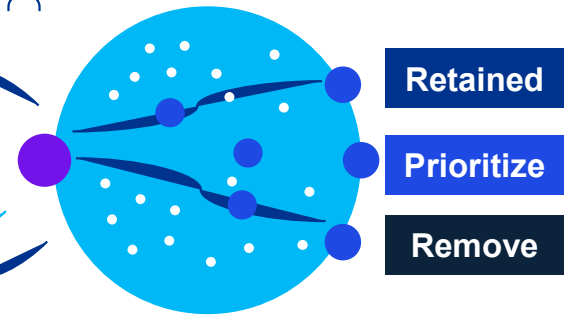
Data driven discovery based on system event logs



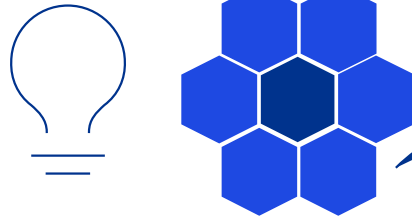
Business engaged



Prioritize opportunities



Analysis and hypothesis areas to uncover opportunities



Define implementation



# Industry pulse looking forward

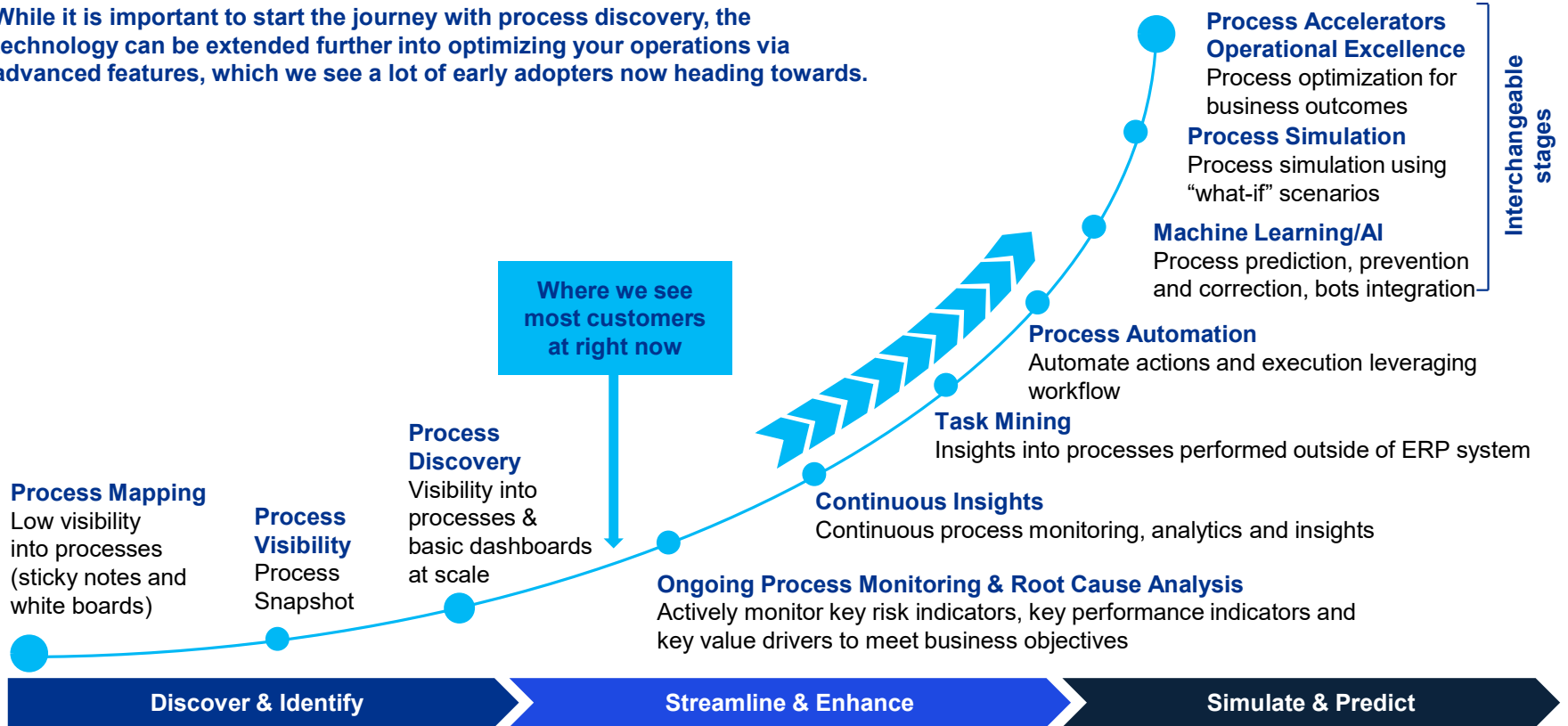
## Industry pulse and looking forward

While process mining adoption has accelerated in the manufacturing domain over the last decade, financial services sector has gained momentum over the last 24 months. Some of the largest financial institutions have already embarked on this journey by setting up process mining Centre of Excellence (CoEs) and adoption has been across sub-segments like investment banking, retail banking, asset and wealth management, insurance, etc. The application area or challenges that process mining is applied to is also quite varied, as reflected in the table below.

Growth drivers	Operational efficiency	Digital transformation	Risk and compliance	Continuous monitoring
<ul style="list-style-type: none"> <li>• Bottlenecks impeding growth</li> <li>• High drop-out rates</li> <li>• Low share of business</li> </ul>	<ul style="list-style-type: none"> <li>• High turnaround time</li> <li>• Low STP, low throughput</li> <li>• Data-enabled root cause analysis</li> </ul>	<ul style="list-style-type: none"> <li>• High frequency activities</li> <li>• High manual rate</li> <li>• Low impact and high-volume transactions</li> <li>• Automation opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Flow variations</li> <li>• Conformance</li> <li>• Exceptions and anomalies</li> <li>• Risk score of activities</li> </ul>	<ul style="list-style-type: none"> <li>• Data driven actions</li> <li>• Track and drive process performance</li> <li>• Change analysis and feedback loop</li> <li>• Process cockpit</li> </ul>

# The evolution of process mining

While it is important to start the journey with process discovery, the technology can be extended further into optimizing your operations via advanced features, which we see a lot of early adopters now heading towards.



**05**

**Questions?**

# Contact

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