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DISCOVER

The Ultimate Guide to Process Mining

A handbook for process excellence

ENHANCE

MONITOR

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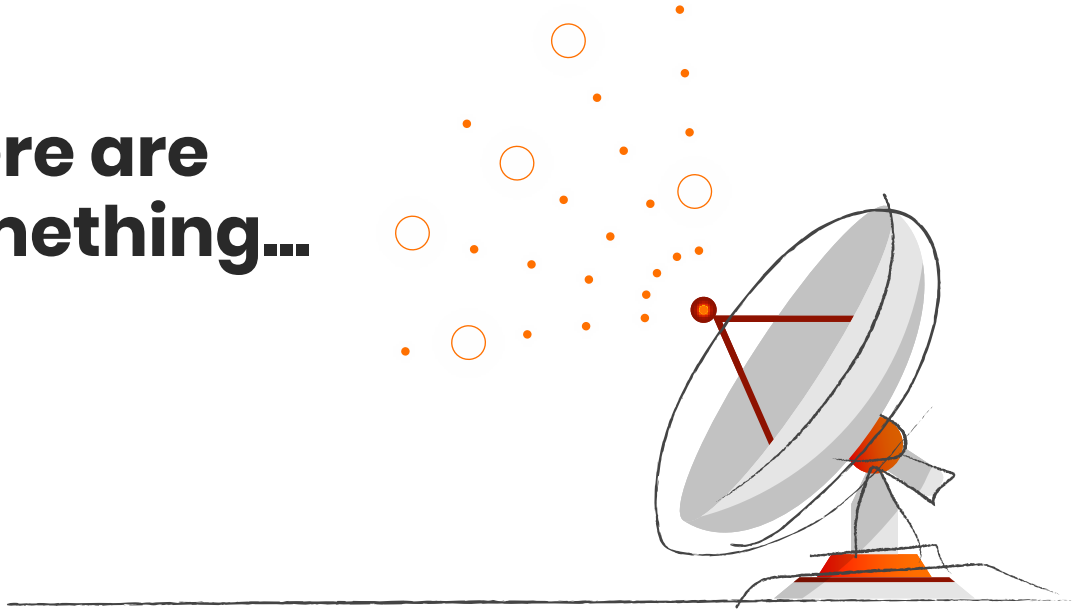
Businesses everywhere are starting to realize something...

That their biggest source of competitive advantage lies in the most granular operational details.



The whole world runs on processes. Think about it. Every customer experience and business outcome is the product of an invisible flow of data and actions between your systems, assets and people.

That's why Process Mining—and by extension, process excellence—is gaining steam. It's helping enterprises optimize each and every operational element for better outcomes, extraordinary experiences and world-class performance.

The Ultimate Guide to Process Mining is a book about how to help your organization become a better version of itself—by orchestrating the minute-by-minute actions happening across the business.

1. It's a **step-by-step methodology** to discover, enhance and monitor your core business processes at the deepest levels.

2. It's a **prescriptive analytics solution** to find (and resolve) the true root causes of friction invisibly embedded in your systems and operations.

3. It's a **holistic, bottom-up approach** to process excellence built on the principles of continuous improvement (like Lean and Six Sigma) while advancing the technologies used to drive it (like AI, automation and BI analytics).

Technology, analytics and process improvement are all parts of this story. But ultimately this book isn't about technology, or analytics, or even improving your processes.

It's about actions and the unlimited acceleration that's possible when you connect on-the-ground actions to top-level business outcomes.

AND OVER THE NEXT 50 (ISH) PAGES, WE'RE GOING TO SHOW YOU HOW.

What this is and who it's for

What this guide is

The Ultimate Guide to Process Mining is a deep dive into the what, why and how of Process Mining—its origin, the critical steps, and most importantly, the results it delivers.

But it's also a practical working document. There are practical examples throughout the book designed to help you identify and progress toward your own Process Mining opportunities. Use them as a basis to plan your approach, build your team, and focus your efforts around specific, measurable outcomes.

What's inside

Chapter 1: What is Process Mining?
What are processes? How can they be optimized? And what are the four stages of Process Mining?

Chapter 2: How to get started.
What does Process Mining look like in a real company? And how can beginners accelerate positive outcomes for the business, users and customers?

Chapter 3: Process Mining in the real world.
What are good Process Mining use cases? How can Process Mining support transformation initiatives?

Who this guide is for

Process Mining is most effective when applied at scale—to high-volume processes with defined steps toward a known goal, through systems that produce time-stamped event logs.*

(Although it can deliver value everywhere for anyone executing, managing or measuring a process—from the CFO of a multi-billion dollar enterprise to the receptionist at a dentist streamlining the patient intake process.)

That means this guide is particularly suited to people in mid-to-large businesses closely connected to defined processes in areas like:

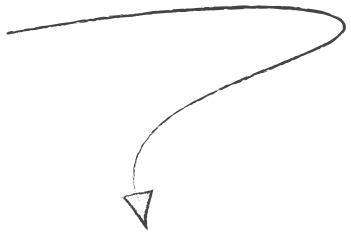
- **Purchase-to-Pay** or **Procurement** in Finance
- **ITSM, System Migration** or Service Delivery in IT
- **Incident-to-Resolution** in Customer Support
- **Lead-to-Order** in Sales and Marketing
- **Order-to-Cash** or **Manufacturing** in Supply Chain

You can find a longer list of these processes (with specific Process Mining use cases) in Chapter 3.

If you're a senior executive, a process practitioner, part of a Shared Services group, or even leading a cross-functional Process Excellence initiative, this book was written for you.

(And if you've come from somewhere else, stick around. People are using Process Mining for all kinds of things—even post-match analysis of international football games).

Let's dive in



*Flick to page 17 to learn what that means

Chapter 1

What is Process Mining?

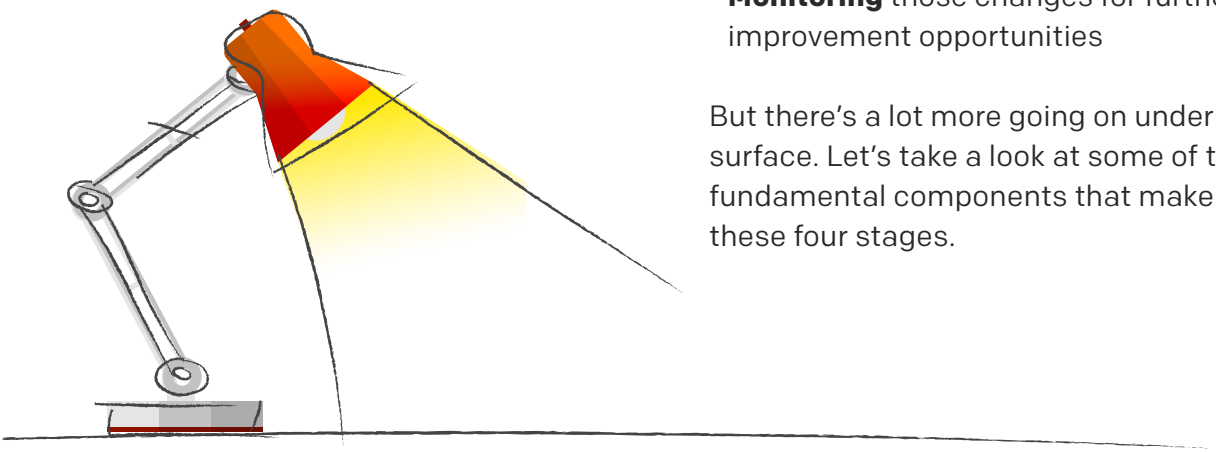
Process Mining 101

Process Mining is a relatively new area of study grounded in a long tradition of businesses striving to optimize business outcomes by improving the efficiency, effectiveness and productivity of their critical workflows.

Process Mining happens in four distinct stages (*which we cover in more detail on page 16*):

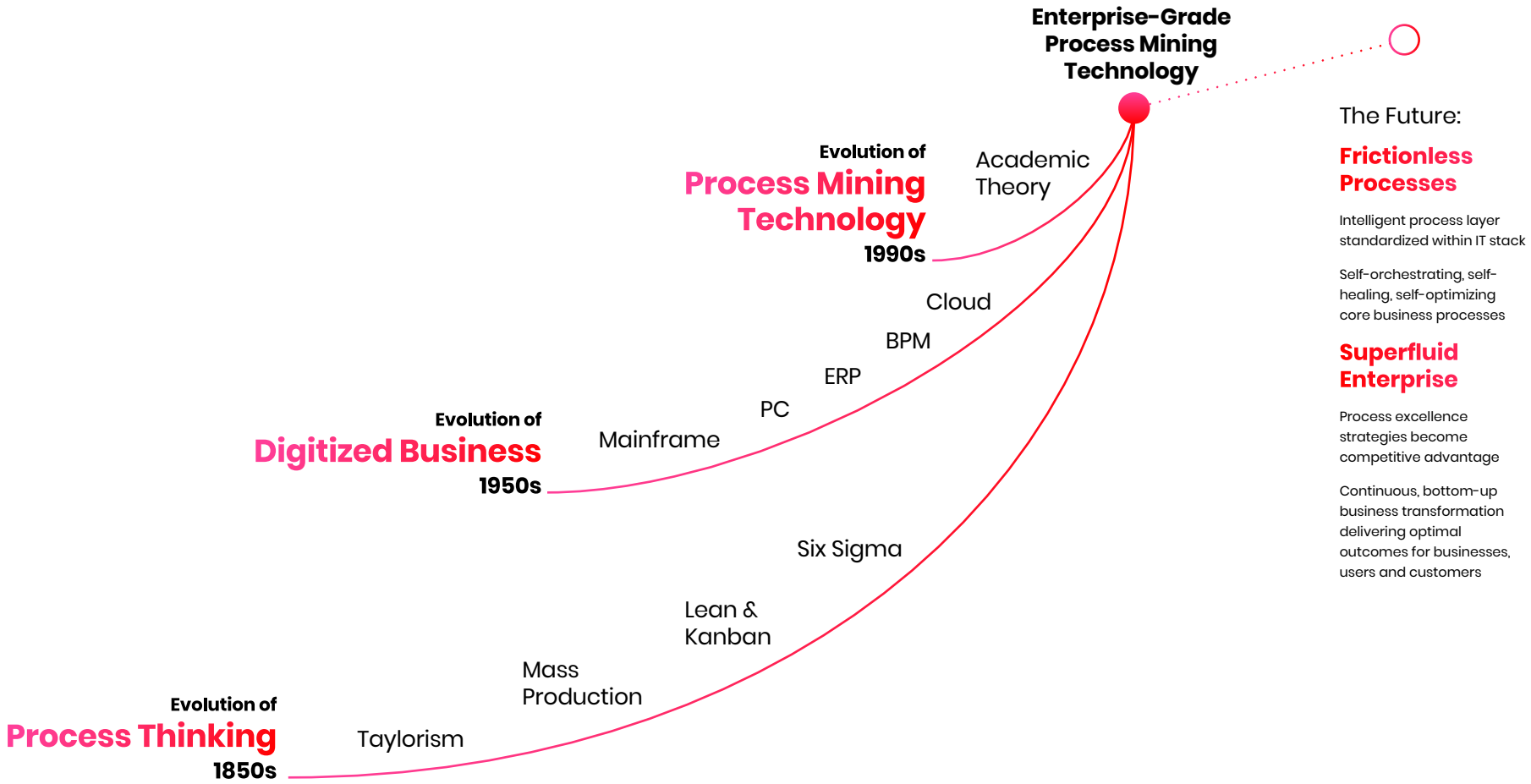
- **Collection** of time-stamped event log data from key transactional systems
- **Discovery** within that data of real processes as they actually happen
- **Enhancement** of those processes to optimize business outcomes
- **Monitoring** those changes for further improvement opportunities

But there's a lot more going on under the surface. Let's take a look at some of the fundamental components that make up these four stages.



Frederick Taylor Winslow was arguably the first person to study and optimize workplace productivity. His 1911 monograph *The Principles of Scientific Management* pioneered the idea that a business's core operations should be analyzed, standardized and improved on.

A brief history of Process Mining



The Future:

Frictionless Processes

Intelligent process layer standardized within IT stack

Self-orchestrating, self-healing, self-optimizing core business processes

Superfluid Enterprise

Process excellence strategies become competitive advantage

Continuous, bottom-up business transformation delivering optimal outcomes for businesses, users and customers

To me, Process Mining is...

"Process Mining is analyzing processes based on event data... i.e., based on what's really happening. Beginners start with things like process discovery and conformance checking, while advanced users can re-engineer processes and even predict what is going to happen in future processes."

Wil van der Aalst, 'Godfather of Process Mining'

"Process Mining seamlessly reconstructs entire processes end-to-end, as they actually happen—across all systems and users."

Dr. Lars Reinkemeyer, Global Process Lead, Siemens

"Process Mining includes: automated process discovery, conformance checking, social network/ organizational mining, automated construction of simulation models, model extension, model repair, case prediction and history-based recommendations."

Gartner, 2019 Guide for Process Mining

Why do we need Process Mining today?

Every business is a collection of core processes. They're foundational infrastructure; the base element of business operations.

Early core business processes were simple (and often manual).

- To create a product you'd procure materials from a supplier, manufacture it and store it.
- To fulfil a purchase, you'd receive an order, retrieve the product, package it up and ship it out.
- To pay a supplier, you'd receive an invoice, arrange the payment, and send confirmation.

But as businesses have digitized every aspect of working life into IT systems, core processes have become complex operational machinery in and of themselves—too fast, frequent, interconnected and distributed to manage manually.

And crucially, businesses evolve over time—they expand, scale up, procure new systems, go through mergers and acquisitions, ditch old processes, adopt new ones, build products, enter new regions, migrate to the cloud and so on.

Every change like this impacts the process environment, and it's impossible to optimize a core process for a specific business outcome without a holistic understanding of how the whole landscape is connected. Process mapping software and consultants just aren't up to that.

As we'll go on to see, Process Mining is purpose-built to handle the inherent complexity and dynamism of the modern process environment. It delivers deep visibility and control into the minutiae of individual processes, the relationships between them, and the outcomes they deliver.

That's the true value of Process Mining —not just in understanding how to make discrete parts of the business more efficient, but how to calibrate the individual components to optimize the whole operational engine for specific outcomes.

The limitations of old approaches

Process improvement isn't a new idea. But the scale and complexity of the modern process environment has quickly accelerated beyond the capabilities of traditional tools.

Process mapping software, business intelligence initiatives—or worse, whiteboards and post-it notes—just can't deliver the real-time insight and control that continuous process excellence demands.

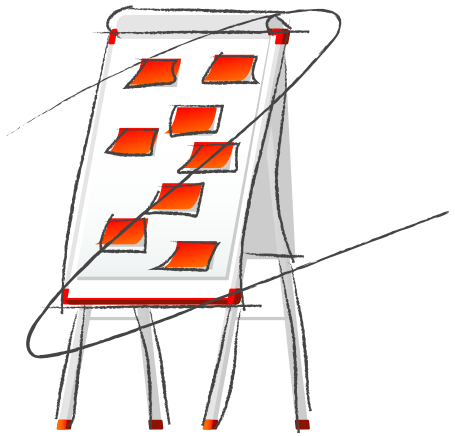
Imagine you're trying to hit a bullseye on a dartboard.

Process mapping tools could provide broad instructions based on a static, high-level snapshot of how the process happened once: pick up a dart, stand in position, throw it at the center, check the result. The result is partial, out-of-context visibility with no analytical value.

BI would automatically tell you where the dart landed; but with no analysis of how the dart got there, you can't improve your next throw. It's just measuring for a predefined outcome.

Conversely, Process Mining analyzes how data moves through a series of steps leading up to an outcome. You'd see your weight shifting and the motion of your arm, your grip on the dart and its trajectory through the air, and live feedback against the ideal form throughout.

Old way		New way
BI & Process Mapping	vs.	Process Mining
Subjective, Partial		**Objective, Complete**
Lengthy, Costly		**Immediate, Self-Service**
One-Time Understanding		**Continuously Enhancing**



Process Mining maturity: from visibility to outcomes

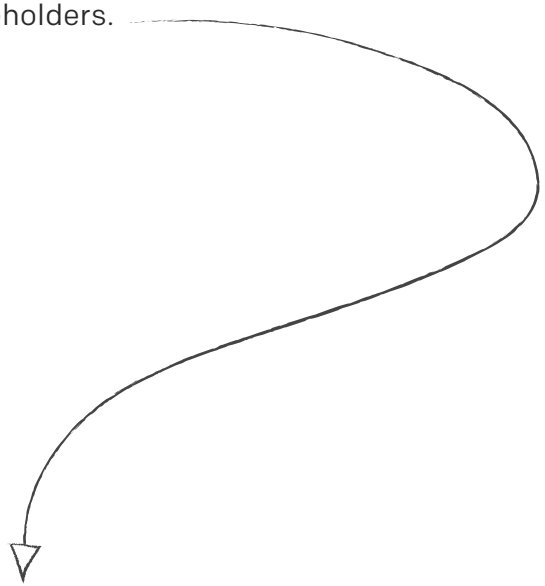
Process Mining isn't just about resolving the mountain of complexity and friction that most organizations have unconsciously accepted as the cost of doing business.

Its true value is in connecting granular operational performance to high-level business outcomes on a continuous basis.

We're going to explore exactly how that happens next, by diving into the four key stages of Process Mining:

- **Collect** event log data from transactional systems
- **Discover** points of process friction and their root causes
- **Enhance**, standardize, streamline, optimize and orchestrate for specific outcomes
- **Monitor** process performance and improvement opportunities

In the next chapter we'll see what this framework looks like when executed, through a real world example. We'll also explore a few different ways to categorize the benefits and outcomes that Process Mining delivers for different audiences—from process practitioners all the way up to executive stakeholders.



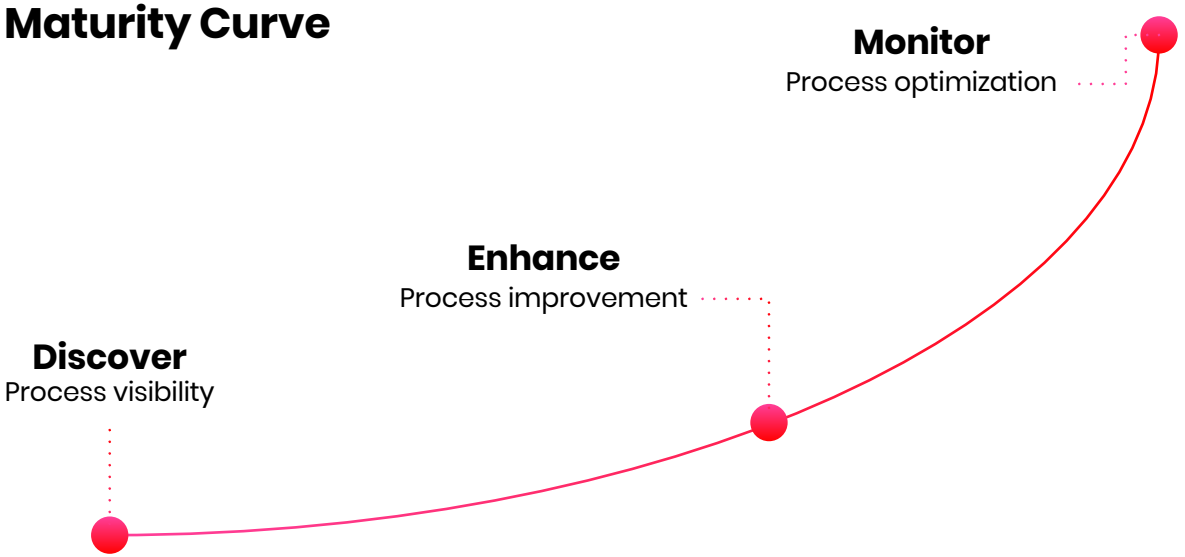
Process Mining maturity: from visibility to outcomes

In the last chapter, we'll take a wider view to see how this fundamental framework not only scales outward—to different Process Mining initiatives across the business—but upward, to support high-level business transformation initiatives with a bottom-up approach to change.

Eventually, mature Process Mining organizations can coordinate multiple Process Mining initiatives toward connected high-level outcomes—anything from huge-scale automation, and supercharged customer experiences, to effortless business agility, seamless system migrations and more.

For now though, let's explore how Process Mining works by taking a deep-dive into its four main pillars: Collection, Discovery, Enhancement and Monitoring.

Process Excellence Maturity Curve

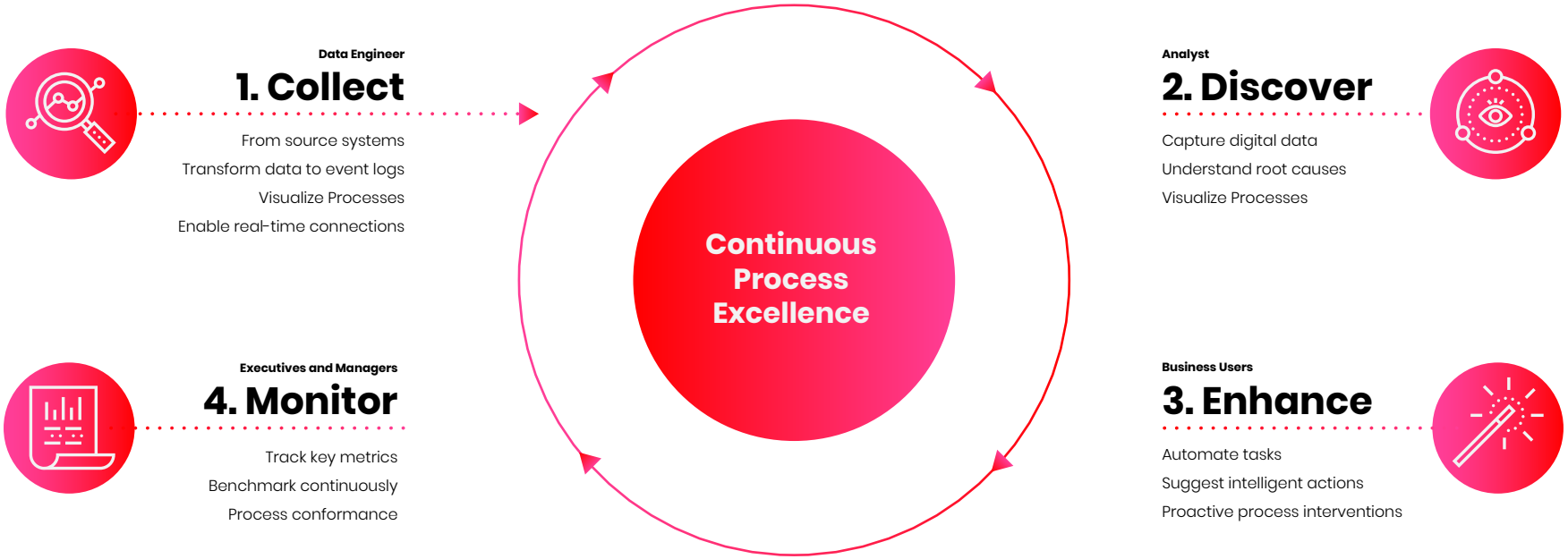


How Process Mining works

The four stages of Process Mining

The Celonis Intelligent Business Cloud delivers Process Mining in four key stages. In this section we're going to break down the different concepts, technologies, activities and people at work in each stage.

The Process Mining lifecycle



The four stages of Process Mining

1 Collect

Collect... raw data from source systems to create event logs

Every interaction inside the transactional systems your business runs on (like SAP, Oracle, Salesforce, ServiceNow, etc.*) leaves **digital footprints**—raw data that can be turned into a record of actions

The first stage of Process Mining is for data engineers to establish a real-time link to those key data sources (through pre-built connectors and APIs), extract that raw data and turn it into an event log.

Event logs have three parts:

- An **activity**
- A **time-stamp**
- An **object** or **ID**

Process Mining technology aggregates these event logs and reconstructs process flows across your whole organization as they actually happened—every time they happened.

Free Celonis training:
Process Connection Basics

Common data sources for Process Mining

SAP ERP
SAP Ariba
SAP S/4HANA
SAP C/4Hana (CX / Hybris)
SAP Success Factors
SAP Concur
ServiceNow
Salesforce
Microsoft Dynamics AX
RPA
SAP ECC
Oracle EBS
Coupa
Oracle JD Edwards
Oracle Peoplesoft
Readsoft
OpenText
HP Service Manager
Siebel
Google Sheets
BMC Remedy
SAP SRM
Infor
SAP CRM
Trackwise

The four stages of Process Mining

2 Discover

Discover... points of process friction and their root causes

Analyzing event logs at scale renders your whole process environment in a level of detail that whiteboards, interviews and process mapping software could never provide—every step of every process, every time it's ever been executed.

In the second stage of Process Mining, data analysts methodically quantify the sum total of your process environment: every case, pathway, variation and error, as well as their business impacts.

The objective is to discover:

- **Points of friction** (and their root causes)
- **Optimal pathways** (and every deviation from them)
- **Business outcomes** (for initial conditions and corrective actions taken)

That all happens across a few different steps:

Free Celonis training:
Process Discovery Basics,
Analysis Building Basics

Happy path

Every process has a "happy path"—the most efficient and effective route from initial input to final output.

Process discovery helps users find this happy path and, during the Enhance stage, automatically correct variations to match it.

Variants

Processes often have hundreds (if not thousands) of variants—deviations from the happy path caused by errors and inefficiencies.

Analyzing process variants can reveal underlying causes of process friction, highlight entirely new blind-spots and surface a blend of quick-win and long-term improvement opportunities.

The four stages of Process Mining

2 Discover

Process discovery

Build a complete picture of every process by exploring an interactive visualization of key metrics, like:

- Volume of cases/items in the process
- Total value of cases/items in the process
- Number of steps in the process
- Number of different paths (“variants”) that cases/items take through the process
- Number of cases/items that flow through each variant
- Visualization of steps and variants

Process analytics

Use powerful AI to understand the root cause (and enhancement opportunity) of every process variation, determine its operational significance and prioritize your response according to its impact on meaningful KPIs tied to key business outcomes, like:

- On-time delivery
- Working capital
- Customer satisfaction
- Risk reduction
- Operating costs
- Automation rates

Root causes

Every variance has a root cause—like an error (like inaccurate data), an erroneous step or a wider improvement opportunity (like automation or task allocation).

Understanding the root causes of every process variation is the secret to uncovering enhancement opportunities that tangibly reduce friction and increase flow.

The four stages of Process Mining

3 Enhance

Enhance... processes by proactively removing friction

The variations and root causes identified during the Discover phase form the basis of enhancement opportunities—practical actions that remove friction and automate flow for your human and digital workforces.

In the third stage of Process Mining business users leverage AI and machine-learning models to execute these enhancement actions across all relevant transactional systems within the same Process Mining interface.

These actions could be in service of:

- Correcting errors
- Removing erroneous steps (or adding new ones)
- Reducing manual effort
- Improving orchestration, standardization and governance
- Increasing rates of automation

There are a few different technologies supporting business users to take these actions.

Free Celonis training:
Action Engine—Set up Intelligent Actions

Categories of process improvement

Standardization
Clarity and error-correction for practitioners.

Streamlining
Acceleration and productivity gains for LOB leaders.

Optimization
Intelligent decisions driving better outcomes and performance for business leaders.

Orchestration
Cross-functional alignment toward strategic goals for business executives.

The four stages of Process Mining

3 Enhance

Action Engine

The Action Engine is our AI-powered process assistant. It continually analyzes data and proactively surfaces a live feed of corrective actions to restore disrupted processes to that happy path.

Process automation

Process automation drives excellence throughout a digital workforce, cutting process costs and freeing up teams to focus on value-generating work. Business users build automated workflows across applications and systems (without writing a single line of code), ensuring that every time a person touches a process, they're adding tangible value.

Machine learning modeling

Combining complex process models with powerful machine learning unlocks a depth and scale of analytical insight that human brains can only dream of. Machine learning modeling uncovers patterns (and their root causes and impacts) across data from millions of cases and hundreds of disparate systems, continually surfacing new, unexpected —and otherwise invisible—opportunities.

The four stages of Process Mining

4 Monitor

Monitor... process performance and improvement opportunities

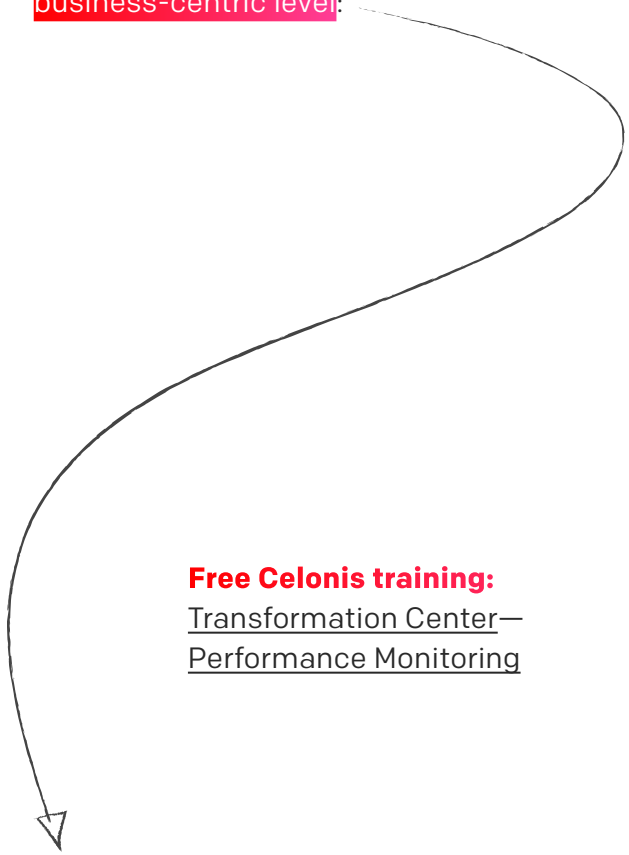
Continual improvement is central to Process Mining—discovery, analysis and enhancement are on-going activities that keep your processes in tight lockstep with your evolving business needs.

In the fourth stage of Process Mining, executives and managers measure and monitor process performance toward KPIs and business outcomes.

This feedback loop is vital to help the whole business:

- **Hold teams accountable** to progress against targets
- **Course-correct** in real time
- **Grow engagement** across different teams
- **Build demand** for further Process Mining initiatives across the business
- **Communicate success** upward and outward

Monitoring happens at both a granular process-centric level and a wider business-centric level:



Free Celonis training:
Transformation Center—Performance Monitoring

The four stages of Process Mining

4 Monitor

Conformance checker

Conformance checking helps to continually assess how closely your core processes adhere to their ideal happy path. This can help to identify and correct new points of friction as they occur, as well as support transparent governance and reduce risk around regulated processes.

Transformation center

The Celonis Transformation Center is a single pane-of-glass management environment that measures and monitors your progress toward KPIs and business outcomes over time.

It keeps individuals, teams and the whole organization focused on (and accountable to) more strategic goals that truly drive business performance.

Try Celonis Snap today

So now you know how Process Mining works, this is a great time to try it out for yourself—for free!

Try Celonis Snap today to discover your own processes by connecting your own event log data, or to see what's possible with a sample data set.

Chapter 2

How to get started

The path to Process Mining

Transforming your core operational processes to support business outcomes can sound daunting. But it's simpler and quicker to get started than it seems.

The beauty of Process Mining is that it's a systematic approach to incremental improvement that works the same at any scale. So whether you're using Process Mining to support high-level transformation or just to improve a small slice of the business, the underlying steps are the same:

Discover your processes, root out and resolve friction, enhance performance and continually monitor outcomes.

And actually, an agile approach is usually best here. Pick a process, focus on resolving friction points that have a large impact relative to the effort, and move on.

That's not to say strategy isn't important to long-term success—it is.

This chapter is about how to start small and scale up, in three key steps. It covers how to create a Process Mining plan-of-attack that takes your organization from its first pilot to building a full-blown Process Mining Center of Excellence inside your business—while staying agile enough to adapt to what you discover.

Getting started in three steps

- **Planning KPIs** tied to strategic goals and business outcomes
- **Building a team** with clear roles and accountability
- **Kicking off the implementation** and communicating success

LET'S EXPLORE WHAT THIS FRAMEWORK LOOKS LIKE THROUGH A REAL-WORLD EXAMPLE.

An industrial equipment manufacturer facing too much friction

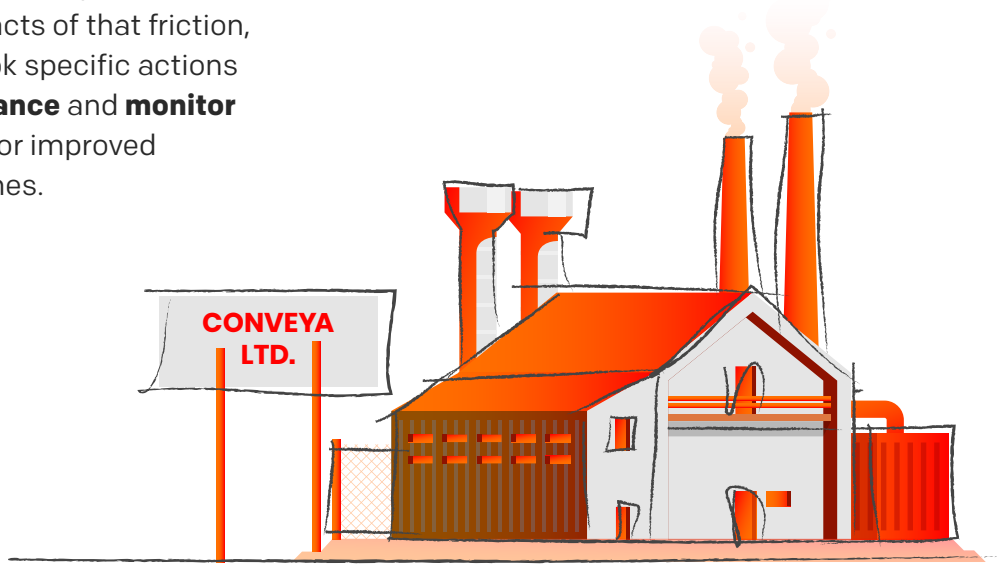
Let's follow a fictional example (inspired by many true stories) of how a company rolled out Process Mining to reduce friction, increase flow and improve performance to achieve a variety of high-value outcomes.

Conveya is a mid-sized manufacturer of made-to-order industrial equipment for a variety of industries (factories, airports, retailers, farming and distribution centers) across the US.

After winning a series of large contracts the company is rapidly scaling up to meet new demand while working hard to maintain its existing customer relationships.

However, they had some deeply ingrained friction within their **Order-to-Cash** process impeding their ability to grow. So they turned to Process Mining for answers.

Let's explore how they used Process Mining to find and analyze the root causes and impacts of that friction, and how they took specific actions to **discover, enhance** and **monitor** their processes for improved business outcomes.



Getting your organization ready for Process Mining

The embedded friction within Conveya's Order-to-Cash process was impacting people at all levels across the organization.

- **The people working in order management** and fulfillment were spending way too much time on manual data processing
- **The heads of process and customer service teams** were firefighting against customer churn due to too many late orders
- **Senior executives** felt too restricted by a lack of available working capital to seize new growth opportunities as they emerged

Conveya didn't know it yet, but—as with almost all process friction—the solution to these pain points neatly mapped to the **Discover, Enhance, Monitor** framework.

Process discovery
Locate the root causes (and impacts) of accidental process friction caused by errors, inaccuracies and inefficiencies

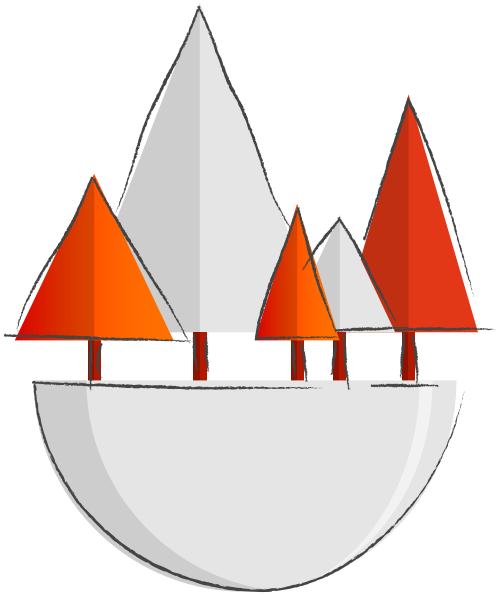
Process enhancement
Remove friction through standardization, streamlining, optimization and orchestration

Process monitoring
Measure the results of change and continuously surface new improvement opportunities

We'll return to discover how Conveya followed this framework end-to-end shortly. But for now, it's worth looking at how they started: by building a holistic understanding of the problem in order to form a cohesive response.

Conveya's first Process Mining steps

At the start Conveya needed to do two things.

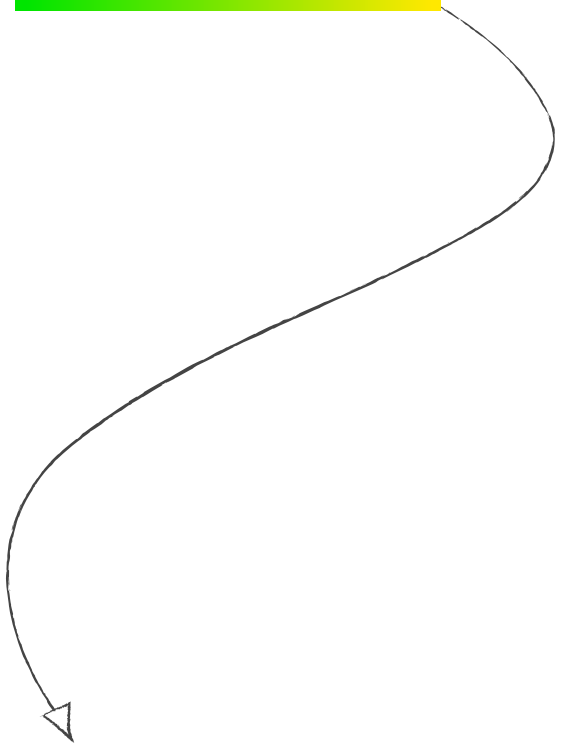


First: discover the true process environment by collecting time-stamped event logs from their ERP systems.

Second: get everyone aligned behind a clear focus and plan using the following framework:

- Their overarching strategic goals
- New and existing initiatives to accomplish those goals
- The specific process pain points inhibiting those goals
- The metrics and KPIs that indicate progress against those process pain points
- A roadmap for future success

Let's look at that framework in more detail.



Conveya's Process Mining planning framework

What were Conveya's strategic Process Mining goals?

- Improve customer satisfaction with reliable delivery times
- Gain competitive advantage with key customers
- Make processes scalable with aggressive growth targets

What initiatives will accomplish those goals?

- Clearer understanding of order fulfillment
- Reduction of cycle times through automation
- More robust Product Information Management

What process pain points inhibit those goals?

- Almost half of credit checks were being applied to low value accounts (and 25% of those checks took over a day to process)
- Too many blocked deliveries —30% of which take over 2 days to process
- Persistently incurring high late fees with key accounts

What KPIs will address those pain points?

- Fewer (and faster) credit checks
- Fewer blocked orders and faster resolution
- Increase on-time delivery rate

Future success goals

- Clean up master data
- Increase no-touch orders
- Make $5m efficiency savings

This framework provided Conveya with a foundation for a cohesive—and future-proof—Process Mining strategy: overarching goals, tied to actionable initiatives, specific pain points, clear metrics, and future ambitions.

A framework like this gets the whole organization aligned in one place—from process practitioners to senior stakeholders. And crucially, it lays the groundwork to get more specific about how discrete process improvements ladder up to business outcomes and transformational change.

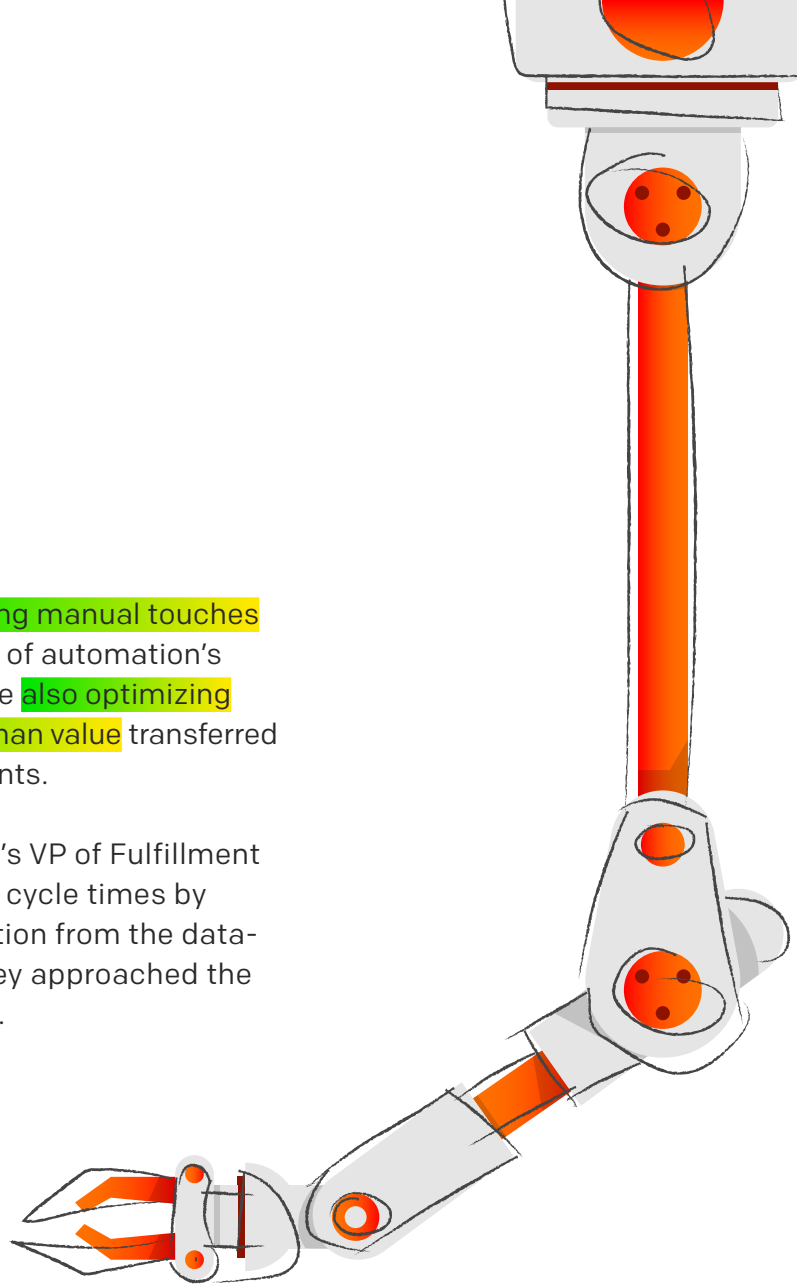
How to use automation

Automation is a key part of process improvement—an automation script or an RPA bot can do in seconds what takes a human minutes, or even hours.

But automation is just an accelerant—not a magic bullet. If you don't fully understand the steps (or the underlying data) you're automating, you can easily accelerate in the wrong direction. Put simply, you'll make your worst processes more efficient.

That's why reducing manual touches is a poor measure of automation's value unless you're also optimizing for the unique human value transferred at those touchpoints.

So when Conveya's VP of Fulfillment wanted to reduce cycle times by removing the friction from the data-entry process, they approached the problem carefully.



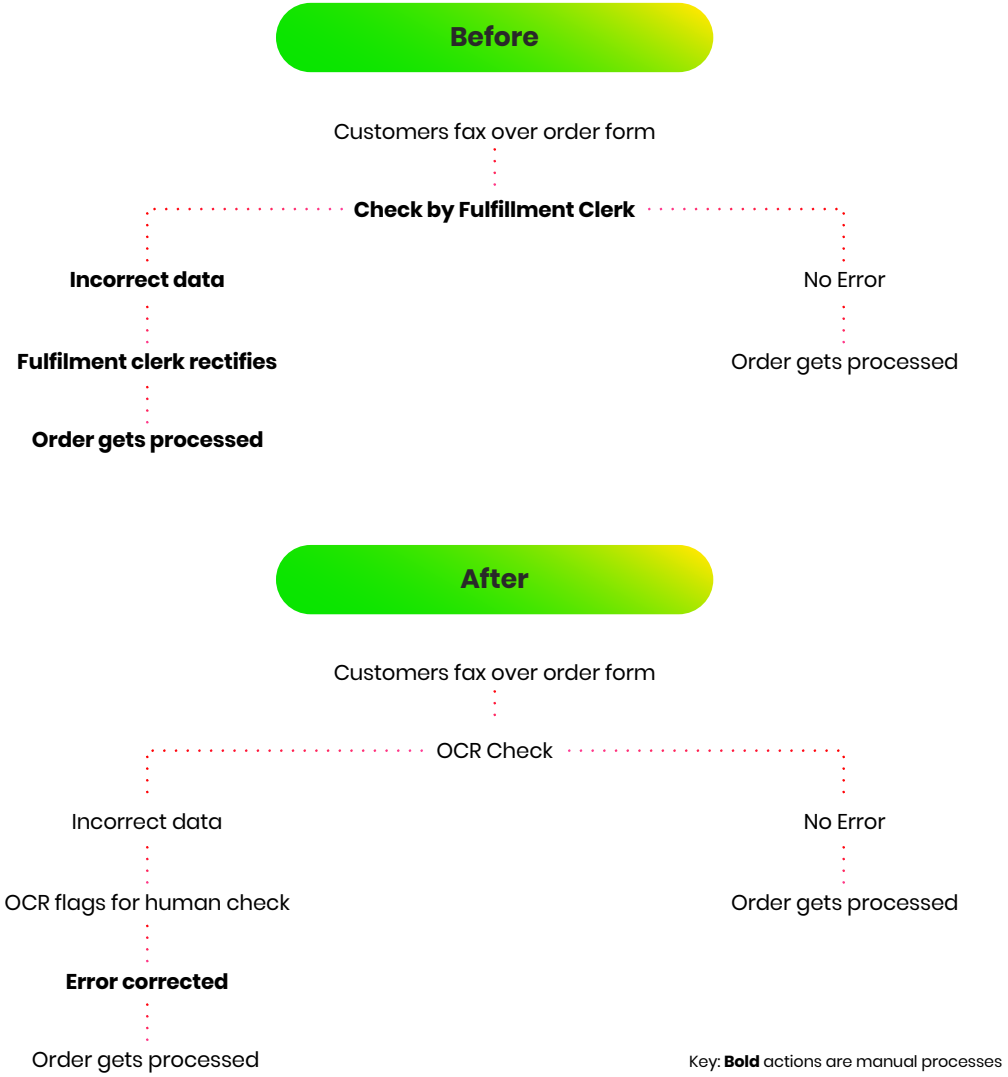
Conveya's order fulfillment automation initiative

Conveya's fulfillment clerks were spending a lot of time manually checking order forms for customer errors, and correcting them before processing.

One way to reduce cycle times in the data entry process would be to implement an optical character recognition (OCR) reader. But by automating fulfilment clerks out of the process, Conveya would have left the OCR to uncritically ingest errors, effectively increasing incorrect master data.

Instead, the VP took a smarter approach—setting up an OCR system with an amended automation script that flagged any forms with master data conflicts (and forms from new customers) for human verification.

The new solution combined the best of both worlds—reducing manual touches and cycle times overall, while preserving the high-value human touches where needed.



How to build your Process Mining team

Process Mining is at its most valuable when it's a long-term function. As Conveya discovered, operational excellence goes beyond a quick fix for a known problem to becoming a permanent, dedicated, exploratory capability.

That's not to say you can't (and shouldn't) start small and focus on quick wins. But you'll get out what you put in. Conveya wanted lasting transformative change, and they committed to creating the right blend of people, skills and resources.

And that means a few things:

An extensible team with clear roles, responsibilities and training opportunities

Governance structures around how information is distributed and decisions are made

Active reporting on successes and what KPIs mean in terms of real business outcomes

Who owns Process Mining?

This is a frequent question. Where should Process Mining sit within the organization? IT? A Process Excellence group? Shared services? A line of business (like Finance)?

If you have a Process Excellence team, it's a no-brainer. If not, it might make sense for your Process Mining team lead to also be the person responsible for the business outcome of the process in question—they have the most skin in the game.

But it's also important to think about how that ownership scales throughout the organization. As useful insights spread and more stakeholders across teams get involved, it's important to both distribute ownership to the people who own outcomes, and retain an integrated approach to process excellence as a distinct function.

Your first Process Mining team

There are **four critical roles** that every Process Mining initiative needs.

After the implementation of your first initiative (which we'll cover in the next section) and once you've started to realize (and report on) your progress toward your key KPIs, your Process Mining team should be in a good place to expand.

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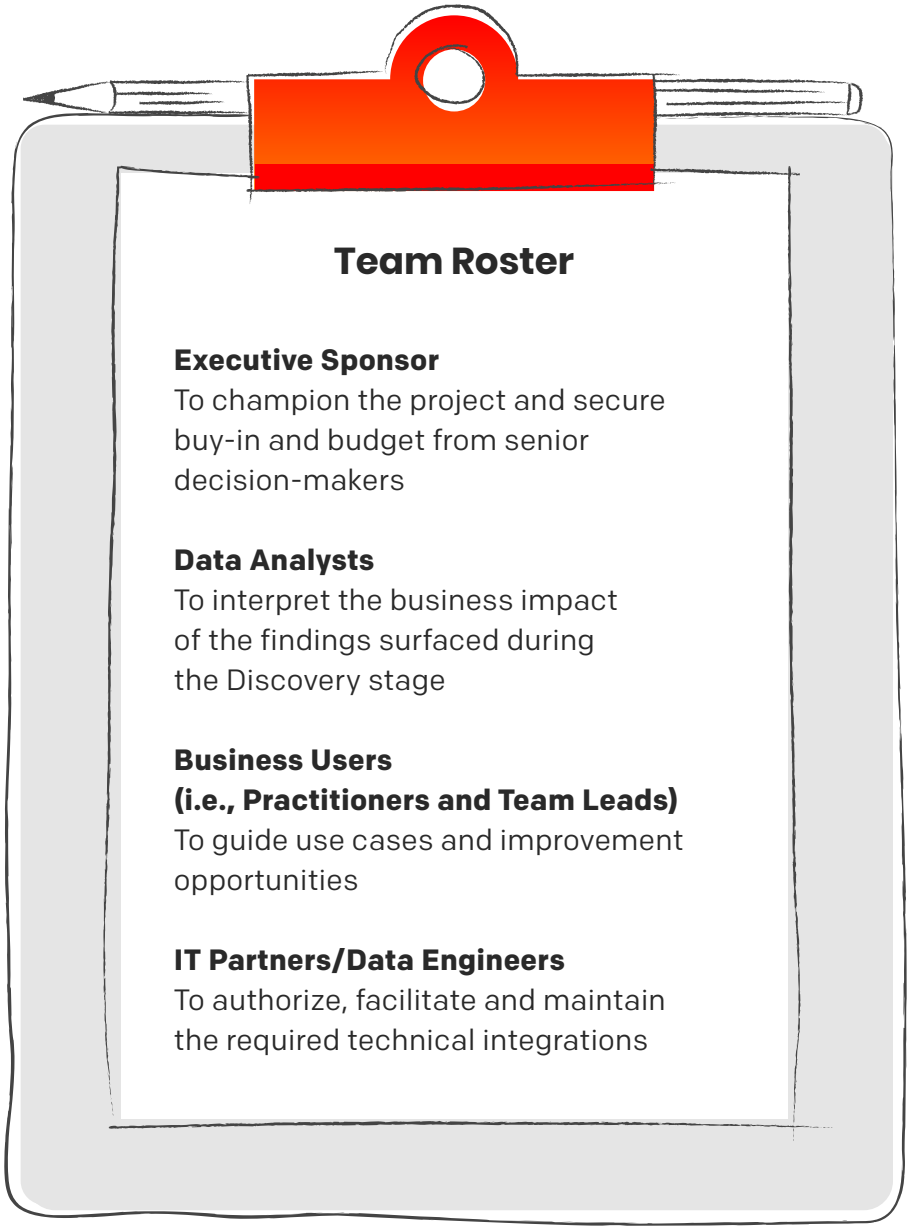
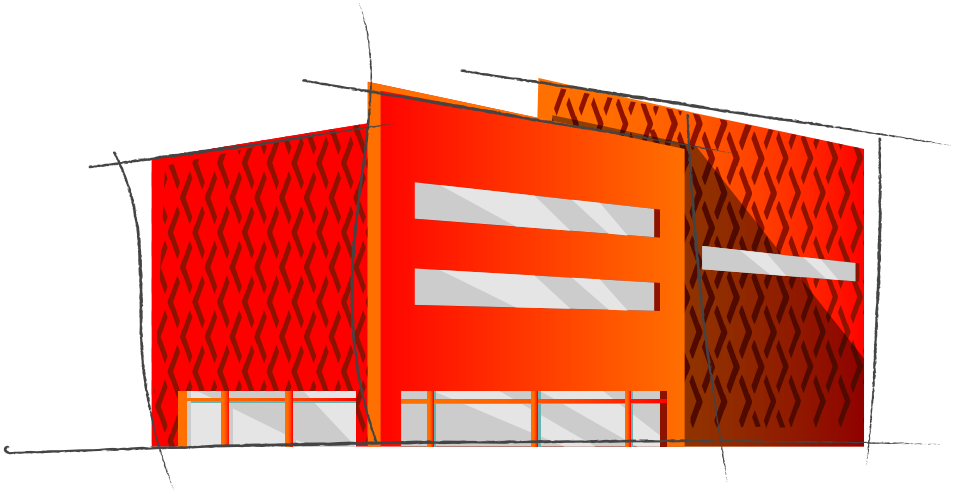


Building a Process Mining Center of Excellence



Mature Process Mining organizations often have a dedicated Process Mining Center of Excellence.

This is an independent group of stakeholders responsible for coordinating how Process Mining is implemented across different teams, and for embedding a Process Mining culture within the organizational identity.

This is about building a team that standardizes approaches, steers different initiatives to support overarching objectives and communicates successes upward and outward. It should include:

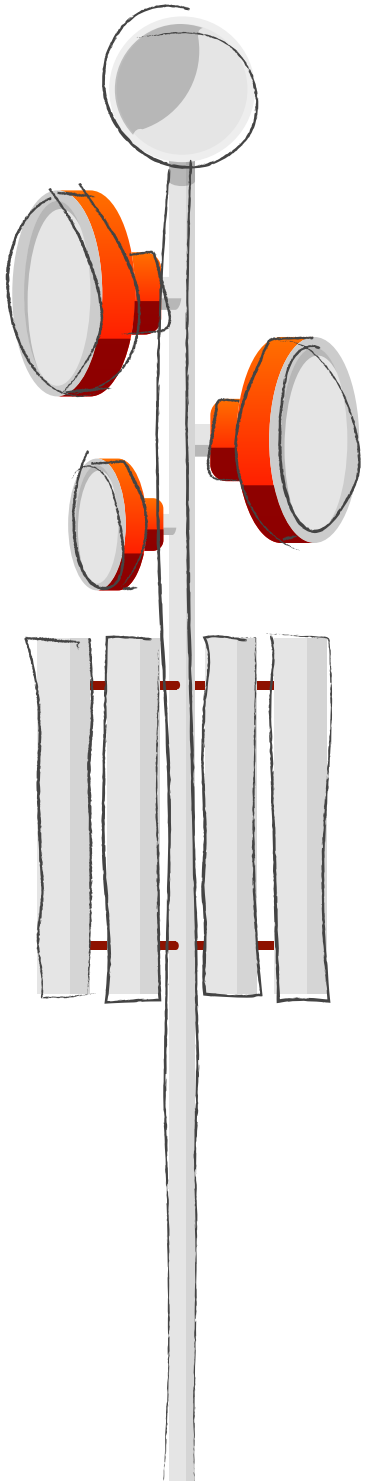
- **The Executive Sponsor**
  Be a champion of process excellence. Keep leadership engaged, continually set their expectations, get their input on strategic goals and ultimately decide which initiatives to support

- **The Capability Owner**
  Communicate success stories outward, orchestrate and implement initiatives, create demand across the business and deliver support where needed

- **The Process Improvement Lead**
  Qualify and prioritize use cases from business owners, steer implementations, monitor improvements

- **Business Experts**
  Feed insights to guide new use cases, suggest new ones and execute improvement tasks

- **Data and Technology Lead**
  Provides ongoing IT architecture and knowledge, authorization, maintenance and updates of integrations



Communicating success

Proactive value realization is an *enormous* part of Process Mining. That's because the effects of process efficiency—saved time, released capital, more resources—need to be accounted for. When you can articulate how Process Mining has created a better business outcome, you truly have ROI.

This isn't a matter of amplifying the same results in the same ways to different groups. You need to tailor your approach depending on who you're talking to—both in terms of the results you're reporting, the way they're framed and the format they're communicated in.

We'll cover the importance of this in more detail in the next chapter, but the real power of Process Mining comes from compounding benefits of incremental change. What feels like a small efficiency to the practitioners on the ground can actually add up to transformative change to the overarching strategy—so long as the right people have the right information to make key decisions.

Kicking off your implementation

At this point, Conveya had their high-level strategic goals in place, with a clear phased plan to attack them. To recap...

Conveya's Process Mining strategy in 20 seconds:

Improve customer satisfaction and gain competitive advantage with key customers

by...

reducing order fulfillment cycle times

by...

automating order processing, and correcting erroneous credit checks and blocked deliveries

to ultimately...

make $5m in efficiency savings and increase touchless orders

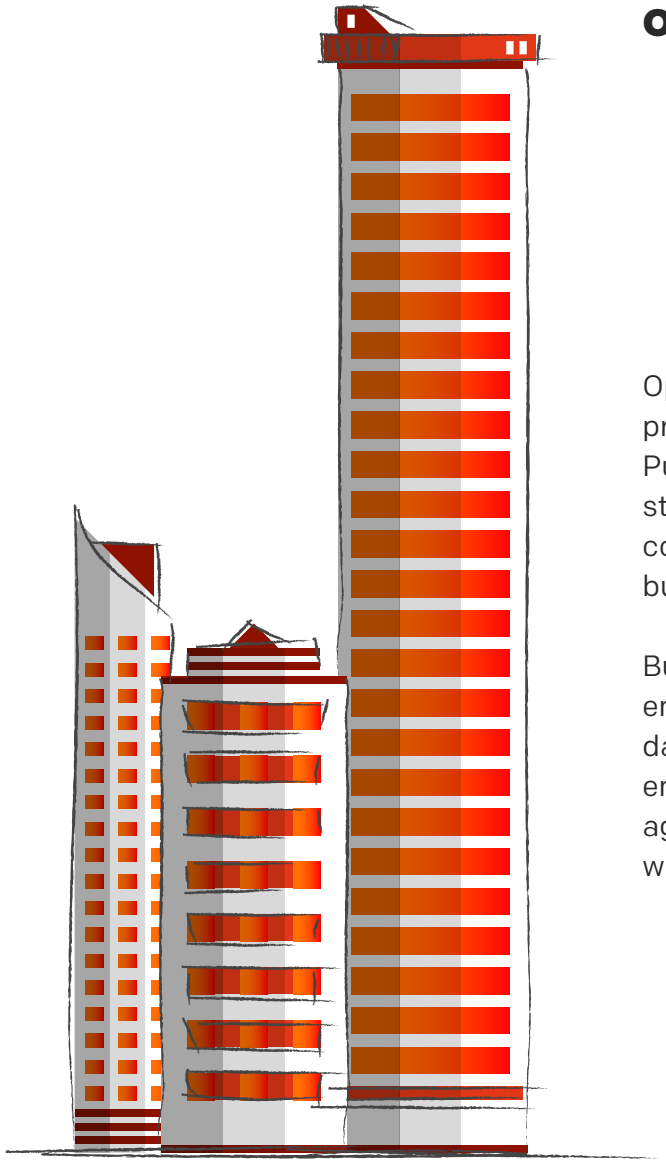
Now let's zoom in to three key improvement areas across Conveya's implementation to see:

- How that strategy was executed
- The actions required at each stage
- The measurable process excellence it enabled
- The business and customer outcomes that process excellence delivered

Conveya's hierarchy of process excellence

On-time Delivery	Streamline approvals	Order-to-cash cycle time
First Conveya **Discovered** they were: • Losing time to credit checks that slowed order processing and shipments—even for their biggest, most loyal customers To **Enhance** the process, they: • Placed a credit check exception rule for customers who regularly paid on time And **Monitored** against these KPIs: • More on-time deliveries for high-value customers • Fewer late fees and customer returns (and therefore increased revenue) • Less opportunity cost from processing returns	First Conveya **Discovered** they were: • Applying the same multi-stage approval process for all customers, creating lead times of up to 7 days for their most loyal customers To **Enhance** the process, they: • Automatically approved orders from loyal customers to save time and reduce costs And **Monitored** against these KPIs: • Intelligent automation of manual, delay-prone tasks • Streamlining across multiple stages of the Order-to-Cash process • Improved likelihood of on-time orders for high-value customers	First Conveya **Discovered** they were: • Using a sub-optimal Order-to-cash process for, reducing their competitive advantage To **Enhance** the process, they: • Created a custom rule-set to identify churn risk among high-value customers and expedite next-day delivery And **Monitored** against these KPIs: • An increase in delivery costs offset by huge retention gains and risk mitigation • Stronger competitive differentiation • Increased loyalty and growing Customer Lifetime Value

Optimizing for expedited delivery probably felt like a counter-intuitive move for a company struggling with on-time delivery on standard orders. But Process Mining revealed this compelling business case—and once the VP of Fulfillment put this in front of their CFO, it was a no-brainer.



The transformative power of Process Optimization

Optimizing your core operational processes (like Order-to-Cash or Purchase-to-Pay) around complex strategic challenges is a huge competitive advantage that not many businesses can execute on today.

Building visibility into your process environment and tying granular process data to high-level business outcomes enables an incredible degree of business agility that's impossible to replicate without Process Mining.

Crucially for Conveya, they gradually built up successes through the hierarchy of process improvement, as the benefits of the initiative compounded over time. What began as a small credit check correction exercise quickly gathered in pace and scope as early quick wins were reported outward.

Even if you start small, with the right implementation plan, it's possible to achieve big strategic change within 12 months. Let's see what their journey looked like, mapped out against a 12-month ROI readout.

Conveya's 12 month ROI readout

Strategic goals	Transformation metrics	Root causes	Actions	Business value
Improve customer satisfaction	Improve on-time delivery	Remove unnecessary credit blocks	Continuously predict and update creditworthiness to ensure proper credit blocks	**Increase revenue** On-time delivery rate X Total customers X Upsell revenue for customers with on-time deliveries **Value = $3.5m**
Improve productivity and throughput time	Cost / order	Manual steps / redundant steps in order mgmt	Continuously predict and update creditworthiness to ensure proper credit blocks	**Reduction in operating costs** Time on manual and redundant activities X Hourly wage of workers X 2000 working hours **Value = $850k**
Improve customer lifetime value (CLV)	Improve customer retention	Late deliveries due to improper handling of order for key customers are causing customer churn	Auto-expedite orders for key customers, to ensure on-time delivery	**Increase CLV** Total customers X improvement in retention rate X CLV **Value = $7m**

Chapter 3

Process Mining in the real world

Process Mining for core operations

In the first chapter we learned about what Process Mining is and how it works.

In the second chapter we examined Process Mining in the wild, and explored the framework of cascading benefits that Conveya, a fictional mid-sized made-to-order, industrial equipment manufacturer realized when they transformed their Order-to-Cash process.

Now it's time to see what that framework looks like across different areas of the business, and to discover the transformative impact Process Mining initiatives can have on other core operational processes.

In the following few pages, we're going to take a look at the friction Process Mining can address in **Finance, Procurement, Logistics** and **Distribution** and **Customer Service**, by breaking down:

- The symptoms of the friction
- The root causes of that friction
- The corrective action to replace that friction with flow
- The KPIs to measure that flow

Finally, we're going to zoom out from core operational processes to wider strategic initiatives that Process Mining also supports: **Increased Automation and RPA, Business Transformation, Customer Experience** and **System Migration.**

These are just ideas—good places to start your journey, and strategic goals to aim for on the horizon. But nothing in this chapter is exhaustive or prescriptive. Process Mining is an endlessly flexible, action-driven system for solving complex problems and creating ambitious business outcomes.

Instead, use the frameworks here to structure your thinking and connect the symptoms, causes, corrective actions and KPIs of your process friction.

How can Process Mining help Finance?

Example: ABB

	Initiative	Optimize working capital		Increase productivity		Manage risk & compliance	
Discover	Friction point	Early payment	Late payment	Rework rates	Automation rates	Duplicate payments	Segregation of duties
Discover	Root causes	Early invoice receipts (or master data PO discrepancies) cause premature baseline dates and trigger payments	Late entries into ERP, missing information, payment blocks or customer delays	Excessive payment blocks and failed 3-way matching between PO, invoice and goods receipt	Non-standard format across different vendors and failure of OCR technologies lead to high rates of manual effort	Character mismatches on forms or multiple vendor invoices from different channels	Accidental or conscious compliance variations either through lack of ERP enforcement or resource constraints
Enhance	Corrective actions	Postpone baseline dates for early invoices	Alert and prioritize discrepancies between invoice data and on-time date	Postpone baseline dates for early invoices	Switch vendors to EDI	Highlight and block duplicate payments	Highlight and diagnose SoD violations
Monitor	KPIs	DPO	Operational cost per PO	Touchless PO	Touchless PO	Falling duplicate payments	Reduce SoD violations

Take a look at how ABB does it

How can Process Mining help Procurement?

Example: Vodafone

	Initiative	Increase purchasing productivity		Optimize purchasing spend		Reduce risk	
Discover	Friction point	High volume of price changes	Manual errors in 3-way-match	Long tail spend	Unfavorable supplier contracts	Maverick buying	Incorrect deliveries
Discover	Root causes	Where price negotiations aren't reflected in master data, causing suppliers to issue corrections to POs with old pricing.	Mistakes made during the physical reconciliation of Purchase Orders against receipts and invoices	Unmanaged spend split between low value transactions and infrequently used suppliers—commonly around 20%	Poor visibility between Sourcing teams and actual supplier performance creates suboptimal negotiations	Requisitions from non-strategic, unapproved suppliers outside of established buying channels.	The wrong items delivered to the right places can mean big risks—particularly for dangerous materials to manufacturing plants
Enhance	Corrective actions	Update master data whenever Sourcing updates contract pricing	Automate 3-way matching on critical invoices	Redirect deviant POs towards approved suppliers	Surface supplier KPI performance for Sourcing	Investigate test-free POs and trigger manager approval	Additional confirmation of delivery location for high risk PR
Monitor	KPIs	Perfect PO rate	Operational cost per PO	Purchasing spend	Purchasing spend	Perfect PO rate	Process conformance

Take a look at how Vodafone does it

How can Process Mining help Logistics and Distribution?

Example: Schukat

	Initiative	Improve productivity		Optimize inventory		Ensure reliability	
Discover	Friction point	Redundant transfer orders	Transportation delays	Warehouse excess	Material shortages and stockouts	Unreliable supplier delivery	Low visibility of warehouse vendor SLAs
Discover	Root causes	Too much unnecessary or low-value stock movement to conform with outdated slotting or staging processes that increase throughput time	Static data leads to shipment delays or last-minute, unnecessarily expedited shipping routes in order to meet delivery dates	Treating all goods as equal leads to shortages and excesses of stock depending on supplier lead times—either creating delays or carrying costs.	All inventory must be mapped to sales demand to avoid carrying costs or lost sale opportunities	Sourcing organization lack insight into vendor and third party performance against SLAs	Poor visibility between Sourcing teams and actual supplier performance creates suboptimal negotiations
Enhance	Corrective actions	Identify and eliminate non-value-add transfers	Use real-time data to recommend optimized routes	Prioritize stock based on lead time	Monitor demand forecast to trigger automated reordering	Trigger alert when supplier delivery times violate SLAs	Surface performance data in supplier negotiations
Monitor	KPIs	Throughput time	On-time, in-full delivery	Falling inventory costs	Days of supply	Process conformance	Service provider spend

Take a look at how Schukat does it

How can Process Mining help Customer Order Management?

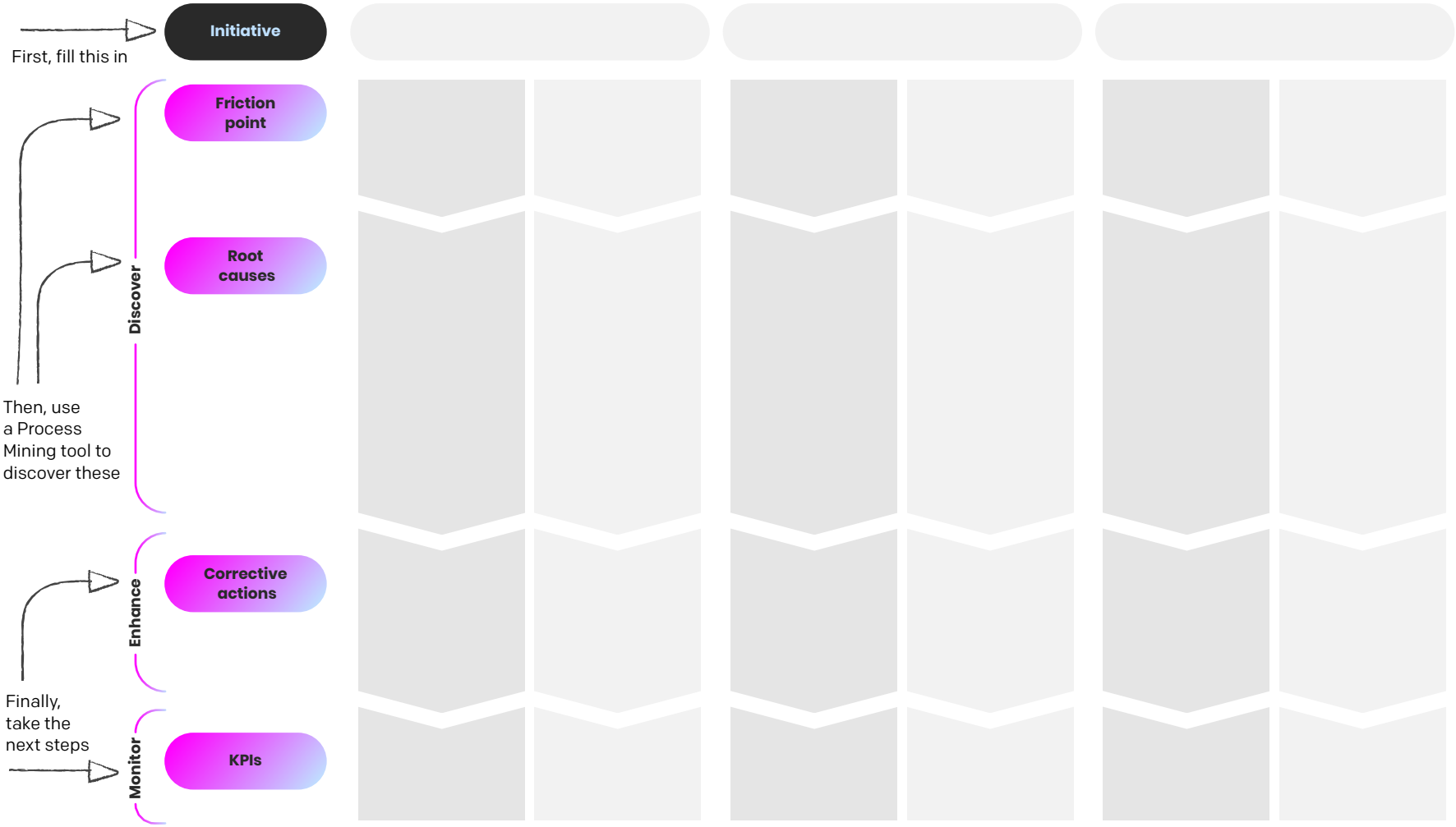
Example: 3M

	Initiative	Maximize on-time delivery		Increase productivity and automation		Improve order operations quality	
Discover	Friction point	Credit block	Backordered inventory	Order change rework	Low automation rate	High rate of return	Quantity changes
Discover	Root causes	Erroneous blocks placed on frequent customers with a history of on-time payment	Orders exceeding available inventory are manually split into two deliveries: remaining stock and backordered stock (with manual POs)	Data discrepancies cause customers to fail initial credit checks	Orders have a high rate of manual touches (i.e., verification steps)	Incorrect Sales Order items not corrected during processing, creating shipping errors	Orders have a high rate of manual touches (i.e., verification steps)
Enhance	Corrective actions	Remove blocks from customers likely to pay on time	Predict backorders, alert clerks and automate POs	Detect master data discrepancies and flag to clerks	Identify high volume, low-variation tasks for automation	Predict inventory returns and flag orders to fulfillment	Check SO quantity against catalog and alert violations
Monitor	KPIs	Credit block rate On-time payment	Customer satisfaction In-full delivery	Rework rate Order cycle time	Touchless order rate Order cycle time	Order return rate. Customer satisfaction	Perfect order rate First-time right orders

Take a look at how 3M does it

How can Process Mining help you?

Use this template to structure your Process Mining journey. Fill in the initiative you want to achieve, and use a Process Mining tool to discover your friction points and root causes. Then take corrective action and monitor the results against your KPIs.



Process Mining in support of transformation initiatives

Outside of continuously optimizing core operational processes toward business outcomes, Process Mining can be a powerful addition to other transformational objectives.

Automation
Automation and Robotic Process Automation (RPA) initiatives are just tools—highly effective as a component of a wider transformation strategy, but limited in isolation. Process Mining acts as an intelligent orchestration layer that leverages automation for business outcomes rather than disconnected cost-saving or productivity gains.

Business transformation
Process Mining fits hand-in-glove with business (or digital) transformation initiatives—providing a structured and evidence-based approach toward realizing specified outcomes **while also** integrating them with established ways of working. In fact, **without** Process Mining, transformation programs can remain isolated from the day-to-day operational reality, thereby creating friction instead of flow.

Customer experience
Removing operational friction tangibly improves the experiences you deliver—meaning fewer delays, frustrations and broken promises for customers. But Process Mining also delivers *flow*. As your processes become more connected, the customer journeys through them automatically feel faster and more seamless, convenient and personal.

System migration
System migrations are huge, high-risk events that make or break enterprises. Even purely technical lift-and-shift migrations can take years, cost millions and still deliver underwhelming results. Process Mining helps IT leaders achieve more frictionless migrations by keeping costs on track, solution-fit tight, and driving user adoption after go-live.

Conclusion

Your next steps toward Process Mining

Starting your Process Mining journey

It's a long journey toward process excellence. But your first steps start here.

And the good news is, now you've got everything you need in order to kick-start a new era of process excellence within your organization—where every operational activity, no matter how minor, materially supports a defined business outcome.

The even better news is that doesn't take long to start seeing results. With the right planning, team, technology and training, process fluidity starts to deliver better business outcomes for everyone.

You'll notice fluidity first in your business users—free of friction, they'll become more productive, more engaged, and more empowered to start adding value to everything they touch.

Then it'll hit your customers—maybe anecdotally at first, but measurably after that. There are fewer delays and errors, and the customer experience starts to accelerate in both speed and quality.

Eventually, you'll see it in your bottom line—waste falls, throughput climbs, and meaningful opportunities for competitive advantage start to reveal themselves in places you never thought to look.

But eventually, something really powerful happens. Fluidity perpetuates, becomes autonomous and spreads across the whole business.

That's when enterprises become superfluid—they reach a tipping point, where the whole business achieves a state of continuous automated improvement.

Superfluid enterprises have total clarity and control over a continuously improving operational landscape—every process is optimized to deliver against desired outcomes and high-level strategy.

If you want to find out more about Process Mining, and how to become a superfluid enterprise— or you want to try Process Mining for free—there's a whole bunch of ways you can continue your journey.

What to look for in your Process Mining solution

Not all Process Mining platforms are born equal. In fact, you should evaluate any prospective Process Mining solution to ensure it has all the capabilities necessary to effect real operational change at the scale you need.

We'd recommend using the following criteria as a minimum requirements checklist.

Action

Discovery and visualization are important, but your Process Mining solution should be geared for action. Pick a technology with tools to turn those insights into alerts and intelligent actions—for people involved with the process, and through automation.

Pre-built analyses

Ready-to-use analyses for common processes (like Purchase-to-Pay, Order-to-Cash, etc.) drastically increase time-to-value, and mean you can start addressing common, high-value sources of friction right out-of-the-box.

Connectivity

Look for out-of-the-box connectivity to common transactional systems (like SAP, ServiceNow, Salesforce and so on). You shouldn't need to write any custom code to connect to all your underlying source systems.

Training

A platform with comprehensive training resources for all Process Mining participants will speed your path toward an internal center of Process Excellence

Usability

Process Mining interfaces have come a long way. You should be able to build analyses, create workflows and explore processes through no-code, drag-and-drop interactivity.

Results

Process Mining is all about outcomes. Your vendor should be able to prove value by giving examples of customers who've worked with the same process you're hoping to optimize.

Ecosystem

Your vendor should be a bridge to a range of partners who can help to set you up and connect to your source systems.

Where to go next

Try out Celonis Snap

Celonis Snap is the world's first free and open Process Mining software. You can mine your first process by connecting up to 500MB of event log data from any CSV/XLS flat file, or use our built-in connectors to a whole range of common systems like ServiceNow.

Try Celonis Snap now

Sign-up for the Celonis Academy

Celonis Academy is our online training center. We offer a huge range of free, guided training courses for Process Miners in every role, from Data Engineers to Executives.

Enroll in Celonis Academy now

Join the Celonis Community

The Celonis Community is a vibrant forum for sharing knowledge, experiences, questions and challenges with other Celonis experts and users.

Join the discussion now

Speak to us

If you'd like to speak to a Process Mining expert in person—either to learn more about Celonis, or just for an open conversation about where to go next, we're always happy to talk.

Speak to us about Process Mining now

Thanks for reading The Ultimate Guide to Process Mining. This is the start of something big, and we can't wait to help you on your way.

Let's get going.