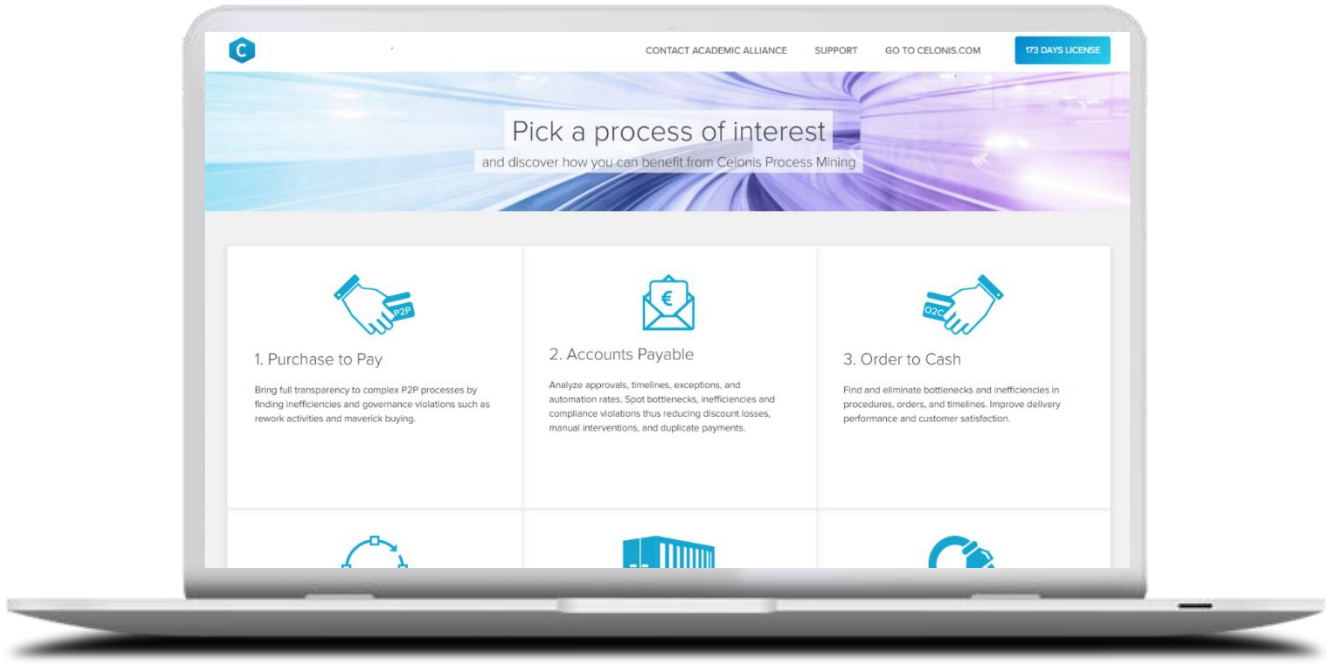
ACADEMIC CLOUD – START PROCESS MINING NOW



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Academic Cloud

Free software licenses for students and researchers

https://academiccloud.celonis.com

Free access
Explore the full power of process mining.

Flexibility
Six pre-loaded data sets and analyses. Import of own log-files.

Efficiency
No installation required. Top speed by latest cloud technology.

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INTRODUCTION TO **PROCESS MINING**

GUEST LECTURE | MAY 30, 2018

JANINA NAKLADAL

LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

AGENDA

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	About Celonis
	Process Mining technology
	Live demo and hands-on session
	Celonis PI – Process Mining becomes smart
	Proof of value and customer success stories
	A look into the future
	Become a Celonaut

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Who we are

HOW EVERYTHING STARTED IN 2011…

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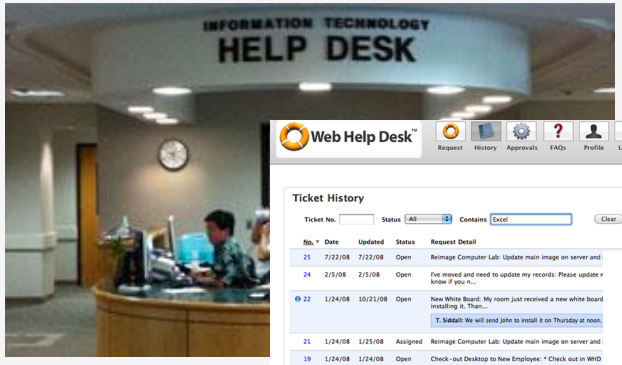
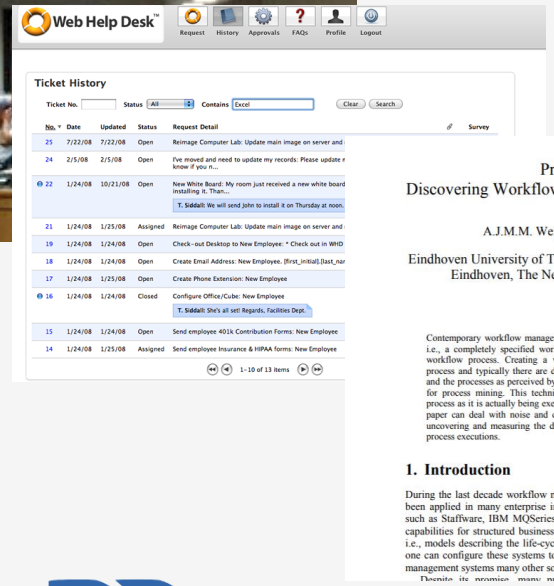
THE TEAM

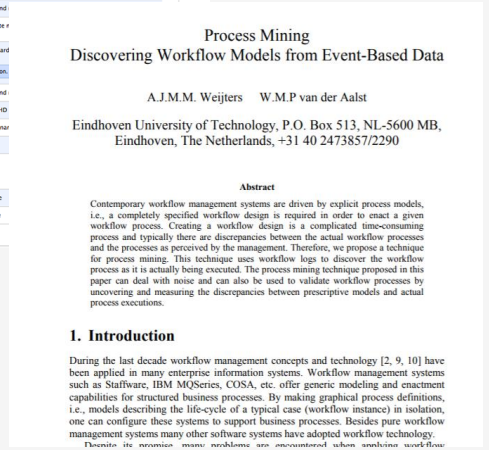
academy consult

Technische Universität München

THE PROJECT







Process Mining
Discovering Workflow Models from Event-Based Data

A.J.M.M. Weijters W.M.P van der Aalst

Eindhoven University of Technology, P.O. Box 513, NL-5600 MB, Eindhoven, The Netherlands, +31 40 2473857/2290

Abstract

Contemporary workflow management systems are driven by explicit process models, i.e., a completely specified workflow design is required in order to enact a given workflow process. Creating a workflow design is a complicated time-consuming process and typically there are discrepancies between the actual workflow processes and the processes as perceived by the management. Therefore, we propose a technique for process mining. This technique uses workflow logs to discover the workflow process as it is actually being executed. The process mining technique proposed in this paper can deal with noise and can also be used to validate workflow processes by uncovering and measuring the discrepancies between prescriptive models and actual process executions.

1. Introduction

During the last decade workflow management concepts and technology [2, 9, 10] have been applied in many enterprise information systems. Workflow management systems such as Staffware, IBM MQSeries, COSA, etc. offer generic modeling and enactment capabilities for structured business processes. By making graphical process definitions, i.e., models describing the life-cycle of a typical case (workflow instance) in isolation, one can configure these systems to support business processes. Besides pure workflow management systems many other software systems have adopted workflow technology.

BR

CELONIS TODAY

CELONIS IS AN INNOVATIVE, AWARD-WINNING SOFTWARE COMPANY AND THE MARKET LEADER FOR PROCESS MINING.

- **We make our customers more successful**
  By improving every process throughout their organizations
- **We work with leading customers in the world**
  More than 350 enterprises are already Celonis customers
- **Among fastest growing software companies in the world**
  4.000% over the last 4 years, 300% yoy
- **Backed by world class investors Accel & 83 North/ Greylock**
  (Facebook, Dropbox, Spotify, Slack, AirBnB, LinkedIn)

Deloitte. Technology Fast50 · ERNST & YOUNG ENTREPRENEUR OF THE YEAR · SAP HANA Innovation Award · SAP Demo Jam · 2016 mittelstand · SAP Pinnacle Awards 2016 Finalist · GERMAN SILICON VALLEY ACCELERATOR · Presidential Entrepreneurship Award 2015

OUR SUCCESS

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USER & USAGE

100,000+
Users

350+
Enterprise customers

15+
Industries

25
Countries

90+
Partners

70+
Standard Connectors

68
Different connected processes

70+ ERPs
Biggest customer landscape

30+ TB
Largest customer Installation

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But…. What is PROCESS MINING?

WHAT IS DRIVING COMPANIES TODAY

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Customer centricity

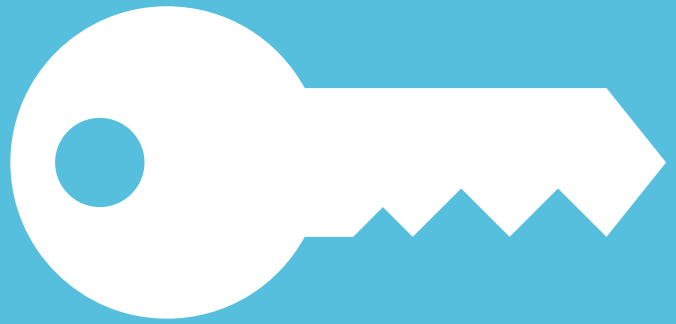
Shorter product cycles

Robotization

Winner-takes-it-all markets

Global, complex and digital supply chains

Mass customization of products



ENTERPRISE ACCELERATION

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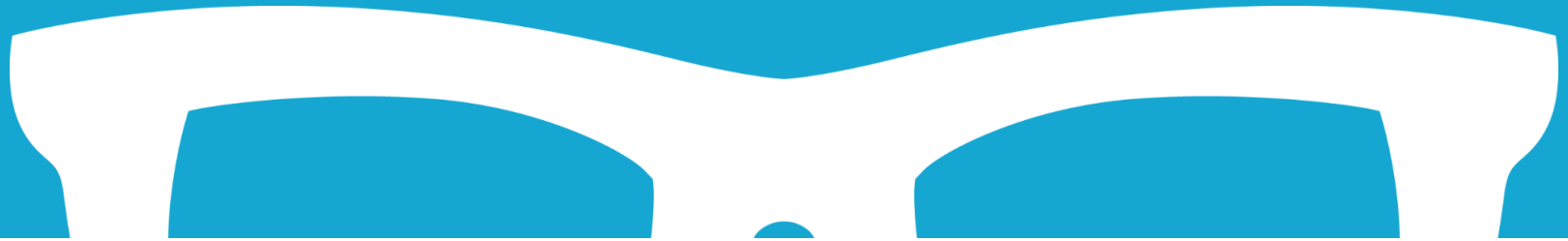
How to find out what really happens in business processes?

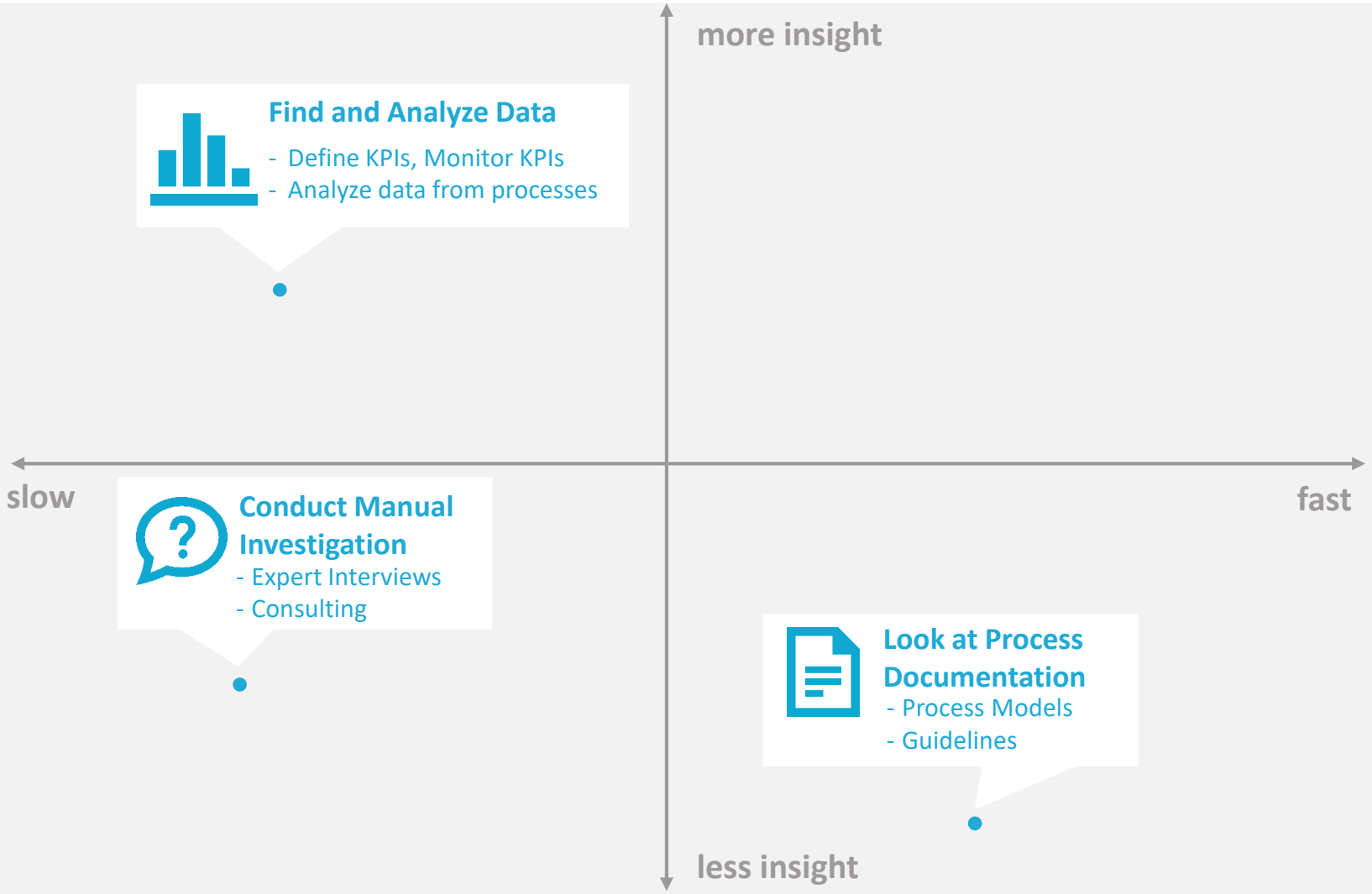


How do you learn about harmful bottlenecks, inefficiencies and compliance issues?

How fast can you get insight into your processes?

How do you find out where to improve your processes?

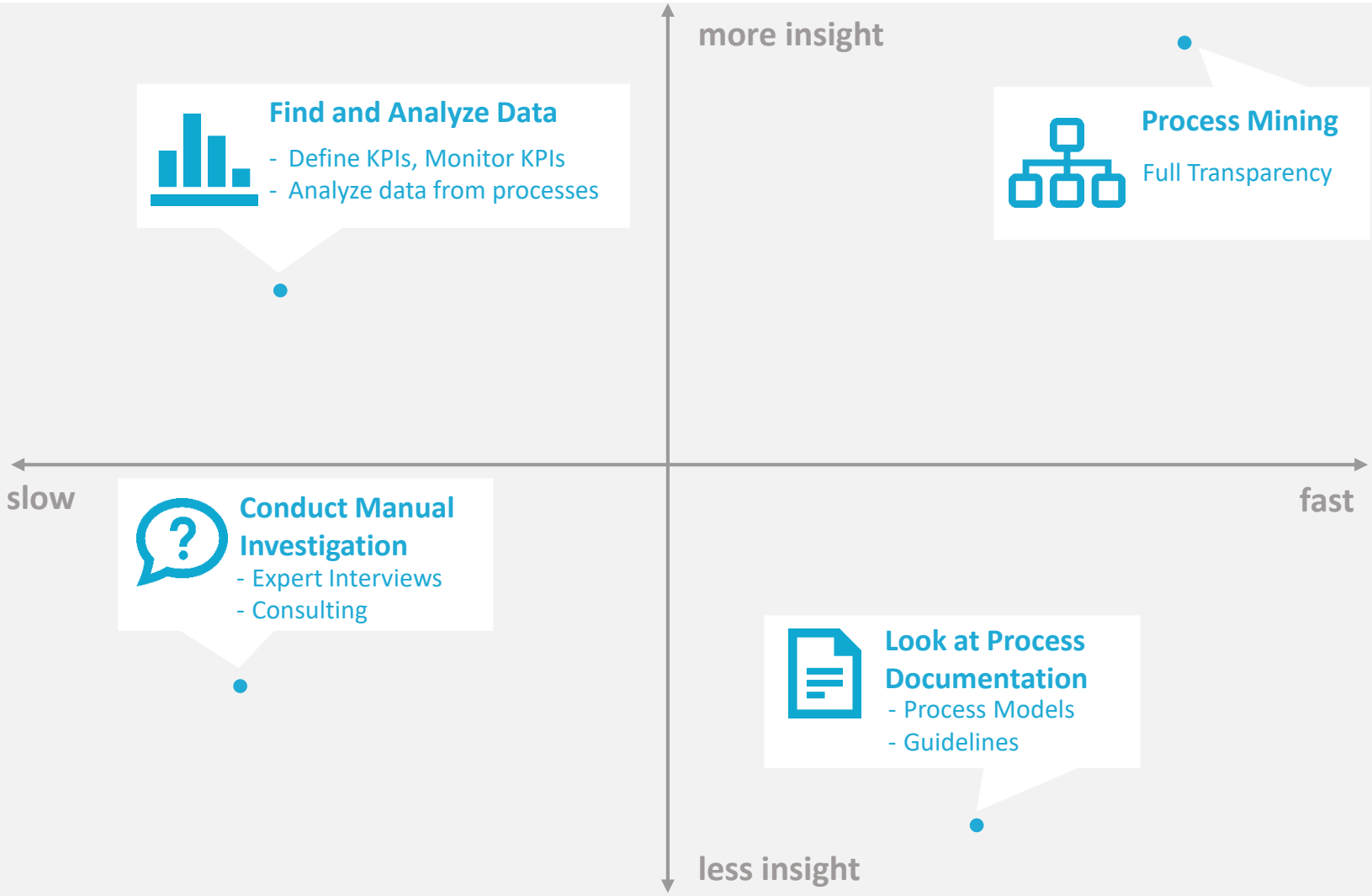
How do you get insight into business processes?



The methods currently available are not efficient or powerful enough.

X

How do you get insight into business processes?



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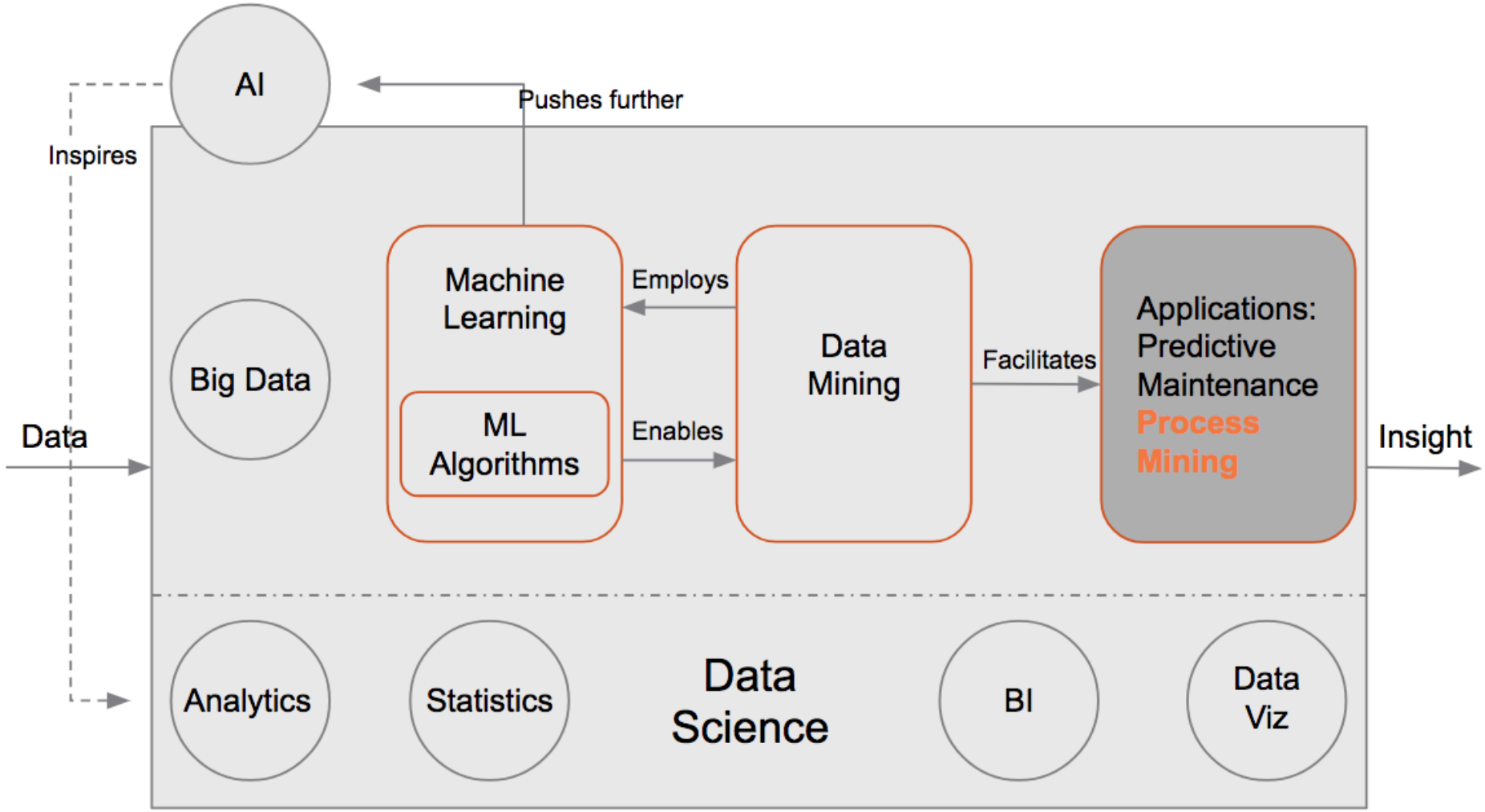
Time for a change:
Switch on the lights!

THE CONTEXT OF PROCESS MINING



NOTHING ON EARTH
COULD COME BETWEEN THEM.
LEONARDO DiCAPRIO KATE WINSLET
TITANIC

(P.) **OFFICIAL LOG BOOK.** **No. 2.**

OFFICIAL L

OF

HOME TRADE SHIP.

Name of Ship.	Do. and Place of Registry.	Port of Registry.	Tonnage.	Name of Master.	Date of Commission.
Felistria		Aberdeen	1342	George Milne	

Date of Commencement of the Voyage Wednesday October 17th 1855

Nature of the Voyage or Employment from Cardiff to Callao from [illegible] to [illegible] Islands and to Queenstown and [illegible]

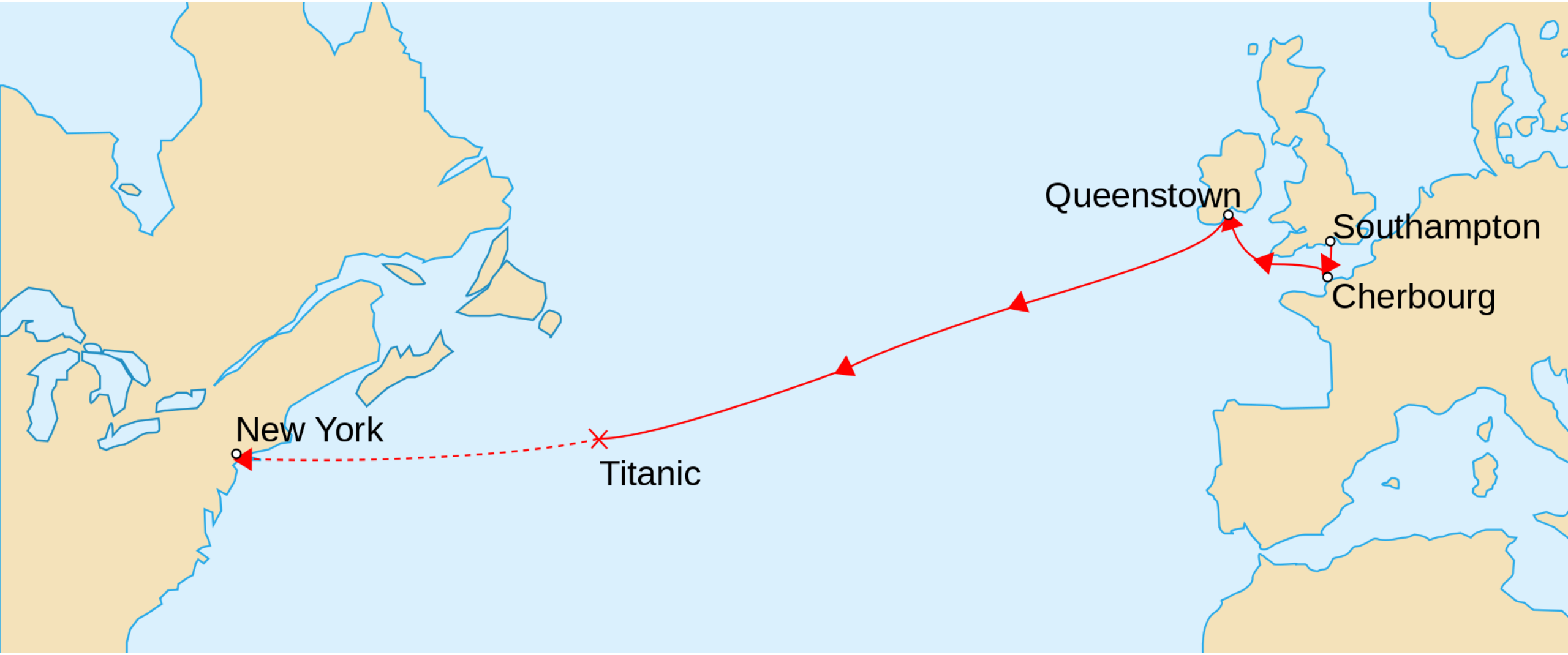
Delivered to the Shipping Master of the Packet Saturday September the [illegible]

day of 18

Signed [illegible]

Note.—The above Entries are to be filled up by the Master before the Log is delivered to the Shipping Master.

DATE.		Latitude.	Longitude	CURRENT.		WIND.		CLOUDS.			Bar.
Month & Day.	Hour.	N.	W.	Set.	Velocity in knots per h.	Direction.	Force.	Kinds.	Portion.	Motion from	
		° ′ ″	° ′ ″								
Nov. 30	8 A. M.	31 44	51 51	N. 4° W.	0.9	S. S. W.	Fresh.	Cirro Stratus.	10	S. W.	30.06
	4 P. M.	31 47	51 4			S. S. W.	Fresh.	Cir. Cum. Stratus and Nimbus.	10	S. W.	30.09
Dec. 1	Midn't.	31 52	50 51			N. N. W.	Light breeze.	Nimbus and Cum. Stratus.	10	S. W.	30.10
	8 A. M.	31 59	49 48			S. W.	Moderate.	Nimbus and Cirro Cum. Stratus.	10	S'd. & W'd.	30.12
	4 P. M.	32 00	49.13			S. S. E.	Light breezes.	Nimbus.	10	Southward.	30.12
" 2	Midn't.	32 00	48 50			S. S. E.	Light breezes.	Nimbus.	10	Southward.	30.12
	8 A. M.	32 24	48 26	N. 53° W.	0.5	S. E.	Moderate.	Cum. Stratus.	8	S'd. & E'd.	30.22
	4 P. M.	32 25 20	47 50	Westward.	0.5	South.	Moderate.	Cir. Cum. Strat.	5	Southward.	30.18


Queenstown
Southampton
Cherbourg
New York
Titanic

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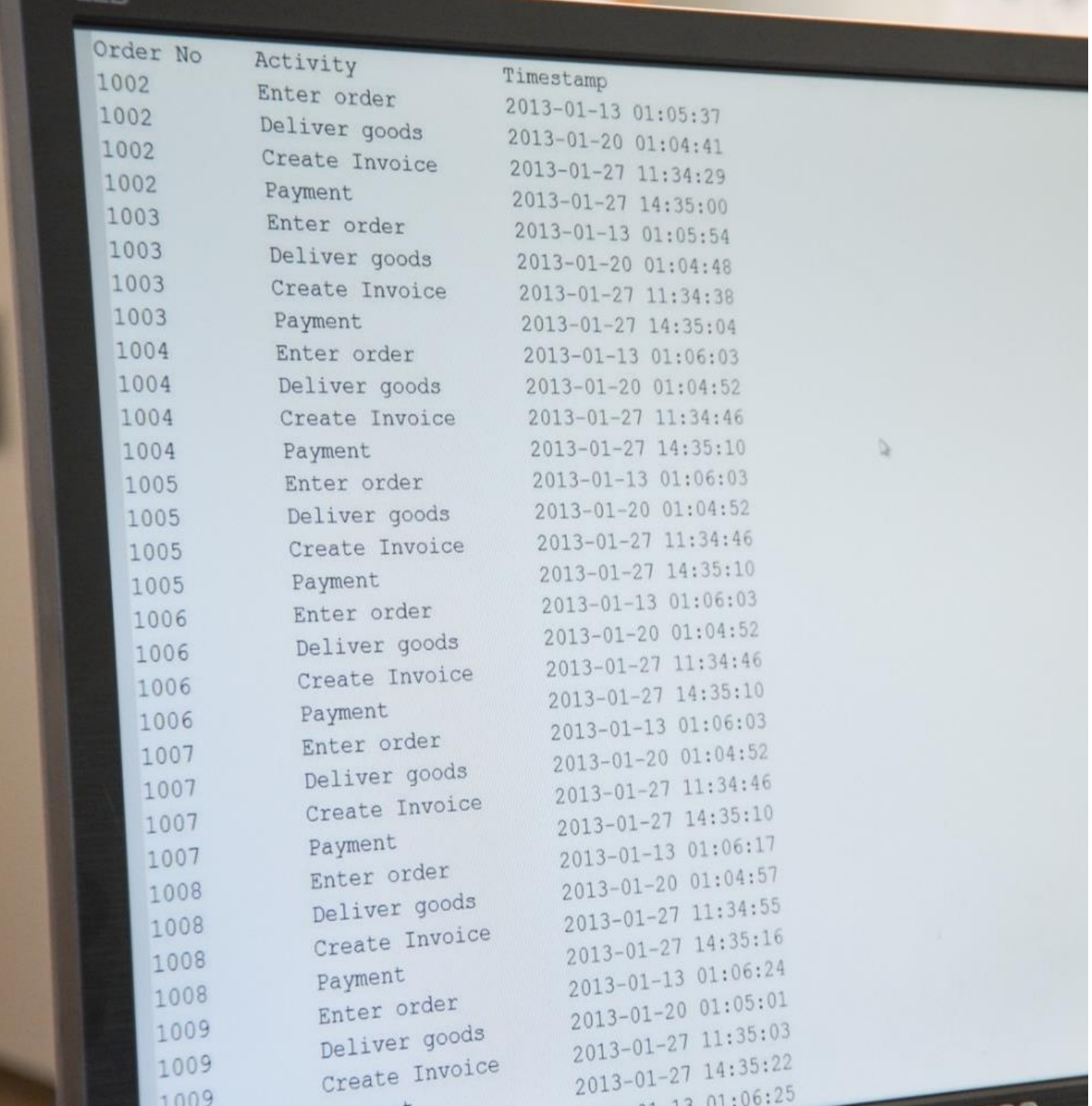
IT-based work
Every workflow is supported by IT systems like SAP.



Order No	Activity	Timestamp
1002	Enter order	2013-01-13 01:05:37
1002	Deliver goods	2013-01-20 01:04:41
1002	Create Invoice	2013-01-27 11:34:29
1002	Payment	2013-01-27 14:35:00
1003	Enter order	2013-01-13 01:05:54
1003	Deliver goods	2013-01-20 01:04:48
1003	Create Invoice	2013-01-27 11:34:38
1003	Payment	2013-01-27 14:35:04
1004	Enter order	2013-01-13 01:06:03
1004	Deliver goods	2013-01-20 01:04:52
1004	Create Invoice	2013-01-27 11:34:46
1004	Payment	2013-01-27 14:35:10
1005	Enter order	2013-01-13 01:06:03
1005	Deliver goods	2013-01-20 01:04:52
1005	Create Invoice	2013-01-27 11:34:46
1005	Payment	2013-01-27 14:35:10
1006	Enter order	2013-01-13 01:06:03
1006	Deliver goods	2013-01-20 01:04:52
1006	Create Invoice	2013-01-27 11:34:46
1006	Payment	2013-01-27 14:35:10
1007	Enter order	2013-01-13 01:06:03
1007	Deliver goods	2013-01-20 01:04:52
1007	Create Invoice	2013-01-27 11:34:46
1007	Payment	2013-01-27 14:35:10
1008	Enter order	2013-01-13 01:06:17
1008	Deliver goods	2013-01-20 01:04:57
1008	Create Invoice	2013-01-27 11:34:55
1008	Payment	2013-01-27 14:35:16
1009	Enter order	2013-01-13 01:06:24
1009	Deliver goods	2013-01-20 01:05:01
1009	Create Invoice	2013-01-27 11:35:03
1009		2013-01-27 14:35:22
		01:06:25

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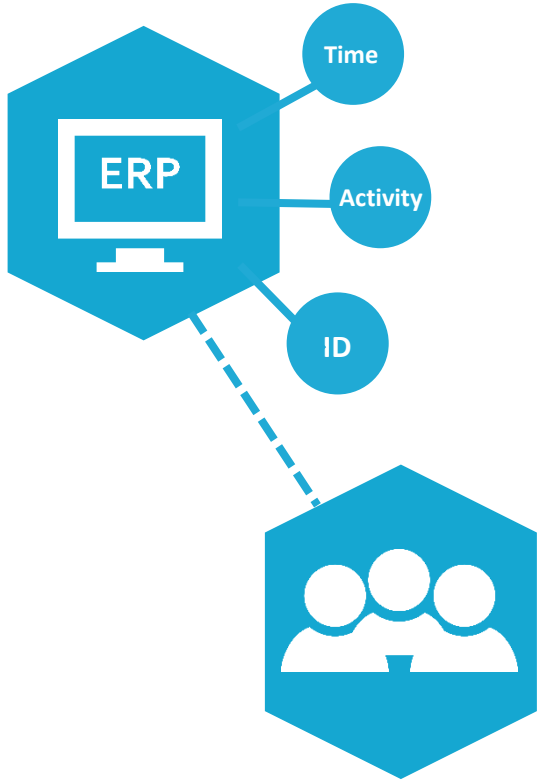

Digital Footprints
Celonis Process Mining finds & reconstructs digital workflow traces.

IT-based work
Every workflow is supported by IT systems like SAP.

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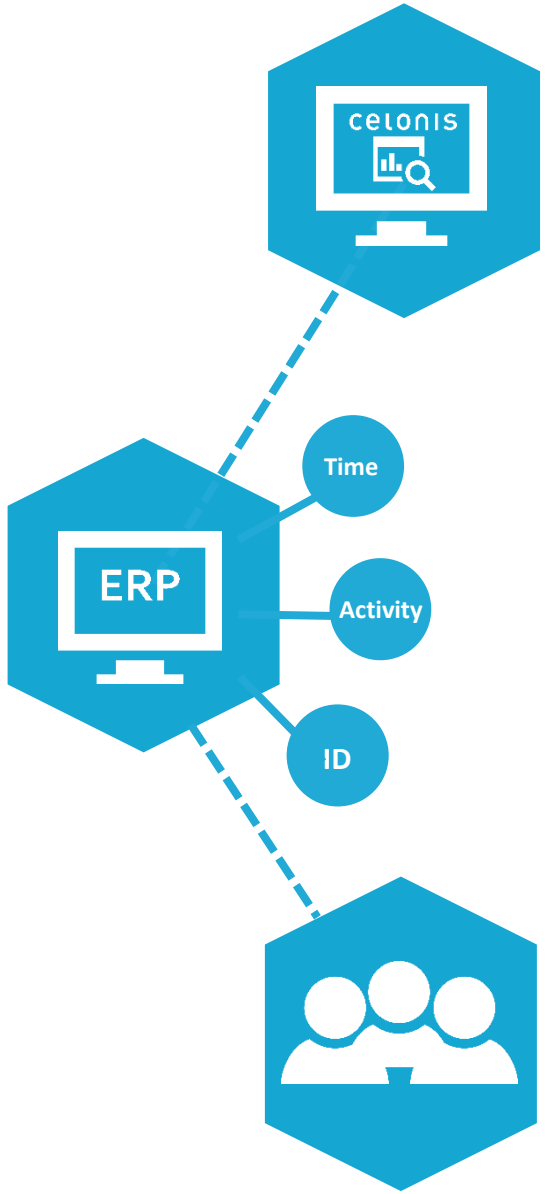

Full Transparency
Actual process flows are visualized in real time.

Digital Footprints
Celonis Process Mining finds & reconstructs digital workflow traces.

IT-based work
Every workflow is supported by IT systems like SAP.

THE DATA MODEL

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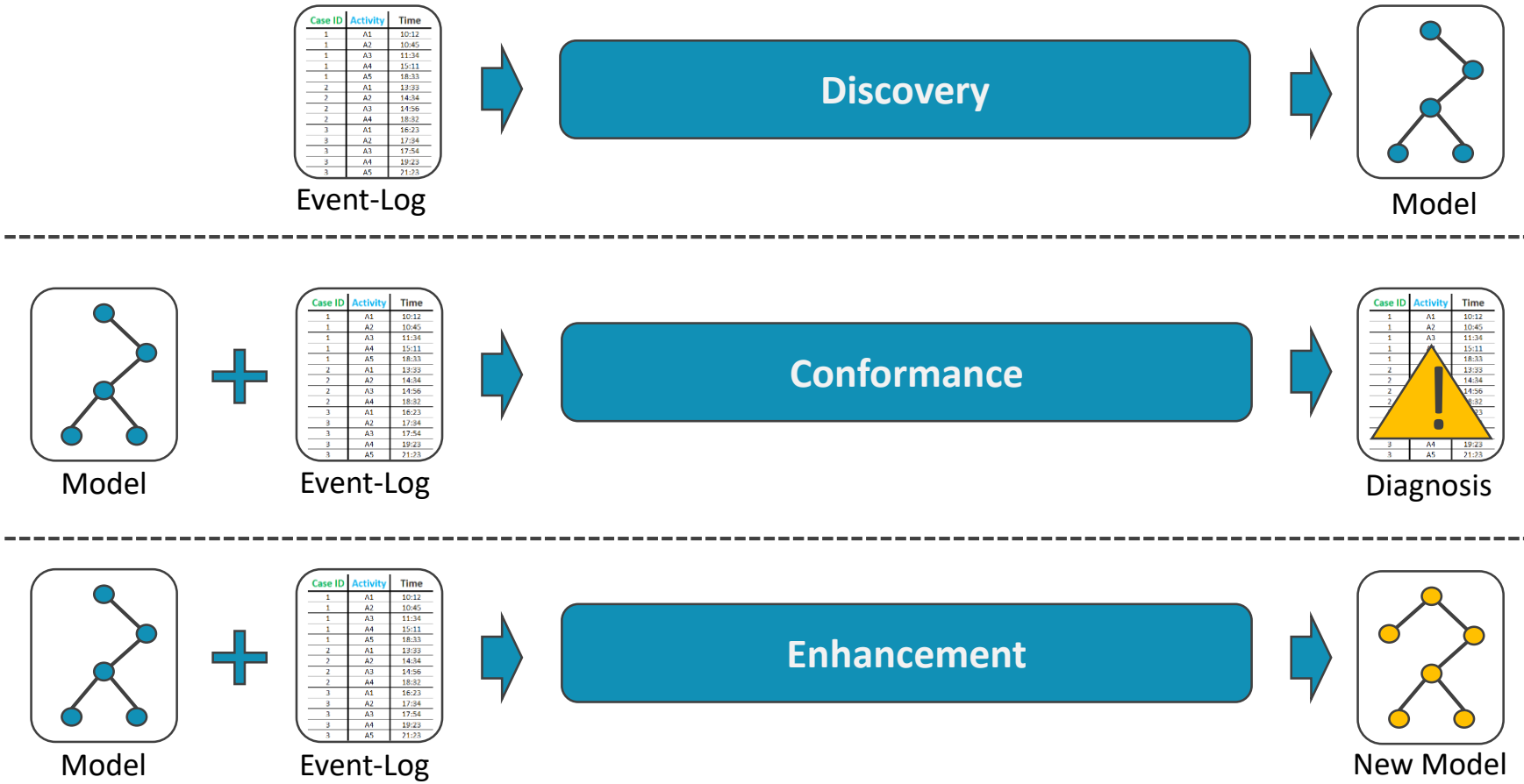
CaseID	Activity	Timestamp
10001	Create purchase order	01-01-2009, 8:35 am
10001	Print and send purchase order	03-01-2009, 12:13 am
10001	Goods receipt	07-01-2009, 07:01 am
10001	Scan invoice	09-01-2009, 2:00 pm
10001	Book invoice	10-01-2009, 10:30 am
10002	Create purchase requisition	02-02-2009, 1:17 pm
10002	Create purchase order	04-02-2009, 9:15 am
10002	Print and send purchase order	07-02-2009, 4:41 pm
10002	Goods receipt	27-02-2009, 6:53 am
10002	Scan invoice	28-02-2009, 1:00 pm
10002	Book invoice	13-03-2009, 11:59 am
10003	Scan invoice	13-04-2009, 10:00 am
10003	Create purchase order	17-04-2009, 3:47 pm
10003	Print and send purchase order	17-04-2009, 5:30 pm
10003	Goods receipt	27-04-2009, 4:23 pm
10003	Book invoice	30-04-2009, 8:50 am

Event log

CaseID	Net order value	Vendor	Company code
10001	5337.98	Unisono SE	100
10002	250.30	Piccolo Ltd.	600
10003	12.17	Poly AG	100

Case table

PROCESS MINING USE CASES



Reference: [Accorsi, et al. 2012, p. 355]

PROCESS MINING USE CASES

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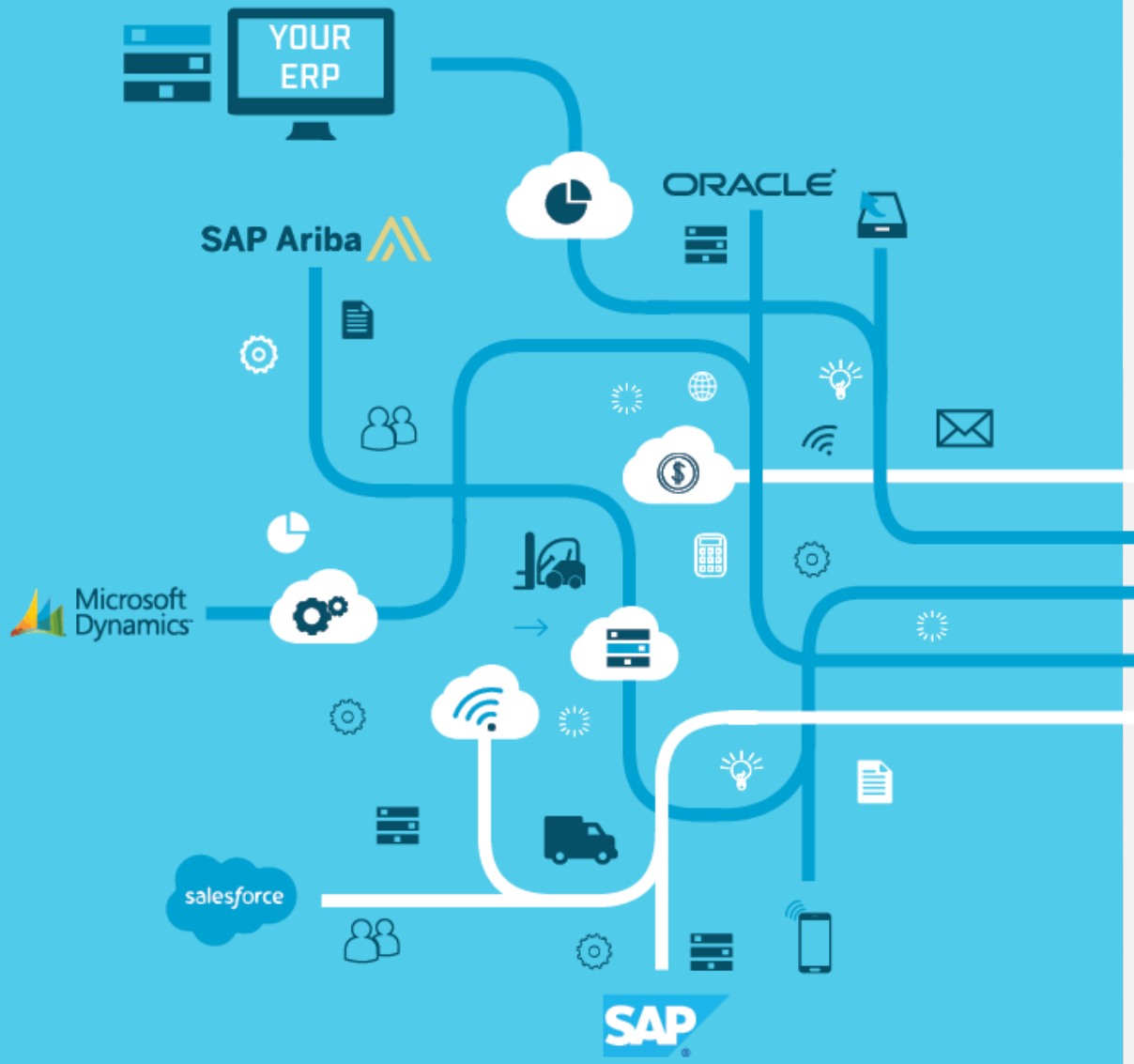
HOW DOES PROCESS MINING WORK?



VISUALIZATION OF THE ACTUAL PROCESSES

AI-POWERED ROOT CAUSE ANALYSIS & IMPROVEMENT

EVENT LOG

2016-12-01	CREATE PURCHASE ORDER	#1234
2016-06-23	START PRODUCTION	#5678
2016-07-14	RECEIVE PAYMENT	#1234
2016-07-14	SEND EMAIL	#9012

11.8k
37.8k
161 days
8.7 days
5.0 days
237
of 11.8k
LIVE DEMO

CELONIS USER GROUPS

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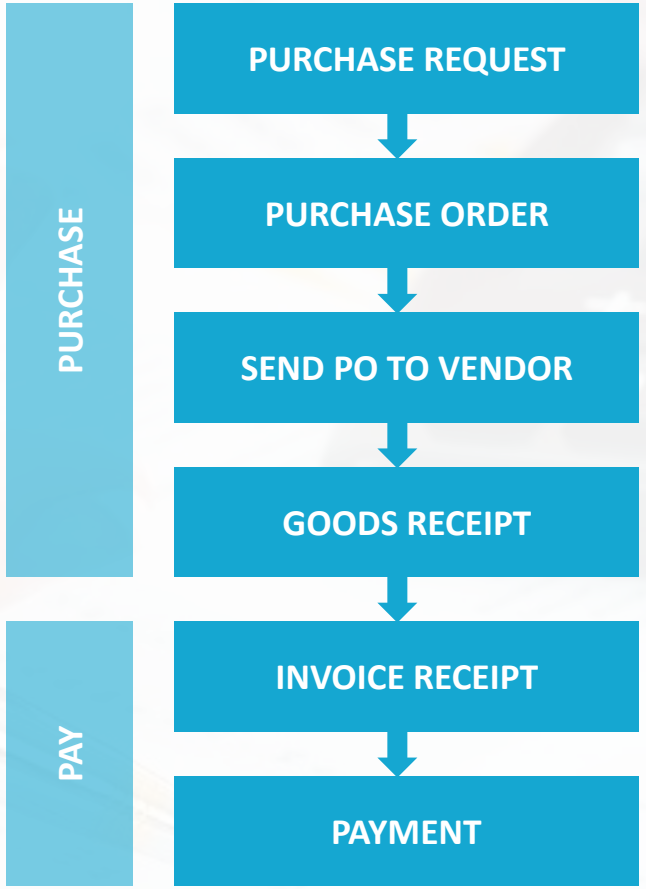
	Today's session	Skills	Know how	Typical tasks
Viewer	**Departments**	Business ★★★★★ Analytics ★★☆☆☆ Coding ☆☆☆☆☆	✓ Process knowledge ✓ No technical knowledge required	✓ Performance analysis ✓ Single case analysis ✓ Process improvement, e.g. customer relationship management
Analyst/Key User	**Departments or Center of Excellence**	Business ★★★★☆ Analytics ★★★★★ Coding ★☆☆☆☆	✓ Understand the requirements of the departments/viewers ✓ Analytical skills (e.g., reporting in Excel)	✓ Create new analyses ✓ Definition of KPIs ✓ Implementing the requirements of the departments/viewers ✓ Data validation
Data Scientist	**IT**	Business ★☆☆☆☆ Analytics ★★★☆☆ Coding ★★★☆☆	✓ Knowledge about the data models ✓ SQL skills	✓ Connecting new processes ✓ Add further data sources

Purchase-to-Pay (P2P)

- Core business process
- High number of transactions
- Complexity:
  Requests, approvals, timelines
- Various departments involved:
  Procurement, Accounting, Warehousing,…



ANALYSIS OF PROCESS FLOW IN THE VARIANT EXPLORER

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Please open the P2P process and navigate to the **"Variant Explorer"** sheet. In this step, you will learn how to interpret the process graph and how to identify inefficiencies and bottlenecks. Please note that one or multiple answers might be correct.

YOUR TASKS Please answer the following questions using the functionality of the variant explorer.

1. How many purchase order (PO) items follow the second process variant?
    a. 37,270
    b. 38,089
    c. 107,688
    d. 149,376

2. What's the overall average throughput time (in days) for the happy path from process start to end?
    a. 28
    b. 30
    c. 38
    d. 655

3. Display the first 17 variants in the variant explorer.
   How does the 17th most common variant look like (use process animation)?
    a. The quantity is changed after the purchase requisition item is created
    b. The purchase order item is blocked after the order is print and sent
    c. Payment blocks are set and removed
    d. The currency is changed after the order is print and sent

FILTER IN THE VARIANT EXPLORER

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Now you will learn to explore the power of filtering and how to get deeper insights into business processes.
Please answer the following questions using filters within the **"Variant Explorer"** sheet.

YOUR TASKS

4. How many different variants exist for PO items with price change?
    a. 1
    b. 3
    c. 68
    d. 655

5. Let's look at PO items without purchase requisitions. How does the second most common variant look like for those?
    a. The process starts with the scan of the invoice
    b. The purchase order items are deleted
    c. The purchase order items are refused
    d. The price is changed after purchase order is sent out to vendor

6. Filter on purchase order items that are blocked (show the 10 most common variants), yet not reactivated.
   How does the main variant look like?
    a. After blocking the purchase order item, the quantity is changed
    b. The process ends with the purchase order items being blocked
    c. After blocking the purchase order item, the goods receipt is cancelled

WORK WITH AN ANALYSIS

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After learning the basic functions in Celonis, you continue with a more in-depth analysis of the process.
For this task, go to the **"Analysis"** and the **"Details"** sheet.

YOUR TASKS

7. Look at purchase order items without purchase requisitions. Who is the dominant vendor for these positions in terms of net value?
    a. IDES Consumer Products
    b. C.E.B. Barcelona
    c. Tiefland Glass AG

8. Have a look at Unisono AG (top 3 vendor in terms of number of PO items).
    Observing the number of PO items and the net value over time, what attracts your attention?
    a. There is an unusual peak in the net value in September 2016
    b. The number of PO items is strongly decreasing over time with December 2016 being the month with the lowest net order value
    c. There is a high accumulation of purchases towards the end of the year with a peak in net order value in November 2016

9. In the "Details" sheet, have a look at the PO item with the Purchasing Document Number 0000097360.
    What is the material group of the goods being ordered?
    a. Monitors
    b. SMI Demo Scenarios
    c. Bulbs

CELONIS CONTENT STORE

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CELONIS IS CONTINUOUSLY DEVELOPING NEW APPS FOR CUSTOMER NEEDS

A NETWORK OF CUSTOMERS AND PARTNERS IS DEVELOPING APPS IN SPECIALIZED AREAS

OVER 250 APPS – AND COUNTING!

INDUSTRIES

APPS SUITABLE FOR **15 + INDUSTRIES**

LINES OF BUSINESS

OVER **10 DIFFERENT LINES OF BUSINESS** COVERED

USE CASES

APPLICABLE FOR A **VARIETY OF USE CASES**

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Celonis PI

Process Mining becomes smart

PI FEATURES

Celonis PI (Proactive Insights Engine) combines Process Mining with machine learning and A.I. to achieve highly intelligent and fully automated insights.

PI Conformance

Compares actual operations to designed processes (conformance checking) and automatically identifies the highest priority issues and their root causes, so you can take immediate action.

PI Machine Learning

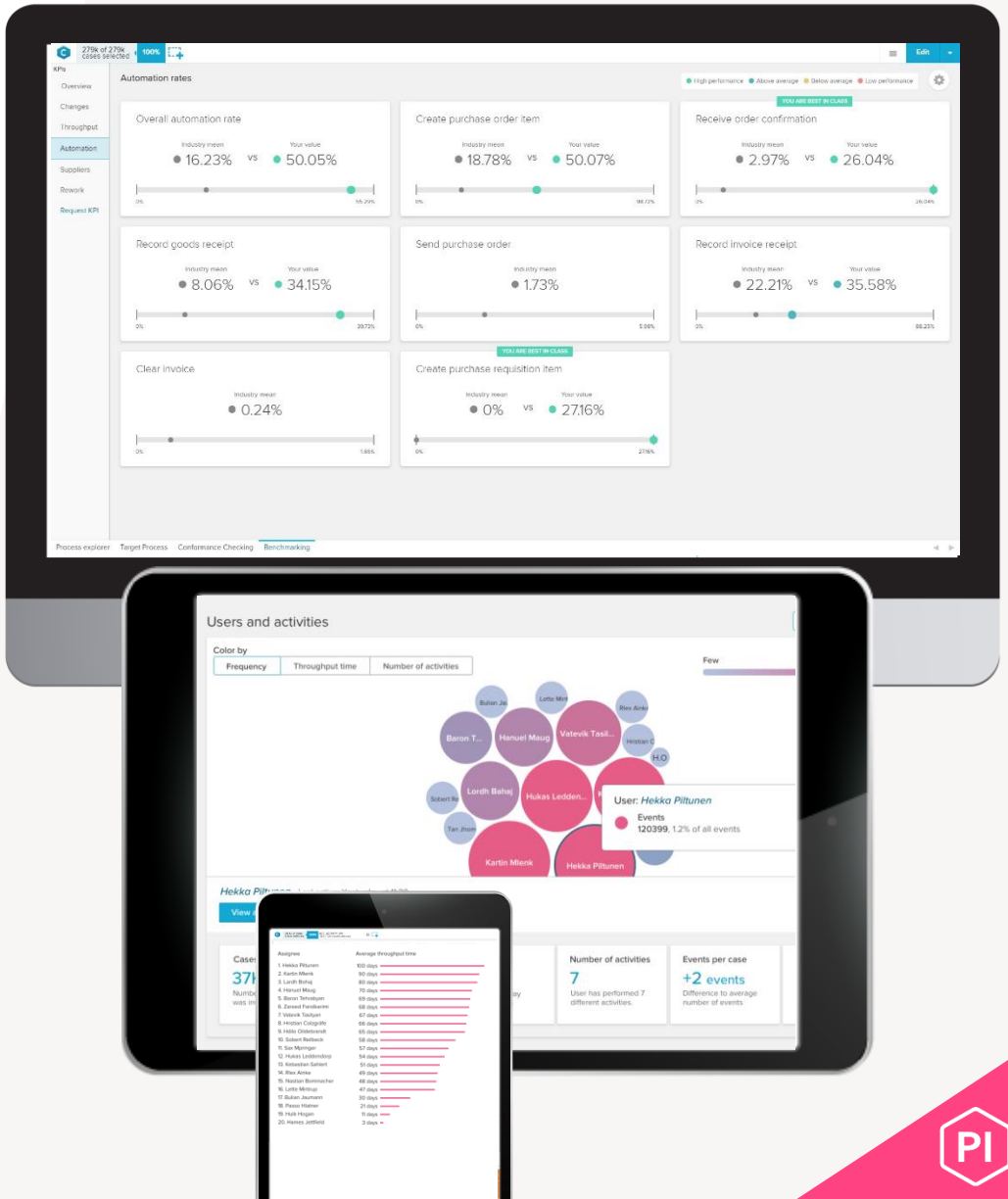
PI Machine Learning integrates the most sophisticated machine learning and statistical algorithms natively into all Celonis analyses. The possibility to integrate any R-Library or statement into Celonis will allow every user to apply advanced prediction techniques.

PI Social

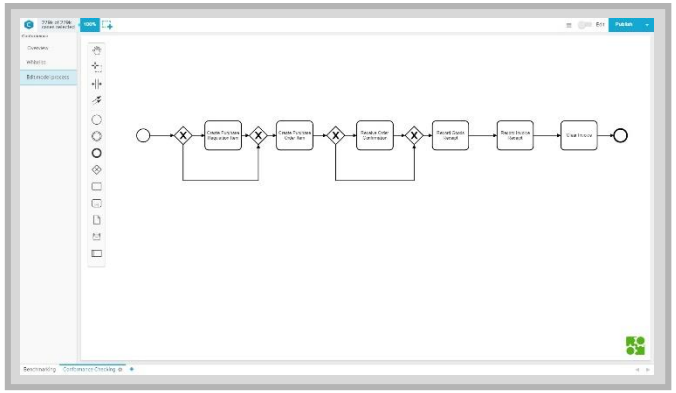
Use PI to gain a deep understading of the human aspect or your processes. Identify which teams have the best outcomes, which interactions result in lost time or bottlenecks, or discover where inneficiencies in organization structure call for improvement.

PI Companion

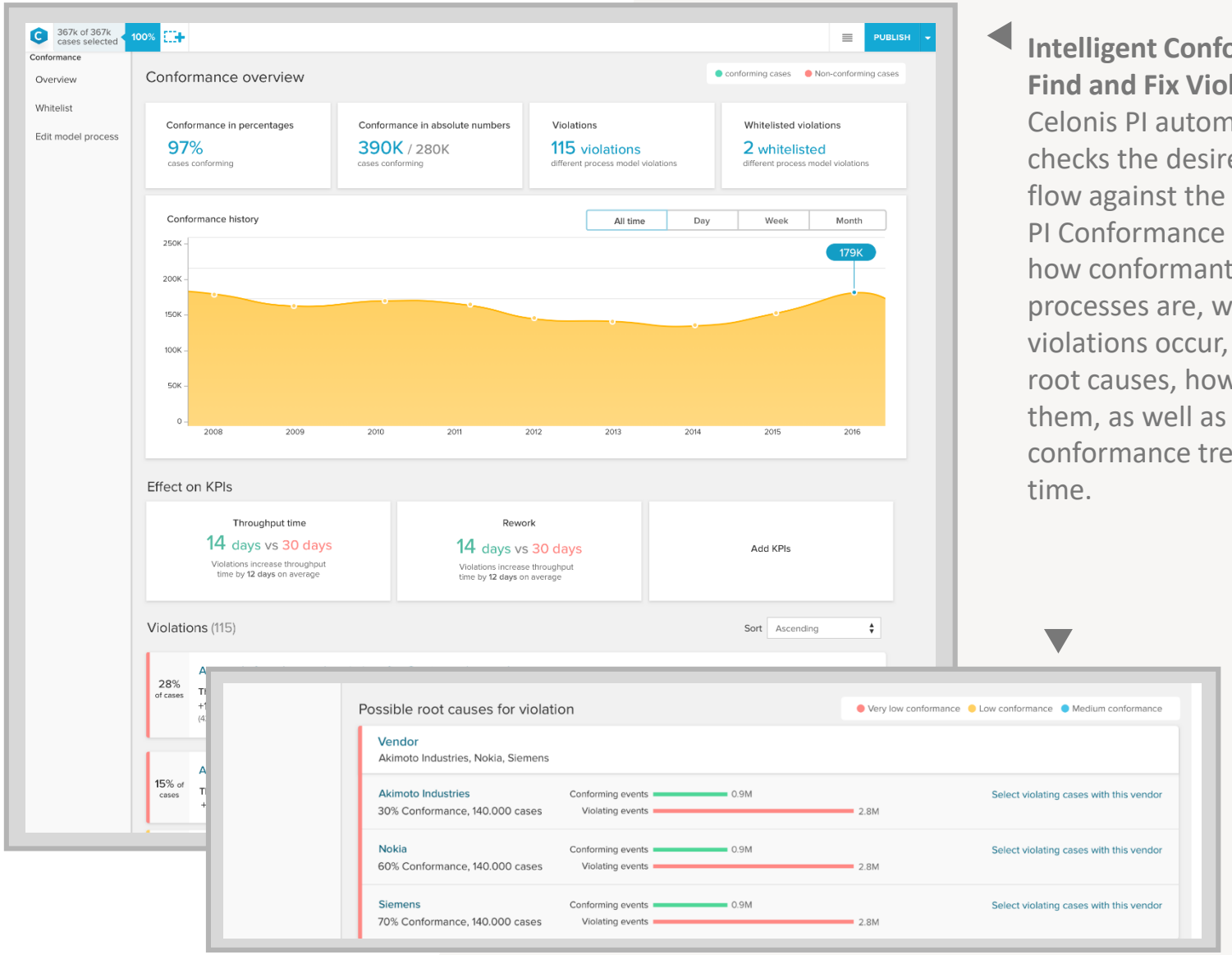
Identifies potential issues before they even happen and allows users to make the right decisions during process execution rather than after a problem arises.



PI CONFORMANCE

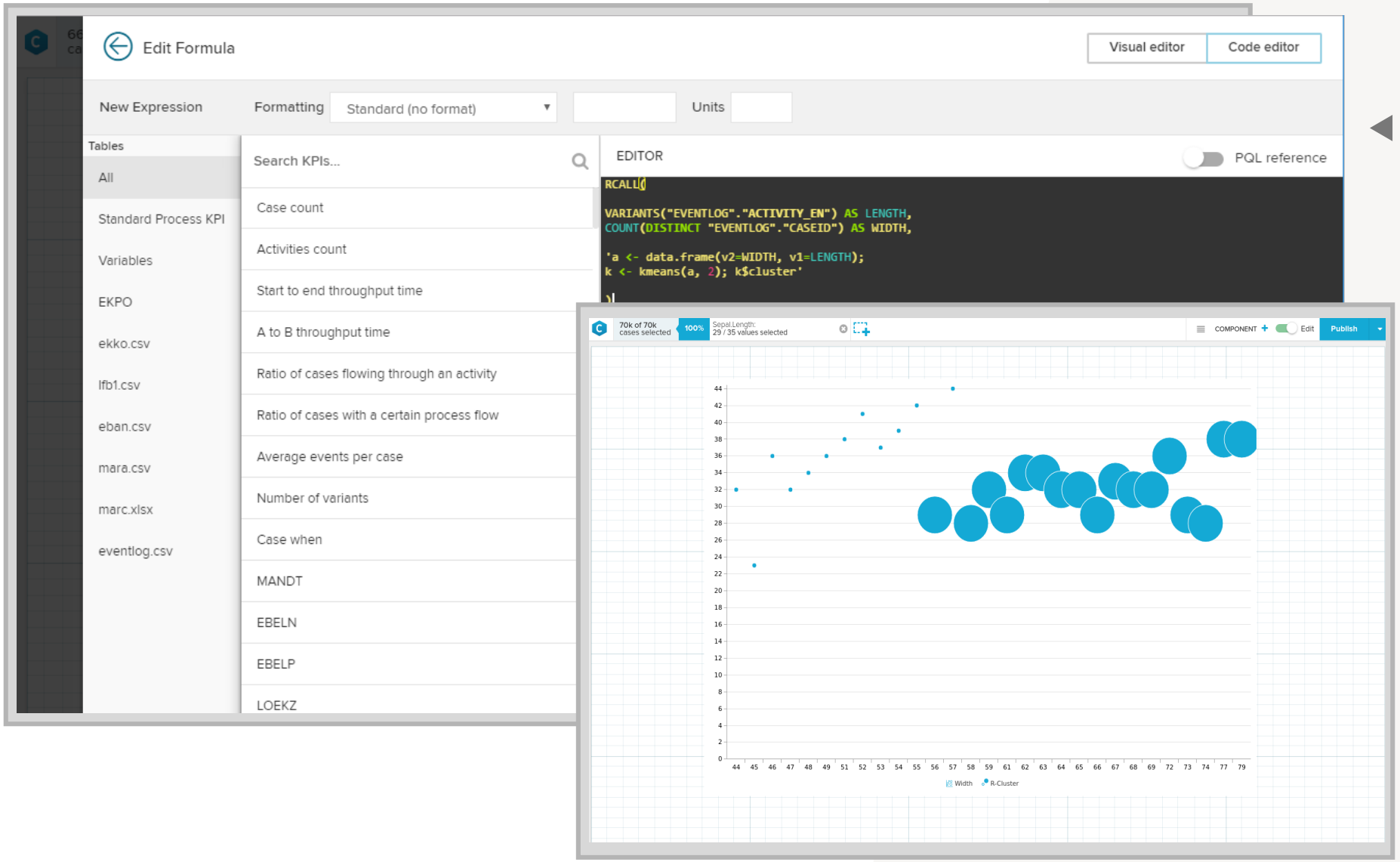


Import Your Process Models
Import your existing processes (BPMN files are supported, from eg Aris) to test their conformance. Or create and edit process models with the built-in *Celonis Business Process Modeler*.



Intelligent Conformance: Find and Fix Violations
Celonis PI automatically checks the desired process flow against the real one. PI Conformance shows how conformant your processes are, where violations occur, possible root causes, how to fix them, as well as conformance trends over time.

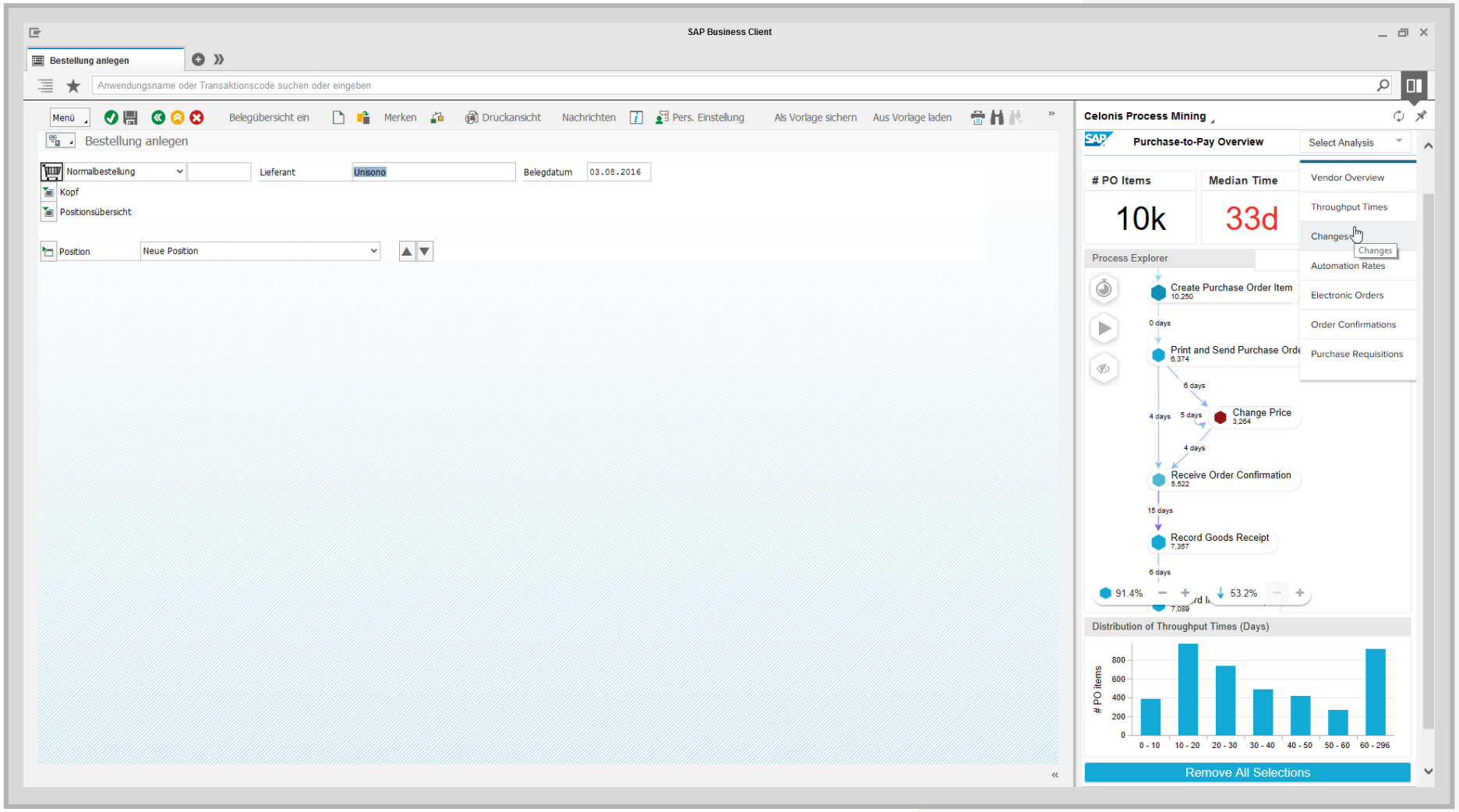
PI MACHINE LEARNING



Unlimited Possibilities to Shape the Future

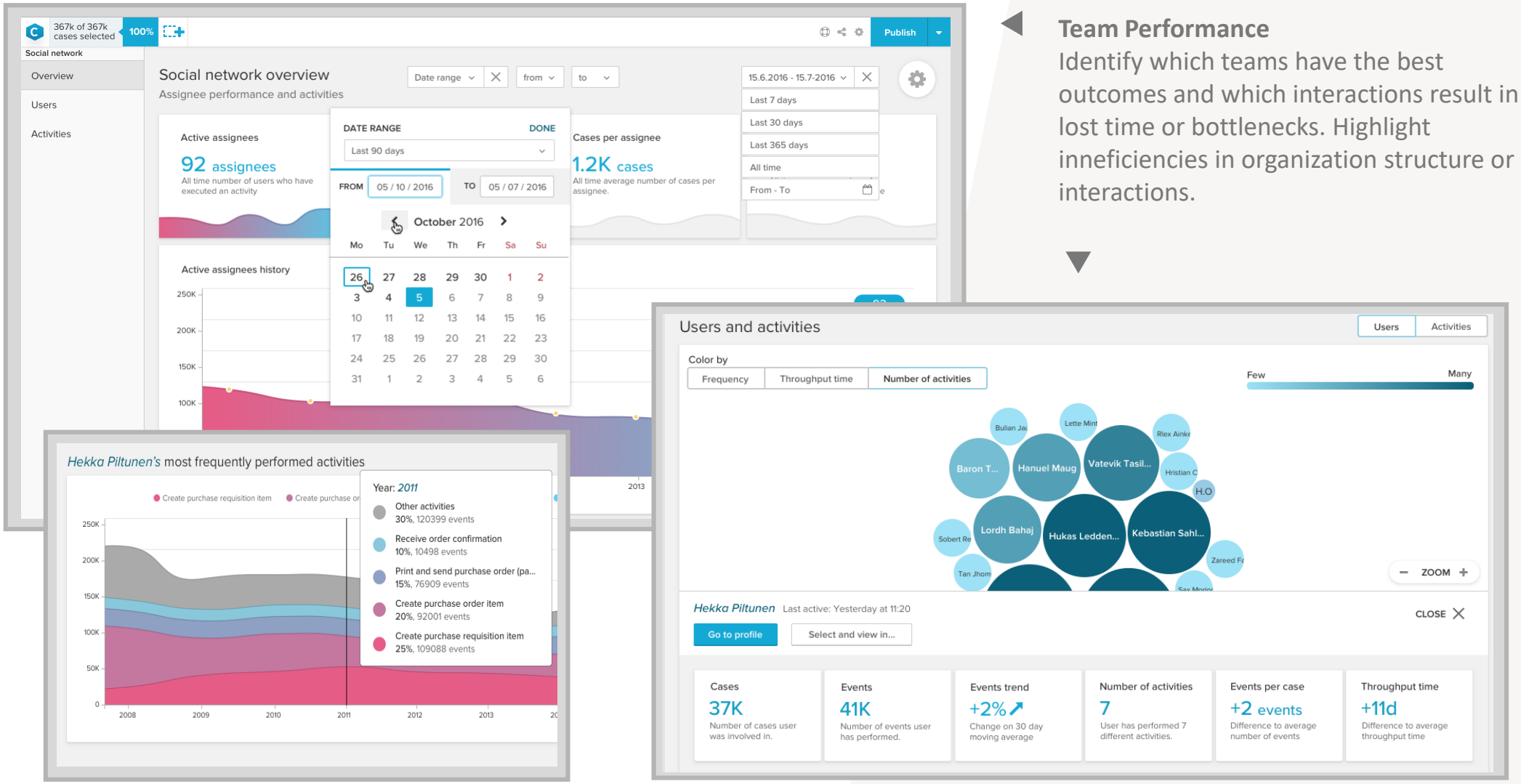
PI Machine Learning opens the door for all analysts to integrate any statistical method and machine learning algorithms to his Celonis analysis. The full support of R-Scripting language – the world's most popular statistic language – with one click integrates millions of ready to use tools into Celonis.

PI COMPANION



PI Companion
This certified addon interacts with SAP systems and supports your decisions by using relevant data from historical transactions. Need a fast delivery? Check which vendor had the fastest delivery record last month! Cautious? Keep an eye on your customers' payment behavior for well-grounded decisions on payment terms.

PI SOCIAL



Team Performance

Identify which teams have the best outcomes and which interactions result in lost time or bottlenecks. Highlight inneficiencies in organization structure or interactions.

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Success Stories

Schukat

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"WITHOUT CELONIS, SAME DAY DELIVERY WOULDN'T BE POSSIBLE. I THINK THAT IN JUST A FEW YEARS, EVERY COMPANY WILL NEED A SOFTWARE LIKE CELONIS."

Georg Schukat, **Schukat electronic**
CEO

SCHUKAT electronic

Company

SCHUKAT ELECTRONIC

Industry

ELECTRONICS WHOLESALER

Employees

150 EMPLOYEES

Processes

PURCHASE-TO-PAY
EXTENDED WAREHOUSE MANAGEMENT
ORDER-TO-CASH

Watch Video

Edeka

celonis
Academic Alliance

"THE BIGGEST ADVANTAGE IS HOW MUCH TIME THE ANALYSIS SAVES. OUR DATA ANALYSTS DON'T HAVE TO WAIT DAYS OR WEEKS FOR ANALYSIS RESULTS ANYMORE."

Michael Dannenberg, **Edeka**
Head of IT Process Coordination / User Service

EDEKA

Company

EDEKA MINDEN-HANNOVER

Industry

RETAIL

Employees

67,000 EMPLOYEES

Processes

IT SERVICE MANAGEMENT

Read Story

Siemens

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"WE ARE ABLE TO ACHIEVE ANNUAL SAVINGS OF DOUBLE-DIGIT MILLIONS AS A RESULT OF THE WORLDWIDE APPLICATION OF PROCESS MINING."

Dr. Lars Reinkemeyer, **Siemens**
Director of ProcessDAsh platform

SIEMENS

Company

SIEMENS

Industry

INDUSTRY, ENERGY, HEALTHCARE AND INFRASTRUCTURE

Employees

343,000+ EMPLOYEES

Processes

>30 Processes
PURCHASE-TO-PAY
EXTENDED WAREHOUSE MANAGEMENT
ORDER-TO-CASH
...

Read Story

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A look into the future

THE FUTURE

of the business world

By 2020, Celonis‘ Process Mining technology for Big Data Analytics will be deeply embeded in every large company as a business critical application in the race for the fastest, most efficient and most transparent processes.

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Become a Celonaut!

CELONIS COMPANY STRUCTURE

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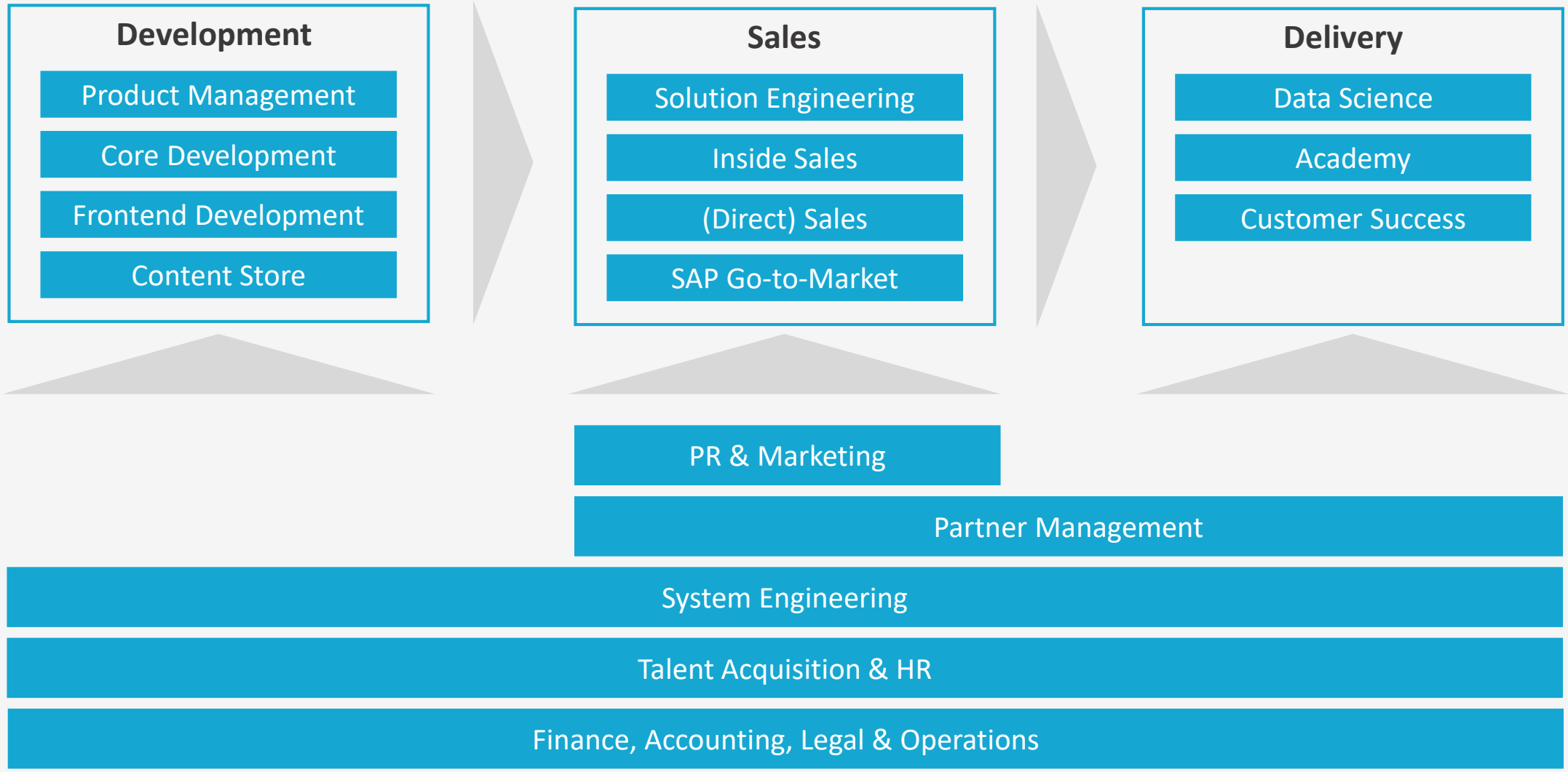

Celonis is a great chance for you because you'll…

…join a **worldwide leading** Process Mining provider and get in touch with Fortune 500 companies.

…meet some of the **most experienced** Data Scientist in the practical field of Process Mining.

…gain **international know-how** in a young, multinational and dynamic team of passionate people.

…add **tangible value** to our customers and the company.

… have **zero bureaucracy** to get things done and make a direct impact.

… work in a **fun**, relaxed and rewarding environment.

You want to become part of the fulminant success story of Celonis?

Apply now!

jobs@celonis.de

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PROCESS MINING EXPERT CERTIFICATE

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Do you want to boost your skills and your career?
Do you want to change the way businesses operate?

Celonis Academic Alliance exclusively invites you
to become a certified Process Mining expert.

How does it work?

- Complete the e-learning on Process Mining including videos, readings and challenges
- Get a valuable and professional certificate for your CV
- Use your Celonis software license

How much does it cost?

Nothing. Exclusively for the first students signing up.

PRE-REGISTER NOW!

https://www.celonis-academic.com/

BECOME A PROCESS MINING SPECIALIST

BPI Challenge 2018

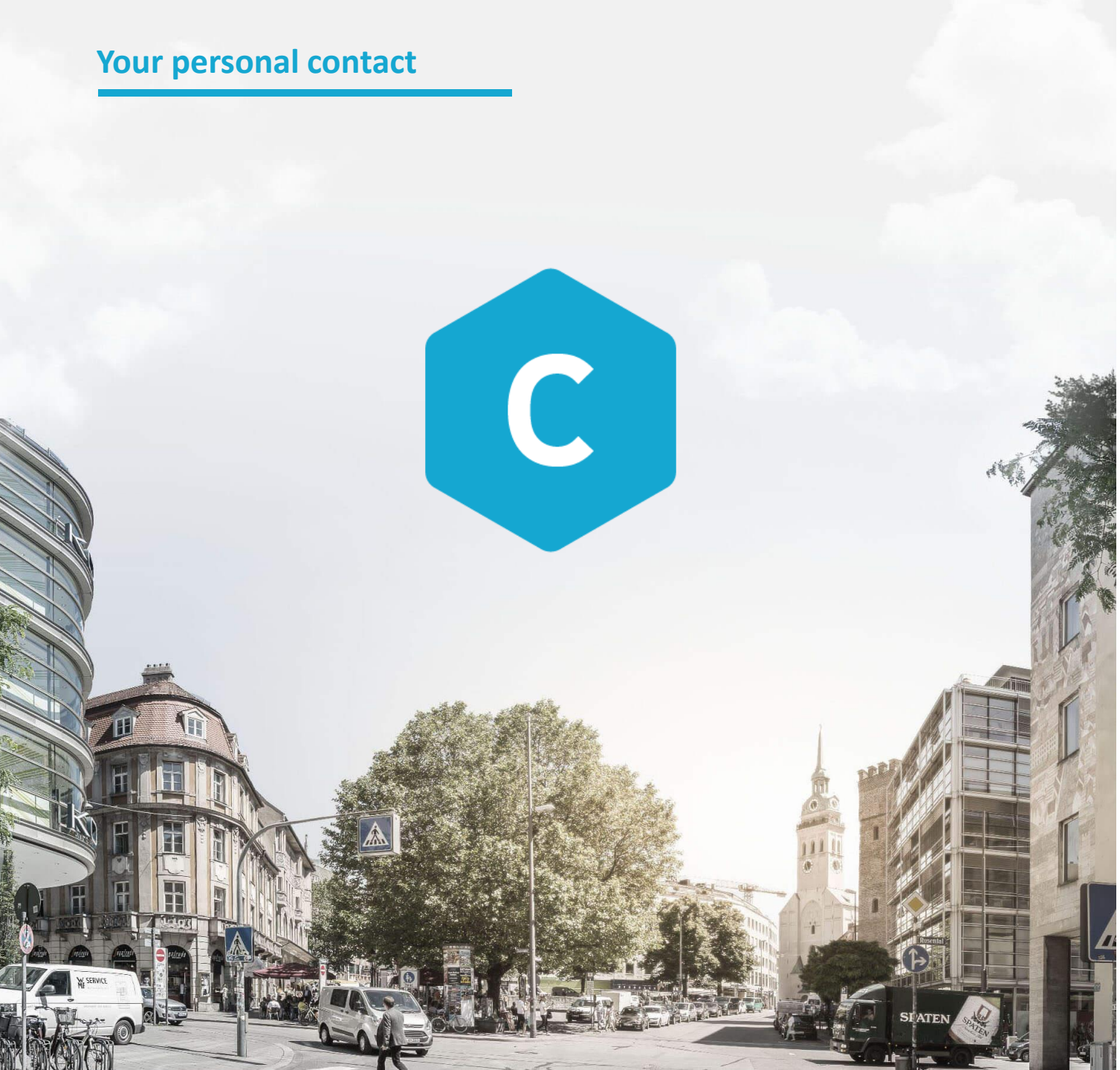
- Celonis sponsors the Business Process Intelligence (BPI) challenge 2018.
- Analyze a real-life event log .
- The best submissions will be awarded at the 14th BPI Workshop in Sydney (September 9-10, 2018).

To participate in the challenge, download the data set at the BPI website.

MOOCs / Videos / Readings

- Coursera online course “Process Mining – Data Science in Action” by Professor Wil van der Aalst. Go to https://www.coursera.org/learn/process-mining
- Celonis YouTube Channel. Go to https://www.youtube.com/user/CelonisPM
- IEEE Task Force on Process Mining. *Process Mining Manifesto*. Download here.
- Van der Aalst, W.M.P. (2016). *Process Mining – Data Science in Action*, 2. edition.

Your personal contact



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