Process Mining:

A DATABASE OF APPLICATIONS

2018 Edition

HSPI Management Consulting

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Process Mining: A Database of Applications 2018

Acknowledgements

The idea of creating the present database of applications came up within HSPI in 2016, during an informal meeting about process mining technology and its spread over several business – and not only – situations.

The *need to collect*, *to put into an ordered system* all the historical information about process mining techniques implementations has led the creation of the very first version of " Process Mining: A Database of Applications".

Thanks to all the Firms, the Universities and Institutions, managers, consultants and the researchers involved.

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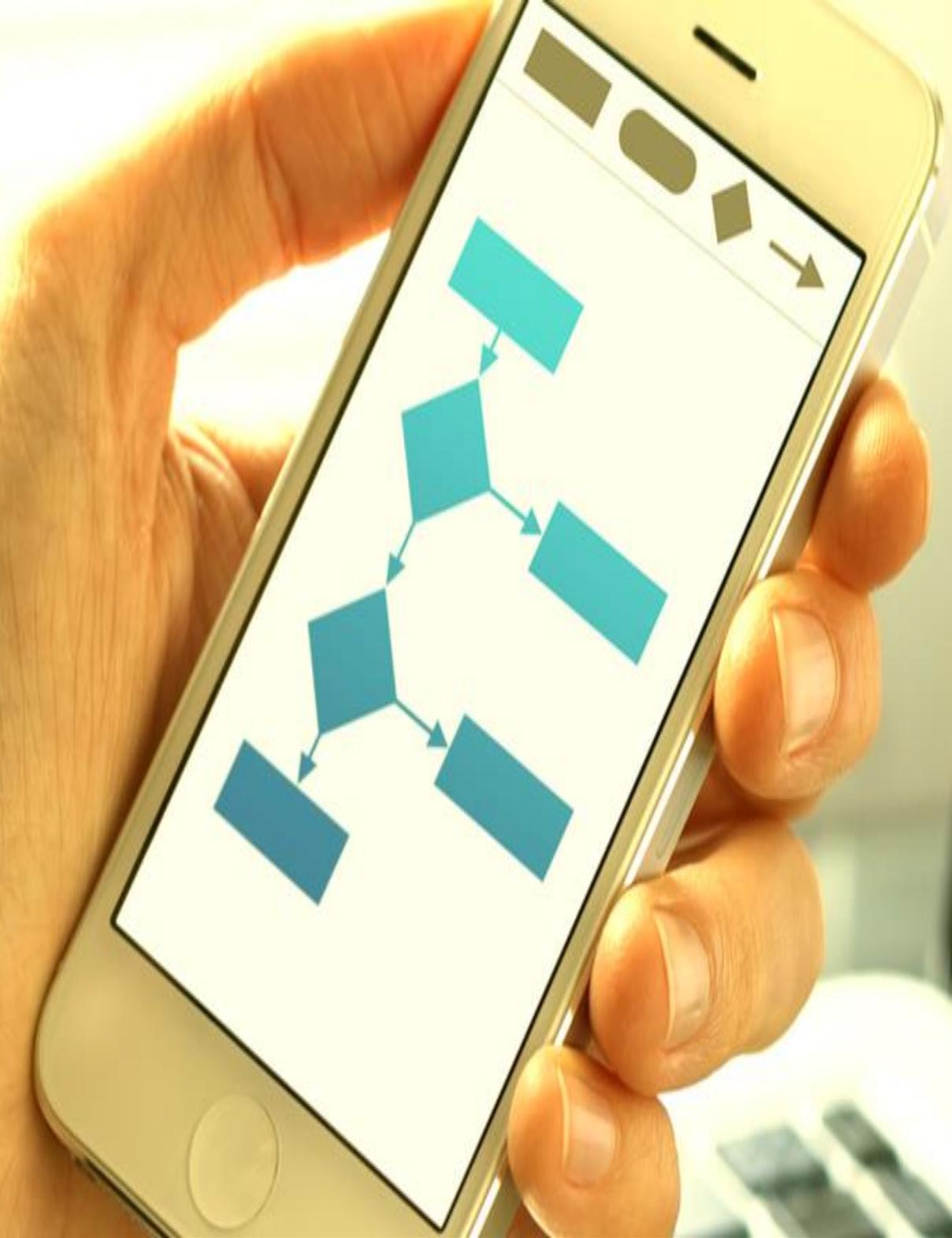
Introduction

The basic idea of process mining is to **extract knowledge from event logs** recorded by an information system. Until recently, the information stored into these event logs were rarely used to analyse the underlying processes. Process mining aims at improving the control over business processes by providing techniques and tools for discovering performance, organizational and social, information from event logs.

There are three classes of **process mining techniques**. This classification is based on whether there is a prior model and, if so, how the prior model is used during process mining.

- **Discovery**: Previous models do not exist. Based on an event log, a new model is constructed or discovered based on low-level events.
- **Conformance checking**: Used when there is an a priori model. The existing model is compared with the process event logs and discrepancies between the log and the model are analysed.
- **Enhancement**: Used when there is an a priori model. The model is extended with a new aspect or perspective, so that the goal is not to check conformance, but rather to improve the existing model.

Our Purpose

The reason for carrying out this research is to create the most complete **list of all the adoptions of process mining techniques** and to collect, directly from who has been involved, basic information about the utilization of this methodology.
The purpose of the study is to create a database of practical cases, no matter the specific industries and the final results, with the only aim of *completeness* and *validity*.

The intended audience includes all those **researchers, data scientists, managers and firms that are willing to implement process mining solutions** or simply **explore business potentials of process mining** in improving business processes or in developing new performance management practices based on real data, extracted from IT systems.

Therefore, the final goal of this knowledge endeavour still remains the same of the first edition, which is to contribute to **build awareness and confidence about process mining methods**.

Please note that HSPI Management Consulting is a **vendor-independent** public company.

Scope of the Study

The cases collected and listed come from companies which operate **in very different industries and markets**. Specifically, the present industry categories have been identified:

- Basic Materials
- Consumer Goods
- Consumer Services
- Financials

- Healthcare
- Industrials
- Public
- Technology

- Telecommunications
- Utilities

The Service industry is then divided among several *sector* that allows to obtain a further level of categorization of the process mining case studies taken into account. More in depth, the industry is made of the following sector:

- Automotive
- Banking
- Chemicals
- Construction & Materials
- General Industrials

- Healthcare Facilities, Services & Equipment
- Insurance
- Logistic
- Personal & Household Goods
- Public Administration and Government

- Retail
- Technology
- Telecommunications
- Utilities
- Other

The firms analysed do their businesses in many countries, each characterized by **significant differences and unique aspects in terms of competitive scenarios, political, legal and tax environments**. So far, the most frequent countries are:

- Australia
- Belgium
- Canada
- Denmark
- Finland

- Germany
- Italy
- Netherlands
- South Korea
- US

The projects can be executed under the supervision or technical support of some partners which can be **universities, vendor firms, consulting firms**, etc. The most recurrent players involved in the projects considered are:

- Celonis
- Cognitive Technology
- Eindhoven University of Technology
- Fluxicon Disco

Definition and Parameters

The database consists of some mandatory features (Industry, Organization, Internal Process, Description, Date, Partner) which characterize each of the projects collected.

1- **"Industry"** refers to the specific industry in which the company operates;

2- **"Sector"** is a sub classification of industry. In particular, it is a category defined by the kind of product or service produced;

3- **"Company"** indicates the name of the firm where process mining techniques were adopted in a project;

4- **"Process"** is the specific process - or group of activities - in which process mining was used;

5- **"Description"** contains a brief overview of the project: the context, objectives and results (if present);

6- **"Year"** indicates the year in which the project was conducted. If not present, the date was assumed to be the same of the working paper or the conference in which the cases were described the first time;

7- **"Partner"** refers to the institution (university, firm) or the resource (researcher, scientist) that has supported the organization during the project.

The evaluation of sources of information is an important step in any research activity. All the elements collected have been validated by **HSPI Process Mining Laboratory** taking into account all the working papers, conference acts and relevant evidences and/or via mail and conference calls with the contacts direct involved into the process mining applications listed.

If you are a Company, a University, or a researcher and you want to report a new application of process mining techniques, please contact us to: *process-mining@hspi.it*

Process Mining Applications

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Telecommunications	Telecommunications	NDA (Slovakia)	*Debt Collection*	General investigation of the debt collection process, identifying customer payment habits, factors driving successful collection of debt.	*2018*	Accenture (Slovakia)
Financials	Financial Services	NDA (Russia)	*IT support process*	Reduction of support case resolution time, discovery of process dynamics, identification and elimination of reworks in the process.	*2018*	I-Teco (Russia)
Industrials	General Industrials	NDA (Russia)	*Procure to pay, Order to cash*	Monitoring of the compliance with the defined as-is process and identification of process inefficiencies like bottlenecks and rework.	*2018*	KPMG (Russia)
Industrials	General Industrials	NDA (Switzerland)	*Order to ship*	Investigating the compliance and variation of the process across multiple plants globally, identifying driving factors for delays for individual products as well as rework happening in the process.	*2018*	NDA
Financials	Insurance	NDA (US)	*Car policy renewal customer journey*	Analysis of the full process after a car insurance policy has run out and what actions lead to highest probability rates for renewal from customers, identifying factors such as individual customer groups characteristics on probability and increase in scope or size of the policy.	*2018*	Cognitio Analytics LLC (US)
Industrials	General Industrials	NDA (Denmark)	*Procure to pay*	Visualize end-to-end process (re-scoped for approving steps), find average handling times between approvers, loops between authorizers, which are most ineffective resources, who is bouncing responsibility more often.	*2018*	Bizcon ApS. (Denmark)
Consumer Services	Retail	NDA (Czech Republic)	*Customer support and return logistics*	Analysis of the return shipping process with regards to customer returns together with the customer support process.	*2018*	NDA
Industrials	Logistic	NDA (Russia)	*Procure to pay*	Monitor the load/unload process across the transport network to increase the rolling stock utilization levels and limit the downtimes.	*2018*	Rondem (Russia)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Healthcare	Pharmaceuticals & Biotechnology	NDA (Denmark)	*Procure to pay*	Goal: Visualize the real process, locate automation candidates (RPA) highlight the deviations from standard process, how much rework is being done because of vendors and / or NN employees, how much time is spent on updating information already in the system (change the quantity, delivery date, etc.), what is the lead time between different steps in the process. Results: Process revealed, rework revealed, automation candidates identified, vendors & NN employees qualified. Improvement effort outside of scope.	*2018*	Bizcon ApS. (Denmark)
Industrials	General Industrials	NDA (Denmark)	*Sales Quotes Process*	Quoting process to identify steps and bottlenecks, improvement potential / automation opportunities, a "live" overview of how the processes are actually running, where the outliers and where people are not following the process. Overview of throughput time per process / process steps.	*2018*	Bizcon ApS. (Denmark)
Financials	Banking	NDA (Greece)	*Product bundling*	Process analysis of banking product bundling with the goal of achieving a higher rate of repayment of these products.	*2018*	Gnosis Management Ltd. (Greece)
Financials	Insurance	NDA (Greece)	*Insurance issuance*	Analysis of the life insurance policy issuance process with regards to target key performance indicators set up at division level as well as identification of factors leading to their violation.	*2018*	Gnosis Management Ltd. (Greece)
Industrials	General Industrials	NDA (Germany)	*Order to cash*	Analysis of the compliance level and violations in the order-to-cash process esp. with regards to internal audit and financial analysis.	*2018*	Daten - Analysen & Beratung GmbH (Germany)
Telecommunications	Telecommunications	NDA (Germany)	*SIM Card activation*	Understanding the activation process and investigating potential fraud cases with regards to internal stores and partner vendors looking for patterns that could indicate fraudulent behavior.	*2018*	NDA
Telecommunications	Telecommunications	NDA (Slovakia)	*Customer journey*	Analysis of the customer journey in one of the new flagship products going through a number of systems such as web portal, CRM, ERP, and proprietary systems.	*2018*	NDA

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Telecommunications	Telecommunications	NDA (India)	*Procure to pay*	Analysis of the procure-to-pay process to get an understanding of how bad a shape it is in currently. Main objective though is to use Minit as a near-real-time monitoring tool for their process.	*2018*	KPMG (India)
Industrials	General Industrials	NDA (US)	*Order to cash*	Analyzing order-to-cash process to understand how customers' changes in orders are impacting production schedule and bottom line revenue while. Identifying main factors that prolong the duration of the process with regards to delivery and clearing payments.	*2018*	Cognitio Analytics (US)
Consumer Services	Retail	NDA (Portugal)	*Customer journey and customer support*	Continuous analysis and monitoring of sales performance in correlation with customer support quality based on customer satisfaction. Analysis of return customer sales and up-selling.	*2018*	Xolyd (Portugal)
Industrials	General Industrials	NDA (Spain)	*Order to ship*	Overall on-going process discovery across the whole organization with the help of kaizen and lean six sigma process improvement techniques with process mining as a baseline tool for process discovery and improvement esp. in the manufacturing of goods and supply chain areas.	*2018*	Xolyd (Portugal)
Industrials	General Industrials	NDA (Denmark)	*Order to cash*	Analyzing the order-to-cash process to identify optimization points and find the differences between the same process being executed in different countries/regions. Identify the level of resource allocation/overallocation.	*2018*	Bizcon (Denmark)
Consumer Services	Retail	NDA (Italy)	*Order to Invoice*	Goals: NDA's aim was to monitor the impact of the change and block activities on their order to invoice lead time, analyze the shipment delays (service time), and get an in-depth analysis of rework activities.	*2018*	Horsa (Italy)
Industrials	General Industrials	NDA (Italy)	*Procure to Pay*	Goals: ▪ Monitor the performance, reliability, and costs of the suppliers. ▪ Improve the effectiveness and efficiency of the process. ▪ Monitor the compliance and violations of the activities with a monitoring tool that would also provide insight on Maverick Buying activities. ▪ Analyze the Spend Under Management. Results: ▪ Identified all Maverick Buying activities with the Root Cause Analysis. ▪ Discovered the key suppliers. ▪ Improved the performance	*2018*	Mind the Value (Italy)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Utilities	Utilities	NDA (Italy)	*Sales Management and Order Management*	Under the scope of energy services, NDA wanted to analyze their client acquisition process that specifically include the new clients that switch to NDA from another vendor. With Process Mining techniques the company wanted to: ▪ Identify and analyze the critical activities. ▪ Reduce the process lead-time. ▪ Identify channel inefficiencies. ▪ In-depth analysis of the process inefficiencies.	*2018*	BIP (Italy)
Financials	Utilities	NDA (Italy)	*Funds - phone records and e-mail management*	Monitor and analyze the process variants of the financial office with Process Mining and Intelligence to reduce the costs and repetitive tasks. Automation of the recovery and the balancing of phone-records and e-mails relative to the operability of the financial office (purchase/sale of stocks). ▪ Expecting Saving 0,9 FTE ▪ Reached Saving 0,9 FTE	*2018*	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	*Liquidity Management Euro and Divided*	Obtain complete transparency of bank transfers with performance indicators through Process Mining in order to monitor and improve the end-to-end process. Automation of transfers between bank accounts: Transfers must be performed several times a day (monitoring 3 times per day) in order to always maintain a proper stock. ▪ Estimated Saving 0,15 FTE ▪ Reached Saving 0,15 FTE	*2018*	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	*Foreclosures*	Process Discovery, Analysis, and monitoring of the information extraction process, to identify any irregular activities and inefficient behavior to drive continuous process improvements. Automation of information extraction from PDF files (foreclosure documents). ▪ Expected Saving 3 FTE ▪ Reached Saving 3 FTE	*2018*	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	*Corporate Events - attestation creation*	With the use of Process Mining acquire complete transparency of the attestation creation process and discover process weaknesses and automation opportunities. Automation of the attestation creation for customers relating to the holding/handling of stocks in the portfolio. ▪ Expected Saving 0,2 FTE ▪ Reached Saving 0,2 FTE	*2018*	OT Consulting (Italy)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Banking	NDA (Italy)	*Corporate Events - events reconciliation*	Automation of the internal purchase/sale of stocks accounting activity. ▪ Expected Saving 0,5 FTE ▪ Reached Saving 0,5 FTE	*2018*	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	*Data Quality*	Use Process Mining to detect anomalies and monitor the corrective actions that will be taken to optimize the process. Automation of the 'correct anomalies' activity within the production environment relative to incorrect/incomplete censuses of the users. ▪ Expected Saving 0,6 FTE ▪ Reached Saving 0,6 FTE ▪ Consistent improvements of the data quality	*2018*	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	*Mortgage Check*	Optimizing the consistency of the data quality through the discovery of non-conformant behavior of the Mortgage Check process. Automation of the 'consistency check' of the available data on the IT procedures and relative documentation (integration with an OCR system) to avoid unexpected behavior. ▪ Expected Saving 5 FTE ▪ Reached Saving 7,5 FTE. ▪ Improving the consistency of the data quality.	*2018*	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	*Central Credit Registers - first information*	Conduct a data-derived performance analysis through Process Mining, to identify the costly and repetitive tasks that are ideal for Robotic Process Automation. Thereafter, monitor if the optimal outcome is reached. Automation of the 'acquisition' activity of the Central Credit Registers (Banca d'Italia database on protested or non-performing loans) of the customer ID and their balance sheet. ▪ Expected saving 0,5 FTE e Reached Saving 0,5 FTE	*2018*	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	*Updating Financial Tools*	With automated process discovery, get an objective overview of the business process to identify from the data-derived model the ideal activities for automation. Automating the data updates on the procedure of external data sources. ▪ Estimated Saving 0,4 FTE ▪ Reached Saving 0,4 FTE	*2018*	OT Consulting (Italy)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Banking	NDA (Italy)	Mortgage Settlements	Process Mining was used to identify the ideal activities for automation of the bank's Tax Office, and to constantly monitor the automation levels and continuously optimize its process. ▪ The 'updating of the database' activity was identified. The activity is relative to the mortgage settlements due to the closure of the related financing. ▪ Expected Saving 1 FTE	2018	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	Future Verification	Verification of the positions and executions among FUTURE, the bank and the Broker.	2018	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	Large-Scale Retailers Withdrawal	Credits and charges related to the large-scale retail distribution channel.	2018	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	Balance and average deposit	Creation of a document with current account balance and average deposit	2018	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	Credit Card Remote Selling	Credit checks on the customer's credit card upon request, selling or rejection of the card.	2018	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	Compilation of Guarantees	Preparatory checks of the Compilation of the Guarantees and once completed make the prints available to the network	2018	OT Consulting (Italy)
Financials	Banking	NDA (Italy)	Current Account Closure	Closure of the services connected to the account and - after the appropriate checks - reservation of the closure on the procedures.	2018	OT Consulting (Italy)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Banking	NDA (Italy)	*Account Opening*	-	*2018*	Cognitive Technology (Italy)
Financials	Banking	NDA (Italy)	*ICT Service Management*	Goals: By the use of Process Mining the bank wanted to reduce their service time and reduce the number of ticketing managed by outsourced services.	*2018*	Cognitive Technology (Italy)
Industrials	Automotive & Parts	NDA (Italy)	*Accounts Payable*	Goals: By using Process Mining, NDA wanted to: ▪ Account Management dynamics. ▪ Discover and analyze process inefficiencies. ▪ Reduce invoice processing time, by reducing the inefficient activities. ▪ Analyze and Monitor the payment behavior. Results: myInvenio successfully ▪ Exposed the critical suppliers relative to the processing time. ▪ Identified all inefficient activities and bottlenecks. ▪ Implemented the continuous monitoring of the account payable process.	*2018*	OT Consulting (Italy)
Industrials	Automotive & Parts	NDA (Italy)	*Procure to Pay*	Goals: By the use of Process Mining techniques, the management team wanted to discover and analyze Maverick Buyings within their Procure-to-Pay processes. Results: The Team successfully exposed all Maverick Buyings and initiated the trajectory to eliminate them from their processes.	*2018*	OT Consulting (Italy)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Insurance	NDA (Germany)	*Optimize taskforce for process "application for care"; Data from highly customized and industry solution of SAP system*	The process "application for care" is highly standardized and monitored with existing reporting functionality. The goal was to add additional insights into the process execution to optimize priority setting and avoid penalties for delays as defined by law. The process involves interaction with external parties, such as health providers, that prolong the process. The users can analyze highly regulated process end-to-end, instead of partial views as with existing reporting. Data and views can be created on the fly to drill down into specific process behavior. With existing reporting, this always required an IT change request, that took multiple weeks to be implemented.	*2018*	NDA
Industrials	Construction & Materials	NDA (US)	*Go-Live Monitoring of harmonized processes & new Supply Chain Software; Data from Oracle Cloud SCM system*	In parallel to a global process harmonization campaign and introduction of a new software, system adoption and compliance with new processes are monitored, monitor the usage of the new procurement system and whether the process (purchase requisition, order with preferred supplier, goods receipt) is followed or whether compliance violations or lack of information/integration are identified. Work in close collaboration with the process management & Quality assurance organization that uses Signavio Process Manager and Collaboration Hub for process definition, agreement and adoption, as well as Signavio Workflow Accelerator for harmonizing manual-IT-process interactions.	*2018*	Support through internal Signavio Consulting Team (US)
Industrials	Construction & Materials	NDA (Germany)	*Payable & Invoice processes; Data from SAP ERP (FI, MM) and SAP Workflow*	Analyzing and improving the accounts payable processes, incl. the invoice check, functional approval, etc. The results derive process improvements, show compliance deviations and show automation potential using RPA. Invoice processing is split among multiple service centers. Data was extracted from all involved IT systems and loaded into Signavio Process Intelligence. The approach identified cost saving potential of ca. 3 Mio. € per year by both automation (esp. RPA and enforcement of rules in SAP Workflow), as well as optimized work distribution and communication between service centers.	*2018*	Support through internal Signavio Consulting Team (Germany)
Consumer Services	Retail	Stark (Denmark)	*Order to Cash*	Identify process rework & repetition points. Find which cases deviate from the designed process. Found out major deviations and gained insight on where to begin to improve	*2018*	NDA
Financials	Banking	Komercni banka (Czech Republic)	*Finance*	Visualization of processes. Lead time improvement. Process statistics with root cause analysis. Combining data across variety of systems for an end-to-end view.	*2018*	NDA

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Utilities	Utilities	Fennovoima (Finland)	*Document Handling*	Gain visibility and lead time analysis on documents handling process. Now understands bottlenecks and how to improve upon them. Dashboards for process performance follow-up.	*2018*	NDA
Basic Materials	Chemicals	Extrafarma (Brazil)	*Purchase to Pay*	Extrafarma want to use process mining capabilities to make their processes more efficient. Therefore, they asked Grupo Assa to prove they can connect their SAP data to the ProcessGold Platform. Once that has been realized a new project will start to implement ProcessGold and define new goals.	*2018*	ProcessGold and Grupo Assa (Netherlands)
Telecommunications	Telecommunications	KPN (Netherlands)	*All relevant business processes starting with Source to Pay and Order to Cash*	KPN is convinced of the value of process mining for continuous improvement of their whole organization. KPN selected ProcessGold as a platform for continuous monitoring and improvement of their business processes starting at their finance department (S2P and O2C).	*2018*	ProcessGold and KPMG (Netherlands)
Utilities	Utilities	Eneco (Netherlands)	*Onboarding, delivery process of smart meter, maintenance process.*	The goal was to reduce 1% of unnecessary customer phone calls and to increase their First Time Right also with 1%. With the ProcessGold Platform we showed Eneco that is was possible to reduce the number of phone calls with the minimum of 2,8% and maximum of 25,1%. Eneco is now working on improving the process. FTR could be improved with maximal 7,7%.	*2018*	ProcessGold and First Consulting (Netherlands)
Financials	Insurance	Menzis (Netherlands)	*Customer declaration process*	Menzis wanted to increase their first-time right process activities. Therefore, they needed insight in all variations of the process. Insight was delivered on how to increase their first time right from 63% to 80% of their declaration process.	*2018*	ProcessGold and First Consulting (Netherlands)
Financials	Insurance	US Health Insurance Company with over 20,000 employees (US)	*Enterprise*	Use Cases: StereoLOGIC has replaced staff interviews with automated capture of the employee activities in real-time and producing the End-to-End process visualizations and measurements. Results: 88% of time savings for process analysis improvement work	*2018*	StereoLOGIC (Canada)
Financials	Insurance	Canadian Health Insurance Company (Canada's leading life insurance provider)	*Customer Onboarding*	Use Cases: ▪ Process Discovery and Improvement ▪ Identifying Opportunities for Robotic Process Automation (RPA) ▪ Generation of Specifications for Robotic Process Automation (RPA) Results (Revealed opportunitied for Process Automation): ▪ New Business Application Set-up (5 agents) - 42% FTE Savings ▪ New Business Issue Process (5 agents) - 66% FTE Savings	*2018*	StereoLOGIC (Canada)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Insurance	Global Mortgage Insurance Company with offices in the US, Canada and Australia	*Appraisals, Underwriting*	Use Cases: ▪ Process Discovery ▪ Productivity Management ▪ Improvement Recommendations Results: ▪ 33.6 % process efficiency gain in less than 3 months	*2018*	StereoLOGIC (Canada)
Financials	Real Estate	Canadian Real Estate Finance Company (Canada)	*Mortgage Processing*	Use Cases: ▪ Process Discovery and Documentation ▪ Identifying Opportunities for Robotic Process Automation (RPA) ▪ Generation of Specifications for Robotic Process Automation (RPA) Results (In less than 1 month): ▪ Identified Opportunities for Automation reducing 17 FTE ▪ Generated Process Specifications for RPA Automation (50 Processes)	*2018*	StereoLOGIC (Canada)
Financials	Banking	One of the Big Five Banks in Canada with over 40,000 employees (Canada)	*Shared Services*	Use Cases: ▪ Discovery and Documentation of Legacy Mainframe Processes ▪ Generation of Process Maps for Systems Transformation Project Results: ▪ 5X Acceleration of Business Process Mapping	*2018*	StereoLOGIC (Canada)

Financials	Banking	US Bank with over $30B US Assets (US)	*Anti-Money Laundering*	Use Cases:
				▪ Process Discovery and Documentation
				▪ Validation of Anti Money Laundering Procedures
				▪ Identification of Opportunities for Robotic Process Automation (RPA)
				▪ Generation of Specifications for Robotic Process Automation (RPA)
				Results:
				▪ Increased Process Discovery Capacity by 6X
				▪ Increased the Process Improvement Capacity by 2X
				▪ Non-Post and Branch Validation Processes detected inefficiencies and potential savings – up to 60%
				▪ Funding and Onboarding Processes: detected inefficiencies and potential savings – up to 40%
				▪ Documents Production Process (HELOC Processes):
				   - list of data fields transferred between applications
				   - time wasted on transferring data fields between applications
				   - detected inefficiencies and potential savings – up to 33%
					2018	StereoLOGIC (Canada)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Technology	Technology	PC Online/Mobile gaming company over $1.6 B revenue in 2017 (NDA)	Mobile game user analysis process	This company's mobile game hits more than $900 million revenue in 2017, and it shows 300,000 DAU (Daily Active User) in a day. Game user's response and behavior are key success factors to the game. To analyze game user's activity pattern, this company applied process mining integrated with their big data system. It shows user's activity pattern, cheating signal of bad users, and user's response to weekly event.	2018	NDA
Industrials	Construction & Materials	POSCO E&C (South Korea)	Production outsourcing	This company adopted process mining to analyze and improve production outsourcing management process and purchase order process.	2018	NDA
Technology	Technology	Semiconductor business company over $27B revenue in 2017 (NDA)	Semiconductor manufacturing process discovery and enhancement	Semiconductor manufacturing process is so complex that lots of approaches have been applied to enhance the process for better yield. However, the state of art approaches were based on statistics and data analysis.	2018	EY-Ernst & Young (UK)
Financials	Financial Services	Securities company (NDA)	Non-face-to-face account opening process	Nowadays, securities companies are adopting non-face-to-face account opening through non-face-to-face customer identification by their app. This is very quick and easy way to open security account without visiting offline branches. However, large portion of mobile app users seem to quit the account opening process and exit the app. To analyze user's activity and their pattern in the app, Puzzle Data provided process mining consulting with 2e Consulting.	2018	2e Consulting (Bosnia Herzegovina)
Healthcare	Healthcare Facilities, Services & Equipment	Severance hospital (South Korea)	Outpatient clinic process	This hospital shows thousands of outpatient attendances in a month for counselling and inspections. To provide better medical service to them, this hospital asked KPC (Korea Productivity Center) and Puzzle Data to analyze their current process and provide enhanced process to them.	2018	Korea Productivity Center (South Korea)
Telecommunications	Telecommunications	National Coverage Telco - Mobile and Fixed services (Brazil)	Robotic Process Automation (RPA)	This Telco began an RPA initiative to improve service quality and customer journey, and added Process Mining (Accelera Labs EverFlow, previously Icaro Tech EverFlow) to their automation strategy in order to verify operational tasks that could be automated and rank them by ROI. Use cases include ITSM (service desk), customer interactions (tickets from different sources), remote troubleshooting, field services and operators/workforce AI Advisors.	2018	Icaro Tech - Accelera Labs partner (Brazil)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Insurance	PGGM (Netherlands)	*Process Improvement*	PGGM, one of the largest pension providers in the Netherlands, wants to make her processes more efficient and reduce the costs of the accountant. To do this, the company has researched the added value of process mining. And with success: the organization expects time savings of 66% for the first, second-and third-line checks of the processes which were studied in the experiment.	*2018*	Fluxicon, KPMG (Netherlands)
Consumer Goods	Media	LOEN Entertainment (South Korea)	*Customer Journeys*	LOEN Entertainment runs Melon, which is the largest online music streaming service in South Korea. They adopted process mining with Disco to analyze their mobile app's log data. LOEN analyzed new users' journeys during the day when they signed up with a KakaoTalk account. KakaoTalk is a free mobile instant messaging application for smartphones with free text and free call features. KakaoTalk is used by 93% of smartphone owners in South Korea. They categorized new users into five segments based on their behavioral pattern and clearly identified the reason why each segment signed up. Furthermore, building on the analysis results, it is planning to conduct a targeted marketing campaign for increasing each segment's CVR (Conversion Rate). The company is judging that their process mining analysis using Disco plays a key role in understanding new customers and is likely to contribute to maximizing earnings.	*2018*	Fluxicon (Netherlands)
Financials	Banking	One of the Big Five Banks in Canada with over 1000 branches, NDA	*LOB 1: Documentation and Training Group* *LOB 2: Retail Banking* *LOB 3: Credit Adjudication* *LOB 4: Process Management Group* *LOB 5: Finance*	LOB 1: ▪ Process Discovery & Documentation ▪ Generation of Standard Operating Procedures LOB 1 Results: ▪ 5X Acceleration of Business Process Documentation and SOP Development LOB 2 Use Cases: ▪ Process Discovery and Time Measurement ▪ Detection of Errors and Inefficiencies ▪ Process Improvement and Standardization LOB 2 Results: ▪ Accelerated Customer Services by 22.5% and Reduced Errors and Delays by 95% in less than 6 months ▪ $15MM operational savings across all branches in less than 1 year LOB 3 Use Cases:	*2017*	StereoLOGIC (Canada)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Banking	**The largest Bank in Canada, NDA**	*LOB 1: Credit Cards LOB 2: Payments LOB 3: Personal Banking Operations*	▪ Process Discovery and Time Measurement ▪ Detection of Employee Errors and Inefficiencies ▪ Customer Experience Measurement LOB 3 Results: ▪ Measured: 1) Total No of Cases reviewed by each Adjudicator; 2) Number of times each Case was re-opened by the Adjudicator; 3) Review Start / End Time ▪ 30% Customer Service Acceleration LOB 4 Use Cases: ▪ Process Discovery and Analysis ▪ Detection of Employee Errors and Inefficiencies ▪ Customer Experience Measurement LOB 4 Results: ▪ 5X Acceleration of Process Analysis and Documentation LOB 5 Use Cases: ▪ Process Discovery and Documentation ▪ Generation of Standard Operating Procedures (SOP) LOB 5 Results: ▪ 6X Acceleration of Process Analysis and Documentation LOB 1: ▪ Monitoring of Offshore BPO Processes for conformance to Best Practices. ▪ Analysis of Inefficiencies and Process Improvement. LOB 1 Results: ▪ Detected and corrected non-conformance to best practices in Offshore BPO Centers (60%); ▪ 22% Performance Improvement LOB 2: ▪ Process Discovery & Documentation ▪ Process Improvement ▪ Generation of Standard Operating Procedures LOB 2 Results: ▪ 5X Acceleration of Business Process Documentation and SOP Development LOB 3 Use Cases:	*2017*	StereoLOGIC (Canada)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
				▪ Process Discovery ▪ Productivity Management ▪ Process Improvement ▪ Detection and Prioritization of RPA opportunities LOB 3 Results: ▪ Up to 90 % process efficiency gain for the Outsourced Processes in scope ▪ Detected automation opportunities for over 50% of processes		
Consumer Services	Retail	Heineken (Netherlands)	*Segregation of Duties and Manual Journey Entries*	Organization wanted to be audit ready. Controls were defined and put in the ProcessGold Platform. 100% insight on violations of these controls was delivered. Roll-out was globally.	*2017*	ProcessGold and Agilos (Netherlands)
Telecommunications	Telecommunications	NDA (Europe)	*product delivery for a new internet service*	The demand for a new corporate internet product is high, but delivery projects are taking much longer than expected, even resulting in many cancelations of orders. Among other things, the analysis unveiled additional revenue potential of several million EUR by delivering earlier and therefore starting the subscription earlier.	*2017*	NDA
Industrial	Logistic	NDA (Germany)	*Order-to-cash & procure to pay processes of multiple sub-organizations; Prepare Implementation & Go-Live of a global ERP system*	Assess current Order-to-cash and procure-to-pay processes of multiple sub-organizations. Per organization, analyze deviation of process from the global template by using Signavio Process Intelligence. The global process definition and communication is done using Signavio Process Manager and Collaboration Hub. After the go-live of the global ERP system, a continuous monitoring of the processes in the new ERP system are established. Outcomes: Faster project, better requirements definition, improvement of ongoing operations after Go-Live.	*2017*	Support through internal Signavio Consulting Team (Germany)
Public	Education	University of Parma (Italy)	*Student's administrative career & General Accounting mgmt.*	University of Parma, in a very important phase of reviewing and centralizing many of its administrative processes, decided to start a Process Mining Assessment to further investigate his processes. The aim of the project is to assess the organization and the activities performed by different faculties, to map processes, capture differences, examine performance and implement best practice, with the final target to gain efficiency centralizing and standardizing the best-fit process flow.	*2017*	Queensland University of Technology (Australia); HSPI Management Consultants (Italy)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Industrials	Industrial Transportation	NS Dutch Railways (Netherlands)	*Dataset Analysis*	Analysis of all the datasets with Process Mining demonstrate that by waiting a few more days before emptying abandoned station lockers would bring to the company a lot of time and effort saved. In addition, Process Mining let NS noticed that some of the OV bikes that where reported as stolen were actually not stolen at all.	*2017*	Fluxicon (Netherlands)
Utilities	Utilities	Shell (UK)	*Purchase to Pay and Order to Cash*	SAP HANA data was connected direct into the ProcessGold platform. Focus was on efficiency. Non-compliant processes, early and late payments and fraud were discovered.	*2017*	ProcessGold and CGI (Netherlands)
Industrials	Support Services	Barona (Finland)	*Invoicing*	Identify organizational difference to drive process and operations harmonization. Discover the invoicing procedures. Communicate process related knowledge.	*2017*	NDA
Consumer Goods	Personal & Household Goods	Nokia (Germany)	*Order to Cash*	Visualization of processes. Lead time improvements. Process harmonization. Measuring & communicating process performance. Reduced rework. Continuous data driven development.	*2017*	NDA
Industrials	Aerospace & Defense	Patria (Finland)	*Order to Cash*	Visual process intelligence. Visibility to operations. Ensuring once delivery with first time right execution. Minimizing rework.	*2017*	NDA
Industrials	Automotive & Parts	NDA (Italy)	*MRP*	-	*2017*	OT Consulting (Italy)
Public	Public Administration and Government	General Prosecution Service (Netherlands)	*All internal processes (Criminal Cases)*	Customer wants to improve their internal processes by shortening throughput times, minimizing risks and fully comply to internal and external laws and regulations. Customer is implementing the so called DMAIC improvement cycle with the help of the ProcessGold platform.	*2017*	ProcessGold (Netherlands)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Insurance	**Nationale Nederlanden (Netherlands)**	*Transactions analysis*	The company got pushback because results were not always aligned with the viewpoints of all stakeholders. For instance, for one process the operational teams experienced a lot of variation - while IT was managing a Straight Through Process. With process mining, it was ultimately possible to get a deeper understanding of how the process was actually working and to take both perspectives into account. Results: ▪ 225.000 process ID obtained, from 600.000 records; ▪ Straight Through Processing (STP) Rate= 87%; ▪ Non STP processes (#44) could ranked based on % of variants a lead time.	*2017*	Fluxicon (Netherlands)
Consumer Goods	Personal & Household Goods	**NDA (Italy)**	*E-Commerce BtoC analysis*	NDA's aim was to monitor the O2C e-commerce process with the objective to compare the brands, retail chains, and commercial areas to finally increase the efficiency of the order management, shipment, and any processes related to deliver to final customer. Results: myInvenio exposed differences between logistic centers, and in some cases important process deviations caused by order reassignments. The intra-brand differences were used for a subsequent detailed analysis, always for efficiency purposes	*2017*	Cognitive Technology (Italy)
Financials	Insurance	**CZ (Netherlands)**	*IT Audit*	By using process mining techniques, CZ Health Insurance was able to obtain different results from the traditional approach in the preparation, fieldwork, reporting, and follow-up steps in its audits. Results: ▪ Changes 'out of the blue'; ▪ Quality of work measured; ▪ Automated compliancy.	*2017*	Fluxicon (Netherlands)
Utilities	Utilities	**Essent NC (Netherlands)**	*Credit Management*	Discovering why the firm was losing so much money in the payment collection process: the termination of contracts took too long time to be performed. By visualizing the problem, the company was able to understand the actual root causes. Therefore, process mining proved to be so much more meaningful than just a snake plot and a ping-pong factor.	*2017*	Fluxicon (Netherlands)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Consumer Goods	Food & Beverage	NDA (Italy)	*Order to Cash*	Goals: Apply process mining to provide insights into the Order to Cash process, to ultimately reduce the delivery time and the payment time by identifying the optimal delivery routes and the root causes of bottlenecks.	*2017*	OT Consulting (Italy)
Healthcare	Healthcare Facilities, Services & Equipment	NDA (Germany)	*Order to Cash*	Goals: Apply process mining to provide insights into the Order to Cash process, to ultimately reduce the delivery time and the payment time by identifying the optimal delivery routes and the root causes of bottlenecks.	*2017*	Cognitive Technology (Italy)
Industrials	General Industrials	NDA (Italy)	*Order to Cash*	Goals: Apply process mining to provide insights into the Order to Cash process, to ultimately reduce the delivery time and the payment time by identifying the optimal delivery routes and the root causes of bottlenecks.	*2017*	Cognitive Technology (Italy)
Consumer Services	Retail	NDA (Italy)	*Order to Cash*	Goals: By analyzing data from the different corporate IT systems, NDA wanted to discover the segregation of duties; find what activities were performed by the specific resources and roles of the organization's Order to Cash process.	*2017*	OT Consulting (Italy)
Industrials	General Industrials	NDA (Italy)	*Shipment Management*	Process Mining was used to deliver the advanced insight on the orders that were necessary to optimize the shipment process.	*2017*	Cognitive Technology (Italy)
Industrials	General Industrials	NDA (Italy)	*Order to Cash*	A Warehouse Management System Analysis was conducted in order to discover process inefficiencies. Results: Using myInvenio, NDA discovered a critical inefficiency in the process: material that was produced in Italy was send to a warehouse located in Spain, and thereafter send back to a different warehouse in Italy to finally be distributed in Italy.	*2017*	Cognitive Technology (Italy)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Banking	US Federal Bank with over $70B US Assets (NDA)	*Back Office Operations*	▪ Discovery and Documentation of As-Is Business Processes ▪ Generation of Process Maps for Systems Transformation Project Results: 6X Acceleration of Process Analysis and Documentation	*2017*	StereoLOGIC (Canada)
Public	Public Administration and Government	NDA (Netherlands)	*Logistic flow of ships*	Organization wanted to improve the quality of controlling ships on hazardous substances. Based on the visualization of the routes it is now possible to perform the controls based on places and ships with the highest risks.	*2017*	ProcessGold (Netherlands)
Financials	Banking	Large European Bank with over 90,000 employees (NDA)	*Back Office Operations*	Goals: ▪ Remote capture of As-Is business processes from local branch offices ▪ Variation analysis and process optimization Results: ▪ Compressing the time to gather business process by 60% ▪ Process optimization by an average of 16%. ▪ Some processes optimized by as much as 70%. ▪ 4 month ROI	*2017*	StereoLOGIC (Canada)
Financials	Insurance	VGZ (Netherlands)	*Dental care process analysis*	Solving of many operational problems much quicker by combining Lean tools with process mining. Using process mining, VGZ was able to visualize the flow of the dental care process within weeks. This directly pointed out bottlenecks and it demonstrated that there were long waiting times when the work was handed over from medical advisors to experts and vice-versa. By applying the traditional Lean tools, such as 5x Why, CZ was able to pinpoint the actual root causes. Results: ▪ Reduction of the throughput time by 40%.	*2017*	Fluxicon (Netherlands)
Financials	Banking	Bank 2b (NDA)	*Process Analysis*	Analysis of Mortgage Approval process. Analysis of communication between front-office and back-office. Preparation of in bank methodology that organizes work in both front and back office.	*2017*	InHouse analysis / support by Minit j. s. a (Slovakia)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Industrials	General Industrials	NDA (US)	*Order to Delivery*	Goals: Apply process mining to provide insights into the Order to Cash process, in particular: ▪ Analyse Process Behaviour and Identify any Improvement opportunities! ▪ Identify the Critical Activities in terms of costs and time. ▪ Monitor the Customers Lead Time Variability ▪ Discover the Key Users of the process and check the Segregation of Duties Results: ▪ Redesigning of the process in order to drastically reduce "Logistics Block". Cost Saving of at least 100k$ and 2 days of average lead-time. ▪ Reducing the number of "Change of Delivery Date" with an expected cost and time saving of about 50k$ and 3 days. ▪ Increase of the Orders within KPI boundaries of 25%	*2017*	Mind The Value (US)
Industrials	Industrial Engineering	Veco (Netherlands)	*Customer journey analysis*	Obtaining a clear visualization of the journey of the customer. Looking into the visualization, a new product development process was discovered. Instead of only producing a sample, in the new product development process pieces needed to be designed, produced and delivered quickly. By shifting priorities, Veco was able to produce customer samples quicker without impacting the regular production lead times. This allows Veco to grow their business, while keeping up the delivery performance for their existing customers.	*2017*	Fluxicon (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	Care Services company (Brazil)	*Workforce Management*	As a care service provider with a wide variety of expertises, this company's core business relies on field dispatches of different skilled technicians to meet customer requests. As the customer satisfaction varied according to location and service expertise, this company needed to identify the customer journey's top offenders and positive highlights to improve their process. Accelera Labs EverFlow (previously Icaro Tech EverFlow) provided the expected answers by analyzing logs from this company's Workforce Management system.	*2017*	Icaro Tech - Accelera Labs partner (Brazil)
Telecommunications	Telecommunications	National Coverage Telco - Mobile and Fixed services (Brazil)	*Operational Efficiency*	Considering Fault Management is critical to network-based services, Accelera Labs EverFlow (previously Icaro Tech EverFlow) helped this Telco to understand any network/APM fault alarm lifecycle, from the moment it was generated to the final resolution. This allowed operation managers to easily identify how alarms were impacted by operators (re)classification, (re)categorization and other actions, improving the decision-making process for fast troubleshooting and MTTR reduction.	*2017*	Icaro Tech - Accelera Labs partner (Brazil)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Industrials	Support Services	**SIAV S.p.A.** (Italy)	*Order to Cash, Help Desk*	The company aimed to map Order to Cash process (supported by SAP, Microsoft Dynamics and Siav Archiflow document management system) and Help Desk process (supported by Microsoft Dynamics CRM). The OTC process was particularly challenging, because it involves many different information systems; despite this, a consistent mapping between different identifiers has been found during ETL phase, and consistent end-to-end process instances have been extracted. An internal Process Discovery tool has been used to analyze the processes. The result of the study was a detailed report on the real processes, underlining unexpected behavior and performance issues, valuable information to develop an improvement plan.	*2017*	NDA
Public	Education	**The School of Management (VSM) City University of Seattle** (US)	*Paths discovery*	The School of Management (VSM) implemented a modern e-learning platform to facilitate more convenient and personalized form of studying. The application for automated processes analysis Minit was used to compare the utilization of the e-learning platform Moodle by different student groups. The School of Management succeeded in putting in action an individual approach to students and improving their journey to outstanding academic results. This progressive approach to students brings greater renown to VSM and increases students' interest in attending.	*2017*	Minit j. s. a (Slovakia)
Telecommunications	Telecommunications	**Telefónica** (Spain)	*IT Service Management*	With logs analysis carried out by process mining techniques Telefonica discovered that the incidents were not registered properly in the trouble ticketing tool, as well as that the internal information/reports could be misleading. Results of the project: ▪ A correct incident recording in the trouble ticketing tool used; ▪ Improvement in the relationships with the interested parties; ▪ Updating and improving of operational reports.	*2017*	Fluxicon (Netherlands)
Financials	Insurance	**Interroll Group** (Switzerland)	*Production Process*	Goal: Gain comprehensive insights into the production process that were not accessible through the regular Manufacturing Execution System. Results: ▪Identified unexpectedly high process variance with over 3,000 distinct variants ▪Determined cause for the extension of process duration by over 700% ▪Created data-based foundation for the internal continuous improvement process	*2017*	Lana Labs GmbH (Germany)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Healthcare	Healthcare Facilities, Services & Equipment	NDA	*Invoice Verification*	Goal: Gain a deeper understanding of process challenges and deviations and identify opportunities for process automation. Results: ▪ Saved 900 men hours per year through process automation ▪ Identified the cause for 97% of process deviations ▪ Revealed over 1,000 internal violations of the Service-Level Agreement ▪ Achieved higher degree of standardization	*2017*	Lana Labs GmbH (Germany)
Industrials	Logistic	NDA	*Credit & Collections Management*	Goal: Gain a competitive advantage by automating and optimizing the process beyond the capabilities of the established process management systems. Results: ▪ Saved more than 100,000 Euros and 1,600 men hours per year on extra manual work ▪ Reduced execution times and idle periods in the process by up to 80% ▪ Identified compliance risks in over 70% of all cases	*2017*	Lana Labs GmbH (Germany)
Utilities	Utilities	**Coal mine (Poland)**	*Process analysis*	Gaining insights about operation process of selected devices in hard coal mine (mechanized roof support) as example of possible extension of data usage from monitoring systems installed into longwall face.	*2017*	AGH University of Science and Technology (Poland)
Public	Public Administration and Government	**Vysoka skola manazmentu / City University of Seattle programs (Slovakia)**	*Compare the utilization of the e-learning platform by different student groups.*	▪ Monitor behavior of Moodle users by visualizing the process map; ▪ Display platform usage in a dynamic animation of the process; ▪ Analyze statistics and metrics of the process and its variants; ▪ Analyze the success of individual online activities, evaluate their attractiveness and replace those with low attendance. The project also led to the creation of ideal study roadmaps for each subject. Minit identified an optimal course of study and time requirements for online activities for prospective students.	*2016*	Minit j. s. a (Slovakia)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Banking	Bank 2 (NDA)	*Process Analysis*	▪ Analysis of Payment Order Processing process. ▪ Analysis of correction/verification team performance. ▪ Identification of infrastructural problems in the involved bank infrastructure.	*2016*	Minit j. s. a (Slovakia)
Financials	Banking	Bank 2 (NDA)	*Process Analysis*	▪ Analysis of Mortgage Approval process; ▪ Analysis of communication between front office and back office; ▪ Preparation of in bank methodology that organizes work in both front and back office.	*2016*	Minit j. s. a (Slovakia)
Financials	Banking	Financial Institution 1 (NDA)	*Mortgage Approval Process*	▪ Analysis of Mortgage Approval process; ▪ Data preprocessing from 10 internal systems.	*2016*	KPMG (Czech Republic)
Industrials	Industrial Transportation	DSME (South Korea)	*Shipbuilding block assembly location process*	This company adopted process mining to analyze and enhance shipbuilding block assembly location process.	*2016*	Xinnos (South Korea)
Consumer Goods	Personal & Household Goods	Samsung Heavy Industries (South Korea)	*Pipe production process*	This government organization adopted process mining to analyze and enhance prosecutor's working process and workload.	*2016*	NDA
Financials	Banking	Financial Institution 2 (NDA)	*Claim Processing*	Analysis of the work load of teams of claim processing team and claim preparation team in order to answer the question: why do the teams need to perform working Saturdays once in a while.	*2016*	Trask / Minit j. s. a (Slovakia)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Technology	Technology	One of the biggest online games providers (NDA)	*Compare the utilization of the e-learning platform by different student groups.*	Analysis aimed at monetization in online gaming, trying to answer questions: ▪ What is the behavior of people leaving the game at a certain moment? ▪ Which people and why buy certain extension packs in the game?	*2016*	Minit j. s. a (Slovakia)
Industrials	Logistic	GEFCO (NDA)	*Order and Invoice Process management*	The aim of the project was to analyze the existing automated processes in play and based on this analysis, identify bottlenecks overburdened human resources, process variants due to their attributes and in latter cases, propose areas in which could benefit from additional optimizations. Gefco utilized Minit to reveal optimization opportunities in its automated business processes, resulting in 60% productivity increase.	*2016*	Minit j. s. a (Slovakia)
Financials	Banking	NDA (Italy)	*Loan Management*	Goals: Making the right and corrective actions to decrease the lead time.	*2016*	Cognitive Technology (Italy)
Technology	Technology	IT Service Provider company (Italy)	*Help Desk for Universities*	This case study applied process mining techniques to help desk data collected from the company to expose performance issues. The study involved process discovery and comparison of execution traces associated with various cohorts of customers including (i) requiring assistance, (ii) presenting malfunctioning with their system, and (iii) requiring changes. Results: ▪ Real process map was identified; ▪ Origins of bottlenecks and re-loops were detected; ▪ More transparency about the ticket processes was obtained to improve customer orientation of its Service Desk.	*2016*	Queensland University of Technology (Australia); HSPI Management Consultants (Italy)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Public	Public Administration and Government	Copyright mediator company (Italy)	Event Licence Approval	This case study applied process mining techniques to event licence approval process to expose deviations and performance issues. Specifically, the study involved process discovery of the "as is" model and the conformance checking of the "as is" process to the expected process. Aim of the project: finding out the root of the problem that was affecting company's core processes. Results: ▪ Anomalies and bottlenecks were clearly detected; ▪ Was found that core processes didn't perform well because of the lack of quality data and transparent communications.	2016	Queensland University of Technology (Australia); HSPI Management Consultants (Italy)
Consumer Services	Retail	NDA (Italy)	New Product Rollout	Goals: The project aimed to define, analyze, monitor, and improve the ideal path, also known as happy path, of the company's New Product Rollout process, to ultimately increase the rollout quantity. Every 6 months NDA has a new product rollout. Results: The company found the Happy Path of its New Product Rollout process using Process Mining and found the insight that drove the increase in their new product rollout.	2016	Cognitive Technology (Italy)
Consumer Services	Retail	NDA (Italy)	Claim Management	Goals: Process mining techniques were used to obtain meaningful information about the Claim Management process provided by multiple corporate IT systems to expose any inefficiencies of the handling to reduce the response time to the claims of their customers.	2016	OT Consulting (Italy)
Industrials	Automotive & Parts	NDA (Italy)	After Sales Car Maintenance	The Goals are: ▪ Discover and analyze process inefficiencies and critical activities. ▪ Get a holistic overview of all activities from different legacy IT systems, and unstructured and structured data. The Results are: ▪ MyInvenio discovered the process involved in the system in its entirety, inclusive of the smallest variance. ▪ MyInvenio immediately displayed the visual comparison between the data-derived and the reference model. ▪ The "As is" Process Analysis was completed at a fraction of the estimated budget, slashing 70% of the predicted man-hours and leading to important savings on the overall project's phases.	2016	OT Consulting (Italy)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Industrials	Industrial Engineering	Production Company in a B2B environment (Netherlands)	*Production Process*	Goal: to reduce throughput time from 3 months to 1 months (later further reduction was anticipated). Process mining was used for: ▪ Analysing bottlenecks, which revealed also unexpected ones; ▪ Measuring "as-is" situation (throughput/waiting time per resource); ▪ Improvements to be performed based on event data were identified.	*2016*	Novo Consilium B.V (Netherlands)
Industrials	Logistic	Smart Coat Inc. (Belgium)	*Logistic*	▪ Real business processes discovery; ▪ Removing unnecessary and divergent process activities ▪ Benchmark various departments, plants, products or sales channels within your company ▪ Identification of the bottlenecks ▪ Visualizing the interactions amongst your employees ▪ Reporting the exact cost prices of activities ▪ Predicting and preventing process errors	*2016*	Horsum - Accelerating technology companies (Belgium)
Telecommunications	Telecommunications	Telefónica (Spain)	*Digital Operations*	Identification of the sources of delays, inefficient communication patterns, and bad practices such as work orders performed out of the scheduled window. As a result, improvements could be made with measurable effects on both the operation costs and the quality of the services.	*2016*	Fluxicon (Netherlands)
Industrials	Logistic	Deutsche Post DHL Group (Germany)	*Audit*	Integration of process mining into DHL's audit process in order to improve both the time spent for the analysis and the depth of the information audited. ▪ They found that process mining helps to reduce the audit time by 25% in comparison to classical data analytics. In addition, they are now able to identify unknown risks in processes, which helps to add more value to the audits.	*2016*	Fluxicon (Netherlands)
Technology	Technology	Zig Websoftware (Netherlands)	*Housing allocation process*	Improving the housing allocation process. Every day that a rental property is vacant costs the housing association money. After process mining analysis, these vacancy costs could be reduced by 4,000 days within just the first six months.	*2016*	Fluxicon (Netherlands)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Utilities	Utilities	SPARQ Solutions (Australia)	Root case analysis	▪ Improving of the operations; ▪ Discovering the actual problems and involving relevant resources in the root cause analysis; ▪ Analysing the overall dispatching process as well as the maintenance process for a single machine.	2016	Fluxicon (Netherlands)
Industrials	General Industrials	NDA (Italy)	Order to Delivery	Goals: The project aimed to apply process mining to provide insights into the Order to Delivery process, to ultimately reduce the delivery time by identifying the optimal delivery routes. Results: NDA	2016	OT Consulting (Italy)
Healthcare	Healthcare Facilities, Services & Equipment	Zimmer Biomet (Switzerland)	Value Stream Mapping	▪ Creating the value stream mapping with a process mining-based analysis of the manufacturing flow in an easier and effective way.	2016	Fluxicon (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	NDA (US)	Sales & Order to Delivery	-	2016	Cognitive Technology (US)
Financials	Banking	NDA (Italy)	Loan Management	Goals: Making the right and corrective actions to decrease the lead time. Results: NDA	2016	Cognitive Technology (Italy)
Financials	Banking	ALFAM Consumer Credit (Netherlands)	Sales Process	They analysed variation, re-processing, waiting times, and service levels. ▪ By visualizing the processes and the process problems, improvement opportunities were designed in a powerful way.	2016	Fluxicon (Netherlands)
Technology	Technology	Dimension Data (South Africa)	Compliance	Each region was responsible for running their own operations with very little enforced standards from a group perspective. The changing business landscape made it necessary for Dimension Data to standardize all their processes across all continent. Process mining was used in order to support the project.	2016	Fluxicon (Netherlands)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Insurance	Aegon (Netherlands)	*Call center and retirement insurance process*	Need to work more efficient to save costs. Serve their customers better. RPA bottlenecks were detected. Dramatic reduction in response times were achieved. Substantial savings in first 3 months after implementing the ProcessGold platform	*2016*	ProcessGold (Netherlands)
Consumer Services	Travel & Leisure	Brisbane Airport Corporation (Australia)	-	Not started yet.	*2016*	Queensland University of Technology (Australia)
Industrials	Support Services	Lassila & Tikanoja (Finland)	*Order to Cash*	Better visibility to the new ERP system. Reduced ERP Implementation costs. Increased data quality. Reducing risks in ERP deployment.	*2016*	NDA
Telecommunications	Telecommunications	Vodafone (UK)	*Process Improvement*	Process Mining facilitated Vodafone's existing SAP infrastructure enabling continual real-time analytics and seamless transition to new process mining functions. Vodafone mentions that process mining also enabled faster GTM: they could resolve things faster and more proactively because they gained more visibility into their processes and operations.	*2016*	Celonis (Germany)
Technology	Technology	Xerox (India)	*Process Optimization*	Xerox is currently starting to use process mining in order to develop new technology projects. The focus of these projects will be on analysing complex business processes, designing cost and performance optimized policies for execution, monitoring, and identifying scope for process improvements.	*2016*	Xerox Algorithms & Optimization group (India)
Public	Public Administration and Government	Supreme prosecutors' office (South Korea)	*Prosecutors' work process and workload*	This government organization adopted process mining to analyze and enhance prosecutor's working process and workload.	*2016*	NDA
Financials	Insurance	UWV (Employee Insurance Agency) (Netherlands)	*Correlation analysis*	Authors presented such a framework and its implementation in ProM by defining an analysis use-case composed of three elements (one dependent characteristic, multiple independent characteristics and a filter), to create a classification or regression problem. ▪ The results of performing an analysis use case is a decision or a regression tree	*2016*	Eindhoven University of Technology (Netherlands)

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INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
				that describes the dependent characteristic in terms of the independent characteristics. ▪ The evaluation has demonstrated the usefulness of performing correlation analyses to gain insight into processes as well as of clustering event logs according to the results of performing analysis use cases.		
Technology	Technology	**Basware (Finland)**	*Invoice Management*	The analysis was conducted for the invoicing process and for a number of selected customers, all using Basware's invoicing system. They managed to analyse the number of open invoices in order to make comparisons between different invoice types or vendors.	*2015*	QPR (Finland)
Consumer Services	Retail	**EDEKA (Germany)**	*IT Service Management*	The Aim: gaining a scalable on-demand visualization of processes to fully exploit the hidden potential of the ticket data, for optimizing the efficiency and thereby costs of the process. Results: ▪ Quick identification of sources of errors and deviations from the to-be process; ▪ Better workforce planning based on the number of incidents in a given period; ▪ Supporting the standardization of the process.	*2015*	Celonis (Germany)
Healthcare	Healthcare Facilities, Services & Equipment	**AMC Hospital (Netherlands)**	*Conformance analysis from Billing system*	▪ Mining the complex hospital processes giving insights into the process; ▪ Deriving the understandable models for large groups of patients; ▪ Comparing results with a flowchart for the diagnostic trajectory of the gynaecological oncology healthcare process.	*2015*	Eindhoven University of Technology (Netherlands)
Industrials	Industrial Transportation	**Dockwise (Netherlands)**	*Procure-to-Pay processes*	By using Process Mining, Dockwise was able to: ▪ Discover that 15% of the orders go through a different process; ▪ Determine that are not always adhered to certain rules and arrangements; ▪ Optimize the quality and usefulness of the KPIs; ▪ Create business cases for improvement based on facts; ▪ To prepare the BI environment for the use of Process Mining.	*2015*	Zuiver ICT (Netherlands)

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Healthcare	Healthcare Facilities, Services & Equipment	**Atrium Hospital (Germany)**	*Conformance analysis*	Process Mining was used in many ways, in order to obtain many relevant results in the healthcare processes: ▪ Visualizing the pathway "Malignant Lymphoma"; ▪ The duration of the different patients was easily fixed and then analysed; ▪ Finding the difference in fixed times for patients in whom a case manager was involved.	*2015*	Zuiver ICT (Netherlands)
Industrials	Industrials Engineering	**Veco (Netherlands)**	*Quality Management (Six Sigma Analysis)*	Veco is a precision metal manufacturer. With more than 15 years of experience in supply chain management, Joris is the operations manager and Six Sigma expert at Veco. He used Minitab to statistically analyse the processes and to drive improvements. According to him, Process mining can leverage the human process knowledge in a powerful way that classical Six Sigma analyses can't.	*2015*	Fluxicon (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	**Radboudumc (Netherlands)**	*Process improvement*	Radboud University Medical Centre is an academic hospital that was quite advanced in the adoption of electronic patient record systems, but process analysis and improvement remained as big a challenge as in all other hospitals as well. Process mining gave advantages to the improvement of healthcare processes based on the example of the Intensive care unit and the Head and Neck Care chain at Radboudumc.	*2015*	Fluxicon (Netherlands)
Financials	Banking	**DUO (Netherlands)**	*Process improvement of finance request*	The new system was introduced with the goal to improve the speed of DUO's student finance request handling processes and to save 25% of the costs. Process mining was used to uncover technical errors in the pilot phase of a new system, as well as to gain transparency in the business KPIs for the new process.	*2015*	Fluxicon (Netherlands)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Public	Education	LatinAmerican University (Colombia)	*Risk evaluation*	▪ Quantifying the level of financial risk associated with each IT service supporting the business process, taking into account different scenarios; ▪ Measuring the expected incomes of business processes, the probability for IT threats, and the changes on the performance of its quality attributes; ▪ Analysing historic events to quantify the impact of IT failures in relation to different time horizons and desired confidence levels.	*2015*	Systems and Computing Engineering Department, School of Engineering, Universidad de los Andes, Bogota (Colombia)
Public	Community, Social and Personal Services	Opéra de Lausanne (Switzerland)	*Users accesses analysis*	Analysis of the users accesses of the Opera's Storage Area Network (SAN) in order to refine the organisation of the SAN.	*2015*	Ville de Lausanne (Switzerland)
Healthcare	Healthcare Facilities, Services & Equipment	4 South Australian Hospitals (Australia)	*Emergency Department Patient Treatment*	This case study applied process mining techniques to patient flow data collected from patients presenting with chest pain at four South Australian hospitals. The study was a cross-organisational, comparative analysis that aimed to utilise routinely collected patient and treatment data to describe differences in the care processes associated with management of Acute Coronary Syndrome (ACS) practiced in the four hospitals.	*2015*	Queensland University of Technology (Australia)
Telecommunications	Telecommunications	Telecommunication Company (Indonesia)	*Customer fulfilment analysis*	The aim of process mining implementation was to discover the typical customer fulfilment business process. It was also aimed at assessing the current rate of completed customer fulfilment. The company could use the findings as a foundation to improve their business process. First, the completion rate of the customer requests was found to be very low deserved further investigation. Then, findings regarding typical processes could be used to set standard sets of services which will be useful for prediction and planning of capacity.	*2015*	Institut Technology Sepuluh Nopember, Sukolilo, Surabaya (Indonesia)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Healthcare	Healthcare Facilities, Services & Equipment	General Hospital of Valencia (Spain)	*Health Process Tracking*	Process mining techniques provided an easy to use way to achieve a view of the deployed process. The algorithm perfectly captured the features of the processes, showing them in an easy and understandable view that was accepted by the medical staff in a real environment. With this information, the health professionals and managers could achieve a real view of the problems that are currently happening. This enabled the improvement of protocols with a better knowledge of the problems, increasing their efficiency and the probability of success.	*2015*	Instituto Universitario de Investigación de Aplicaciones de las Tecnologías de la Información y de las Comunicaciones Avanzadas (ITACA), Universitat Politecnica de Valencia (Spain)
Basic Materials	Chemicals	Kemira (Spain)	*Order to Cash*	-	*2015*	NDA
Basic Materials	Chemicals	Kemira (Austria)	*Purchase to Pay*	-	*2015*	NDA
Healthcare	Healthcare Facilities, Services & Equipment	Toulouse Hospital (France)	*Outpatient clinic redesign*	Toulouse Hospital decided to redesign an outpatient clinic in order to mutualize the 11 consulting services of 6 medical specialties. Process Mining clearly appeared as a good solution to support continuous improvement of complex and continuous (24/24) hospital processes. Furthermore, it became a relevant tool in diagnosis phase and to monitor activities.	*2015*	Toulouse Hospital (France)
Healthcare	Healthcare Facilities, Services & Equipment	Integrating the Healthcare Enterprise (US)	*Audit and node authentication*	Integrating the Healthcare Enterprise (IHE) defines in its Audit Trail and Node Authentication (ATNA) profiles how real-world events must be recorded. Since IHE is used by many healthcare providers throughout the world, an extensive amount of log data is produced. In the research they investigate if audit trails, generated from an IHE test system, will carry enough content to successfully apply process mining techniques. Furthermore they assess the quality of the recorded events.	*2015*	Integrating the Healthcare Enterprise (US)

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Healthcare	Healthcare Facilities, Services & Equipment	Hospital in Mainkofen (Germany)	*Care station for elderly people*	The ward is an intensive care station for elderly people suffering from dementia and similar old-age diseases. Each of the patients' needs care around-the-clock. ▪ Discovering how real-world processes are executed; ▪ Discovering that the process exhibits a relatively high repetition rate; The process could be documented directly and time-saving in comparison with the past.	*2015*	Institut für Parallele und Verteilte Systeme (IPVS) der Universität Stuttgart (Germany)
Basic Materials	Forestry & Paper	MetsäBoard (Finland)	*Order to Cash*	-	*2014*	NDA
Healthcare	Healthcare Facilities, Services & Equipment	Isala Hospital (Netherlands)	*Patients' records management*	▪ Compliance analysis of the whole patients' records management. In average, 30 medical steps were avoided; ▪ Reduction of the emergency management total duration.	*2014*	Eindhoven University of Technology (Netherlands)
Industrials	Construction & Materials	Caverion (Finland)	*Performance Management*	▪ Measuring process performance based on ready defined indicators to ensure proactive actions to any discrepancies; ▪ Quicker invoicing and improved cash flow from discovering and removing process bottlenecks; ▪ Ability to continuously compare and value process performances and variations per country.	*2014*	QPR (Finland)
Consumer Goods	Personal & Household Goods	Electronic Manufacturer (Netherlands)	*Service Refund Process*	A critical bottleneck at a subcontracting forwarding company could be detected. Discovering that additional documents were requested due to incomplete information at the beginning of the process if it was started through a channel. Understanding the problem could reduce this wasteful activity by more than 85% and significantly speed up the process for the customer and reducing customer complaints as well.	*2014*	Fluxicon (Netherlands)

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Financials	Insurance	Bridge Loans (South Africa)	*Loan Processes*	▪ Making right corrective actions and making the loan application process 40% faster; ▪ Gaining a better understanding of why actual processes may differ, and measuring the performance of the system processes; ▪ Monthly reports for comparing and analysing process performances; ▪ Proactive process management via quick discovery of problem areas.	*2014*	QPR (Finland)
Telecommunications	Telecommunications	Norddeutscher Rundfunk (Germany)	*IT Service Management*	▪ Analysing of Service Desk processes and building the foundation for an optimized Services Management.	*2014*	Celonis (Germany)
Telecommunications	Telecommunications	Fiducia (Germany)	*IT Service Management*	Fiducia wished to implement automatic reporting. Results: ▪ Reconstruction of the entire dataset based on HP Service. It is now possible to perform long-time evaluations and process reconstructions based on the data saved in archives of the last 2-10 years; ▪ Using live process reconstruction, the identification and elimination of bottlenecks, long-running tickets and process inefficiencies became possible. To keep track of current trends, live monitoring dashboards were established.	*2014*	Celonis (Germany)
Telecommunications	Telecommunications	Hessischer Rundfunk (Germany)	*IT Service Management*	▪ Analysing Service Desk processes and building the foundation for an optimized Services Management.	*2014*	Celonis (Germany)
Consumer Goods	Personal & Household Goods	Siemens AG (Germany)	*Service Process Management*	With the continuously monitoring and analysis of new data from a multitude of SAP systems around the world, they obtained the following results: ▪ Evidence of weak points; ▪ Enabling constant improvement, harmonization and standardization of processes.	*2014*	Celonis (Germany)

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Healthcare	Healthcare Facilities, Services & Equipment	Berufsgenossenschaftliche Unfallkrankenhaus Hamburg stands (Germany)	*Service Process Management*	▪ Clearly assigned tasks, optimized flows of information as well as communication /collaboration across departments and occupation groups that resulted in smooth work flows, short decision-making processes and individual solutions. This enabled the best possible treatment and rehabilitation of patients across all medical fields.	*2014*	Celonis (Germany)
Healthcare	Pharmaceutical & Biotechnology	Bayer (Germany)	*Process compliance*	The goal of the project was to bring global transparency to the core processes (procurement, sales and logistics) in order to identity inefficiency potentials and ensure process compliance. Solution: process mining was used to reconstruct and to monitor global processes in relation to efficiency and risk beyond country, system and company borders. Now, processes as well as performance and risk indicators can be dynamically analysed by users.	*2014*	Celonis (Germany)
Healthcare	Healthcare Facilities, Services & Equipment	Kliniken Südostbayern (Germany)	*Performance management for medicinal treatment*	The Kliniken Südostbayern decided to use the Process Mining solution for hospital management as a tool to obtain all the needed information. With Process Mining was possible to extract all necessary data from hospital information system (HIS) and to provide a detailed view of treatments.	*2014*	Celonis (Germany)
Financials	Banking	DZ-Bank (Germany)	*Process data analysis*	Business processes require the highest possible level of transparency. Especially in the banking sector, the analysis of process data from source systems plays a very important role. Employees of the banking sector work with IT-systems every day, for example in relation to electronic files, creating process data continuously. Process mining enabled the improvement of the analysis required.	*2014*	Celonis (Germany)
Industrials	Support Services	IG Metal (Germany)	*IT Service Management*	IG Metall placed high expectations on its customer service and internal IT Service Management. That's why the IG Metall had opted for the use of Process Mining. Process Mining made it possible to significantly improve efficiency and quality in the handling of customer requests by visualizing how inquiries are being processed and thus uncovering process weaknesses.	*2014*	Celonis (Germany)
Telecommunications	Telecommunications	SWR (Germany)	*IT Service Management*	SWR used the software Assyst as its service desk solution and integrated the Process Mining for IT service management in order to analyse its service processes. This enabled the company to substantially improve its Service Management.	*2014*	Celonis (Germany)

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Industrials	Logistic	Schukat Electronic (Germany)	*Order Process management*	As a catalogue distributor of electronic components, the company put high emphasis on the ability to deliver and processing orders. Since complete transparency of business processes is also an important component of constant optimization, Process Mining is now part of the IT landscape of the company. In conjunction with SAP HANA, Process Mining every day creates real-time transparency over the actual processes.	*2014*	Celonis (Germany)
Consumer Goods	Automotive & Parts	Essmann Automotive (Germany)	*Production process system*	By using process mining the, Eissmann created efficient production processes. Its integration into lean corporate processes and into the management system, represented a key pillar of long-term success. By involving suppliers at an early stage in the product creation process and promoting team-oriented partnerships, Eissmann achieved excellent and competitive products.	*2014*	Celonis (Germany)
Public	Public Administration and Government	Centraal Bureau voor de Statistiek (Netherlands)	*Statistical analysis*	Statistics Netherlands is responsible for collecting and processing data in order to publish statistics to be used in practice, by policymakers and for scientific research. With process mining they have improved their performances.	*2014*	Fluxicon (Netherlands)
Financials	Banking	ING (Netherlands)	*Website and call center improvements*	Making sure a customer has the best possible experience when interacting with the company is one the most important goals many companies strive for. ING DIRECT Australia asked for an in-depth analysis of the behaviour of their customers on their website before they called the call center. Using process mining they were able to get valuable business insights to make better decisions on how to further develop both their website and call center.	*2014*	Fluxicon (Netherlands)
Public	Public Administration and Government	Ville de Lausanne (Switzerland)	*Construction permit process*	Analysis of the construction permit process, in order to find bottlenecks.	*2014*	Ville de Lausanne (Switzerland)

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Consumer Goods	Automotive & Parts	Volvo (Germany)	*Paths discovery*	A first dataset provided data about factory orders for the construction of trucks. The second dataset contained customer orders of trucks. It was discovered that the attribute 'ORDERNUMBER' of any event in a trace of the first log was also displayed in the attribute 'Omnumber' of the event 'Accepted' in the second.	*2014*	Ghent University, Department of Business Informatics and Operations Management (Belgium)
Healthcare	Healthcare Facilities, Services & Equipment	Scottish Rite Emergency Department of Children's Healthcare of Atlanta (US)	*Paediatric asthma emergency department (ED) processes*	Process mining's visual analytics has played an important role in healthcare pro-cess analysis. The interactive visual approach enabled users to gain insight into the complexity of paediatric asthma care pro-cesses. It helped with care quality improvement programs, providing comparison, benchmarking and analysis of conformance to existing care protocols.	*2014*	School of Interactive Computing & Tennenbaum Institute, Georgia Institute of Technology (US)
Healthcare	Healthcare Facilities, Services & Equipment	EU project's MOSAIC (NA)	*Datasets of Type 2 Diabetes analysis*	Process mining methods were executed in order to derive healthcare pathways. The approach started by processing raw data, derived from heterogeneous data sources, and created event logs, which contained meaningful healthcare activities. Once event logs have been obtained and tasks and transitions defined, it was possible to explore how state-of-art process mining techniques could be used to gain insights into patients care.	*2014*	International Conference on Biomedical and Health Informatics (Spain)
Healthcare	Healthcare Facilities, Services & Equipment	Chicago Outpatient Clinic (US)	*Analysis of Workflows in Clinical Care*	Process Mining was used for workflows analysis for outpatient clinic center, admitting high-risk patients and low-risk patients. Based on the results from process mining, a discrete event simulation model was proposed to quantitatively analyze the clinical center. Sensitivity analyses have also been carried out to investigate the care activities with limited resources such as doctors and nurses. The results suggested that the methodology was a useful tool for healthcare process improvement.	*2014*	Department of Mechanical and Industrial Engineering, University of Illinois at Chicago (US)

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Basic Materials	Industrial Metals & Mining	A steel manufacturer (UK)	*Process improvement*	Objectives: ▪ To investigate the flows of material through the route; ▪ To get insights and knowledge on the approach by using internal data only. Results: ▪ Identification of some issues with the flows; ▪ Discovering that the large number of processes actually undertaken; ▪ Identification of the issues in relation to the interpretation of the process.	*2014*	A steel manufacturer (UK)
Financials	Insurance	Suncorp (Australia)	*Home Insurance Claim*	This project aimed to apply process mining to Home Insurance Claims, processing records provided by Suncorp with the aim of finding insights into the reasons behind long processing times. Results: ▪ Evidence of two major loops, which represented bottlenecks for the entire process. ▪ Processing time reduction from 30-60 days to 5 days (within the SLA conditions).	*2013*	Queensland University of Technology (Australia)
Consumer Services	Travel & Leisure	Copenhagen Airports A/S (Denmark)	*Bag-tag Analysis*	▪ Identification of the reasons for KPI discrepancies; ▪ Finding areas with potential process challenges more in depth; ▪ The easy and fast way of looking at the process from different perspectives revealed many new insights; ▪ The perspective could shift from KPIs and bottlenecks, to process performance related to locations.	*2013*	Fluxicon (Netherlands)
Industrials	Construction & Materials	Ruukki (Finland)	*Process Management*	Process mining was used to respond to the needs of both system management and business. For System Owners: ▪ Gaining transparency to system usage and enabling more focused guideline enforcement and modifications. For Business: ▪ Supporting prioritization of process improvement activities; ▪ Highlighting the importance of transparent process management over functional siloes.	*2013*	QPR (Finland)

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Consumer Goods	Personal & Household Goods	Samsung Electro-Mechanics (South Korea)	*Conformance analysis and machine performance analysis*	▪ The derived process model showed real process flows in the factory and it was used to understand the manufacturing process; ▪ The conformance checking showed how traces fit with the derived model; ▪ The machine performance analysis showed the utilization of their resources; ▪ The analysis results were presented to the managers of SEM, who were impressed by the obtained results.	*2013*	Ulsan National Institute of Science and Technology (South Korea)
Healthcare	Healthcare Facilities, Services & Equipment	Seoul National University Bundang Hospital (South Korea)	*Performance Analysis per patient type*	A performance analysis was conducted in order to make a simulation model and to analyse the process patterns according to patient types. The results: ▪ According to the result of comparing the event log and their standard process model, the matching rate was as 89.01%; ▪ Using the performance analysis result, they generated the simulation model. The simulation showed that the 10% increase of patients made the largest change in consultation waiting time; ▪ Extraction of the process models and analysis of process patterns according to patient types. The most frequent pattern of each patient type was discovered.	*2013*	Ulsan National Institute of Science and Technology (South Korea)
Consumer Services	Travel & Leisure	Ana Aeroports de Portugal (Portugal)	*Service Process Management*	▪ Finding a more effective method to balance the workforce; ▪ Changing the process to be much leaner for particular technical categories; ▪ Eliminating non-value-add tasks; ▪ Identifying unambiguous performance metrics for the process; ▪ Making changes in the way "Change Orders" are created and recorded in order for technical people to focus on what is really important and improve how they identify execution priorities; ▪ Applying the same practices to other ITIL processes; ▪ Making sure that no "Change Order" was implemented without being previously authorized.	*2013*	Process Sphere - End to end BPM (Portugal)
Technology	Technology	IBM i (US)	*Database management*	For IBM i users, the event data were perhaps most prolific and most commonly available in database journals. This provided an event log of potentially thousands to millions of database events related to the files journaled. ▪ Setting Journaling Parameters and extracting Journal Data and creating the animation.	*2013*	IBM (US)

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Public	Public Administration and Government	Auditdienst Rijk (Netherlands)	*Assurance on the financial statements*	The Dutch National Auditing Service monitors the annual reports of all Dutch ministries and provides assurance on the financial statements that are included. They used process mining to perform their audits in an efficient way.	*2013*	Fluxicon (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	St Andrew's War Memorial Hospital (Australia)	*Emergency Department Patient Treatment*	This project aimed to apply process mining to provide insights into St Andrew's War Memorial Hospital's (SAWMH) process for treating patients presenting at the Emergency Department (ED) with chest pain. The study involved process discovery and comparison of patient flows associated with patients whose stay in ED was less than 4 hours with those whose stay was longer than 4 hours. The study also aimed to investigate potential delays introduced to the patient flows as a result of conducting routine clinical activities and the determination of factors that influence patients' length of stay in ED.	*2013*	Queensland University of Technology (Australia)
Healthcare	Healthcare Facilities, Services & Equipment	Seoul National University Bundang Hospital (South Korea)	*Modelling of Outpatient Care Mega-Process*	From a total of 698,158 event logs, the most frequent pattern was found. The matching rate between the expert-driven process model and the machine-driven model was found to be approximately 89.01%. It Was found that process mining techniques could be applied in the healthcare area, and through detailed and customized analysis in the future it can be expected to be used to improve actual outpatient care processes.	*2013*	Industrial Strategic Technology Development Program funded by the Ministry of Knowledge Economy, Korea (South Korea).
Industrials	General Industrials	Boxes manufacturing (India)	*Process modelling and improving*	The generated process model reflected the actual process as observed through real process executions. The heuristic mining algorithm gave clear information on how the process was executed, and analysis of the process could be evaluated to improve the performance of manufacturing.	*2013*	Department of Computer Science and Applications, Dayananda Sagar College of Arts (India); Science and Commerce (India)

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Healthcare	Healthcare Facilities, Services & Equipment	Dentistry (Netherlands)	*Patient treatment*	For a complex dental process, it turns out that the introduction of new digital technologies is largely beneficial for patients and dental lab owners, whereas for dentists there is hardly any benefit. ▪ The effects of digital dentistry on the implant value chain was investigated using process mining and discrete event simulation. The implant value chain was concerned with all steps that could be associated with dental implants, covering the stages from patient diagnosis until implant placement.	*2013*	Eindhoven University of Technology (Netherlands); Perceptive Software (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	Children's National Medical Center (Columbia)	*Adherence to ATLS protocol analysis*	Through process mining they determined compliance with the ATLS protocol sequence, reviewed the most commonly occurring sequence and individual deviations, detected differences in clinical behaviour after the introduction of the checklist. Although the frequency of activations without notification was not reduced, the addition of the checklist to the trauma resuscitation routine helped standardize the care provided specifically for these events.	*2013*	American College of Surgeon's 99th Clinical Congress, Surgical Forum (US)
Healthcare	Healthcare Facilities, Services & Equipment	IBM T. J. Watson Research Center NY (US)	*Paths discovery*	Identifying care pathways correlated with outcomes from patient event data were of vital importance for gaining the insights of which specific care pathway will lead to a good/bad outcome. Once identified, such care pathways were used by medical boards for refining care plan descriptions for treating diseases such as congestive heart failure etc.	*2013*	IBM (US)
Healthcare	Healthcare Facilities, Services & Equipment	Gynaecologic Oncology Department (Belgium)	*Patient treatment deviation analysis*	Using process mining techniques research has demonstrated that the patients' diagnosis-treatment cycles often significantly deviate from the standardized clinical pathways. ▪ Analysing these deviations might result in the further enhancement of the quality of care, the promotion of patient safety, an increase in patient satisfaction; ▪ Understanding pathway behaviour and deviations became possible.	*2013*	Department of Decision Sciences and Information Management, Faculty of Economics and Business (Belgium)

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Healthcare	Healthcare Facilities, Services & Equipment	37 hospitals located in the Lombardia Region (Italy)	*Patient treatment*	The work showed that process mining and case retrieval techniques can be applied successfully to clinical data to gain a better understanding of different medical processes for different groups of patients). In this way, not only different practices used to treat similar patients may be discovered, but also unexpected behaviour may be highlighted.	*2013*	Computer Science Institute, Università del Piemonte Orientale, Alessandria (Italy); Università di Pavia (Italy)
Healthcare	Healthcare Facilities, Services & Equipment	Maastricht University Medical Centre (Netherlands)	*Patient routes in a medical Treatment process*	The study used both the heuristic and the fuzzy miner for the process analysis. It was concluded that the heuristics miner is not able to show all low frequent behaviour which makes it difficult to use for extension/improvement research in the medical domain. The fuzzy miner is able to show this behaviour but must be accompanied by the Conformance Checker to make sure that all discrepancies are found between the original process and the acquired event log.	*2013*	Eindhoven University of Technology, University of Technology (Netherlands); Maastricht University Medical Centre (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	Many European academic hospital (NDA)	*Diagnosis treatment cycle*	Research demonstrated that the patients' diagnosis-treatment cycles often deviate from the approved and standardized clinical pathways. By Studying these differences may result in the further improvement of the quality of services, the promotion of patient safety, an increase in patient satisfaction and an optimization of the use of resources. Understanding pathways behaviour and deviations becomes possible because of an increased availability of reliable data logs, originated from every hospital information systems.	*2013*	Department of Decision Sciences and Information Management, Faculty of Economics and Business, Leuven (Belgium)
Healthcare	Healthcare Facilities, Services & Equipment	Dutch Clinic (Netherlands)	*Ambulant surgery process*	It was used the log of a Dutch clinic for the ambulant surgery process. This is a sequential process that deals with both ambulant patients and ordered stationary patients.	*2013*	Eindhoven University of Technology, University of Technology (Netherlands)

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Healthcare	Healthcare Facilities, Services & Equipment	Chania Hospital (Greece)	*Clustering healthcare processes*	The aim was to support decision making by providing comprehensible process models in the case of such flexible environments. Following a process mining approach, they proposed a methodology to cluster customers' flows and produce effective summarizations. Then they proposed a novel method to create a similarity metric that was efficient in downgrading the effect of noise and outliers. It was used a spectral technique that emphasized the robustness of the estimated groups, therefore it provided process analysts with clearer process maps.	*2013*	Eastern Macedonia and Thrace Institute of Technology (Greece); Technical University of Crete, University Campus (Greece)
Industrials	Logistic	Package Delivery Company (Belgium)	*Machine Configuration*	▪ Evaluation of the correctness of the configuration of the state machine; ▪ Investigation of a huge number of abnormal flows that have been identified by business users; ▪ Linking the different states and events back to the business process.	*2012*	AE architects for business & ICT (Belgium)
Utilities	Utilities	Alliander (Netherlands)	*Purchasing*	The Challenges: ▪ Managers thought they knew how processes worked, but it wasn't true; ▪ To find a solution that can be applied to multiple processes and departments; ▪ To discover areas of inefficiency; ▪ To find why staff members had different ways of completing the same process. The Results: ▪ Quick insight into how processes really worked; ▪ Extensive list with potential areas for improvement; ▪ Improved process insight delivers efficiency improvements; ▪ A complete picture of eight business processes that allowed for standardisation and staff re-training.	*2012*	Perceptive Process Mining, Lexmark (US)
Basic Materials	Chemicals	AkzoNobel (Netherlands)	*Procure-to-Pay processes*	▪ Management obtained insights into exceptions where the "First time right" principle was not realized; ▪ Peer comparisons between countries helped to identify best practices that could be adopted on the corporate level; ▪ The direct insights in process improvements enabled the desired "value extraction" from the P2P processes; ▪ Compliance control was realized to execute on corporate guidelines that must be followed.	*2012*	Capgemini (Netherlands)

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Industrials	Industrial Engineering	Vaisala (Finland)	Process Management	▪ Making effective operations and improved customer satisfaction through clear visual understanding of the real process and the deviations; ▪ Reducing operational costs and time to corrective actions by having the means for effective change management, through fast verification and follow-up of process changes; ▪ Sales process optimization through understanding of the process flows, and the ability to benchmark performances.	2012	QPR (Finland)
Telecommunications	Telecommunications	WDR (Germany)	IT Service Management	-	2012	Celonis (Germany)
Financials	Banking	Bank of Queensland, (Australia)	-	-	2012	Queensland University of Technology (Australia)
Healthcare	Healthcare Facilities, Services & Equipment	Princess Alexandra Hospital (UK)	Emergency Department Patient Treatment	This project aimed to apply process mining to provide insights into Princess Alexandra Hospital's (PAH) "as is" processes for treating patients presenting at the Emergency Department with multiple traumatic injuries. The study involved process discovery and comparison of patient flows associated with various cohorts of patients including (I) patients presenting with minor and major trauma, and (II) patients presenting at different times of the day.	2012	Queensland University of Technology (Australia)
Healthcare	Healthcare Facilities, Services & Equipment	Metro North Hospital (Australia)	Outpatient Referral Process	Process mining was used to discover models from patient referral, appointment, to provision of a service with a specialist. Key insights obtained from this analysis include lack of implementation of the standards across hospitals, variation and impact of delays on the health and well-being of patients.	2012	Queensland University of Technology (Australia)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Public	Education	Queensland University of Technology (Australia)	*Student Services*	The project aimed to apply process-oriented data mining (process mining) to analyse student behaviour (through the use of Blackboard data) in order to increase student retention.	*2012*	Queensland University of Technology (Australia)
Consumer services	Retail	Woolworths (Australia)	*Logistic Process*	The project aimed to apply process-oriented data mining (process mining) to provide insights into Woolworths' Delivery Process. Specifically, the study involved process discovery of the delivery process, and the identification of optimal delivery routes.	*2012*	Queensland University of Technology (Australia)
Healthcare	Healthcare Facilities, Services & Equipment	Hospital of Sao Sebastiano, (Portugal)	*Emergency Services*	The process mining methodology was applied in the emergency service of a hospital that had its own electronic patient record system, developed in-house. Event data collected from this system was analysed. Using the radiology workflow as an example, they showed how the proposed methodology could provide insight into the flow of healthcare processes, their performance, and their adherence to institutional guidelines.	*2012*	Hospital de Sao Sebastiao, Santa Maria da Feira, (Portugal); Technical University of Lisbon (Portugal)
Healthcare	Healthcare Facilities, Services & Equipment	Medical University of Vienna (Austria)	*Compliance analysis for treatment processes*	The goal of the project was to analyse skin cancer treatment processes regarding their compliance with relevant guidelines. Focus was put on the transformation and integration of the available data sources as well as billing data of the Main Association of Austrian Social Security Institutions. The challenge was to extract and integrate the data in a process-oriented way in order to apply process mining techniques in the sequel.	*2012*	University of Vienna (Austria); Medical University of Vienna (Austria)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Healthcare	Healthcare Facilities, Services & Equipment	Department of Ophthalmology at the University Hospital of Leipzig (Germany)	*Workflow Management*	The objective was the design and the implementation of a surgical workflow management system (SWFMS) that could provide a robust guidance for surgical activities. Results: They demonstrated that a SWFMS with a workflow schema that was generated from a subset of 10 patient individual surgical process models (iSPMs) was sufficient to guide approximately 65% of all surgical processes in the total set, and that a subset of 50 iSPMs was sufficient to guide approx. 80% of all processes.	*2012*	University of Leipzig, Innovation Center for Computer Assisted Surgery (ICCAS) (Germany); University Hospital of Leipzig Department of Ophthalmology and Neurosurgery (Germany)
Healthcare	Healthcare Facilities, Services & Equipment	Dutch Academic Hospital (Netherlands)	*Analysis of Patient Treatment Procedures*	Given the heterogeneous nature of the cases, the research first demonstrated that it was possible to create more homogeneous subsets of cases (e.g., patients having a particular type of cancer that need to be treated urgently). Such pre-processing was crucial given the variation and variability found in the event log. The discovered homogeneous subsets were analysed using state-of-the-art process mining approaches. More specifically, they reported on the findings discovered using enhanced fuzzy mining and trace alignment. A dedicated pre-processing ProM plug-in was developed for the challenge.	*2012*	Eindhoven University of Technology; Philips Healthcare (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	Royal Prince Alfred Hospital Sydney (Australia)	*Patient Treatment*	Gaining Insight from HIV/AIDS Patient Journey Data by using a Process-Oriented Analysis Approach with process mining.	*2012*	School of Information Technologies, The University of Sydney (Australia)
Healthcare	Healthcare Facilities, Services & Equipment	Mercy Health System St. Louis (US)	*Clinical workflow management*	▪ Automating the method of documenting clinical workflows; ▪ Identifying variations of clinical workflows and optimizing them; ▪ Optimizing clinical workflows.	*2011*	The Healthcare Business Process Management Blog (US)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Insurance	Queensland Nominal Defendant (Australia)	-	-	*2011*	Queensland University of Technology (Australia)
NDA	NDA	Multinational enterprise (NDA)	*Conformance analysis*	From the analysis performed it was possible to highlight that the most striking of the variations was the difference between the processes executed in each of the order management teams around the world. ▪ The process improvement teams took this information to one of the regular meetings of representatives from the regional teams so they could present findings to obtain the standardization level needed.	*2011*	Khalifa University, P.O., Abu Dhabi (UAE)
Financials	Insurance	United India Insurance Company LTD. (India)	*Paths discovery*	Process mining techniques were used to obtain meaningful knowledge about flows, in order to discover typical paths followed by particular groups of Insurance holders. ▪ Obtaining understandable mined process models for large groups of services to identify the same and different insurance holder process; ▪ The results were not derived by human thinking: the automated mined process model helped the insurance agent in their daily activities.	*2011*	Bharathiar University, Technical University, Avadi, Tamil Nadu (India); Department of Computer Science, Rashtriya Sanskrit Vidyapeetha, Tirupati, Andhra Pradesh (India)
Financials	Insurance	Motor Accident Insurance Commission (Australia)	*Compulsory Third Party (CTP) Claim*	The project aimed to apply process-oriented data mining (process mining) to historical CTP claims processing records provided by multiple CTP insurance providers with a view to exposing impediments to efficient (time & cost) claims handling and to determine the impact of various "context" factors on the process execution.	*2011*	Queensland University of Technology (Australia)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Insurance	Association of Certified Fraud Examiners (ACFE) (US)	*Transactional logs analysis*	Authors presented a case study in which they applied process mining in the context of transaction fraud. Given the procurement process of an organization using SAP as ERP system, they applied the process diagnostics approach to discover the real process and to analyze flaws. ▪ This enabled the explicit possibility of checking internal controls and business rules in more general. This way, process mining enabled auditing by not only providing theory and algorithms to check compliance, but also by providing tooling that help the auditor to detect fraud or other flaws in a much earlier stage.	*2011*	Faculty of Business Economics, Hasselt University, Agoralaan (Belgium); Eindhoven University of Technology (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	Hospital for Children, Toronto & Women and Infants Hospital, Providence (Canada, US)	*Patient treatment modelling*	The paper presents a framework for process mining in critical care. The framework uses the CRISP-DM model, extended to incorporate temporal and multidimensional aspects (CRISP-TDMn), combined with the Patient Journey Modelling Architecture (PaJMa), to provide a structured approach to knowledge discovery of new condition onset pathophysiology in physiological data streams. The approach is based on temporal abstraction and mining of physiological data streams to develop process flow mappings.	*2011*	University of Ontario Institute of Technology, Oshawa (Canada); The Hospital for Sick Children, Toronto (Canada) Department of Paediatrics, University of Toronto, Toronto (Canada)
Healthcare	Healthcare Facilities, Services & Equipment	Belgium Hospital (Belgium)	*Process improvement for breast cancer patients*	They analysed a dataset consisting of the activities performed to 148 patients during hospitalization for breast cancer treatment in a hospital in Belgium. They exposed multiple quality of care issues that will be resolved in the future, they discovered process variations and best practices and issues with the data registration system. For example, 25 % of patients receiving breast-conserving therapy did not receive the key intervention "revalidation". They found this was caused by lowering the length of stay in the hospital over the years without modifying the care process.	*2011*	NDA
Telecommunications	Telecommunications	Bayerischer Rundfunk (Germany)	*IT Service Management*	Aim: To establish an improved Service Desk control station. Results: ▪ Ticket data analysis and telephone routing systems at an hourly rate; ▪ Pre-defined key indicators which provided a quick overview and showed existing trends;	*2010*	Celonis (Germany)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Healthcare	Healthcare Facilities, Services & Equipment	EncounterPRO Healthcare Resources (US)	*Systematic Optimization of EHR Efficiency*	▪ Ready-made analyses of business processes. Due to real time data assessment implemented, the effectiveness of correction measures could be reviewed immediately. The goal was to improve medical practice throughput and throughput time, using process mining as a negative feedback control model in order to visualize, compare, and improve ambulatory EHR patient encounter task workflows. ▪ Generating process models of existing practices; ▪ Comparing measures of productivity (throughput and throughput time); ▪ Explaining differences in productivity in terms of differences in processes; ▪ Suggesting process improvements for low productivity practices. They chose nine paediatric practices relying on the same EHR workflow management system and they compared throughput and throughput times across the practices for October (traditionally a busy month for paediatricians).	*2010*	EncounterPRO Healthcare Resources (US)
Healthcare	Healthcare Facilities, Services & Equipment	Verbeeten Institute (Netherlands)	*Achieve standardized. in healthcare processes*	Goal: to help healthcare organizations achieving a standardized and high-quality care process by using historic information gathered by registering the day-to-day operations with a healthcare information system. The research project successfully evaluated the applicability of process and data mining techniques in the context of the problem definition. However, it must be stated that the unavailability of exact activity and waiting time metrics significantly restricted simulation capabilities.	*2010*	Eindhoven University of Technology, University of Technology (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	Maastricht University Medical Centre (Netherlands)	*Conformance analysis on clinical pathways*	The researchers developed and tested dynamic programming formulations for adherence measurement in clinical pathways – based on partially ordered data in medical records and pathway definitions. With these new methods at hand, they analysed clinical pathway adherence at the Cardiovascular Centre of Maastricht University Medical Centre.	*2010*	Institute of Health Policy & Management, Erasmus Medical Centre (Netherlands); Maastricht University Medical Centre (Netherlands)

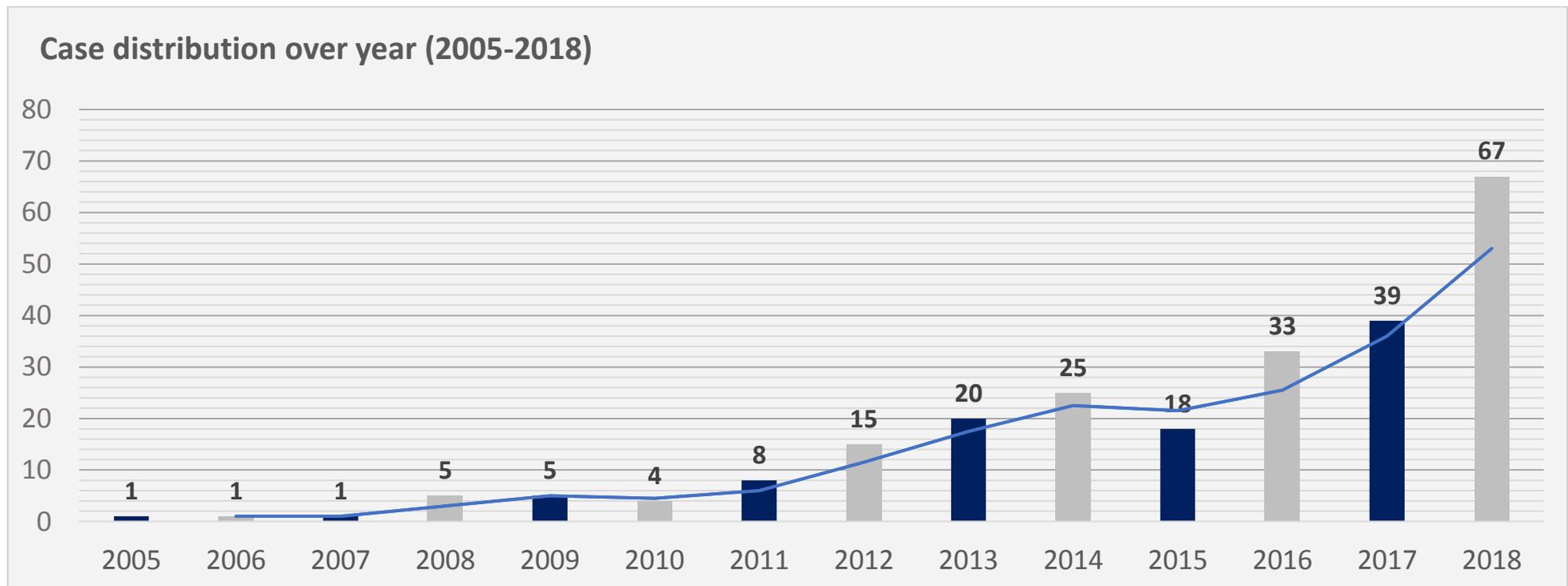| INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Public	Public Administration and Government	Dutch governmental organization (Netherlands)	*Process Diagnostics*	Authors proposed a process diagnostics methodology, that gave a broad overview of the process supported by the information system. In the process diagnostics methodology, several perspectives of the process were highlighted. The outcome covered the control flow perspective, i.e. "how the process model actually looks like", the performance perspective, i.e. "how well does the system perform" and the organizational perspective, i.e. "who is involved in the process and how".	*2009*	Eindhoven University of Technology (Netherlands)
Technology	Technology	ASML (Netherlands)	*Test Processes*	Authors demonstrated that current process mining techniques can already answer many questions, even yield concrete suggestions for process improvement. However, due to the rapid technological advancements, the analysis results presented are likely to be outdated already for the next series of wafer scanners than the ones that they analyzed. To enable a continuous improvement of the test process in ASML, process analysis should be best carried out in an iterative manner.	*2009*	IEEE transactions on systems, man, and cybernetics (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	Dutch Hospitals (Netherlands)	*Process improvement for diabetes foot patients*	The project was divided in three phases process visualization, process analysis, and evaluation. During these phases, two approaches, process mining and visual analytics were used to visualize and analyze a business case. Based on the outcomes of this, the method was developed. The main finding is these phases was the fact that process mining and visual analytics as such do not provide with enough process insight. Rather, a combination of both approaches is required.	*2009*	Technische Universiteit Eindhoven, University of Technology (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	Maxima Medical Centre (Netherlands)	*Patient treatment analysis*	Research objectives: to find the applicability of process mining on acquiring objective process information in the healthcare domain. Several process mining objectives were set: ▪ Researching all the possibilities by discovering the care flow of the rheumatoid arthritis patients; ▪ Checking if the process model discovered in the first objective corresponded to the predefined care paths and to reality.	*2009*	Eindhoven University of Technology, University of Technology (Netherlands)

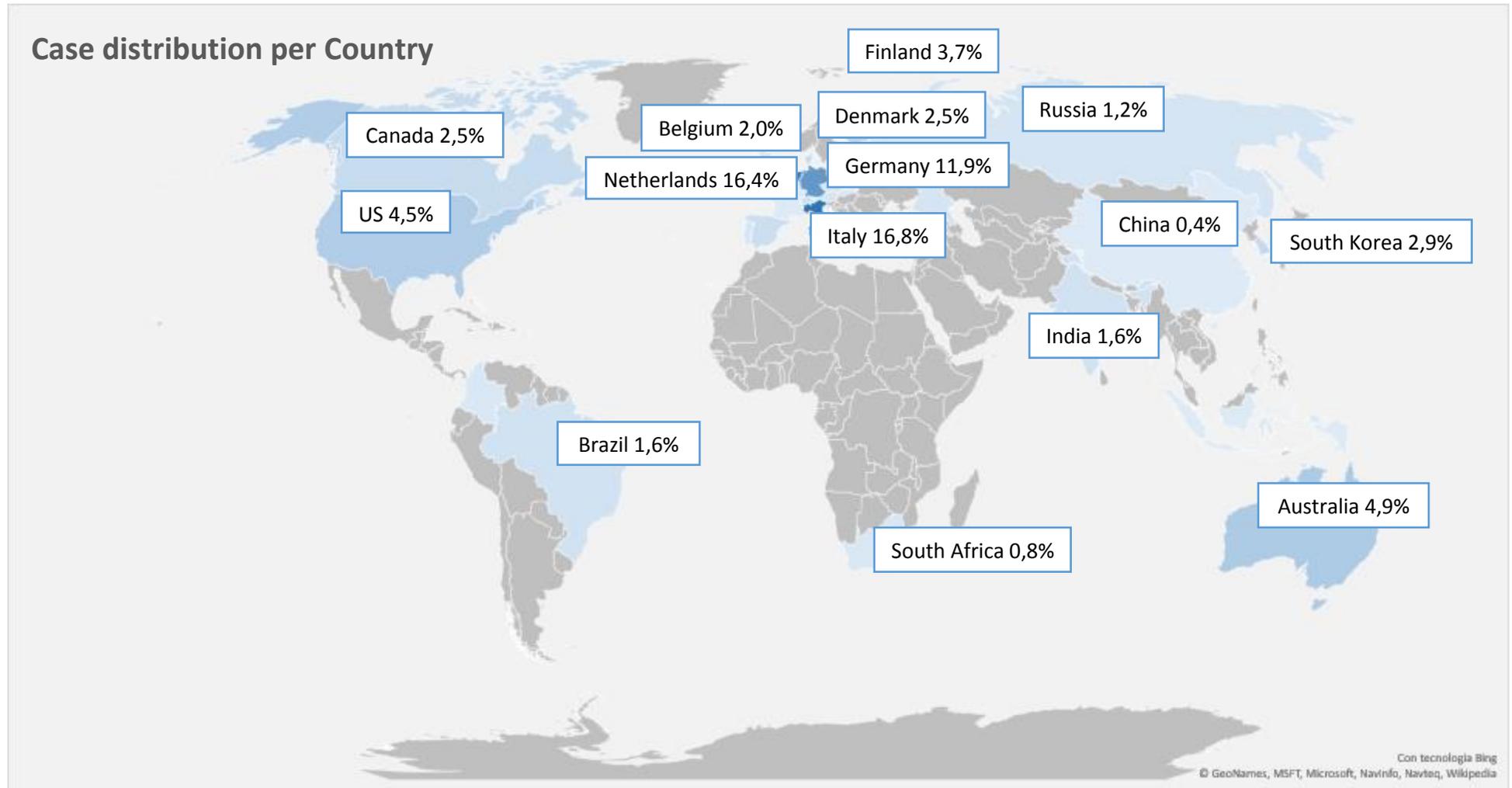| INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Healthcare	Healthcare Facilities, Services & Equipment	University Hospital Leipzig (Germany)	*Analysis of surgical intervention populations*	According to differences in patient characteristics, surgical performance, or used surgical technological resources, surgical interventions have high variability. Statistical differences between the gSPMs of ambulatory and inpatient procedures of performance times for surgical activities and activity sequences were identified.	*2009*	Universität Leipzig, Leipzig (Germany); Faculty of Medicine, INSERM, Rennes (France); VisAGeS, INRIA (France)
Financials	Insurance	ING (Netherlands)	*Internal Auditing*	Process Mining empowered ING to make a difference in auditing quality by providing better focus on possible risk, control and efficiency issues. Results: ▪ Identification of the most complicated cases and finding out the exceptions; ▪ Detecting policy violations and unusual transactions; ▪ Checking that processes as designed are also being executed the same way; ▪ Verifying if internal controls, such as authorizations, are performed correctly.	*2008*	Bitz Clarity LTD (UK)
Healthcare	Healthcare Facilities, Services & Equipment	Erlangen University Clinic (Germany)	*Business Process Analysis*	In order to support the analysis of the radiology workflows at the clinic, the authors developed a data warehouse for process mining. Despite the limitations, the authors concluded that process mining has a great potential to facilitate the understanding of medical processes and their variants.	*2008*	International Congress of the European Federation for Medical Informatics
Healthcare	Healthcare Facilities, Services & Equipment	4 Italian Hospitals (Italy)	*Patient treatment*	Process mining was used to discover how stroke patients are treated in different hospitals. There was a need for intensive pre-processing of clinical events to build the event logs. It was concluded that process mining could be successfully applied to understand the different clinical pathways adopted by different hospitals and different groups of patients.	*2008*	Eindhoven University of Technology (Netherlands); University of Pavia (Italy)
Public	Public Administration and Government	Municipality in the Netherlands (Netherlands)	*Modelling of social network and information flows*	Authors addressed three issues (I) Organizational model mining, (II) Social network analysis, and (III) Information flows between organizational entities. With a case study, they have shown how each of these issues can be supported. Moreover, they showed how organizational mining can benefit from creatively using approaches developed for the process perspective.	*2008*	Eindhoven University of Technology (Netherlands)

INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Healthcare	Healthcare Facilities, Services & Equipment	Zhejiang Huzhou Central Hospital (China)	*Patient workflow*	The study adopted process mining to analyse clinical pathways. The key contribution of the paper is to develop a new process mining approach to find a set of clinical pathway patterns given a specific clinical workflow log and minimum support threshold. The experimental results indicate the applicability of the proposed approach, based on which it is possible to discover clinical pathway patterns that can cover most frequent medical behaviours that are most regularly encountered in clinical practice.	*2008*	College of Biomedical Engineering and Instrument Science, Zhejiang University (China)
Healthcare	Healthcare Facilities, Services & Equipment	Catharina Hospital (Netherlands)	*Analyze careflows of an Intensive Care Unit*	The clustering approach of the DWS Algorithm was able to discover some patterns; however, the discriminants rules were hard to understand. To handle this problem, the author introduced the Association Rule Miner (ARM) plug-in, which aimed at discovering association rules and frequent item sets in the event log. The technique has proved to be useful to obtain patterns in the event log and to group similar patients.	*2007*	Eindhoven University of Technology (Netherlands)
Public	Public Administration and Government	Dutch National Public Works Department (Belgium)	*Invoice Management*	Dutch National Public Works Department is responsible for the construction and maintenance of the road and water infrastructure. Using a variety of process mining techniques, they analysed the processing of invoices sent by the various subcontractors and suppliers.	*2006*	Department of Technology Management Eindhoven University of Technology (Netherlands)
Healthcare	Healthcare Facilities, Services & Equipment	Dutch hospital (Netherlands)	*Logistic process of treating patients*	Authors proposed a knowledge management perspective to provide a strategy for modelling and redesigning a business process. The specific group of patients required the involvement of different specialties for their medical treatment that lead to more efforts regarding the coordination of care for these patients.	*2005*	University of Groningen (Netherlands)
Telecommunications	Telecommunications	NDA	-	-	*NDA*	Queensland University of Technology (Australia)

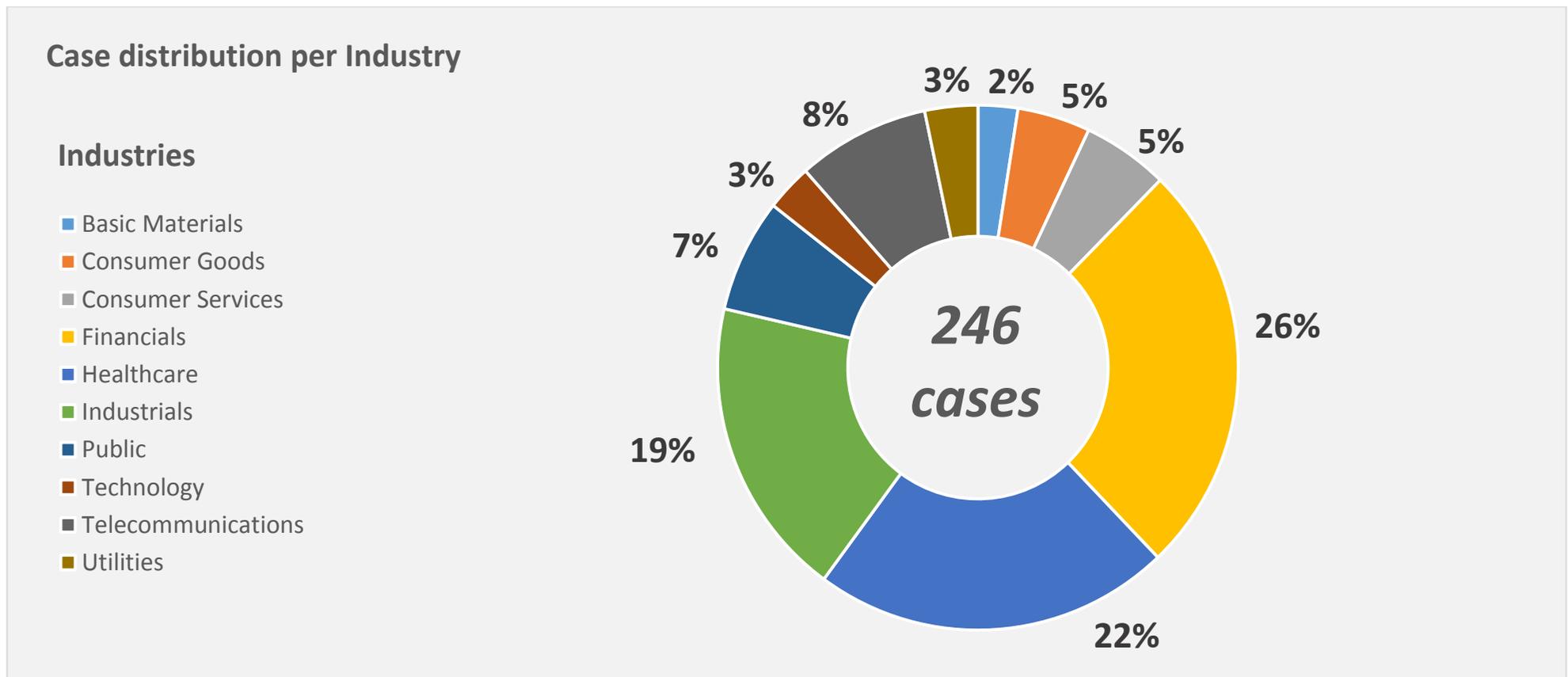| INDUSTRY	SECTOR	ORGANIZATION	PROCESS	DESCRIPTION (Goal, Results)	YEAR	PARTNER
Financials	Insurance	NDA	-	-	*NDA*	Queensland University of Technology (Australia)
Healthcare	Healthcare Facilities, Services & Equipment	4 South Australian Hospitals (Australia)	*Emergency Department Patient Treatment*	The case study applied process mining techniques to patient flow data collected from patients presenting with chest pain at four South Australian hospitals. The study was a cross-organisational, comparative analysis that aimed to utilise routinely collected patient and treatment data to describe differences in the care processes associated with management of Acute Coronary Syndrome (ACS) practiced in the four hospitals.	*NDA*	Queensland University of Technology (Australia)

Infographics

In general, the results of the study confirm that business projects relying on process mining tools and techniques are becoming more popular in recent years. The histogram shows that in the last three years there has been an exponential increase, achieving the peak in 2018; anyway, after the slightly decrease of applications collected in 2015, the trend has increased again in 2016 outdoing the results of two years earlier. At present, the cases collected in 2018 are 67.

Case distribution over year (2005-2018)

Year	Cases
2005	1
2006	1
2007	1
2008	5
2009	5
2010	4
2011	8
2012	15
2013	20
2014	25
2015	18
2016	33
2017	39
2018	67

Case distribution per Country

Finland 3,7%

Denmark 2,5%

Russia 1,2%

Canada 2,5%

Belgium 2,0%

Germany 11,9%

Netherlands 16,4%

US 4,5%

China 0,4%

South Korea 2,9%

Italy 16,8%

India 1,6%

Brazil 1,6%

Australia 4,9%

South Africa 0,8%

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The worldwide cases distribution depicts a situation in which process mining's main users remain concentrated in Europe, North America and in Australia. Indeed, more than 45% of the global process mining applications collected are located in **Italy, Netherlands** and in **Germany** (16,8%, 16,4% and 11,9%, respectively), partially thank to the spread of the *Industry 4.0 master plans and initiatives* that are taking place in several European Countries in recent years. On the other hand, the Australian Country alone is accountable for another 4,9% of the applications. These global results emphasize the prior role of **Universities** and **excellence innovation Centres** in promoting the education and the research of process mining, as well as supporting practical applications in business contexts.
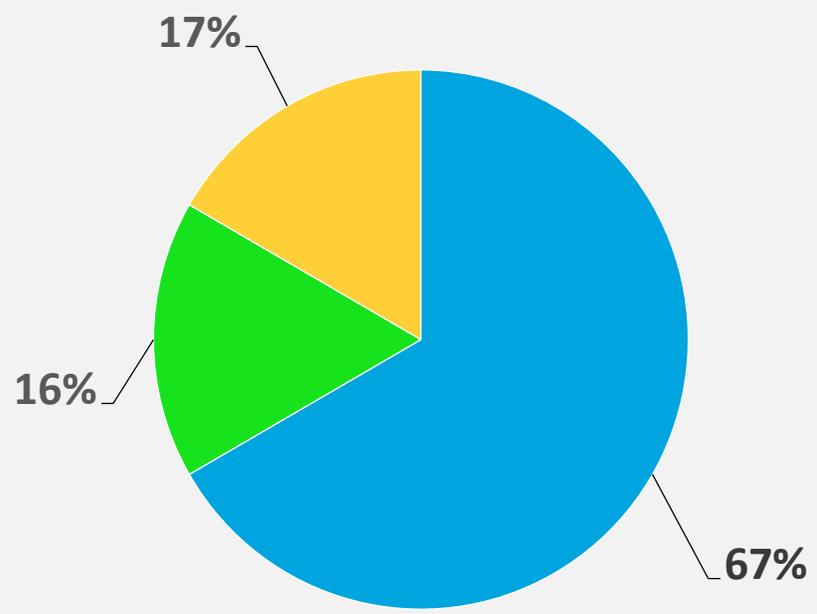
In accordance to the data the most frequent using of process mining tools and techniques are organizations operating in **Financials** (26%), followed by the ones working in **Healthcare** (22%) and **Industrials** (19%). In particular, the cases listed in the industry group are analysed more in depth in the pie charts.

Case distribution per Industry

Industries

- Basic Materials
- Consumer Goods
- Consumer Services
- Financials
- Healthcare
- Industrials
- Public
- Technology
- Telecommunications
- Utilities

246 cases

3% 2% 5% 5% 8% 3% 7% 19% 22% 26%

Basic Materials

Sector

■ Chemicals ■ Forestry & Paper ■ Industrial Metals & Mining
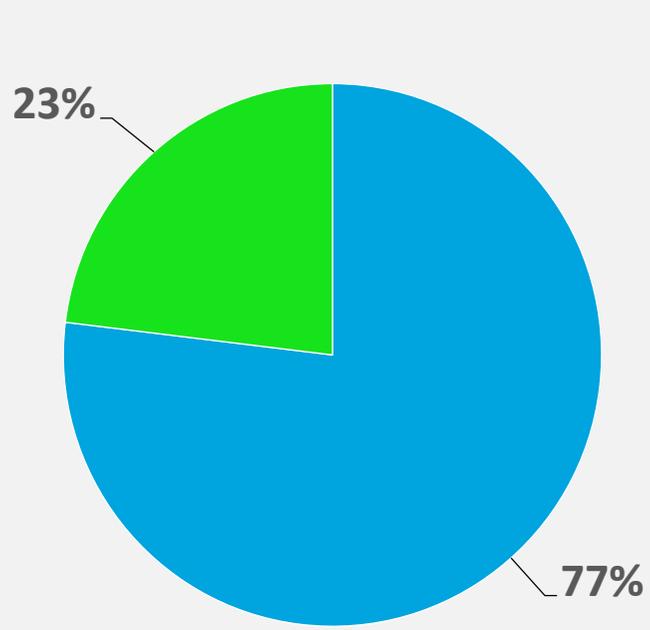
Consumer Goods

Sector

■ Automotive & Parts ■ Food & Beverage

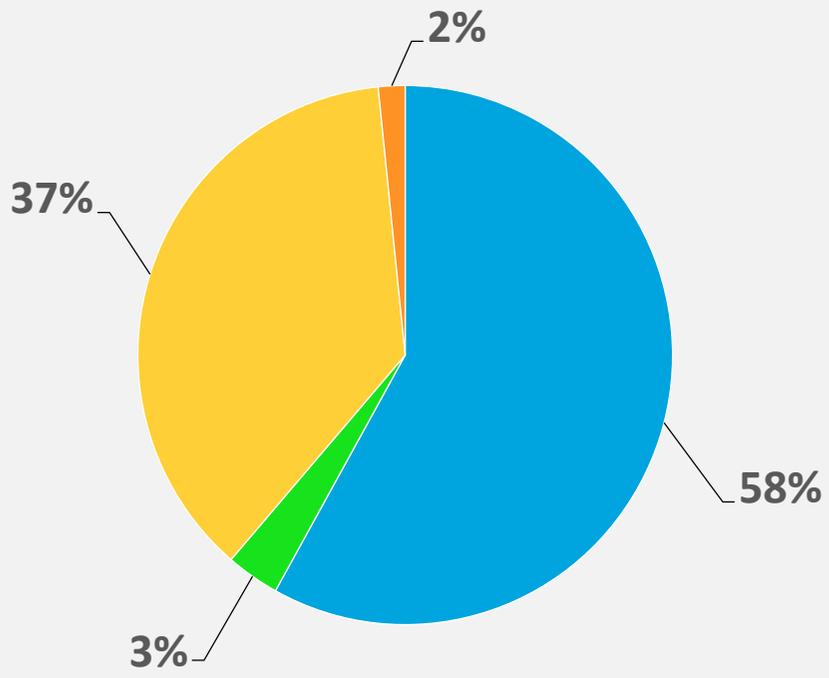■ Media ■ Personal & Household Goods
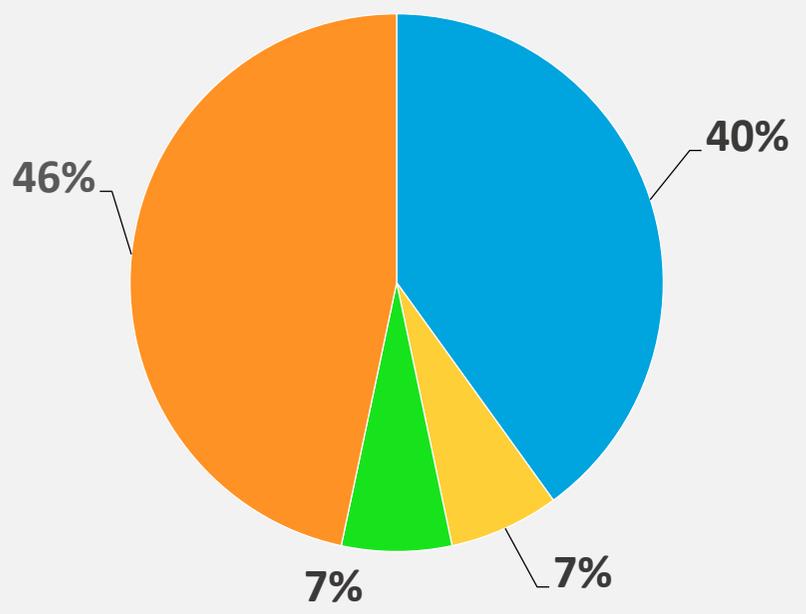
Consumer Services

Sector

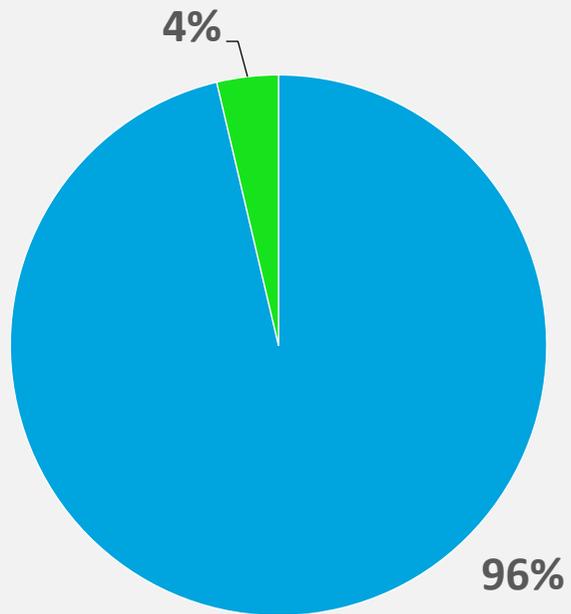■ Retail ■ Travel & Leisure

Financials

Sector

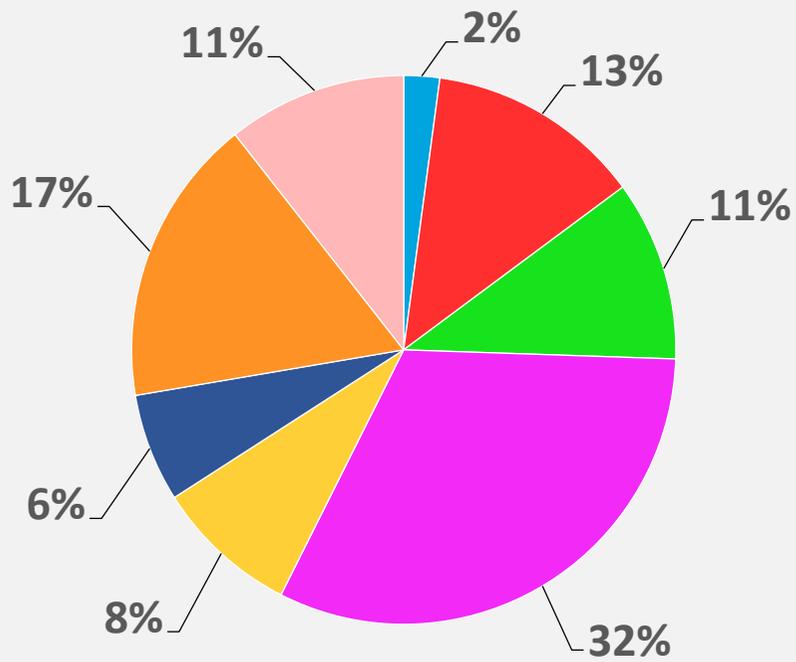■ Banking ■ Financial Services ■ Insurance ■ Real Estate

Healthcare

Sector
- Healthcare Facilities, Services & Equipment
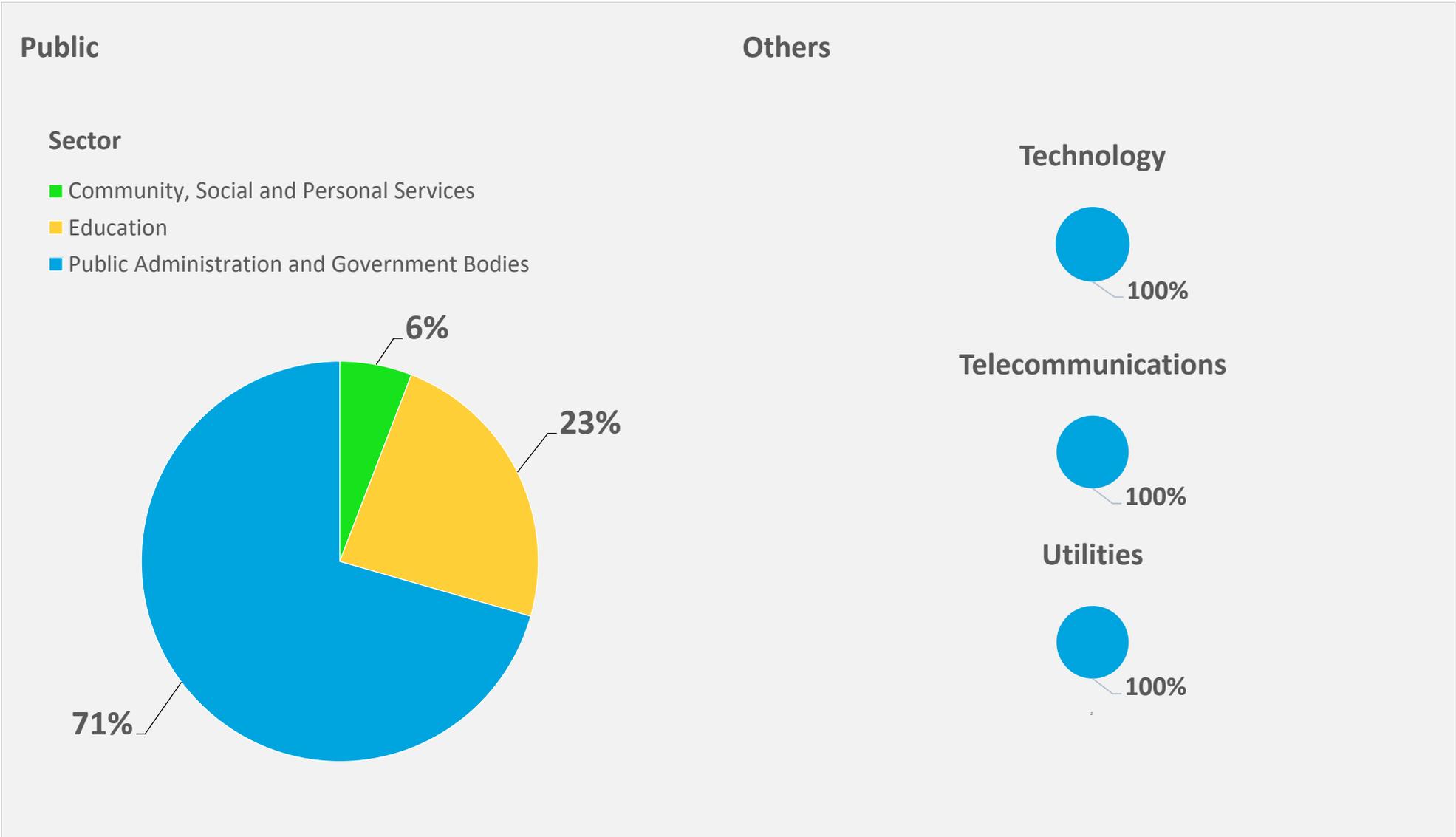- Pharmaceuticals & Biotechnology

Industrials

Sector
- Aerospace & Defense
- Automotive & Parts
- Construction & Materials
- General Industrials
- Industrial Engineering
- Industrial Transportation
- Logistic
- Support Services

65

Public

Others

Sector

- Community, Social and Personal Services
- Education
- Public Administration and Government Bodies

6%

23%

71%

Technology

100%

Telecommunications

100%

Utilities

100%

Remarks

In the last decade the field of process mining gained attention from research and practice. The current general discussions about process mining seem unoptimistic about its potentials, as the critiques mostly center around how process mining is too technical to be a stand-alone tool **without consultancy services**, and that it is not providing real time analytics for instant actions and results. In HSPI we believe that Process Mining will become the **main process management technique** and the **decision-support tool in real time**.

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References and Contacts

Authors:

Philippe Gonella, IEEE CIS Task Force on Process Mining

Mattia Castellano, HSPI SpA

Antonio Di Fiore, HSPI SpA

Paolo Riccardi, HSPI SpA

Roberto Carbone, HSPI SpA

Contact:

process-mining@hspi.it

The company:

HSPI SpA - Management Consulting

Viale Aldo Moro 16 - 40127 Bologna (Italy)
Tel. +39 051509861 | Fax. +39 051 509737
BOLOGNA | ROME | MILAN
www.hspi.it | e-mail: info@hspi.it