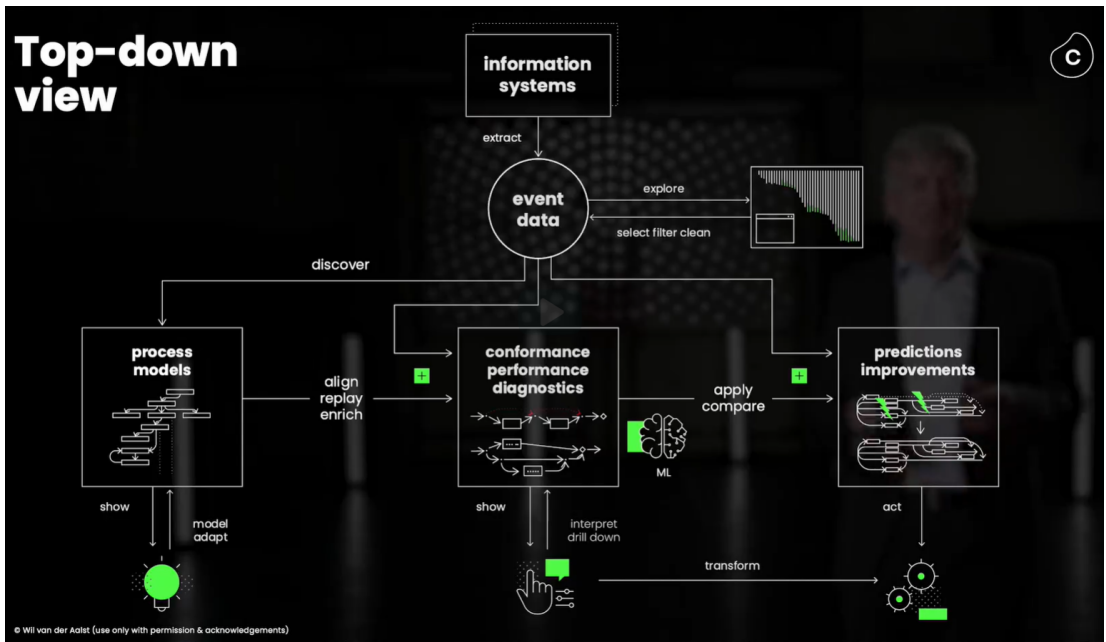


# Process Mining Overview

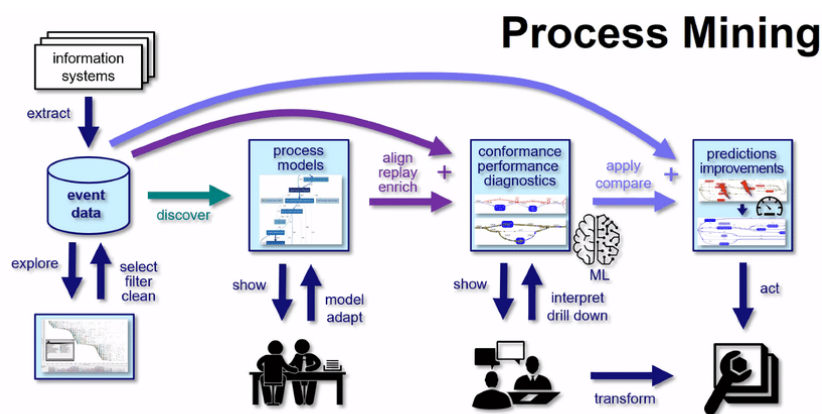
## ▼ Overview of Process Mining

**Process mining** is a method used to discover, monitor, and improve real processes (not assumed processes) by extracting knowledge from event logs readily available in today's information systems. The main types of process mining are:

1. **Discovery:** Creating a process model from event logs without any prior information.
2. **Conformance:** Checking if reality, as recorded in the log, conforms to the model and vice versa.
3. **Enhancement:** Improving or extending an existing process model using information about the actual process recorded in the log.



## ▼ Steps in Process Mining



1. **Data Collection:** Gather event logs from information systems. These logs should include:
  - **Case ID:** A unique identifier for each instance of the process.
  - **Activity:** The specific task or step performed.
  - **Timestamp:** The time when the activity was performed.
  - **Additional Attributes:** Such as resources, costs, or user IDs.
2. **Preprocessing:** Clean and prepare the data. This may involve:
  - Filtering incomplete cases.
  - Dealing with missing values.
  - Normalizing timestamps.
  - Aggregating or splitting events if necessary.
3. **Process Discovery:** Apply algorithms to the event log to create a process model. Common algorithms include:
  - **Alpha Miner:** A simple algorithm that discovers a basic process model.
  - **Heuristic Miner:** Handles noise and infrequent behavior better than Alpha Miner.
  - **Inductive Miner:** Produces models that are more understandable and less complex.
4. **Conformance Checking:** Compare the discovered model with the existing process model to identify deviations. This helps in understanding discrepancies between the actual and intended processes.
5. **Model Enhancement:** Use the insights gained from conformance checking to refine and enhance the process model. This could involve:
  - Adding performance data (e.g., bottlenecks, waiting times).
  - Identifying frequent paths and optimizing them.
  - Removing or simplifying rarely used or redundant paths.
6. **Visualization and Analysis:** Use tools to visualize the process model and perform in-depth analysis. Popular process mining tools include:
  - **ProM:** An open-source process mining framework.
  - **Disco:** A user-friendly tool for process mining.
  - **Celonis:** A commercial process mining software with advanced features.
7. **Implementation of Improvements:** Based on the analysis, implement changes to the process to improve efficiency, reduce costs, and enhance overall performance.

## ▼ Practical Example

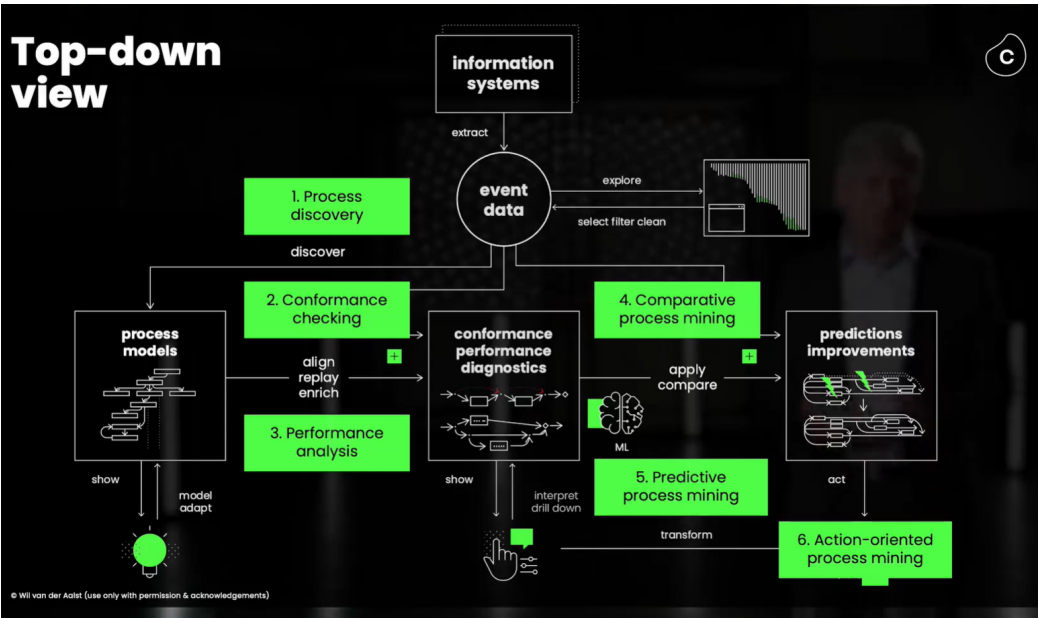
Let's consider a practical example involving an online order processing system:

1. **Data Collection:** Collect event logs from the order processing system, including details like Order ID, Activity (e.g., Order Received, Payment Processed, Item Shipped), and Timestamps.

2. **Preprocessing:** Clean the data to handle any inconsistencies or missing values. Ensure all activities are correctly timestamped.
3. **Process Discovery:** Use an algorithm like Heuristic Miner to discover the process model from the event logs.
4. **Conformance Checking:** Compare the discovered process model with the intended order processing workflow to identify any deviations or inefficiencies.
5. **Model Enhancement:** Refine the process model by adding performance data, such as identifying bottlenecks in the payment processing step.
6. **Visualization and Analysis:** Use a tool like Disco to visualize the process model and perform detailed analysis to uncover patterns and insights.
7. **Implementation of Improvements:** Implement changes to streamline the order processing steps, reduce waiting times, and improve overall customer satisfaction.

### ▼ Process Mining Tasks

1. **Process Discovery:** Take event data & produce a model.
2. **Conformance Checking:** Compare model behavior with real observed behavior.
3. **Performance Analysis:** Identify bottlenecks and understand their causes.
4. **Comparative Process Mining:** Compare the same process or different processes to find improvement areas.
5. **Predictive Process Mining:** Predict future issues to take early action.
6. **Action-Oriented Process Mining:** Turn insights into actions.



💡 Celonis allows you to do all the tasks of process mining

### ▼ Key Points on Process Mining

- **Primary Approach:** Process mining has become the primary data-driven BPM (Business Process Management) approach.
- **Intersection of Sciences:** Process mining is where *Data Science (does not consider process)* and *Process Science (does not consider data)* meet.
- **Purpose:** Uses event data to improve process & performance & compliance to follow the correct & optimize way for processes.
- **Input Data:** Event data / event logs.
- **Event Components:** Events can have multiple cases and consist of:
  - Case
  - Activity
  - Timestamp
  - ...
- **Trace Concept:** For large datasets, if event data have events that occurred many times but in different cases or timestamps for different cases, the most accrued sequence is called a trace, representing a normal/correct process.



- **Benefits:** Helps identify performance & compliance problems, understand what is going on, and how processes are being executed.
- **Process Insights:** Follow individual cases, identify bottlenecks, deviations from normal paths, and highlight the most common processes and deviations.
- **Spaghetti Process Model:** Initial processes can be complex (spaghetti models) and require filtering to eliminate unwanted or non-optimal paths.
- **Complexity:** Real-world processes often have many variations due to hand-offs, network issues, duplication, ineffective communication, etc.
- **Diagnosis and Improvement:** Process mining helps organizations identify performance & compliance problems, understand their causes, and suggest corrective actions.
- **Predictive Capability:** Predicts whether certain processes will have problems in the future (likelihood of deviation).
- **Machine Learning Integration:** Classical ML techniques struggle with event data, but process models aligned with event data can leverage standard ML techniques.
- **Goal:** Improve processes with insights to change processes or automatically trigger workflows to address identified or predicted issues.

### ▼ Exercise

Event log dataset

Aa Application_Number	≡ Activity_Name	≡ Event_Time	≡ Resource	≡ Loan_Goal	≡ Requested_Amount
<a href="#">Application_797</a>	A_Create Application	1/3/2016 18:50	User_1	Car	13500
<a href="#">Application_797</a>	A_Submitted	1/3/2016 18:50	User_1	Car	13500
<a href="#">Application_797</a>	A_Concept	1/3/2016 18:51	User_1	Car	13500
<a href="#">Application_797</a>	A_Accepted	1/4/2016 19:14	User_5	Car	13500
<a href="#">Application_797</a>	A_Complete	1/4/2016 19:17	User_5	Car	13500
<a href="#">Application_797</a>	A_Cancelled	2/29/2016 7:02	User_1	Car	13500
<a href="#">Application_524</a>	A_Create Application	1/3/2016 17:13	User_1	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Submitted	1/3/2016 17:13	User_1	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Concept	1/3/2016 17:14	User_1	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Accepted	1/4/2016 18:58	User_8	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Complete	1/4/2016 19:14	User_8	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Validating	1/14/2016 9:09	User_119	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Incomplete	1/14/2016 14:15	User_30	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Pending	1/14/2016 14:41	User_113	Caravan / Camper	15000
<a href="#">Application_174</a>	A_Create Application	1/3/2016 16:49	User_1	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Submitted	1/3/2016 16:49	User_1	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Concept	1/3/2016 16:50	User_1	Existing loan takeover	11000
<a href="#">Application_881</a>	A_Create Application	1/3/2016 17:48	User_1	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Submitted	1/3/2016 17:48	User_1	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Concept	1/3/2016 17:49	User_1	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Accepted	1/4/2016 13:19	User_13	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Complete	1/4/2016 13:25	User_13	Existing loan takeover	15000
<a href="#">Application_174</a>	A_Accepted	1/4/2016 13:41	User_7	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Complete	1/4/2016 13:50	User_7	Existing loan takeover	11000
<a href="#">Application_881</a>	A_Validating	1/15/2016 10:45	User_119	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Incomplete	1/19/2016 9:00	User_29	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Denied	1/19/2016 9:00	User_29	Existing loan takeover	15000
<a href="#">Application_174</a>	A_Validating	1/20/2016 8:10	User_114	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Incomplete	1/20/2016 14:13	User_99	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Validating	1/21/2016 11:16	User_116	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Incomplete	1/21/2016 12:10	User_95	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Validating	1/21/2016 15:04	User_41	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Pending	1/22/2016 8:12	User_95	Existing loan takeover	11000
<a href="#">Application_634</a>	A_Create Application	1/3/2016 18:44	User_1	Home improvement	10000
<a href="#">Application_634</a>	A_Submitted	1/3/2016 18:44	User_1	Home improvement	10000
<a href="#">Application_634</a>	A_Concept	1/3/2016 18:45	User_1	Home improvement	10000
<a href="#">Application_634</a>	A_Accepted	1/5/2016 15:51	User_7	Home improvement	10000
<a href="#">Application_634</a>	A_Complete	1/5/2016 15:59	User_7	Home improvement	10000
<a href="#">Application_634</a>	A_Validating	2/4/2016 7:23	User_116	Home improvement	10000
<a href="#">Application_634</a>	A_Incomplete	2/4/2016 8:29	User_101	Home improvement	10000
<a href="#">Application_634</a>	A_Pending	2/4/2016 17:12	User_114	Home improvement	10000

Question 1

How many events are there?

41 → total number of events / instances

Correct

Question 2

How many activities are there?

10 → total number of unique instances

Correct

Question 3

How many cases are there?

5 → total number of unique instances

Correct

Question 4

Each case in this event log has a sequence of activities, which we call a trace in process mining. For each case, write down the corresponding trace. Note that multiple cases may correspond to the same trace, i.e., sequence of activities. How many unique traces are there? In process mining, we call these unique traces also trace variants.

4 → unique traces

Application ID	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6	Activity 7	Activity 8	Activity 9	Activity 10	Activity 11
Application_174	A_Create Application	A_Submitted	A_Concept	A_Accepted	A_Complete	A_Validating	A_Incomplete	A_Validating	A_Incomplete	A_Validating	A_Pending
Application_524	A_Create Application	A_Submitted	A_Concept	A_Accepted	A_Complete	A_Validating	A_Incomplete	A_Pending			
Application_634	A_Create Application	A_Submitted	A_Concept	A_Accepted	A_Complete	A_Validating	A_Incomplete	A_Pending			
Application_797	A_Create Application	A_Submitted	A_Concept	A_Accepted	A_Complete	A_Cancelled					
Application_881	A_Create Application	A_Submitted	A_Concept	A_Accepted	A_Complete	A_Validating	A_Incomplete	A_Denied			

Correct

Question 5

Find the case with the maximum number of events. How many events does the corresponding trace have?

11

Correct

Question 6

How many loan goals exist in this event log?

4

Correct

Question 7

How many resources exist in this event log?

15

Correct

Question 8

Which of the following statements are correct? (Select all that apply)

- ☒ All cases in the event log start with activity A\_Create Application.
- ☐ All cases in the event log end with A\_Cancelled or A\_Pending.
- ☐ Requested\_Amount for one particular case may change during the process.
- ☒ Activity A\_Submitted is always executed by the same resource.

Correct

▼ Tools and Resources

- **Celonis:** [Celonis Process Mining](#)
- **Disco:** [Disco Tool](#)
- **ProM:** [ProM Framework](#)

▼ Further Learning

- **Books:**
  - "Process Mining: Data Science in Action" by Wil van der Aalst
  - "Process Mining in Action" by Lars Reinkemeyer

▼ Celonis



Example Case : <https://content.training.celonis.cloud/package-manager/ui/public/assets/c4f8c1c1-3242-4b95-be46-3820212b122d#!/documents/c4f8c1c1-3242-4b95-be46-3820212b122d/view/sheets/333dbdf2-94e5-41d2-95dc-0e26b97b6738>

▼ Execution Management System - EMS

An **Execution Management System (EMS)** is a platform designed to monitor, analyze, and improve business processes by leveraging real-time data and advanced analytics. EMS provides organizations with a unified framework to ensure that their processes are executed efficiently, predictably, and in alignment with strategic objectives. Here's an in-depth overview:

Overview of Execution Management System (EMS)

- **Purpose:** An Execution Management System is designed to provide real-time insights into business operations, enabling organizations to manage, optimize, and automate their processes more effectively. EMS systems help in identifying bottlenecks, predicting outcomes, and ensuring processes align with business goals.
- **Core Functions:**
  - **Process Monitoring:** Continuously track process execution in real-time.
  - **Performance Analysis:** Analyze key performance indicators (KPIs) and metrics to assess process effectiveness.
  - **Optimization and Automation:** Recommend or implement changes to improve process efficiency and effectiveness.
  - **Predictive Insights:** Forecast future outcomes and provide actionable insights using historical data and predictive analytics.
  - **Integration:** Seamlessly integrate with existing IT infrastructure and business applications.

Key Features of EMS

1. **Real-Time Process Monitoring:**
  - **Dashboards and Visualization:** Provides intuitive dashboards that offer insights into current process states, performance metrics, and alerts.
  - **Event Tracking:** Monitors every step of a business process to ensure compliance and identify deviations from expected execution paths.
2. **Data-Driven Decision Making:**
  - **Advanced Analytics:** Utilizes machine learning and AI to derive insights from data and make informed decisions.
  - **Scenario Simulation:** Allows businesses to simulate different scenarios and evaluate the potential impact of changes before implementation.
3. **Automation and Optimization:**
  - **Intelligent Automation:** Uses robotic process automation (RPA) and AI to automate repetitive tasks and optimize workflows.
  - **Resource Allocation:** Dynamically allocates resources based on process demands and priorities.
4. **Predictive Capabilities:**
  - **Outcome Prediction:** Forecasts potential process outcomes, enabling proactive management of risks and opportunities.
  - **Anomaly Detection:** Identifies unusual patterns or deviations that may indicate inefficiencies or issues in the process.
5. **Integration and Connectivity:**
  - **System Integration:** Connects with enterprise systems such as ERP, CRM, and other business applications to provide a comprehensive view of operations.
  - **APIs and Connectors:** Facilitates easy integration with third-party applications and data sources.
6. **Compliance and Governance:**
  - **Regulatory Compliance:** Ensures that processes adhere to industry regulations and standards.
  - **Audit Trails:** Maintains detailed logs of process execution for auditing and compliance verification.

Importance of EMS

- **Enhanced Efficiency:** Streamlines business processes by identifying bottlenecks and inefficiencies, leading to improved productivity and reduced costs.

- **Proactive Management:** Allows organizations to anticipate issues and take corrective actions before they impact operations.
- **Strategic Alignment:** Ensures that business processes are aligned with strategic goals, improving overall organizational performance.
- **Customer Satisfaction:** Enhances service delivery by ensuring processes are executed reliably and efficiently, leading to improved customer satisfaction.

Components of EMS

1. **Process Engine:**
  - The core component that manages the execution of business processes and workflows.
  - Ensures that all tasks are executed according to predefined rules and conditions.
2. **Analytics Module:**
  - Provides advanced data analytics capabilities to measure process performance and identify improvement opportunities.
  - Generates insights for continuous process optimization.
3. **Integration Layer:**
  - Connects EMS with existing enterprise systems and data sources.
  - Facilitates seamless data exchange and process integration across the organization.
4. **User Interface:**
  - Offers dashboards and visualizations for real-time process monitoring and reporting.
  - Allows users to interact with the system and manage processes efficiently.
5. **Automation Tools:**
  - Includes tools for automating routine tasks and processes.
  - Utilizes RPA and AI to reduce manual intervention and increase process efficiency.

Real-World Applications of EMS

1. **Manufacturing:**
  - **Use Case:** Real-time monitoring of production lines to detect bottlenecks and optimize resource allocation.
  - **Benefits:** Improved production efficiency, reduced downtime, and enhanced product quality.
2. **Finance:**
  - **Use Case:** Streamlining financial transactions and ensuring compliance with regulatory standards.
  - **Benefits:** Faster transaction processing, reduced operational risks, and better compliance management.
3. **Healthcare:**
  - **Use Case:** Managing patient care processes and ensuring timely delivery of medical services.
  - **Benefits:** Enhanced patient care, reduced wait times, and improved resource utilization.
4. **Retail:**
  - **Use Case:** Optimizing supply chain operations and inventory management.
  - **Benefits:** Reduced inventory costs, improved supply chain efficiency, and enhanced customer satisfaction.
5. **Telecommunications:**
  - **Use Case:** Managing network operations and ensuring service quality.
  - **Benefits:** Improved network performance, reduced outages, and better customer experience.

Benefits of EMS

- **Operational Efficiency:** Streamlines business processes and reduces operational costs by identifying inefficiencies.
- **Informed Decision Making:** Provides actionable insights for strategic and tactical decision-making.
- **Risk Mitigation:** Identifies potential risks and issues early, allowing organizations to take preventive measures.
- **Scalability:** Supports the growth and expansion of business operations by ensuring processes are scalable and adaptable.

Challenges and Considerations

- **Data Privacy and Security:** Ensuring the security and privacy of sensitive business data.
- **Integration Complexity:** Managing integration with existing systems and overcoming interoperability challenges.
- **Change Management:** Addressing resistance to change and ensuring user adoption of EMS solutions.
- **Customization Needs:** Tailoring EMS to meet specific organizational requirements and industry regulations.

Example Platforms

1. **Celonis Execution Management System:**
  - Provides comprehensive process mining and execution management capabilities.
  - Offers a range of tools for process discovery, conformance checking, and optimization.
2. **IBM Business Automation Workflow:**
  - Combines business process management and case management capabilities.
  - Enables organizations to automate and optimize their business processes.
3. **UiPath Process Mining:**
  - Integrates with UiPath's RPA platform to provide process mining and execution management solutions.
  - Focuses on automating and optimizing business workflows.
4. **SAP Signavio:**
  - Offers a suite of tools for process management, including process mining and execution management.
  - Enables organizations to model, analyze, and optimize their business processes.

Conclusion

An **Execution Management System (EMS)** is a critical tool for organizations seeking to improve their operational efficiency, reduce risks, and align processes with strategic goals. By providing real-time insights and predictive capabilities, EMS empowers businesses to make informed decisions, optimize resources, and enhance customer satisfaction. As industries continue to evolve, the role of EMS in driving digital transformation and process excellence will become increasingly important.

▼ Basic Concepts of Celonis

patient	activity	timestamp	doctor	age	cost
5781	make X-ray	23-1-2014@10.30	Dr. Jones	45	70.00
5541	blood test	23-1-2014@10.18	Dr. Scott	61	40.00
5833	blood test	23-1-2014@10.27	Dr. Scott	24	40.00
5781	blood test	23-1-2014@10.49	Dr. Scott	45	40.00
5781	CT scan	23-1-2014@11.10	Dr. Fox	45	1200.00
5833	surgery	23-1-2014@12.34	Dr. Scott	24	2300.00
5781	handle payment	23-1-2014@12.41	Carol Hope	45	0.00
5541	radiation therapy	23-1-2014@13.57	Dr. Jones	61	140.00
5541	radiation therapy	23-1-2014@13.08	Dr. Jones	61	140.00
...	...	...	...	...	...

case id

activity name

timestamp

resource

other data

- Event:** An **event** represents an individual occurrence within a business process. Each event is a specific *action* or *activity* that takes place at a *particular time*. For example, "Order Received," "Payment Processed," or "Item Shipped."

Application ID	Activity	Timestamp	User	Loan Goal	Requested Amount
Application_797	A_Create Application	1/3/2016 18:50	User_1	Car	13500

- Case:** A **case** is a unique instance of a process. It encompasses a sequence of events that are related to a specific entity, such as an order or a customer. Each case is identified by a unique case ID. For example, all the events related to "Order #12345" would be considered a single case.

Application_Number	Event_Time	Activity_Name	Resource	Loan_Goal	Requested_Amount
Application_174	1/3/2016 16:49	A_Create Application	User_1	Existing loan takeover	11000
Application_174	1/3/2016 16:49	A_Submitted	User_1	Existing loan takeover	11000
Application_174	1/3/2016 16:50	A_Concept	User_1	Existing loan takeover	11000

- Activity:** An **activity** refers to a distinct step or task within a process. Activities are the actions that are recorded as events within a case. Examples include "Create Application," "Submit Application," and "Approve Loan."

Activity_Name
A_Create Application
A_Submitted
A_Concept

- Timestamp:** A **timestamp** is the specific date and time when an event occurs. It is crucial for understanding the sequence and duration of activities within a process. For example, "2023-07-16 10:30:00" could be the timestamp for when an order was received.

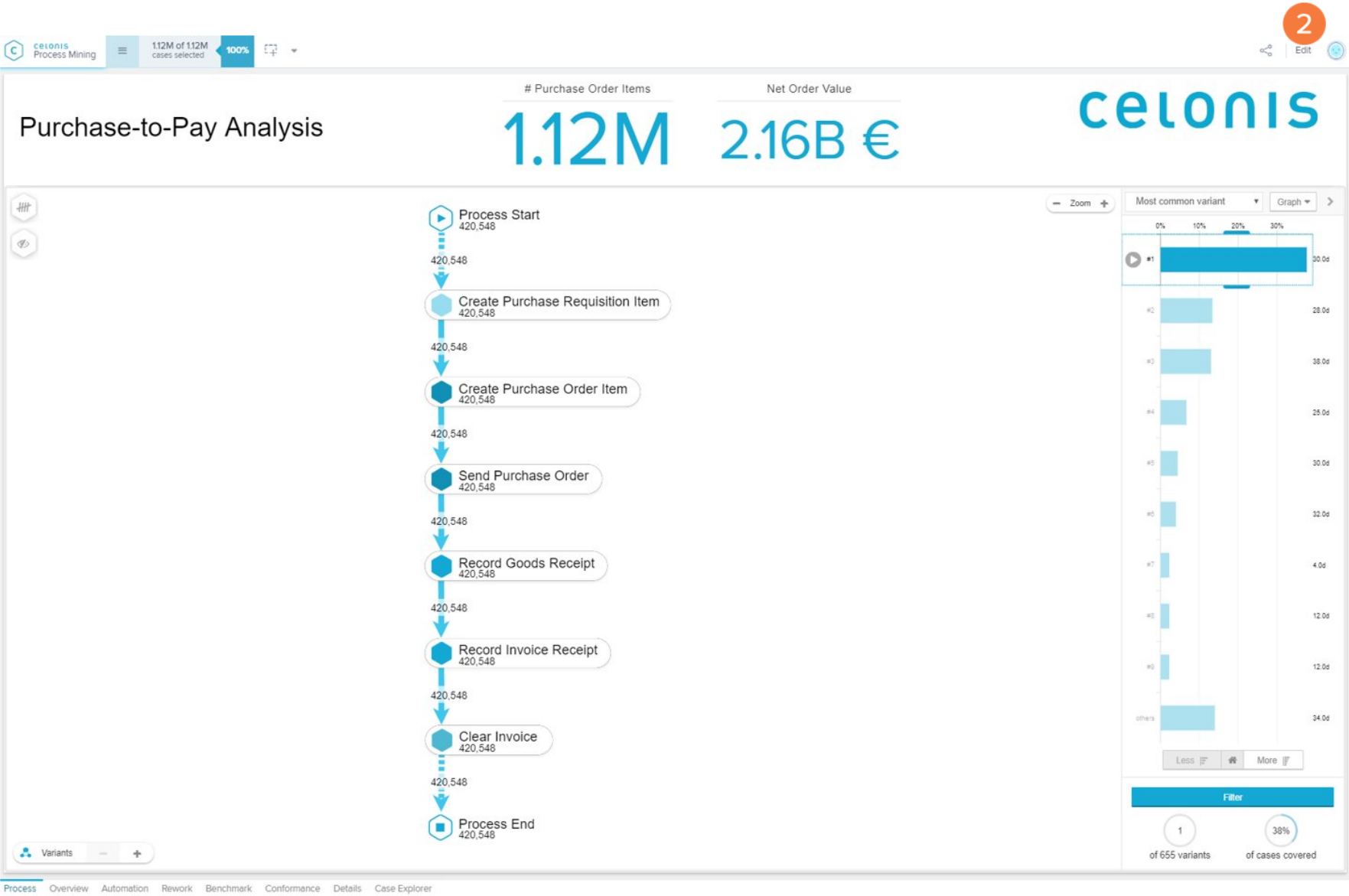
Event_Time
1/3/2016 16:49
1/3/2016 16:49
1/3/2016 16:50

- Event Log / Activity table:** An **event log** is a collection of events recorded from various cases within a process. Each entry in the event log typically includes a case ID, an activity, and a timestamp, along with any additional relevant information. Event logs are the primary data source used in process mining.

Application_Number	Event_Time	Activity_Name	Resource	Loan_Goal	Requested_Amount
Application_174	1/3/2016 16:49	A_Create Application	User_1	Existing loan takeover	11000
Application_174	1/3/2016 16:49	A_Submitted	User_1	Existing loan takeover	11000
Application_174	1/3/2016 16:50	A_Concept	User_1	Existing loan takeover	11000
Application_524	1/3/2016 17:13	A_Create Application	User_1	Caravan / Camper	15000
Application_524	1/3/2016 17:13	A_Submitted	User_1	Caravan / Camper	15000
Application_524	1/3/2016 17:14	A_Concept	User_1	Caravan / Camper	15000
Application_881	1/3/2016 17:48	A_Create Application	User_1	Existing loan takeover	15000

- Process:** A **process** is a set of activities or tasks that are performed in a specific order to achieve a particular business goal. Processes can be visualized as a flow of events that transform inputs into outputs. Examples of processes include order processing, loan approval, and customer onboarding.
- Process Model:** A **process model** is a representation of a process, typically in the form of a diagram or flowchart. It outlines the sequence of activities, decision points, and the flow of cases through the process. Process models are used to understand, analyze, and improve business processes. In process mining, process models are derived from event logs to reflect the actual behavior of a process.





▼ Event log

Event log

Aa Application_Number	≡ Activity_Name	≡ Event_Time	≡ Resource	≡ Loan_Goal	≡ Requested_Amount
<a href="#">Application_797</a>	A_Create Application	1/3/2016 18:50	User_1	Car	13500
<a href="#">Application_797</a>	A_Submitted	1/3/2016 18:50	User_1	Car	13500
<a href="#">Application_797</a>	A_Concept	1/3/2016 18:51	User_1	Car	13500
<a href="#">Application_797</a>	A_Accepted	1/4/2016 19:14	User_5	Car	13500
<a href="#">Application_797</a>	A_Complete	1/4/2016 19:17	User_5	Car	13500
<a href="#">Application_797</a>	A_Cancelled	2/29/2016 7:02	User_1	Car	13500
<a href="#">Application_524</a>	A_Create Application	1/3/2016 17:13	User_1	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Submitted	1/3/2016 17:13	User_1	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Concept	1/3/2016 17:14	User_1	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Accepted	1/4/2016 18:58	User_8	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Complete	1/4/2016 19:14	User_8	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Validating	1/14/2016 9:09	User_119	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Incomplete	1/14/2016 14:15	User_30	Caravan / Camper	15000
<a href="#">Application_524</a>	A_Pending	1/14/2016 14:41	User_113	Caravan / Camper	15000
<a href="#">Application_174</a>	A_Create Application	1/3/2016 16:49	User_1	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Submitted	1/3/2016 16:49	User_1	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Concept	1/3/2016 16:50	User_1	Existing loan takeover	11000
<a href="#">Application_881</a>	A_Create Application	1/3/2016 17:48	User_1	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Submitted	1/3/2016 17:48	User_1	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Concept	1/3/2016 17:49	User_1	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Accepted	1/4/2016 13:19	User_13	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Complete	1/4/2016 13:25	User_13	Existing loan takeover	15000
<a href="#">Application_174</a>	A_Accepted	1/4/2016 13:41	User_7	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Complete	1/4/2016 13:50	User_7	Existing loan takeover	11000
<a href="#">Application_881</a>	A_Validating	1/15/2016 10:45	User_119	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Incomplete	1/19/2016 9:00	User_29	Existing loan takeover	15000
<a href="#">Application_881</a>	A_Denied	1/19/2016 9:00	User_29	Existing loan takeover	15000
<a href="#">Application_174</a>	A_Validating	1/20/2016 8:10	User_114	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Incomplete	1/20/2016 14:13	User_99	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Validating	1/21/2016 11:16	User_116	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Incomplete	1/21/2016 12:10	User_95	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Validating	1/21/2016 15:04	User_41	Existing loan takeover	11000
<a href="#">Application_174</a>	A_Pending	1/22/2016 8:12	User_95	Existing loan takeover	11000
<a href="#">Application_634</a>	A_Create Application	1/3/2016 18:44	User_1	Home improvement	10000
<a href="#">Application_634</a>	A_Submitted	1/3/2016 18:44	User_1	Home improvement	10000
<a href="#">Application_634</a>	A_Concept	1/3/2016 18:45	User_1	Home improvement	10000

Aa Application_Number	≡ Activity_Name	≡ Event_Time	≡ Resource	≡ Loan_Goal	≡ Requested_Amount
<u>Application_634</u>	A_Accepted	1/5/2016 15:51	User_7	Home improvement	10000
<u>Application_634</u>	A_Complete	1/5/2016 15:59	User_7	Home improvement	10000
<u>Application_634</u>	A_Validating	2/4/2016 7:23	User_116	Home improvement	10000
<u>Application_634</u>	A_Incomplete	2/4/2016 8:29	User_101	Home improvement	10000
<u>Application_634</u>	A_Pending	2/4/2016 17:12	User_114	Home improvement	10000