

# Process Mining: Insights Every Day



*IT Audit VU*

**12-03-2021**

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# AGENDA

Program for 12-03-2021 from 09:30 AM to 5:00 PM.

- Recap day 1
- Practical (assurance) application
- Filing and Archiving

## COFFEE

- Demo: short repetition of day 1 / What else is possible
- Explanation of the case
- Hands-on: create fake event log using Excel
- Hands-on: import and analyse the event log using Minit

## LUNCH

- Hands-on: import and analyse the event log using Minit
- Hands-on: create presentation using PowerPoint

## COFFEE

- 15:15u Present cases
- Conclusion



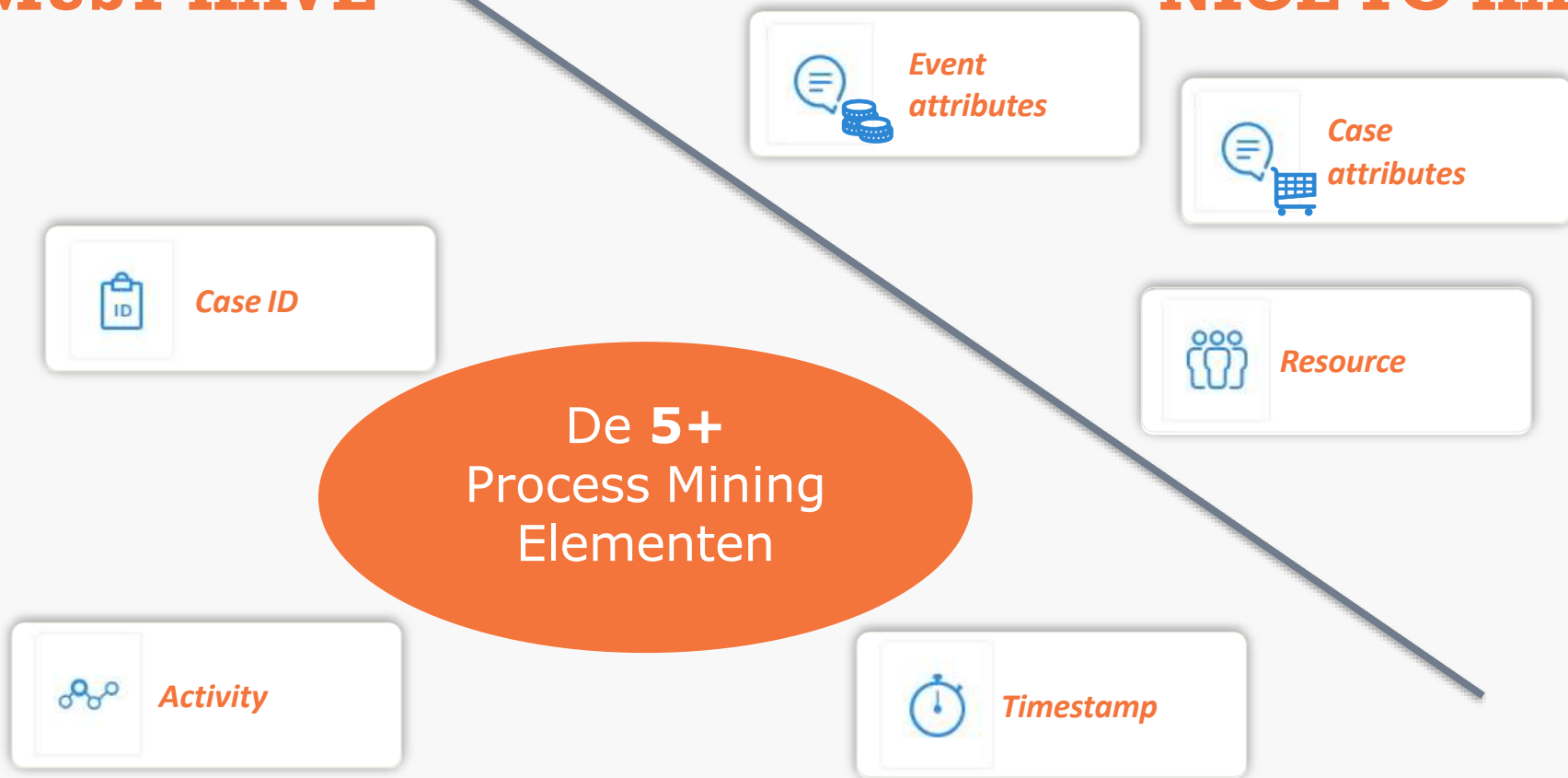
# Recap Day 1

# What is process mining?

- A process mining algorithm creates the translation of data (event log) to a visualization of a process. This is done by looking at the degree of correlation between activities in the event log.
- There are many different process mining algorithms.
  - There are about 30 commercial tools, one or more algorithms have been incorporated.
  - In open source tool ProM you can decide which algorithm you want to use. ProM is mainly used in academia.
- The power of process mining is visualization; "Show me" instead of "Tell me." This potentially changes the approach from the (internal) auditor.

# MUST HAVE

# NICE TO HAVE



Case

	Case ID	ACTIVITY	TIMESTAMP	TIMESTAMP	RESOURCE	ATTRIBUTES	
	CaseID	Activity	EndTimestamp	StartTimestamp	Resource	ActivityFinalAction	CostCenterID
Instance 1	958680	Approving on specific level	12.11.2014 11:32:10	12.11.2014 11:32:01	Daphne Cash	Approved	21
	958680	Approving on specific level	13.11.2014 16:31:49	12.11.2014 11:32:12	Tad Day	Approved	21
	958680	Process order	13.11.2014 19:53:32	13.11.2014 16:31:53	Daphne Cash	OrderProcessed	21
	958680	Delivery confirmation	10.12.2014 16:09:39	13.11.2014 19:53:38	Jael Nichols	DeliveryCancelled	21
Instance 2	956461	Approving on specific level	23.10.2014 9:58:38	23.10.2014 9:56:24	Lara Obrien	Approved	35
	956461	Process order	23.10.2014 10:04:12	23.10.2014 9:58:42	Lara Obrien	OrderProcessed	35
	956461	Delivery confirmation	28.10.2014 10:16:36	23.10.2014 10:04:21	Lara Obrien	DeliveredCompletely	35
Instance 3	960076	Approving on specific level	24.11.2014 9:20:46	24.11.2014 8:17:45	Leila Sawyer	Approved	23
	960076	Approving on specific level	24.11.2014 10:31:24	24.11.2014 9:20:49	Noel Shields	Approved	23
	960076	Approving on specific level	27.11.2014 14:40:24	24.11.2014 10:31:35	Kane Wilder	Demand	23
	960076	Demand for information	3.12.2014 13:55:54	27.11.2014 14:40:24	Noel Shields	InformationSent	23
	960076	Approving on specific level	8.12.2014 16:15:46	3.12.2014 13:55:57	Kane Wilder	Approved	23
	960076	Process order	8.12.2014 17:15:40	8.12.2014 16:15:54	Zeus Hebert	OrderProcessed	23
	960076	Delivery confirmation	8.12.2014 17:16:36	8.12.2014 17:15:42	Zeus Hebert	DeliveredCompletely	23

Events

# Preparing an event log

- Add columns (attributes)
- Add rows (cases and/or activities)
- Checking data integrity → plausibility and completeness
- M:N relations are difficult
- Database normalization: redundancy inherent in event log

# Project approach: Data analysis & Process Mining



**Plan**



**Import**

SQL



**Prepare**

ACL  
IDEA  
Alteryx



**Analyse**



**Report**



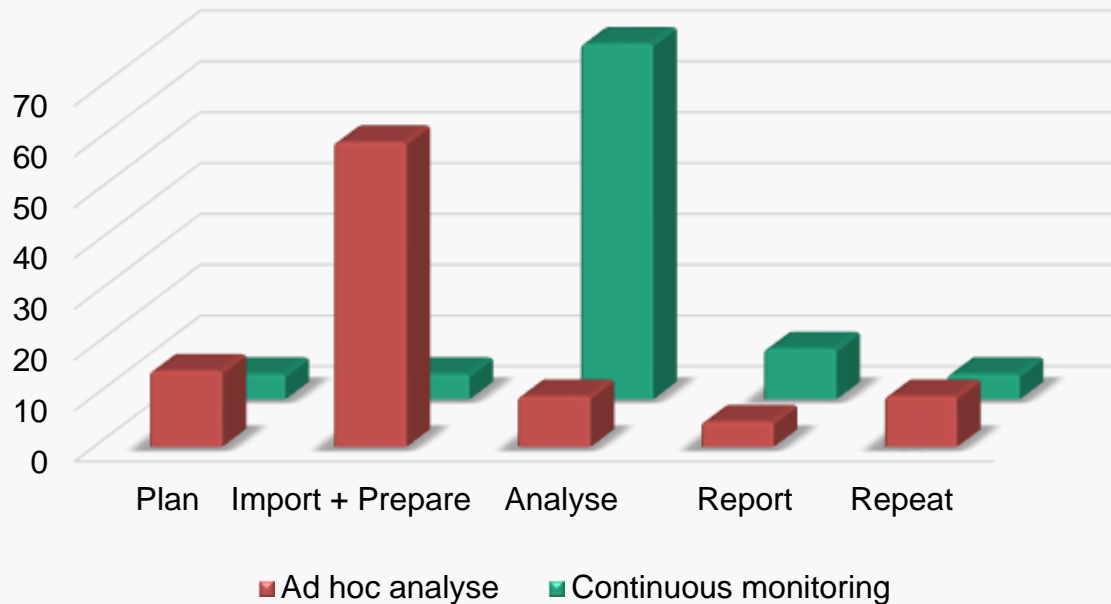




Going  
continuous

# Going continuous

Spending project hours

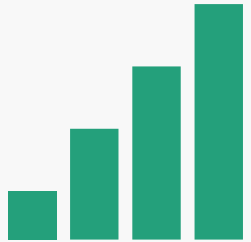




# Practical (assurance) Application

# Data analysis and process mining application areas

- Fraud guidelines
- Order to cash
- Sales discounts
- Ordering vs. billing
- Purchase to pay
- Purchase
- Transfer pricing
- Speed of payments vs. Cash flows
- Monitoring suspense balances
- Relationship between building up provisions and underlying causes
- Sales team performance
- Capacity analysis
- Double payments
- Stock turnover rates
- VAT analysis
- Social media vs. current contracts
- Result per customer
- Budget overruns
- Managing ledger accounts
- Testing real payment terms at invoice level (purchasing and sales)
- Segregation of duties and authorizations
- Credit card declarations
- Cash flow
- Revenue assurance (leakage)
- Movement of cash and goods
- Etc.



# Limited attention in standards

## Standaard 330

- "A16. Het gebruik van **auditsoftwaretoepassingen** kan een meer uitgebreide toetsing van elektronische transacties en grootboekbestanden mogelijk maken, hetgeen nuttig kan zijn wanneer de accountant besluit om de omvang van het toetsen aan te passen, bijvoorbeeld om in te spelen op de risico's op een afwijking van materieel belang die het gevolg is van fraude. Dergelijke technieken kunnen worden gebruikt om een **steekproef** van transacties uit belangrijke elektronische bestanden te trekken, om transacties met specifieke kenmerken te **sorteren** dan wel om **de gehele populatie** te toetsen in plaats van enkel een selectie daaruit."
- "A27. In dergelijke omstandigheden kan mogelijk controle-informatie over de effectieve werking worden verkregen door het verzoeken om inlichtingen in combinatie met controlewerkzaamheden, zoals waarneming of het **gebruikmaken van auditsoftwaretoepassingen**."

# Opportunities based on NBA-handreiking 1141

Applicable at all stages of the audit:

- As part of the risk assessment: types of transactions, diary entries;
- For internal control testing: authorization of transactions, flows in the systems;
- As part of the substantive work: price per item, margin by location, compare system details.

To discover fraud indications:

- Analysis of memorial bookings: among others nature, size, person, period;
- Recognizing trends: including transaction flows, type of booking;
- Reporting fraud: significant transactions, specific times, significant bookings;
- Improper appropriation of assets: analysis of bank files, duplicate invoices.

Relevant safeguards /points of interest:

- Design and existence of the relevant automated system configurations and/or automated (application) controls;
- Design, existence and operation of the relevant, underlying general IT controls (ITGCs, or general IT control measures).

# Why Process Mining?

## 1. Process Discovery

- ✓ Gain insight into your actual process
- ✓ Objective vs. Subjective: 100% of all transactions
- ✓ Explorative vs. targeted search
- ✓ Visualization of risks and control measures

## 2. Conformance checking

- ✓ IST-SOLL comparison
- ✓ Process comparison: periods, regions, etc.
- ✓ Performance

## 3. Rule-based property verification

- ✓ Insight into the actual operation of control measures
- ✓ Complete overview with exceptions
- ✓ Fraud signal detection
- ✓ Continuous monitoring (database connection)



# Application areas process mining

- Assurance
  - Focus on analysis of key controls
- Fraud research
- Starting point for application of RPA:
  - Standardize and optimize process in preparation for RPA
  - Map RPA candidates with process mining.
  - Simulate the possible influence of RPA on the total process
  - Analyse logs of actions performed by RPA bots
  - Continuous Monitoring: Monitor how bots perform in relation to the overall process
- Very suitable as a part of Lean Six Sigma

# Audit phases

## 1. Process Discovery

- ✓ Mainly in the understanding phase of an audit
- ✓ The goal is to understand processes

## 2. Conformance checking

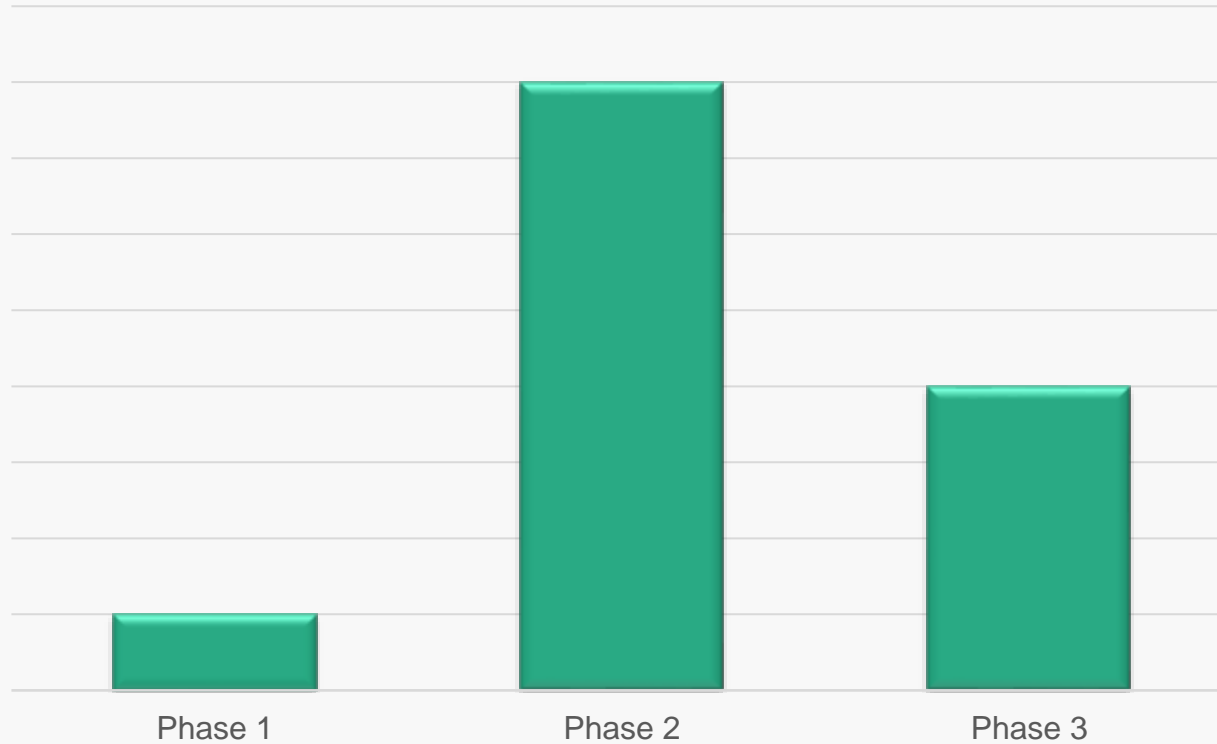
- ✓ During the interim phase of the audit
- ✓ Determine whether identified controls are present

## 3. Rule based property verification

- ✓ During the end-of-the-year phase of the audit
- ✓ Determine that controls have worked well throughout the period
- ✓ Track exceptions



# Audit phases – ITGCs



# Conditions

- When is data analysis meaningful?
  - Organizational characteristics (high degree of digitization)
  - Follow-up of results of other audits (substantive activities)
  - Add value
- Conditions = insight into:
  - IT control
  - Processes (high level)
  - Meaning of the data
- IT General Controls:
  - Am I sure that mutations can be traced to the correct individuals? (inherent risk)
  - Data not manipulated?
- What do I know about the underlying source data?
  - Have I seen underlying invoices? Risks?



# Filing and Archiving

# Filing and Archiving

- Objective analysis
  - Conclusion
  - Sources
  - Analysis
  - Results
  - Reporting
- 
- Reperformable, story of the audit, audit trail
  - Format, requirements differ per situation and office



# Demo: Repetition Day 1



What else  
is possible?

# What else is possible?

- Hierarchical process mining
- Business rules
- Custom metrics
- Root cause analysis
- Case duration influence
- What-if simulations
- Dashboards
- ...



# Case



# Case explanation

- Preparation we gave last week:
  - Think individually of a case where process mining could be applied based on your practical experience.
  - Think about what data you would need for it.
  - Think about what opportunities and/or risks you would like to test in your case using process mining.
- Carry out the case today:
  - Pick the best idea for a case from your group
  - Create a fake event log in Excel based on that case with exceptions that you would like to check and file/archive.
  - Import the event log and carry out analyses using Minit.
  - Present results and identify the challenges you see in applying process mining.

# Create your own event log

- Create an event log per group in Excel based on a case you have created with corresponding controls.
- Import the event log and analyse it using Minit.

## Columns:

- Column: Case-ID (unique identifier)
- Column: Activity (description of the process step)
- Column: Timestamp (dd-mm-yyyy hh:mm)
- (Column: Resource (employee))
- (Column: Attribute X) etc.

## Handle in terms of size event log:

- 10 cases
- 5-6 activities per case
- 5 cases follow the happy path
- Let the remaining cases deviate from the happy path to be able to analyze and present your audit questions.

*Short example: Order to cash process*

<u>Case ID</u>	<u>Activity</u>	<u>Timestamp</u>
2018001	Order geplaatst	25-05-2018 13:39
2018001	Betaling ontvangen	25-05-2018 14:12
2018001	Goederen gereed voor verzending	25-05-2018 16:59
2018001	Goederen verzonden	26-05-2018 01:58
2018002	Order geplaatst	25-05-2018 13:49
2018002	Betaling ontvangen	25-05-2018 22:04
2018002	Goederen gereed voor verzending	27-05-2018 00:31



# Presentation topics

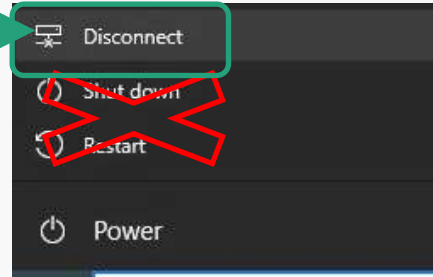
- Object of investigation
    - Key risks
  - Objective
  - Approach
  - Observations
  - Linking observations to risks
  - Recommendations
- 
- Mail presentation in PDF to [academy@coney.nl](mailto:academy@coney.nl)

# Options to create an event log:

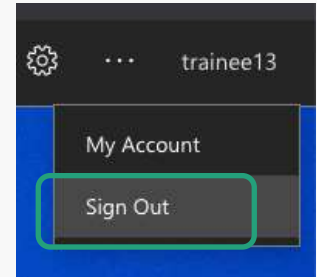
1. Use Excel on your own laptop, save as .csv and mail to yourself to download from your mail in the training environment.
2. Use Openoffice within the training environment, save as .csv
3. Use Excel on your own laptop, save as .csv
  - a. Open the .csv file in a plain text editor (e.g. Notepad)
  - b. Copy the data and paste this data to your clipboard
  - c. On the desktop within the training environment, create a new notepad file and paste the clipboard data into it.
  - d. Save as .csv

# Sign in to the Minit training environment

- Open via an "Incognito / InPrivate Window":  
<https://rdweb.wvd.microsoft.com/webclient/>
- Username and password are provided
- Click on: 
- Enter username and password again
- **Be aware!** When closing: 



or



# Groups - Accounts

Group	Trainee accounts
1	<a href="mailto:trainee1@oceanlabs.nl">trainee1@oceanlabs.nl</a> / <a href="mailto:trainee2@oceanlabs.nl">trainee2@oceanlabs.nl</a>
2	<a href="mailto:trainee3@oceanlabs.nl">trainee3@oceanlabs.nl</a> / <a href="mailto:trainee4@oceanlabs.nl">trainee4@oceanlabs.nl</a>
3	<a href="mailto:trainee5@oceanlabs.nl">trainee5@oceanlabs.nl</a> / <a href="mailto:trainee6@oceanlabs.nl">trainee6@oceanlabs.nl</a>
4	<a href="mailto:trainee7@oceanlabs.nl">trainee7@oceanlabs.nl</a> / <a href="mailto:trainee8@oceanlabs.nl">trainee8@oceanlabs.nl</a>
5	<a href="mailto:trainee9@oceanlabs.nl">trainee9@oceanlabs.nl</a> / <a href="mailto:trainee10@oceanlabs.nl">trainee10@oceanlabs.nl</a>
6	<a href="mailto:trainee11@oceanlabs.nl">trainee11@oceanlabs.nl</a> / <a href="mailto:trainee12@oceanlabs.nl">trainee12@oceanlabs.nl</a>
7	<a href="mailto:trainee13@oceanlabs.nl">trainee13@oceanlabs.nl</a> / <a href="mailto:trainee14@oceanlabs.nl">trainee14@oceanlabs.nl</a>
8	<a href="mailto:trainee15@oceanlabs.nl">trainee15@oceanlabs.nl</a> / <a href="mailto:trainee16@oceanlabs.nl">trainee16@oceanlabs.nl</a>



# Conclusion

**Thanks for your  
attention, good luck!**