

## Innovation mindset

### Process mining

#### Overview

Advances in database systems, data visualization and the understanding of business processes have come together to create an exciting and powerful way for organizations to gain a deep understanding of their data with a technique called process mining. Process mining uses event logs from an organization's database systems to deeply analyze a process.

Process mining is just starting to be more utilized in practice; therefore, as a technology, it can be labeled emerging and innovative as its potential and application are still being discovered. At its core, process mining is a data analytics technology as it allows visualization of data. This data is different, though, from what is traditionally analyzed using data analytics tools today because it needs to include descriptive data about data, including activity and time stamp data (event logs). This is sometimes referred to as metadata. Challenges exist today in adopting this emerging technology more widely due to the feasibility and cost of the data collection and the complexity and variability of business processes.

The process mining curriculum materials are designed to give students an introduction to this emerging technology and its application to better understand how business processes actually occur, compared with how they are expected to occur. This curriculum has been classified under the innovation mindset topic because it is still emerging in practice, but it can also easily be classified under the analytics mindset topic as well. The materials are therefore designed to develop both mindsets.

In developing an innovation mindset, students are encouraged to consider how they might understand a process in a better manner than it is currently understood today and specify how the use of emerging technology, such as process mining, can bring value. This helps advance their ability to redefine how work can get done faster, simpler and better, as well as their comfort and acceptance and willingness to try and fail with something new. Students are also encouraged to get hands-on experience by using a process mining tool, thus promoting their ability to solve problems creatively and embrace new technology.

In developing an analytics mindset, students are expected to:

- ▶ Ask the right questions
- ▶ Extract, transform and load relevant data (i.e., the ETL process)
- ▶ Apply appropriate data analytics techniques
- ▶ Interpret and share the results with stakeholders

These cases are designed to be used in various courses across the curriculum, including an accounting information systems course, data analytics course, auditing course and managerial course. The case materials are designed to be flexible so they can be implemented in class, as homework, as a student project or as part of an exam.

The cases may each be used independently, but they have been presented in an ordered series to most comprehensively meet the learning objectives for developing both innovation and analytics mindsets.

### Introduction case

This case provides an overview of process mining and its application, data needed for a process mining analysis, examples of process mining visualizations, roles associated with process mining, process mining programs and vendors, and benefits and challenges of process mining. It is similar to a short textbook chapter. Students are required to read the information provided, then answer questions posed to foster critical thinking about the subject matter.



Case study

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Case study solutions

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Handouts

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This handout can provide additional reading material for your students on the topic of process mining. It is an EY publication, *Process mining and its impact on BPM*. Note that BPM stands for business process management.

### Document the process case

In order to analyze a business process through process mining, it is important first to understand how the business process is designed. This case presents a narrative of an order-to-cash business process for a hypothetical company, BW Fishing Inc., and requires a student to make a flowchart of this process. The completed flowchart (solution to this case) and the narrative are included in the appendices of the subsequent cases for reference (and, in particular, for the scenario where you do not require your students to complete this case). Note that you can use any tool you prefer students use to prepare the flowchart. We have provided the solution built using Lucidchart but saved as a Microsoft Visio file type, which is captured in the Microsoft Word and Adobe files.



Case study

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Case study solutions

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## Build the data set case

This case provides students with an overview of the database provided to them (data tables and their corresponding data fields). It requires students to query this database to create the data set needed for the process mining software to effectively analyze the activities (or events) in the order-to-cash process (this can also be referred to as an activity file). You can require students to complete the querying using SQL (option 1) or Microsoft Access Query Design View (option 2). The appendices of the case include the narrative and flowchart of the order-to-cash process from the Document the process case.



Case study

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Data set

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Case study solutions

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Data set solution

Option 1: SQL

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Option 2: Microsoft Access Query Design View

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## Build the dashboards case

This case helps students learn the process of building process mining dashboards in a walkthrough format using Celonis software. This case is an introductory case and as such, does not require significant student judgment or experience. Rather, this case is designed to help students learn the basics of the Celonis process mining software so they can build their own dashboards in the future and be better prepared to use the process mining dashboards provided in the subsequent cases.

- ▶ The data is provided in an Excel spreadsheet that has 9,735 rows for 1,000 sales transactions. The data in this case differs from that in the other cases.
- ▶ These dashboards are created using Celonis software. See the information later in this guide about access to this software. Student will submit a URL link to their dashboards for grading.
- ▶ The appendices of the case include the narrative and flowchart of the order-to-cash process from the Document the process case.
- ▶ The solutions are embedded into the case itself as it includes screenshots of the dashboards that the students are required to build and detailed instructions of how to build the dashboards. The case requirements essentially help the students learn how to use the software and so the case is not meant to be an evaluative exercise.
- ▶ A video is also provided to walk students through the step-by-step procedures to build the dashboards.



Case study

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Data sets

[Innovation\\_mindset\\_case\\_studies\\_Process\\_mining\\_Event\\_log\\_data.xlsx](#)



Videos

Link: The link is not provided for this user guide. See the EYARC site for the user guide that includes the link.

Downloadable MP4 file:

[Innovation\\_mindset\\_case\\_study\\_solutions\\_Process\\_mining\\_Build\\_the\\_dashboards.mp4](#)

### Analyze the process – Case 1

This case has students use the process mining dashboards provided to analyze the order-to-cash cycle for BWF Fishing Inc. The case requires students to use the dashboards to analyze this process based on the perspectives of different departments within the company, including Internal Audit, Corporate Accounting and Finance, and Information Technology.

These dashboards have been created using Celonis software. These dashboards are accessible via the cloud using this link (the link is not provided for this user guide. See the EYARC site for the user guide that includes the link).

- ▶ It is not necessary to acquire Celonis software to complete the case.
- ▶ Basic instructions about how to use the Celonis dashboards are included in the case.
- ▶ The appendices of the case include the narrative and flowchart of the order-to-cash process from the Document the process case.
- ▶ The solutions include both a document and a video to walk students through the step-by-step procedures to use the dashboards to respond to the questions.



Case study

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Case study solutions

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Videos

This video provides “how-to” instructions for each case requirement.

Link: The link is not provided for this user guide. See the EYARC site for the user guide that includes the link.

Downloadable MP4 file:

[Innovation\\_mindset\\_case\\_study\\_solutions\\_Process\\_mining\\_Analyze\\_the\\_Process\\_Case1.mp4](#)

## Analyze the process – Case 2

This case has students use the process mining dashboards provided to analyze the credit approval process within the order-to-cash cycle for BW Fishing Inc. Students must assume the role of the external auditor piloting the use of process mining in the planning phase of the audit in which both an audit opinion on internal controls and the financial statements is required.

- ▶ Part 1 of the case requires students to analyze the credit approval process without using the dashboards and identify the possible internal controls risks.
- ▶ Part 2 of the case requires students to analyze the credit approval process using the dashboards.
  - Students must identify each process variant, assess the risk of each process variant and provide support for their assessments.
  - Students are then required to test select internal controls and share their findings of this testing.
  - Students are asked to draw overall conclusions regarding their work and consider:
    - ▶ Implications for their audits
    - ▶ Additional audit procedures that might need to be performed
    - ▶ Whether process mining assisted them in identifying additional or different internal controls risks by comparing their work in Part 2 to risks they identified in Part 1
  - Students are then asked about their perspectives of whether they believe that process mining would be beneficial for use by the audit profession.
- ▶ These dashboards have been created using Celonis software. These dashboards are accessible via the cloud using this link (the link is not provided for this user guide. See the EYARC site for the user guide that includes the link).
- ▶ It is not necessary to acquire Celonis software to complete the case.
- ▶ Basic instructions on how to use the Celonis dashboards are included in the case.
- ▶ The appendices of the case include the narrative and flowchart of the order-to-cash process from the Document the process case.
- ▶ The solutions include both a document and a video to walk students through the step-by-step procedures to use the dashboards to respond to the questions.



### Case study

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### Case study solutions

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### Videos

This video provides how-to instructions for each case requirement.

Link: The link is not provided for this user guide. See the EYARC site for the user guide that includes the link.

Downloadable MP4 file:

Innovation\_mindset\_case\_study\_solutions\_Process\_mining\_Analyze\_the\_Process\_Case2.mp4

## Advanced preparation

It is recommended that you expose students to the definition and importance of the innovation and analytics mindsets and related competencies prior to covering this case. The EYARC offers you lecture notes, slides and a competency framework in the Introduction to the analytics mindset module.

## Data

The data for these cases was simulated. The company is a fictional retail company that sells fishing supplies. There are various data sets for the different cases. These data sets are either simple or complex, depending on the case. Although simulated, the processes, patterns in the data and internal control weaknesses mimic those found in a real company's data.

## Software

Select cases use the process mining software made by Celonis. Celonis provides free access for educators as well as online training resources. See <https://www.celonis.com/academic-alliance/> for full details.

- ▶ For the Build the dashboards case, students **do need** access to the Celonis software.
  - Students can use Celonis Snap edition of the software to complete this case. This software version is limited in functionality in comparison to the academic edition of the software, but it is easier to use and still allows the student to understand the basics of building process mining visualizations. It is available at <https://www.celonis.com/solutions/celonis-snap>.
  - ▶ Should students want to experience the more complex but more powerful version of the software, students can sign up for the academic edition. It is available at <https://www.celonis.com/acal-students/>.
- ▶ For the Analyze the process Cases 1 and 2, students **do not need** to have the Celonis software. The dashboards are already prepared and can be used by anyone with an internet connection as they are hosted in the cloud.