

IBM Cloud Pak for Business Automation

Demos and Labs

IBM Process Mining

Lab Guide - Use Process Mining to Get Insights into Client Onboarding Workflow

IBM Process Mining 2.0.2

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2 Introduction

2.1 Process Mining

Process mining is a family of techniques in process management that support the analysis of actual business processes based on event logs. In Process Mining, a business process is a collection of activities or tasks related to a specific service or product to serve an established business goal, such as processing a loan application.



In Process Mining, an Event represents the execution of an Activity in a process. Events are rows in the data source CSV file.

During process mining, specialized data mining algorithms are applied to identify trends, patterns, and details in event logs recorded by an information system. This aims to improve process efficiency and understanding.

More technical information about IBM Process Mining:

<https://ibm.box.com/v/IBMProcessMiningTechIntro>

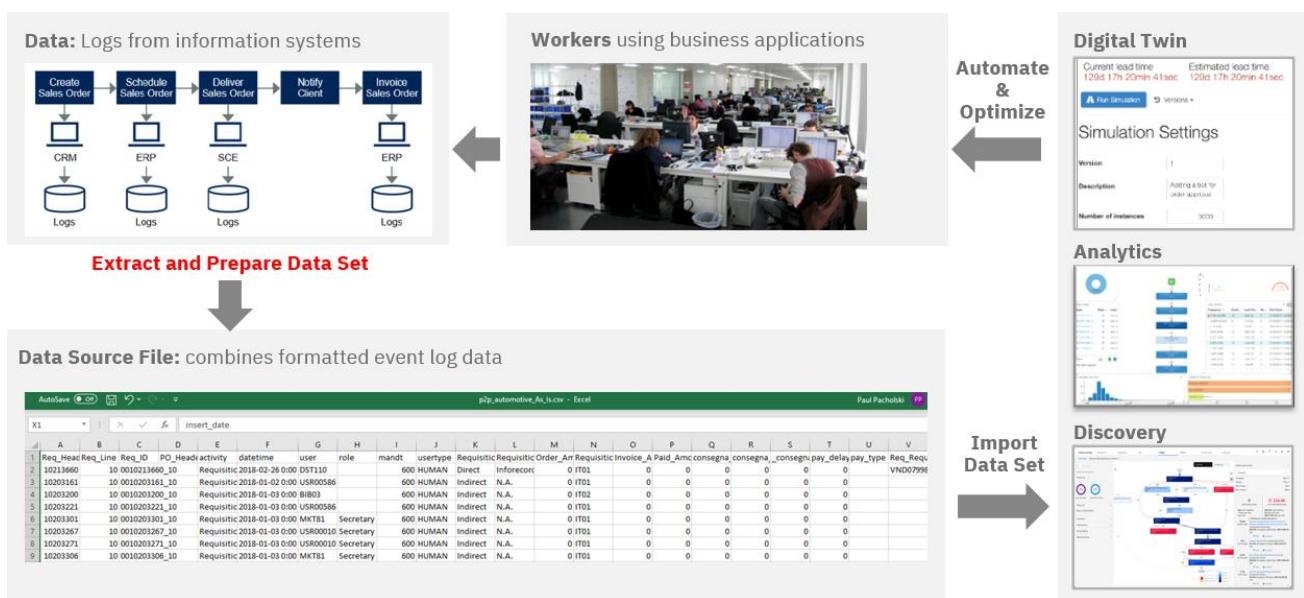


Figure 1. Process Mining

Two initial steps must be completed before we can start using Process Mining tools (see the **Extract and Prepare Data Set** Step in the figure above, marked in red):

1. Generating and extracting audit log data from applications intended for process mining.
2. Converting the raw audit log data to a format acceptable by IBM Process Mining.

The good news is that by combining IBM Business Automation Workflow with IBM Business Automation Insights, IBM Process Mining can automatically extract data sets, prepare the data, and create a Process Mining Project for you.

2.2 Using IBM Business Automation Insights for Data Extraction

IBM Business Automation Insights captures events generated by operational systems using IBM Business Automation products. These events are aggregated into business-relevant KPIs and displayed on dashboards, giving lines of business a real-time view of their operations.

More technical information about IBM Business Automation Insights: <https://ibm.box.com/v/IBM-BAI-Tech-Intro>

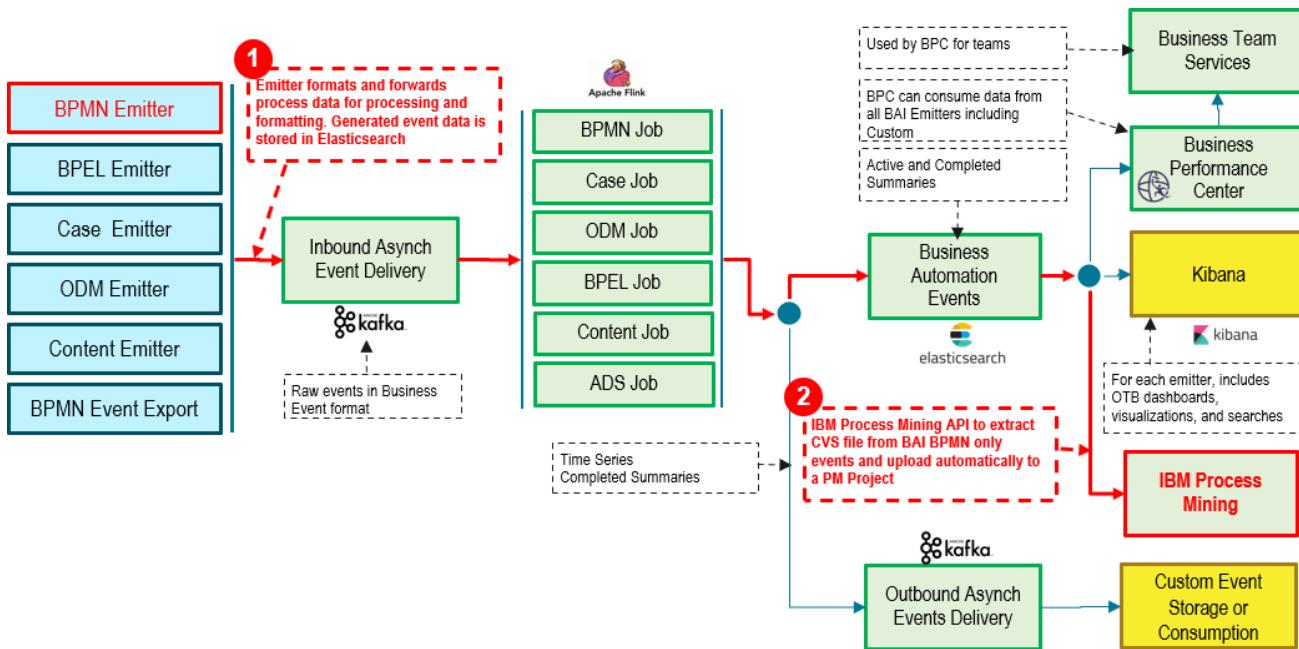


Figure 2. IBM Business Automation Architecture. Path 1: Data Generation. Path 2: Process Mining Project Creation

IBM Business Automation Insights emitters send business and process lifecycle data to the Elasticsearch datastore. The only programming effort required when designing a Workflow is to define what and when to emit the data from Cases and Processes - see **Path 1** in Figure 2 above, marked in red.

2.3 Using IBM Process Mining API for Data Preparation

IBM Process Mining provides several APIs to transfer IBM Business Automation Workflow process data from BAI Elasticsearch directly to an IBM Process Mining project. This capability helps avoid costly manual data preparation. It automates the direct import of data into the IBM Process Mining project, as shown in Path 2 of Figure 2 above, marked in red.

The two key IBM Process Mining APIs are (see Figure 3 below):

1. API to retrieve all Process Apps that have events in Elasticsearch, and
2. API to convert events from all Processes in a selected Process App to CSV files and send them to the IBM Process Mining server.

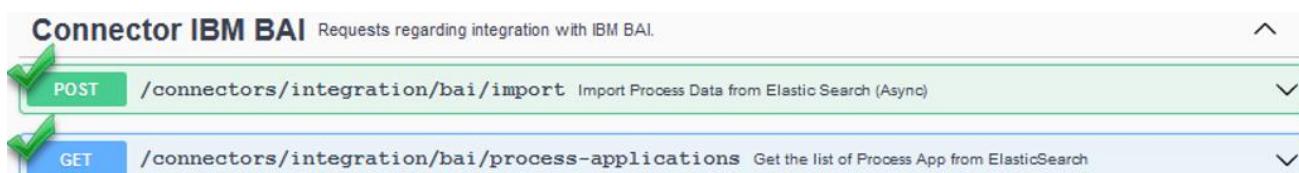


Figure 3. IBM Process Mining API for IBM Business Automation Insights

For more details, see a recorded demo: <https://ibm.box.com/v/BAI-2-PROCESS-MINING-EXPORT> and lab instructions: <https://ibm.box.com/v/BAI-2-PM-EXPORT-LAB>

2.4 Client Onboarding Solution

2.4.1 Client Onboarding Use Case

Focus Corp is a business services provider offering a range of services across various industries. Focus Corp utilizes a fully automated solution, Client Onboarding, to onboard clients to its services.

Watch [this video](#) to see how client onboarding requests are completed.

2.4.2 Client Onboarding Workflow Implementation Details

We implemented the Client Onboarding use case utilizing most of IBM Cloud Pak for Business Automation's capabilities. We chose the Case Solution feature of IBM Business Automation Workflow for orchestration, and there are several reasons for this decision. The use case is ad hoc and event-driven, with new situations arising unexpectedly, such as the expiration of backing documents or new regulations requiring additional documents. Knowledge workers frequently decide the next steps in the Process. Lastly, the use case is document-intensive and requires data persistence beyond process completion, enabling us to reopen cases later.

Figure 4 below shows the implementation details. Each Case Activity is implemented using a BPMN Process. Each step in a BPMN Process includes a series of Process steps. Each process step emits BAI events that are stored in Elasticsearch.

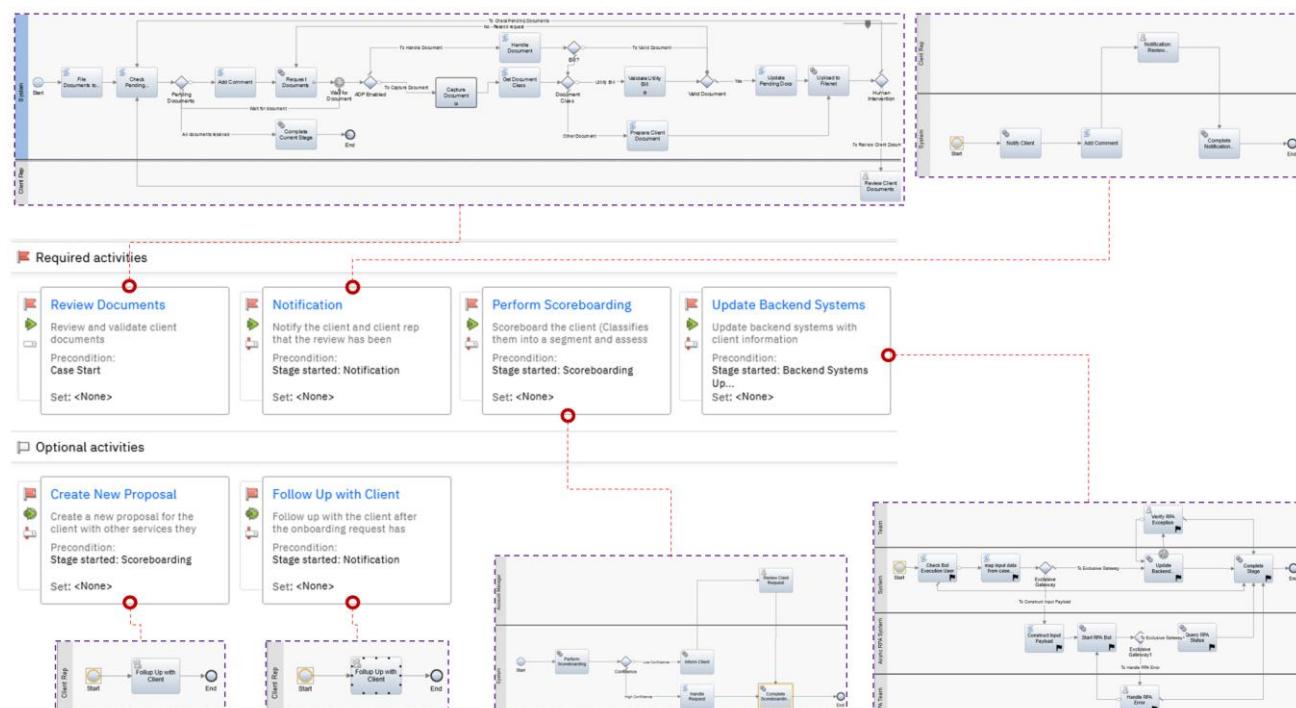


Figure 4 Client Onboarding Solution - Implementation Details

2.5 Lab Objectives

This lab demonstrates how IBM Process Mining leverages the Client Onboarding Solution event data captured in BAI to identify automation and business improvement opportunities.

The primary objective is to introduce you to the rich features and functions of IBM Process Mining through experiential learning, focusing on identifying process improvement opportunities.

If you need to dive deeper into any particular topic while working through the instructions or after completing the lab, please refer to the [documentation](#).

Let's get started!

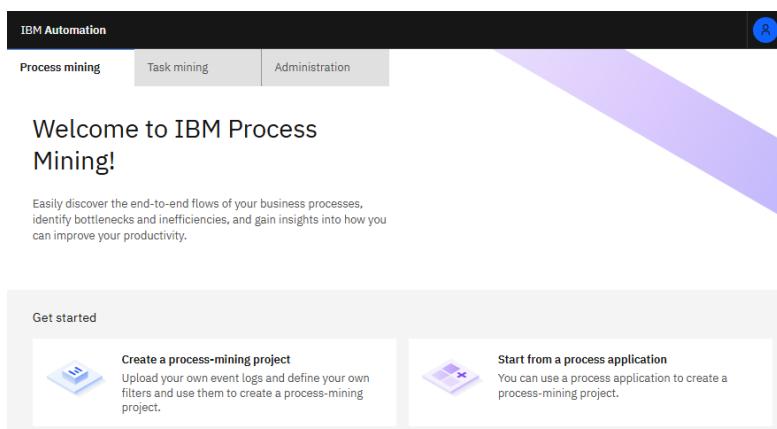
3 Lab Setup

3.1 Provision Process Mining Environment

- _1. Download or open [this](#) document.
- _2. Follow the instructions to reserve the Tech Zone Environment, and then start the Process Mining Server.
- _3. Follow the instructions in "3.2.1 Accessing PM Web Client from the Desktop's Web Browser" to access the PM web console.

3.2 Open IBM Process Mining Application

- _1. Launch the PM Web UI console using one of the methods in "2.4.1 Accessing PM Web Client from your Desktop's Web Browser."
- _2. You should now see the IBM Process Mining web UI.



3.3 Import Lab Files

- _1. Download the following files. You will use them in this lab:

File	Link
Client Onboarding NG.csv	https://ibm.box.com/v/CO-LAB-DATASET-NG
Client Onboarding NG.idp	https://ibm.box.com/v/CO-LAB-IDPFILE-NG

4 Exercise: Use Process Mining to Get Insights into Client Onboarding Solution

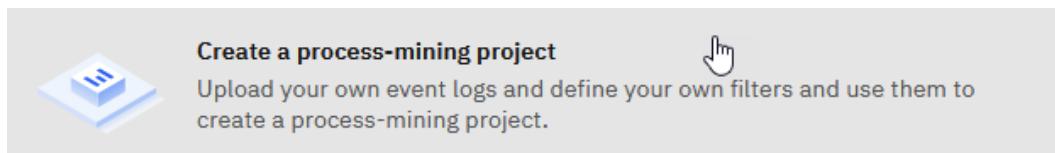
4.1 Create and Configure the Client Onboarding Process

Typically, the Process Mining API extracts process data from Elasticsearch, creates a Process for you, populates it with the data, and maps the required columns (process ID, timestamp, and activity name). In this lab, you will not be using the API directly. However, the dataset you'll use in this lab to build your Process Mining Project was extracted from the Elasticsearch data store using the IBM Process Mining API.

4.1.1 Create the Client Onboarding Process

Note: IBM Process Mining tools use the term 'Process' for a Process Mining Project. From now on, we will refer to the Project Mining Project as a 'Process.'

1. Click on the **Create a process-mining project** tile.



2. For **Process Title**, enter **Client Onboarding** and click **Create Process**.

Create a process-mining project

Please ensure you name and select the correct organization carefully for this process, as you will not be able to change these after pressing Save.

Name

Client Onboarding

Use existing organization Create new organization

Organization name

Find an organization

Migrate a legacy project

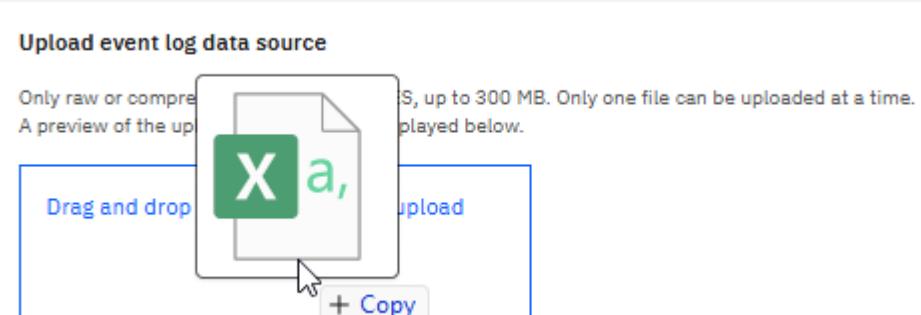
Retrieve data and backup from legacy project

Cancel Create process

4.1.2 Upload Process Data

In this step, you will upload the Client Onboarding Solution data initially emitted to BAI.

_1. Drag and drop (or click to upload) the **Client Onboarding NG.csv** file you downloaded earlier.



Upload event log data source
Only raw or compressed CSV files up to 300 MB can be uploaded at a time.
A preview of the uploaded file will be displayed below.

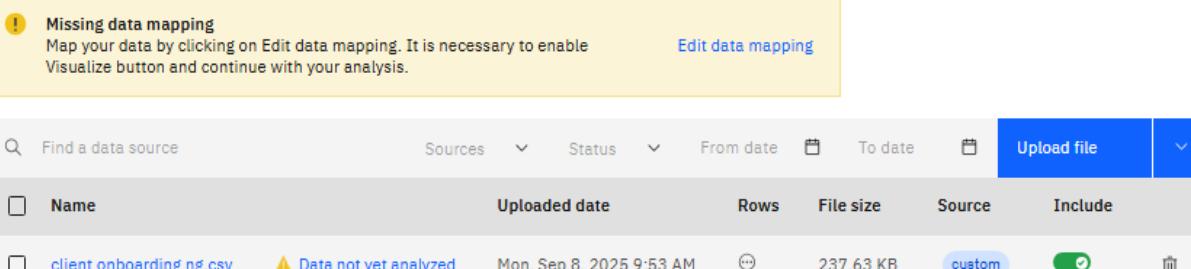
Drag and drop + Copy



The supported Data Sources file format is a CSV or a zipped CSV.

_2. You should now see your file uploaded.

Note: We will address the "*Missing data mapping*" warning next by importing the project configuration file, which includes the data mapping.



Missing data mapping
Map your data by clicking on Edit data mapping. It is necessary to enable the Visualize button and continue with your analysis.

Name	Uploaded date	Rows	File size	Source	Include
client onboarding ng.csv	Mon, Sep 8, 2025 9:53 AM	237.63 KB	custom	<input checked="" type="checkbox"/>	

4.1.3 Upload Process Configuration Settings

In addition to the CSV file generated by the extraction process of data from IBM Business Automation Insights (BAI), we will also upload a process configuration. The process configuration file includes data mapping definitions, predefined process filters, Client Onboarding dashboards (which we will use to analyze Client Onboarding processes), and the process reference model.



The process reference model of a process describes its expected standard behavior in terms of activities and Workflow. A process owner typically designs the reference model in BPMN or XPDL and then imports it into a Process Mining project. A reference model is optional; it is not required to visualize a process.

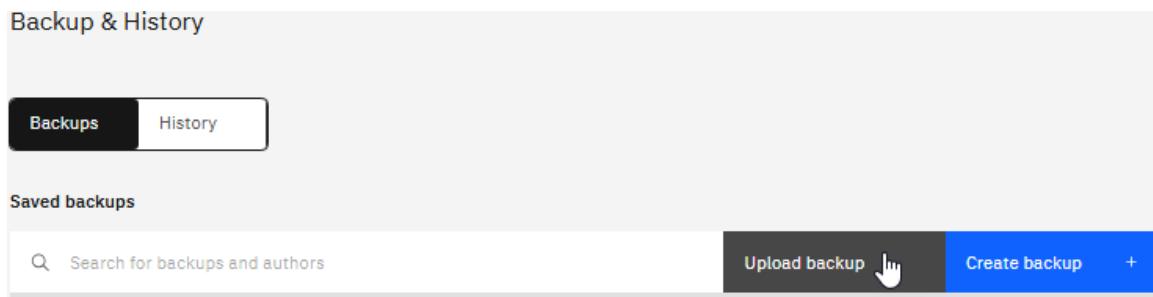
_1. Click the **Apply backup** link.



Do you want to start from pre-built configurations?
Upload and apply a backup from an existing project.

Apply backup

_2. Click the **Upload backup** button.



Backup & History

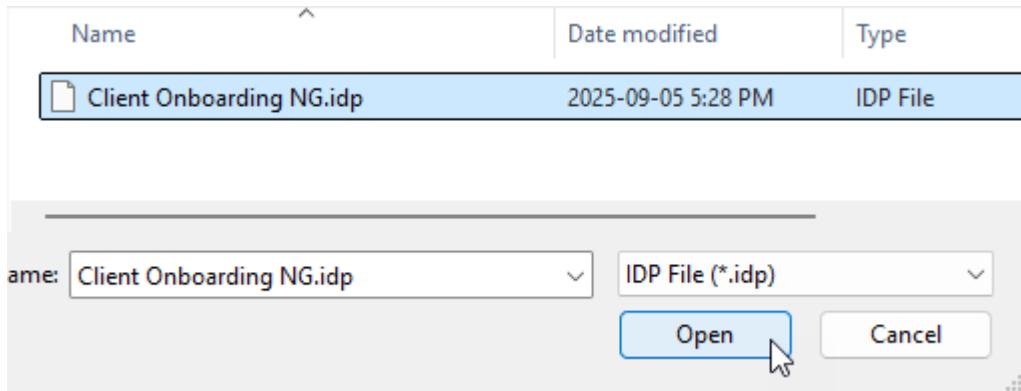
Backups History

Saved backups

Search for backups and authors

Upload backup  Create backup +

_3. From the file system, select the **Client Onboarding NG.idp** file and click on **Open**.



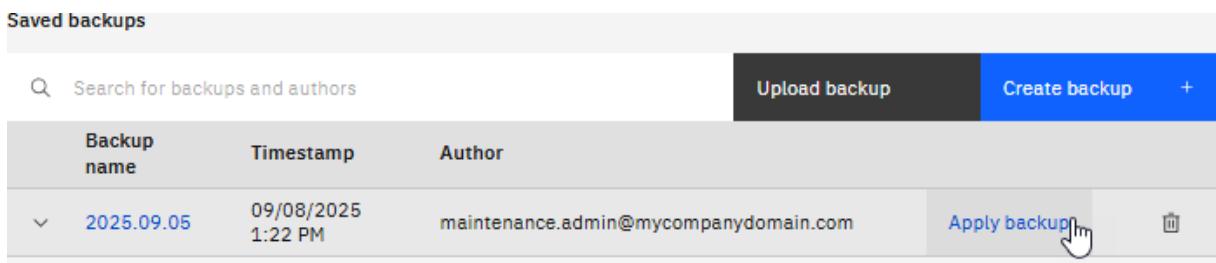
Name	Date modified	Type
 Client Onboarding NG.idp	2025-09-05 5:28 PM	IDP File

Name: Client Onboarding NG.idp

Type: IDP File (*.idp)

Open  Cancel

_4. Click **Apply backup** link.



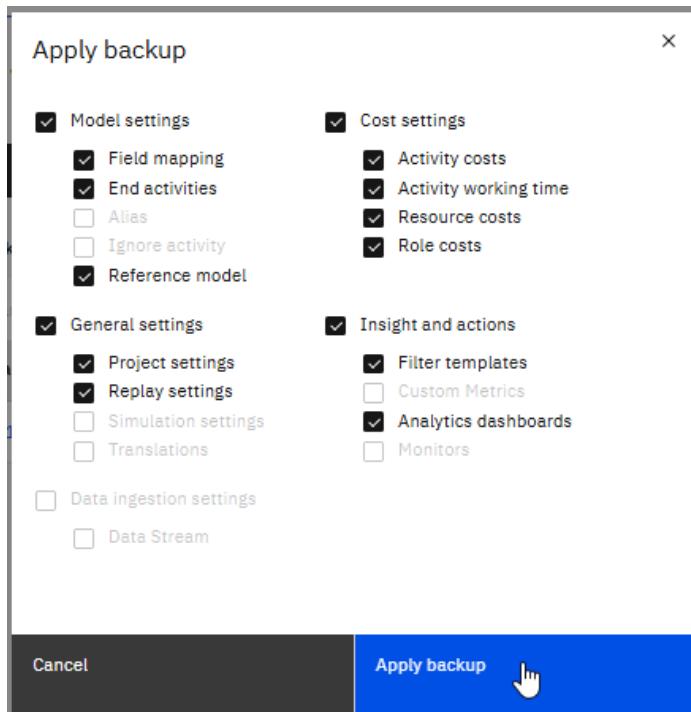
Saved backups

Search for backups and authors

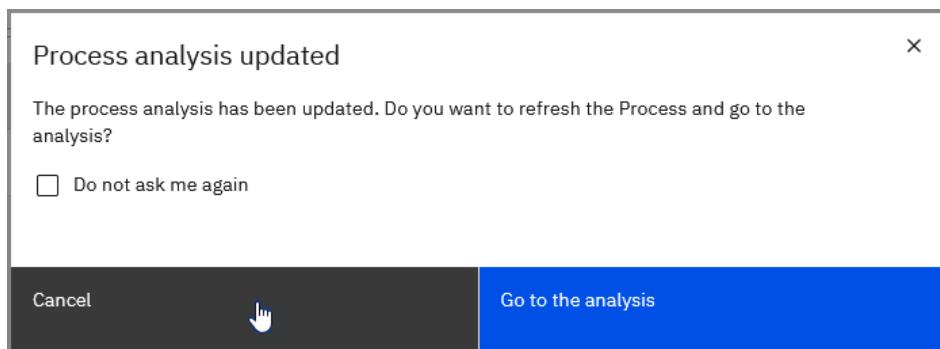
Upload backup Create backup +

Backup name	Timestamp	Author	Actions
2025.09.05	09/08/2025 1:22 PM	maintenance.admin@mycompanydomain.com	Apply backup 

_5. Click the **Apply backup** button.



_6. Wait until you see the *Process analysis updated* pop-up window, then click the **Cancel** button.



4.1.4 Perform Additional Data Mapping

The Process Mining API automatically extracted the data from BAI, created a Project for us, and even performed the compulsory data mapping. It mapped the essential fields required to generate Process visualization. The required fields are:

1. **Process ID.** There can be multiple columns; in our dataset, we only have one – the Case Reference ID: CO.ReferenceID)
2. **Activity.** In our dataset, it is the name of an Activity in a Process - activityName
3. **Time Stamp.** Only one is required (start or stop of an activity). Because BPMN processes emit this lifecycle data to BAI, our dataset includes start and stop timestamps (startTime and endTime). This is important because both time stamps allow us to compute Activity durations!

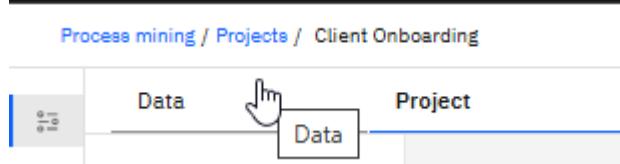
Notice that some additional fields, such as resource, role, and other business data fields, are already mapped (**green tick**). We mapped these fields for you. The **red x** shows examples of the fields that were not mapped.

Data mapping

Data mapping				
shortProcessInstanceId	activityName	startTime	endTime	

Let's now map one of the business data fields to illustrate the mapping editor.

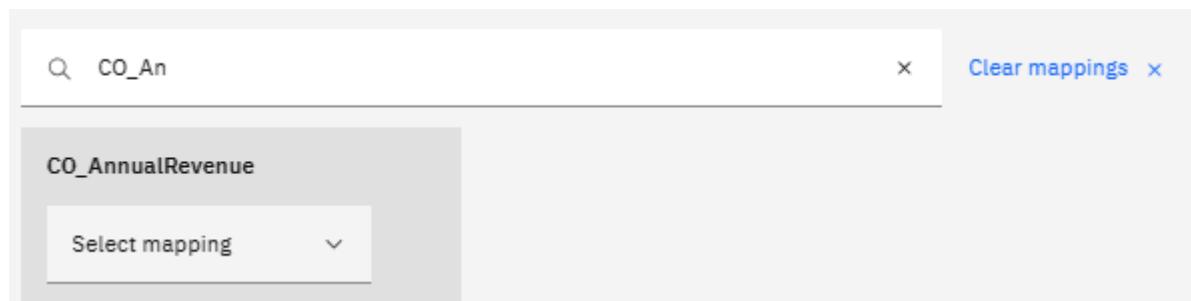
- _1. Click the **Data** tab.



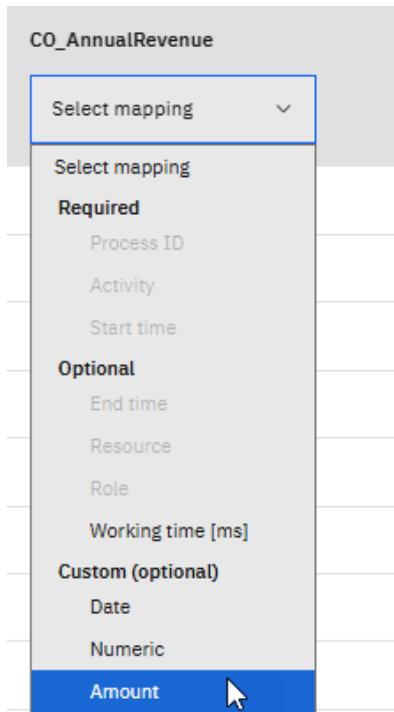
- _2. Click the **Edit data mapping** button.



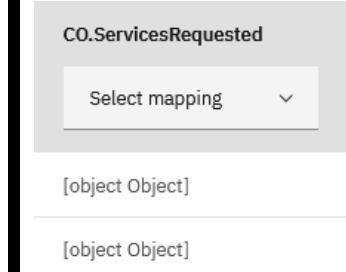
- _3. In the search bar, enter **CO_An**.



_4. In the **CO_AnnualRevenue**, from the dropdown, select **Amount**.



Note: Because the Co_ServicesRequest variable in BPMN Process is a List of Business Objects, and the IBM BAI BPMN Emitter does not serialize complex types, it is marked as [object Object], and the data is inaccessible in Process Mining.



_5. Click **Next**.



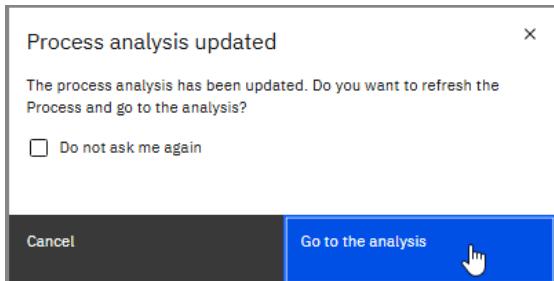
_6. On the "Configure the time format" page, click **Next**.



_7. On the "Custom configuration" page, click **Save**.



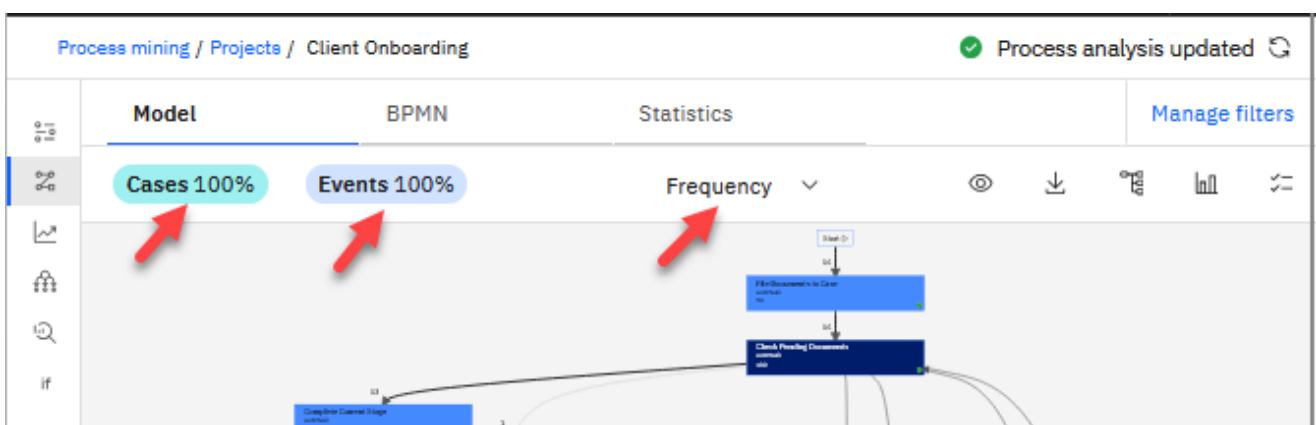
_8. In the *Process analysis updated* window, click **Go to the analysis** to update the Model View.



4.2 Gain Business and Technical Insights into Client Onboarding

4.2.1 Explore Model View

The Model View depicts the Client Onboarding Process, highlighting the most frequent activities, paths taken, and the "real" Process versus the expected Process. A picture is worth 100 words!



Our data set only has one Process ID field (Reference ID). IBM PM supports the visualization of multiple processes, each having a different Reference ID.

By default, the Model opens in the **Frequency View**, showing all the **Cases**.



A case is the end-to-end execution of a process (for example, one purchase order, one customer complaint, one insurance claim, etc.). A unique Case ID identifies each Case in the event log. A case is composed of a sequence of events (activities) performed over time that together form the full lifecycle of that instance. Process mining uses cases to reconstruct the real process flow by analyzing the order, timing, and variations of events across multiple cases.

In multi-level processes, the combination of process IDs defines a new case. Each process ID represents a different sub-process that contributes to executing a single Case. See this [link](#) for more details about multi-level process mining.

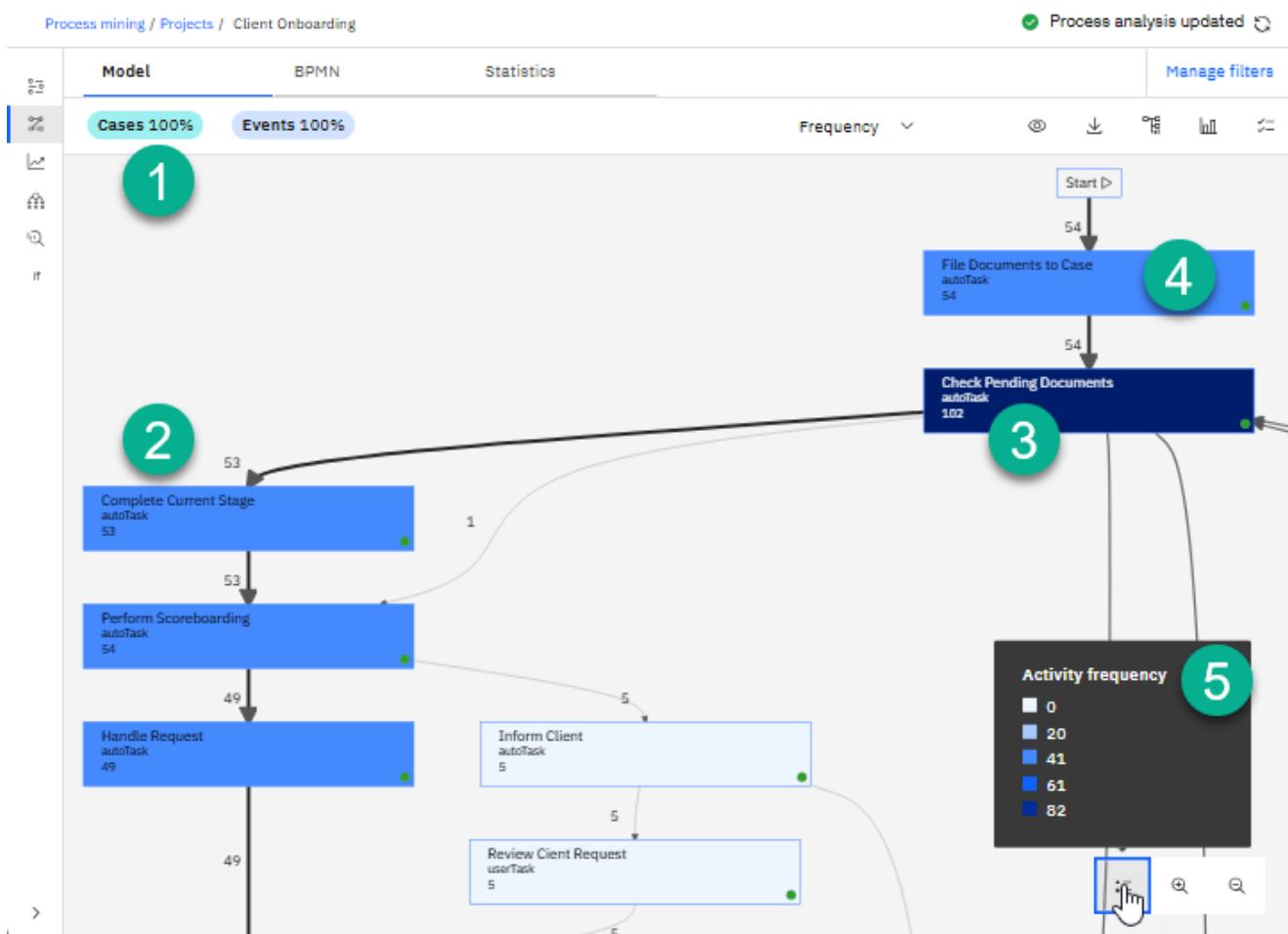
And **Events** discovered in the imported data.



In IBM Process Mining, an Event is the atomic record of something that happened during the execution of a process. An Event must have a correlation ID field. Events with the same Correlation ID belong to the same Case.

_1. Let's examine the default Model View.

In the Frequency model, the dark blue color highlights the most frequent activities, while the bold arrows highlight the most frequent transitions or process paths taken based on the event. In this way, you can identify the most frequent paths between activities of the Process.

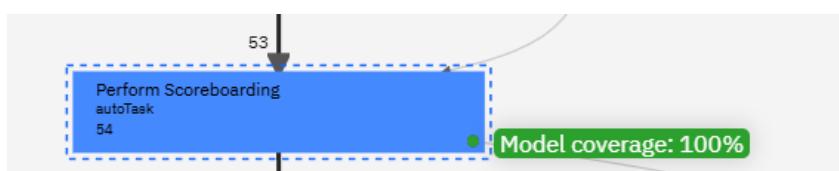


Hint: Use the mouse wheel to zoom and the mouse right button to move the Process diagram.

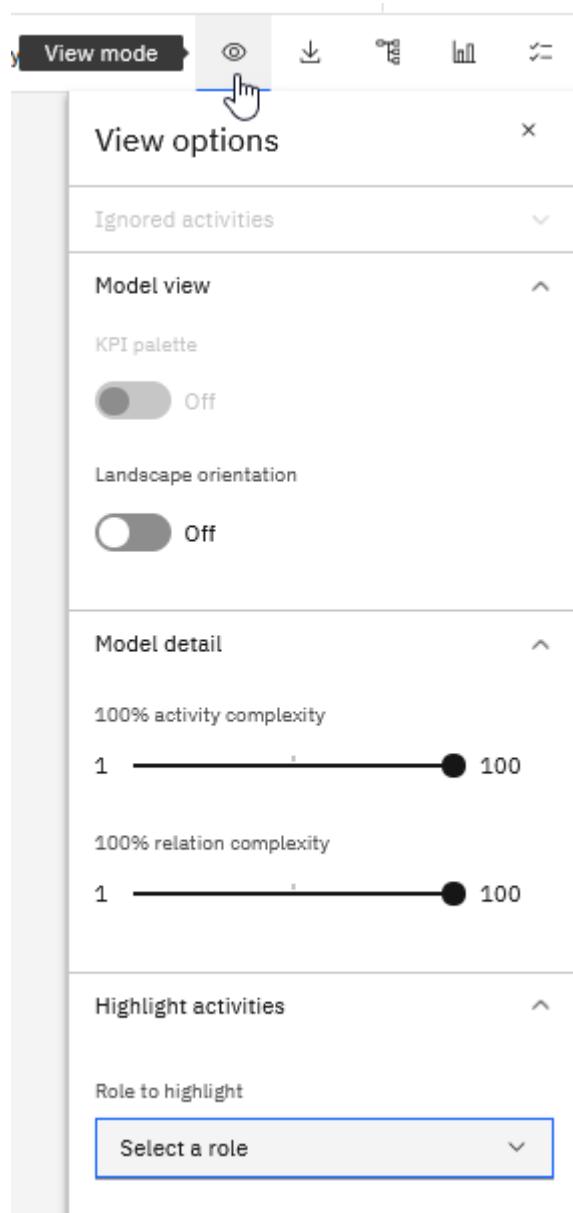
Let's examine the default Frequency View:

1. The top left view displays the number of cases and all related events (rows in the CSV file). 100% means no filters are applied, showing all the data.
2. The numbers beside the lines indicate how frequently each Path to a specific activity has been taken.
3. The numbers inside the rectangles indicate how many times the Activity occurs. The Activity count usually represents the total of the numbers on all incoming paths.
4. The description in the rectangles includes the name of the Activity, and the roles associated with the Activity is listed.
5. The color saturation of Activity indicates how frequently an activity was used. Refer to the Activity frequency legend.

The green circle in each activity, located at the bottom corner, represents the model coverage. 100% means that the model covers all possible relationships with that activity.



The Model View can be used for controlling how the Model is displayed:



- Selection of portrait or landscape view.
- Specifying the Model Detail. For example, set the model detail level to 1% to view the most frequent activities.
- Highlighting activities by role.

4.2.2 Identify the Most Costly Activities

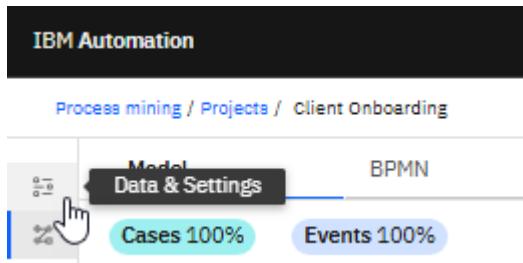
Cost can be defined as the default cost of all activities and the standard cost for a few particular activities.

The following formula defines activity cost:

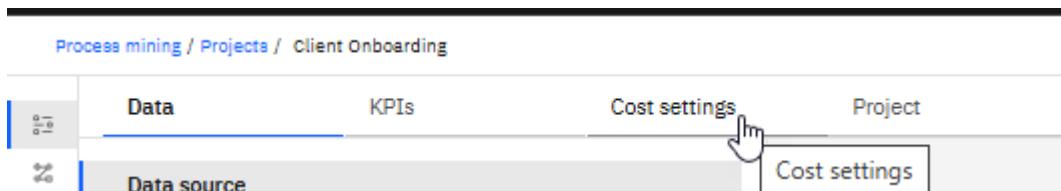
$$\text{Activity cost} = \text{Activity Standard Cost} + (\text{Average Working Time} * \text{Avg Resource or Role Cost})$$

The variables in the formula are hardcoded in the Manage section.

_1. Click the **Data & Settings** tab.



_2. Click the **Cost settings** tab.



_3. Click the **Activity costs** tab.

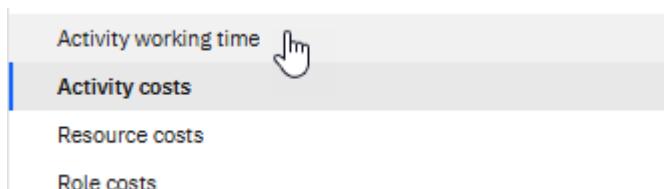


_4. Note the Activity costs.

The Manual activities have their costs set individually. Specifically, note EUR 110 for the Notification: Review Request Completed.

Activity	Cost	Type	End date
Default	EUR 2.00	Any	N/A
Default	EUR 50.00	Manual	N/A
Create New Proposal	EUR 350.00	Manual	N/A
Follup Up with Client	EUR 390.00	Manual	N/A
Notification: Review Request Completed	EUR 110.00	Manual	N/A

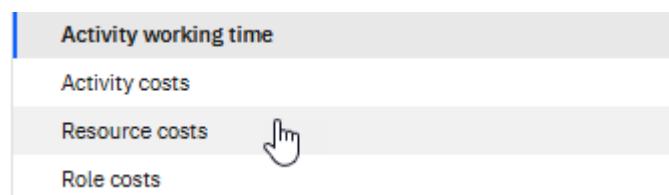
_5. Click the **Activity working time** tab from the left panel.



_6. Note 45 minutes for the Notification: Review Request Completed.

Activity	Value	Type	End date
Default	10 minutes	Manual	N/A
Default	1 minute	Automatic	N/A
Create New Proposal	20 minutes	Manual	N/A
Follup Up with Client	45 minutes	Manual	N/A
Notification: Review Request Completed	45 minutes	Manual	N/A

_7. Click **Resource costs**.



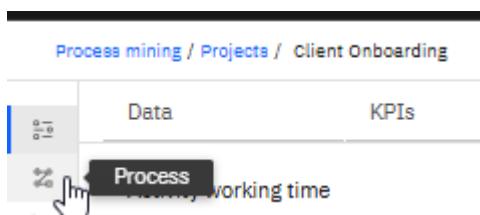
The cost of an activity can vary based on its standard cost, the cost of resources involved, and its working time, according to the PM cost model.

_8. Note EUR 150 for all manual (human) tasks.

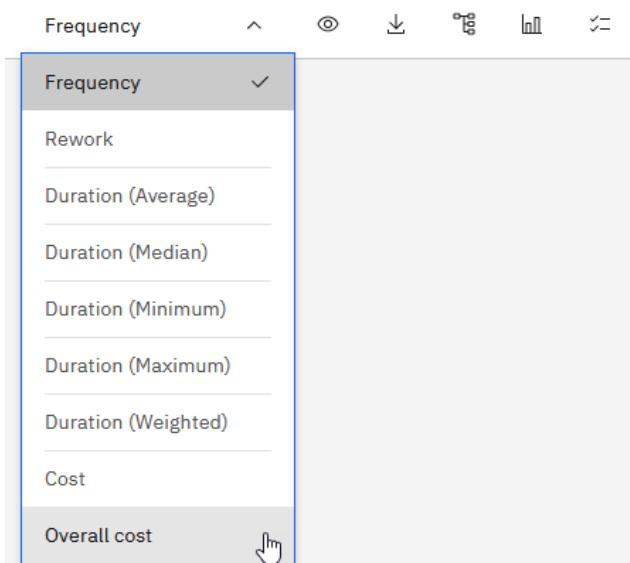
Resource	Hourly cost	Type	End date
Default	EUR 100.00	Automatic	N/A
Default	EUR 150.00	Manual	N/A

Note: Automated tasks have a lower rate than human tasks because the duration of automated tasks is significantly lower than that of human tasks, so the overall costs (duration * cost) are considerably smaller for automated tasks.

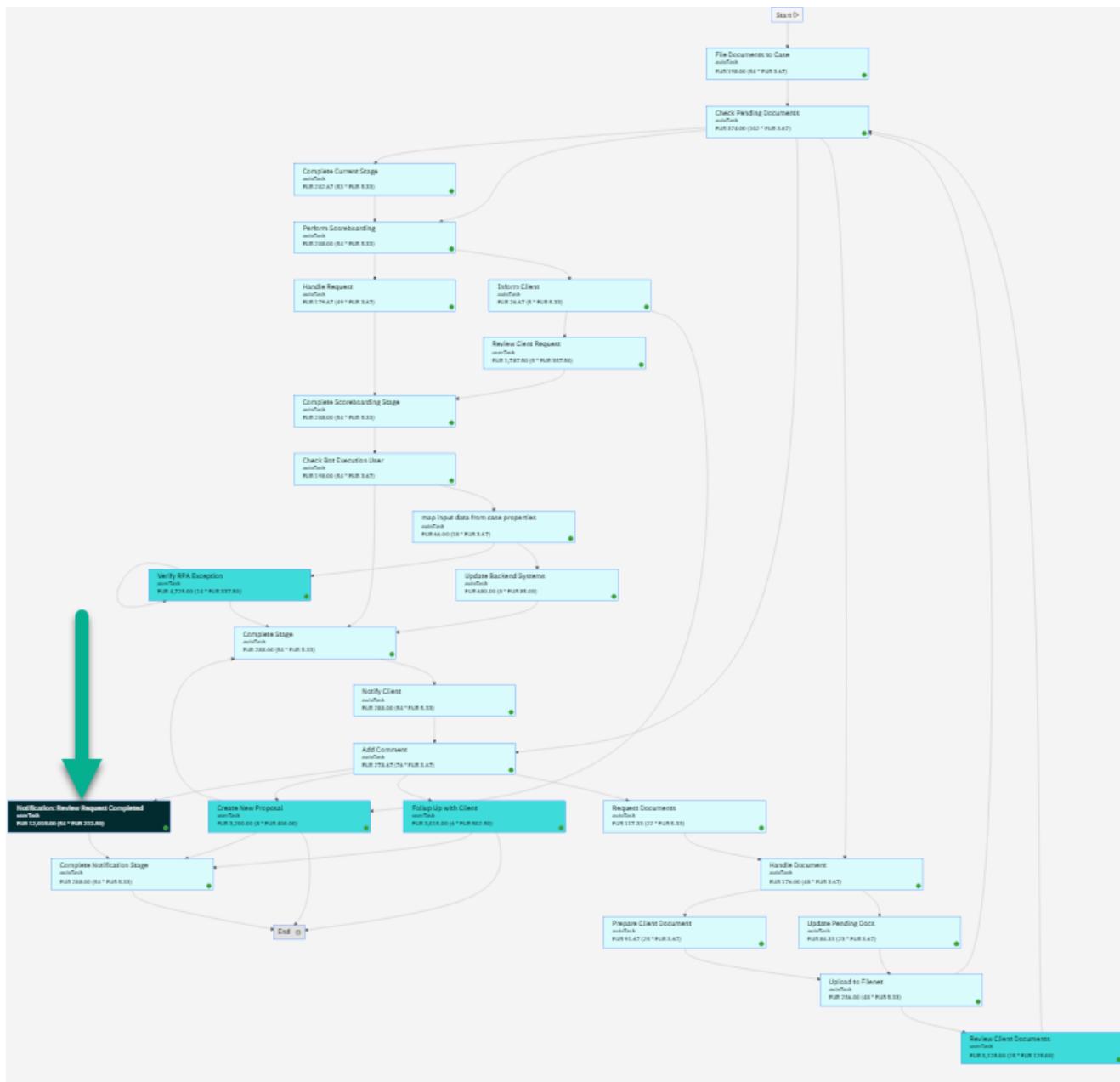
_9. Click on the **Process** icon.



_10. From View mode, select **Overall Cost**.



11. Locate the Notification: Review Request Completed task.



12. Note that the Overall Cost (the sum of all 54 cases) is the highest for the darkest Activity: **Notification: Review Request Completed**.

Notification: Review Request Completed
userTask
EUR 12,015.00 (54 * EUR 222.50)

_13. Let's examine how IBM Process Mining calculated this Activity's overall Cost.

$$\text{Activity cost} = \text{Activity Standard Cost} + (\text{Average Working Time} * \text{Avg Resource or Role Cost})$$

54 is the number of Cases in our dataset. This Activity was executed once in each of the 54 cases.

EUR 222.50 = EUR 110 (Activity Cost) + 0.75 hour (Activity Working Time) * EUR 150 (Resource cost)

Business Insight:

We identified the costliest Activity in the Client Onboarding Process.

4.2.3 Identify Rework

Activities repeated more than once in the same process instance are defined as **Rework**. Activities with Rework typically reveal process inefficiencies that can be targeted for process re-engineering.

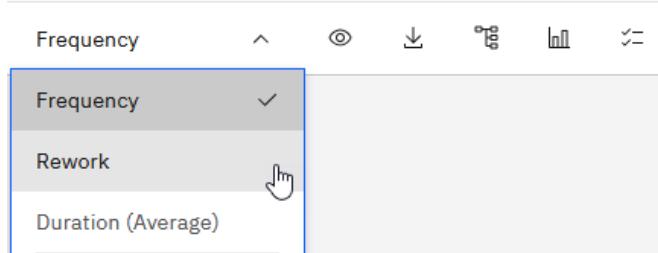
IBM Process Mining automatically discovers two kinds of Rework:

1. If you see an arrow that goes out and falls into the same Activity, it is called a **self-loop**.
2. When an activity is repeated several times within the same process instance but passes by other activities, it is referred to as **instance-looping**.

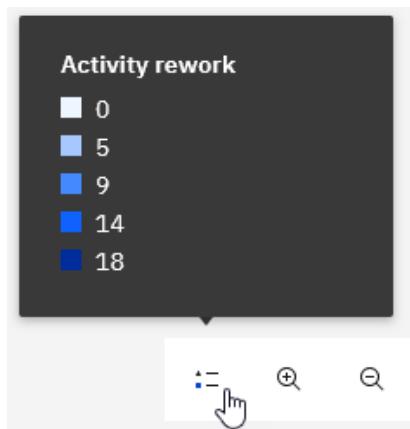
Let's identify the Activity with a significant Rework value and then identify the Process to which this Activity belongs. This will help us determine the root causes of the Rework.

4.2.3.1 Instance Looping Rework

_1. Select **Rework** to change from Frequency to Rework view.

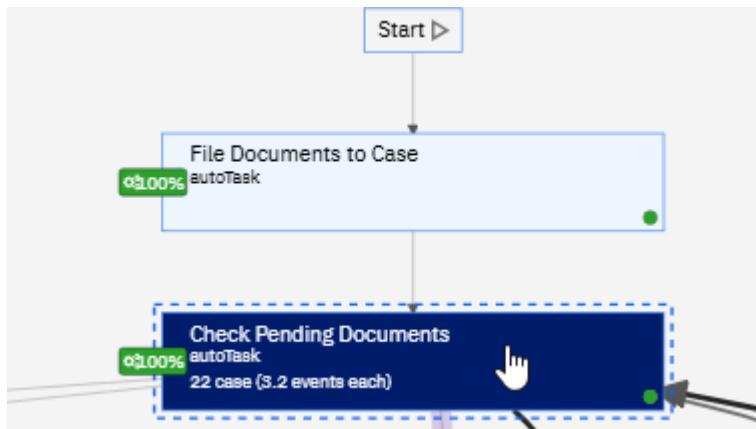


_2. Open the **Legend** from bottom menu.



_3. Note that Activities with Rework are marked according to the legend. The darker the activity color, the more Rework occurred in the same process instance.

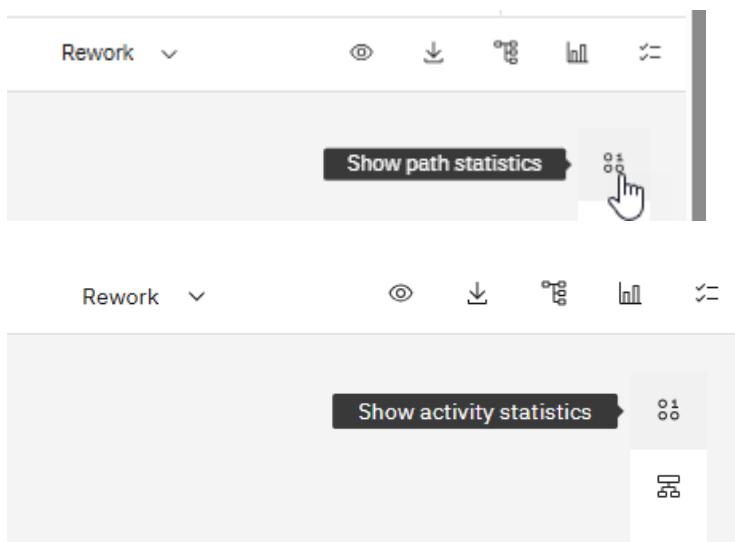
_4. Click the **Check Pending Documents** activity to select it.



It is an example of instance-looping:

- This Activity is repeated (Rework) in 22 out of 57 cases
- On average, the Activity repeats 3.2 times during the 23 Cases where it occurs.
- The green badge indicates the 'Automated Instance Ratio', which for this Activity is 100% automation ratio (meaning it is fully automated)

_5. Click **Show activity statistics**.

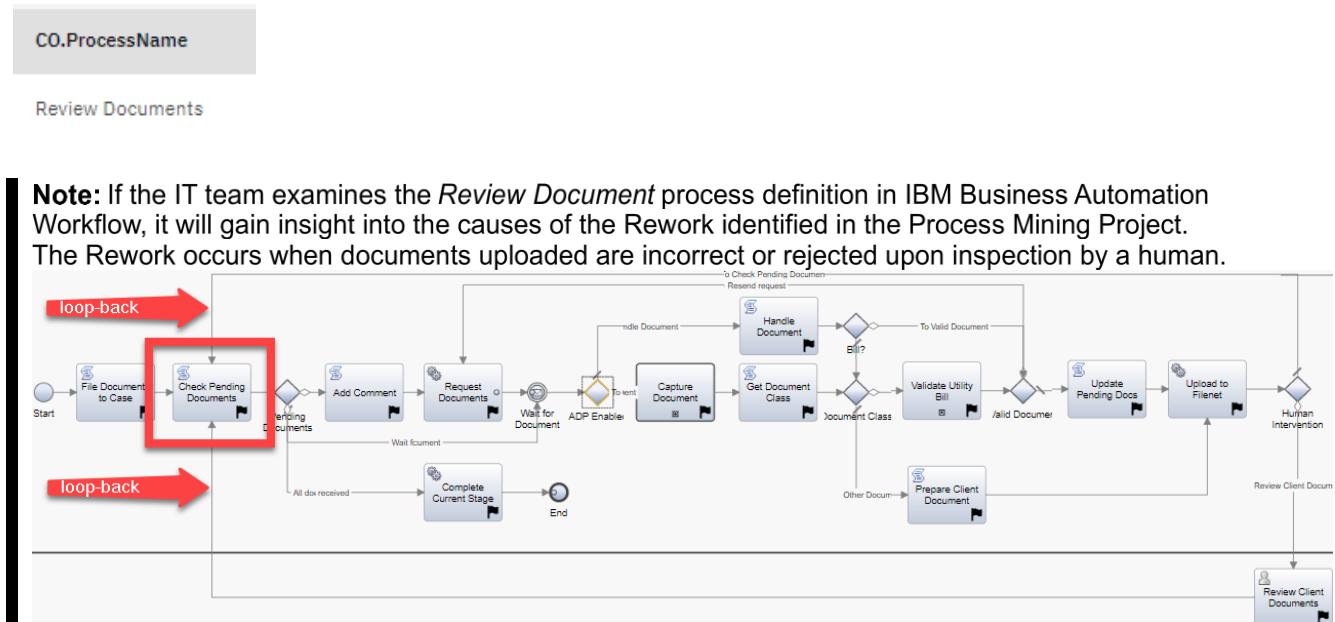


_6. In *View details for cases by*, select **CO.ProcessName** from dropdown



Note: This is the name of the BPMN process to which this Activity belongs.

_ 7. Note that the BPMN Process name is *Review Documents*.



Business Insight:

We now understand the impact of Rework on process metrics, including lead Time and costs. Business action involves ensuring that customers provide all necessary documents accurately when requesting a new service for the first Time.

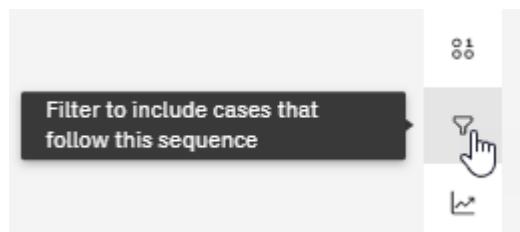
_ 8. Click X to close the *Activity statistics* window.

4.2.3.2 Self-Looping Rework

_ 1. Click the **self-link** on the **Verify RPA Exception** activity.

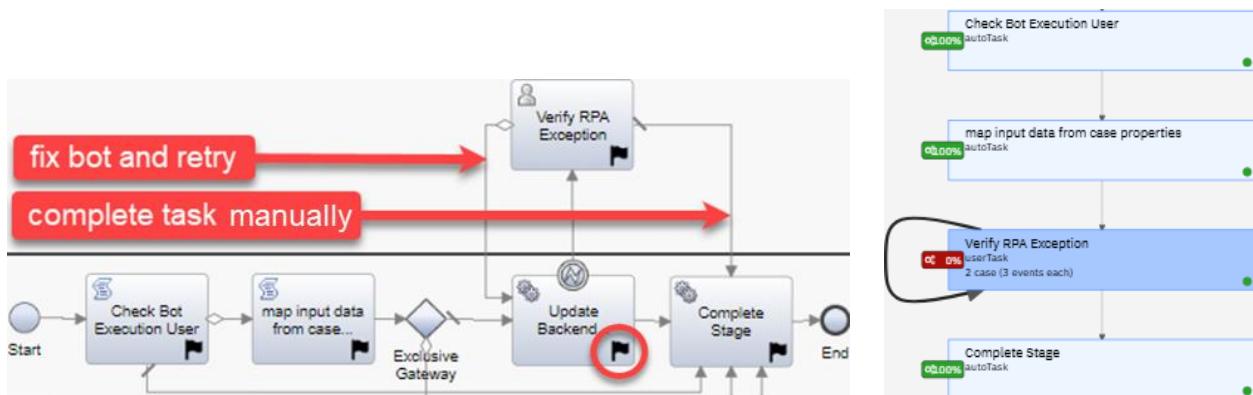


_ 2. Click the **filter to include cases that follow this sequence** button.



_3. Let's examine how the Process Mining diagram correlates with the BPMN process...

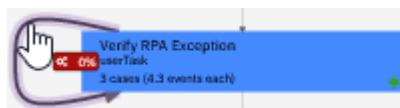
Let's compare the BPMN diagram of the *Update Backend System* process (left) with the IBM Process Mining Model View (right).



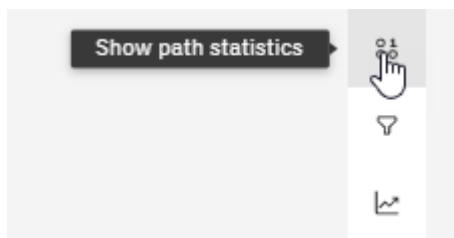
When the RPA Bot fails, the Event Emitter (black flag in the **red circle**) on the Update Backend System activity does not fire because the Activity never completes. The Event Emitter fires upon the completion of the Activity (it appears on the right-hand side of the Activity; hence, it is a post-event). Therefore, we see Verify RPA Exception Activity immediately after the **map input data from case properties** Activity.

The user who completes the Verify RPA Exception activity is responsible for either fixing the bot execution (restarting the Bot in Bot Control Center) or performing the task manually that the Bot performs.

_4. Click the **self-loop Path**.



_5. Click **Show path statistics**.

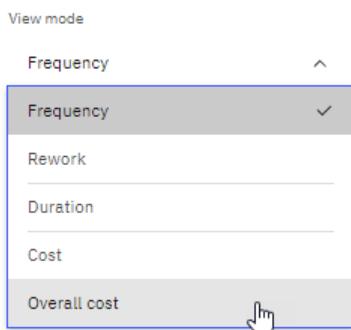


_6. Note the Case IDs and the number of retries between 1 and 3

Verify RPA Exception - Verify RPA Exception	
CO_ReferenceID	Count
8NTSYXBT	3
L593QKNV	1
Items per page:	10
1 - 2 of 2 item	

_7. Click X to close the *Path statistics* window

_8. Change *View mode* to **Overall cost**



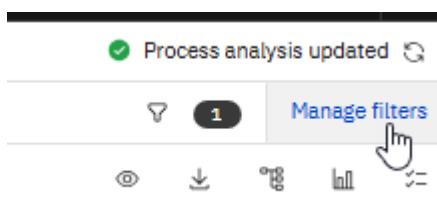
_9. Note the high overall cost of having 3 cases, including the Verify RPA Exception activity. EUR 2,025.00! This cost is avoidable.



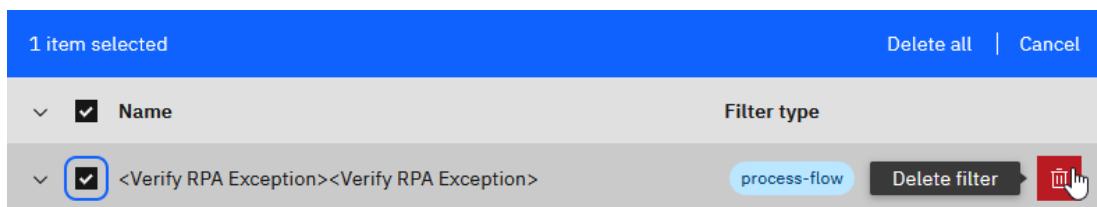
Business Insight:

We found that the self-loop style Rework pattern is linked to failed RPA bots and measured its effect on the Cost and Lead Time of cases. The IT organization might consider replacing RPA bots with an API-based integration to resolve this issue.

_10. Click the **Manage filters** button.



_11. Select the <Verify RPA Exception>... filter and click the **Delete filter** (red garbage can).



_12. Click **Apply**.



4.2.4 KPI Analysis

4.2.4.1 KPI Compliance

With IBM Process Mining, we can define KPIs (related to case cost/duration or activity duration) and monitor KPI compliance.

Let's look at the current KPI settings for this project.

_13. Click the Data & Settings tab.

The screenshot shows the IBM Automation interface with the title bar "IBM Automation". Below it, the breadcrumb navigation shows "Process mining / Projects / Client Onboarding". A top navigation bar has tabs for "Model", "Data & Settings" (which is highlighted with a black background), and "BPMN". Below this, there are two circular progress bars: "Cases 100%" and "Events 100%".

_14. Click the KPIs tab.

The screenshot shows the same interface as above, but the "KPIs" tab is now highlighted with a blue underline. The breadcrumb navigation and top navigation bar remain the same.

_15. Click the KPI benchmarks tab.

The screenshot shows the "KPI benchmarks" tab highlighted with a blue underline. The breadcrumb navigation and top navigation bar remain the same.

_16. You should now see the KPI definitions.

In the next part of the lab, you will see the KPI defined here used in the Process View.

You can define the Activity KPIs for all Activities (default) and specific Activities.

The screenshot displays two side-by-side sections. On the left, under "Default activity KPIs", there are three threshold definitions: "Activity throughput thresholds" (Between 1 second and 30 seconds), "Activity wait queue thresholds" (Between 1 second and 30 seconds), and "Activity duration thresholds" (Between 1 second and 30 seconds). On the right, under "Specific activity KPIs", there is a table with ten entries, each with an "Edit activity KPIs" link:

Specific activity KPIs	Edit activity KPIs
Create New Proposal	Edit activity KPIs
Review Client Request	Edit activity KPIs
Notification: Review Request Completed	Edit activity KPIs
Verify RPA Exception	Edit activity KPIs
Review Client Documents	Edit activity KPIs
Follup Up with Client	Edit activity KPIs
File Documents to Case	Edit activity KPIs
Complete Current Stage	Edit activity KPIs
Notify Client	Edit activity KPIs

We will use the existing KPI settings, but you can modify them by pressing the Edit KPIs button.

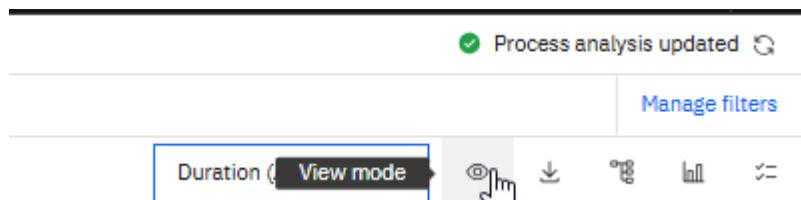
_17. Click the Process icon.

The screenshot shows the "Process" icon highlighted with a blue underline. The breadcrumb navigation and top navigation bar remain the same.

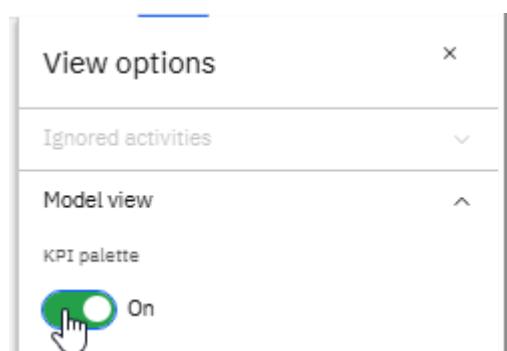
_18. Change the Model View to **Duration (Average)**



_19. Click the **View mode (eye)** icon.

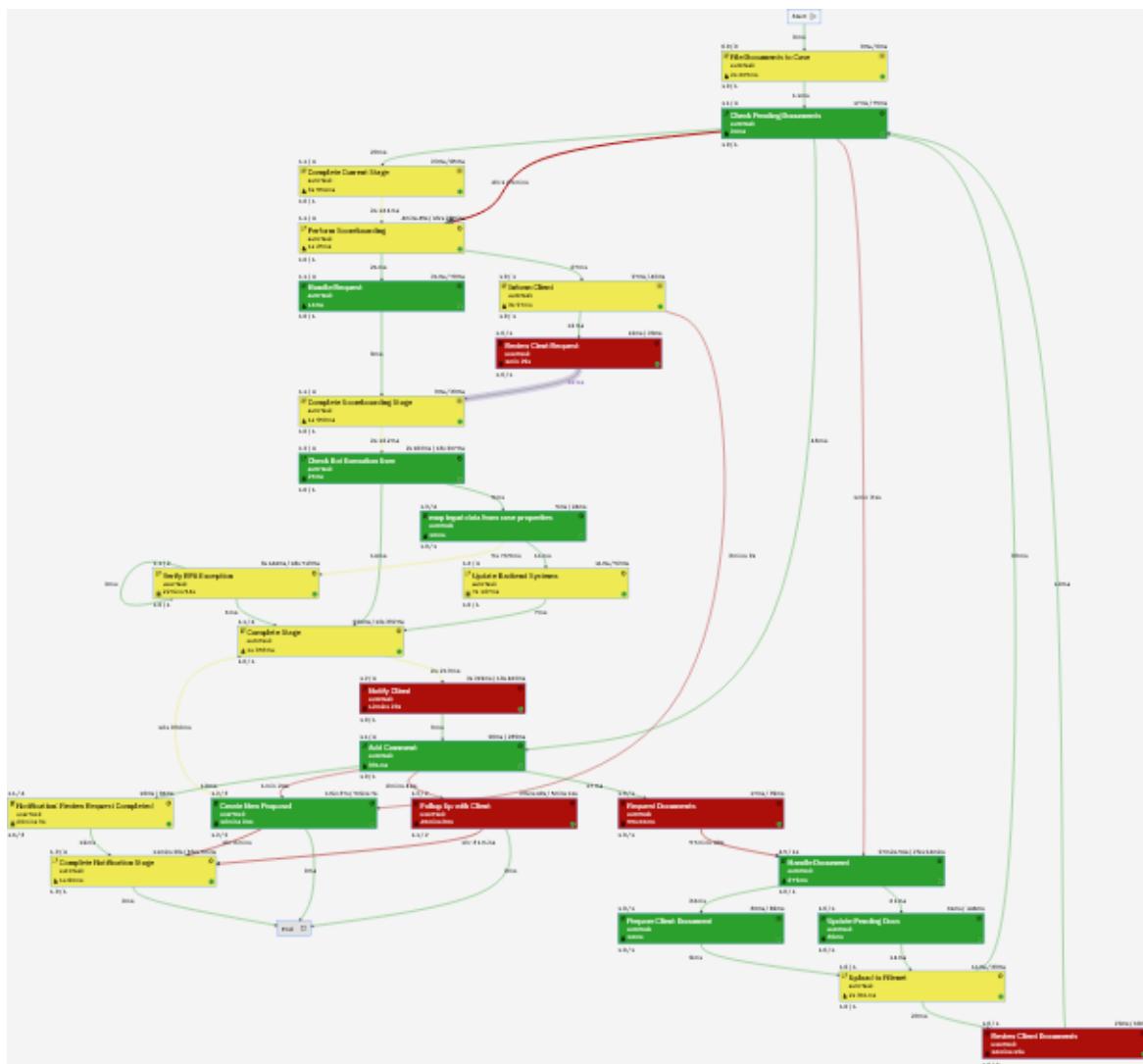


_20. Toggle the **KPI palette** to **On**.



_21. You should now see the Model with Activities and Transitions.

You can use this view to identify what Activities and Transitions deviate from the KPI.



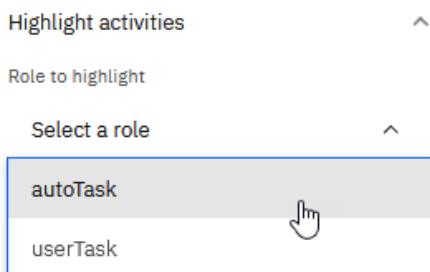
The Activities and Transitions color reflects the KPI settings. See the note below about the KPI Settings.

ACTIVITY	Activity with service time in line with the defined KPIs
CONNECTION	Transition with waiting time in line with the defined KPIs
ACTIVITY	Activity with risky service time
CONNECTION	Transition with risky waiting time
ACTIVITY	Activity with critical service time
CONNECTION	Transition with critical waiting time

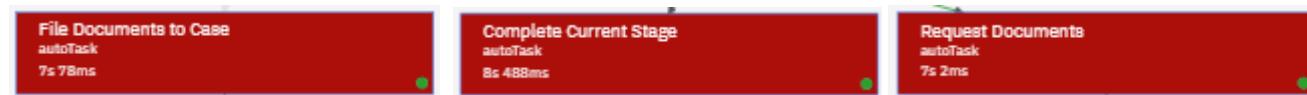
4.2.4.2 Root Cause Analysis of KPI Violations

Let's focus on identifying Automated Activities for which the average duration exceeds their threshold duration.

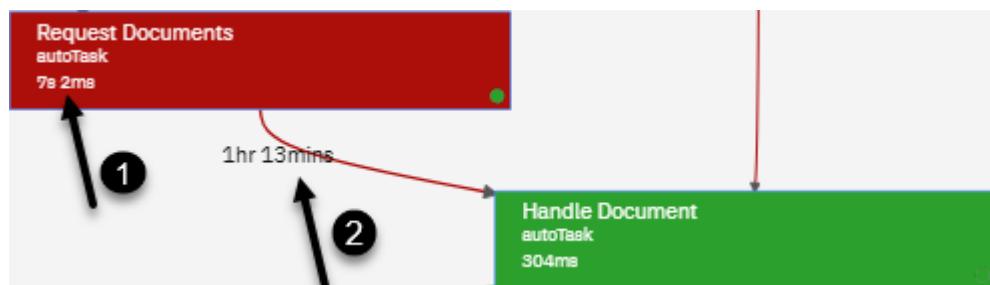
- _1. In *View options*, under *Highlight activities*, for *Role to highlight*, select **autoTask**.



- _2. Notice there are three offending Automated Activities.



- _3. Let's focus on the *Request Documents* Activity!

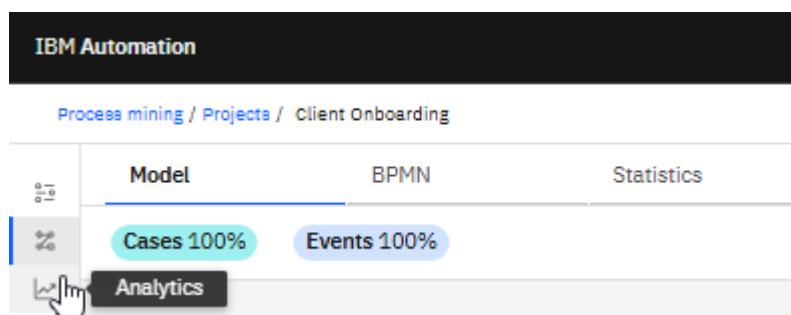


It has two issues:

1. The Average Duration exceeds the KPI threshold. Why does an automated Activity take so long to execute?
2. The next Activity (Handle Document) is invoked, on average, 1 hour and 13 minutes later. This is called Wait Time. A significant delay! Why is there a considerable time delay between the execution of two consecutive automated activities? The delay should be microseconds!

Let's drill down into details to include enough information to create a Ticket for the IT organization to investigate this issue!

- _4. Click the **Analytics** icon.



_5. You should now see the **Automated Activity Performance Analysis** dashboard open.

The screenshot shows the IBM Automation interface. At the top, there's a navigation bar with 'IBM Automation' and a breadcrumb trail 'Process mining / Projects / Client Onboarding'. Below this is a main content area with tabs: 'Automated Activity Performance Analysis' (which is selected), 'Human Activity Analysis', and 'Human Activity Performance Analysis'. Under the selected tab, there are two buttons: 'Cases 100%' and 'Events 100%'. The main content area displays a table titled 'Automated Activities with Service Time > 5 seconds'. The table has columns: CASEID (sorted by number), ACTIVITY, CO_PROCESSNAME, Service Time, and Case Cost. The table lists various cases where the service time for 'Request Documents' activity exceeds 5 seconds, with costs ranging from EUR 298.17 to EUR 1,342.00.

_6. Let's examine the **Automated Activity with Service Time > 5 seconds** widget.

CASEID	ACTIVITY	CO_PROCESSNAME	Service Time	Case Cost
5LBYCRGV	Request Documents	Review Documents	9s 795ms	EUR 298.17
SWG4TX4T	Request Documents	Review Documents	9s 759ms	EUR 439.50
TKP6YN7H	Request Documents	Review Documents	9s 348ms	EUR 423.17
YE6TQDMV	Request Documents	Review Documents	8s 699ms	EUR 942.00
TNHWLHQJ	Request Documents	Review Documents	8s 688ms	EUR 749.50
J3S7JKWM	Request Documents	Review Documents	8s 554ms	EUR 705.83
QJ4NVGSV	Request Documents	Review Documents	8s 325ms	EUR 439.50
5PEVSTWE	Request Documents	Review Documents	8s 300ms	EUR 1,342.00
CTLWY6NX	Request Documents	Review Documents	8s 102ms	EUR 298.17
EQHWU6XJ	Request Documents	Review Documents	7s 244ms	EUR 839.50
PVUKKEUC	Request Documents	Review Documents	7s 168ms	EUR 657.33
CXV8WCYA	Request Documents	Review Documents	7s 104ms	EUR 439.50
5NGBBK6F	Request Documents	Review Documents	6s 657ms	EUR 298.17

1. The Activity column is sorted, and you can easily identify all cases where the Request Documents activity exceeds 5 seconds. We consistently observe a significant number of cases with durations exceeding 5 seconds. Definitely, IT needs to look into it!
2. We can provide the IT team with the name of the Process: Review Documents.
3. We have a list of all Case IDs. By clicking on the Case ID in the table, we can see the actual process flow of the Case displayed in the Process Model view. This may help further analyze the root cause or provide additional information to the IT team.

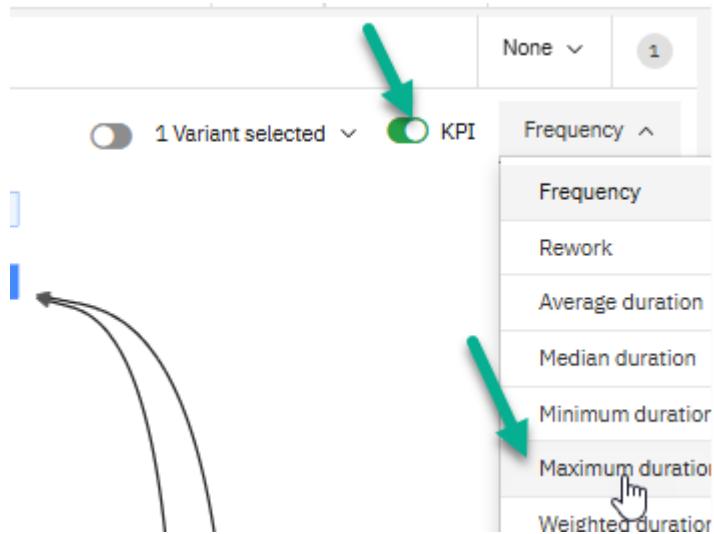
_7. Let's examine the **Automated Activity Wait Time > 200 seconds** widget.

Automated Activities Wait Time > 200 seconds					None	Search and filter
CASEID	ACTIVITY	CO_PROCESSNAME	Wait Time	Case Cost		
C6AER76P	Handle Document	Review Documents	2h 24min	EUR 439.50		
CTLWY6NX	Handle Document	Review Documents	2h 19min	EUR 298.17		
FLV9WF7B	Handle Document	Review Documents	2h 16min	EUR 613.50		
WWW4FNN3	Handle Document	Review Documents	2h 14min	EUR 439.50		
CXV8WCYA	Handle Document	Review Documents	2h 10min	EUR 439.50		
5NGBBK6F	Handle Document	Review Documents	2h 9min	EUR 298.17		
4X8QTH3G	Handle Document	Review Documents	2h 7min	EUR 439.50		
5LBYCRRGV	Handle Document	Review Documents	2h 3min	EUR 298.17		
QJ4NVGSV	Handle Document	Review Documents	1h 59min	EUR 439.50		
TKP6YN7H	Handle Document	Review Documents	1h 30min	EUR 423.17		
8PGTP7FN	Handle Document	Review Documents	1h 12min	EUR 439.50		
SWG4TX4T	Handle Document	Review Documents	48min 9s	EUR 439.50		
J3S7JKWM	Handle Document	Review Documents	32min 28s	EUR 705.83		

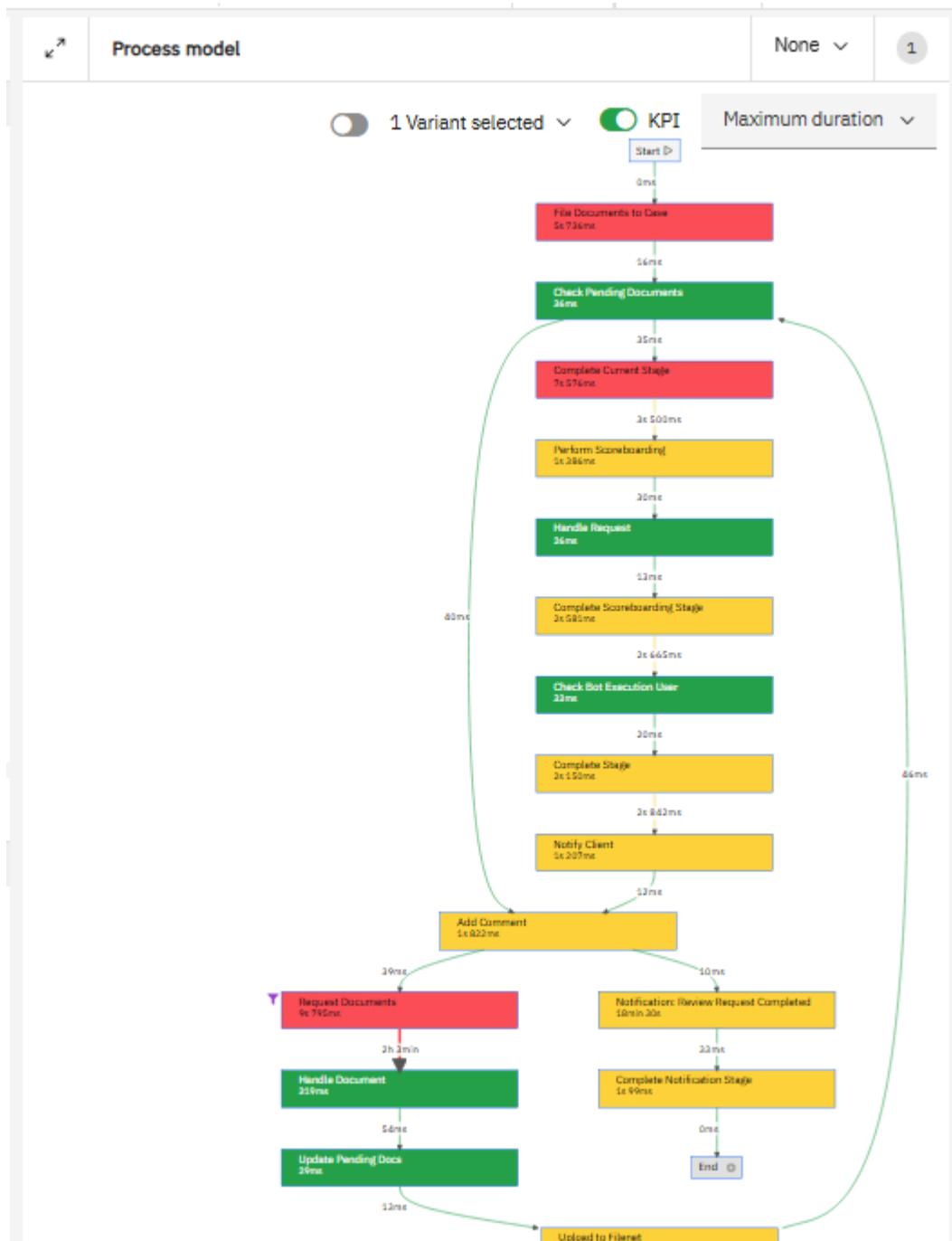
1. The Activity column is sorted, and you can easily identify all cases where the Handle Documents activity exceeds 5 seconds. We consistently observe numerous instances in which wait times to transition from the Handle Document activity to the Request Document activity exceed minutes and hours. Definitely, IT needs to look into it!
 2. We can provide the IT team with the name of the Process: Review Documents.
 3. We have a list of all Case IDs. By clicking on the Case ID in the table, we can see the actual process flow of the Case displayed in the Process Model view. This may help further analyze the root cause or provide additional information to the IT team.
- _8. To see how we can analyze a Case execution, click the **first Request Document** Activity row in the first widget and select **Apply filter**.

Automated Activities with Service Time > 5 seconds		
CASEID	ACTIVITY	CO_PROCESSNAME
VU8TFECVV	Upload to Filenet	Review Documents
8PGTP7FN	Upload to Filenet	Review Documents
TNHWLHQJ	Upload to Filenet	Review Documents
QJ4NVGSV	Copy value	Review Documents
5LBYCRRGV	Apply filter	Review Documents

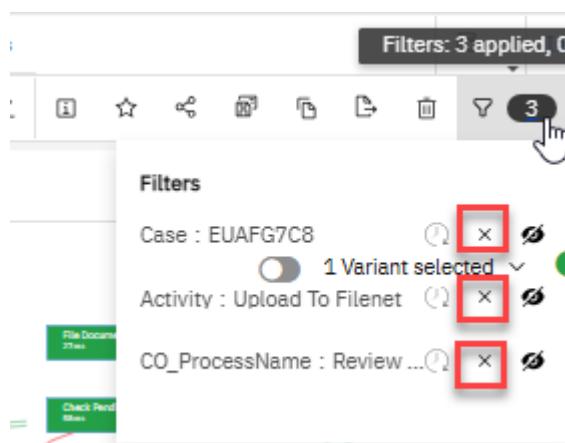
- _9. In the Query completed window, click **Refresh**.
- _10. This action adds a filter to restrict the process Model to show the flow only for the Case with the Case ID 5LBYCRGV (the Case you selected)
- _11. Select the **Maximum duration icon** first and then select the **KPI** switch.



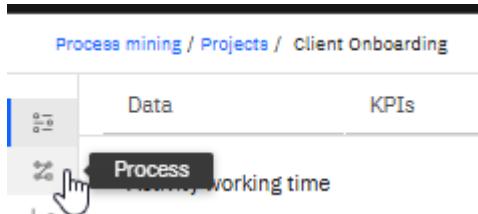
_12. You can now examine the Case execution details.



_13. Click the Filters icon and then click x to remove all dashboard filters.



14. Click the **Process** icon.

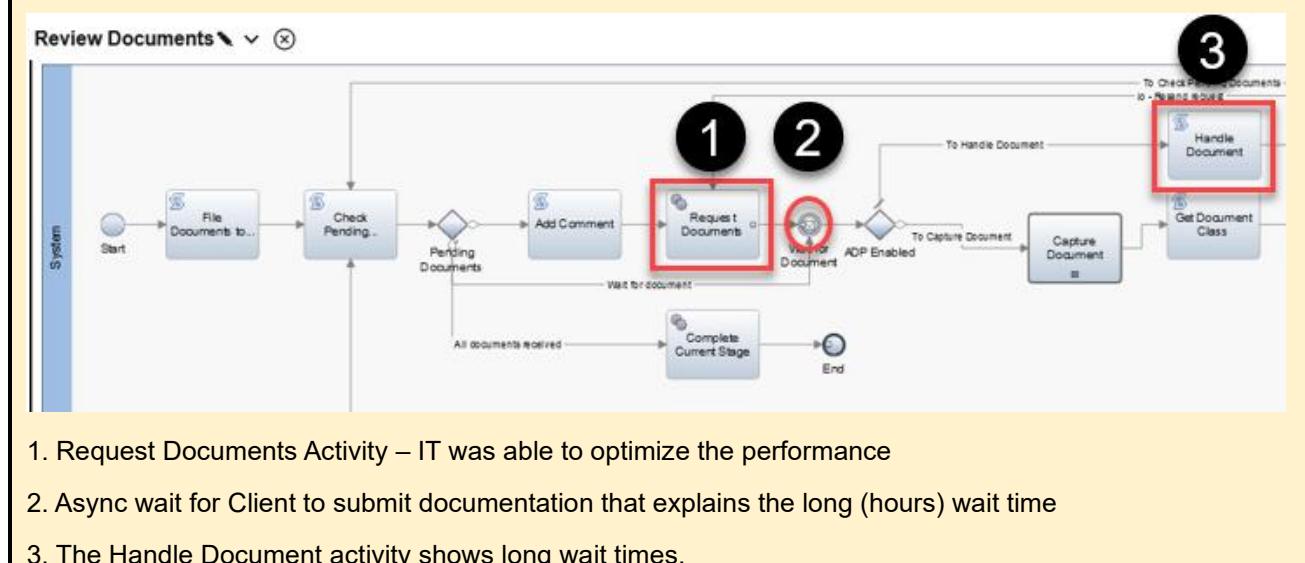


Process Improvement Insight:

We identified that the automated Request Document Activity is taking longer than expected to complete. We brought it up to the IT team. The IT team determined that the Activity included many excessive PI calls and promised to optimize the performance.

Next, we identified the mysterious delay between the completion of the Request Document automated activity and another automated activity, Handle Document. The IT team determined that it is an asynchronous activity in between. This async Activity waits for documents to be submitted by clients.

To understand the Process Mining insights, let's examine the implementation of the Review Document Process.



4.2.5 Process Variant Analysis

Client Onboarding Workflow has multiple paths (e.g., happy Path, exception cases, etc.). IBM Process Mining can visualize them individually or together.

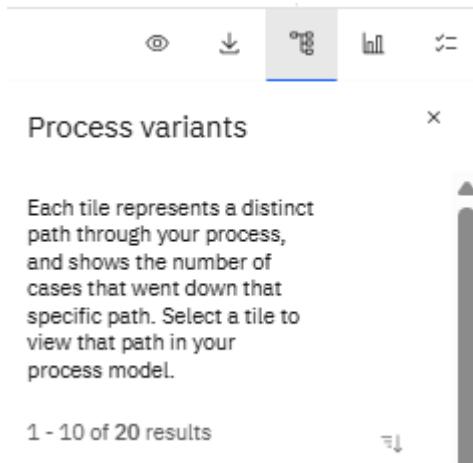


Process Variant is a unique path that cases take to execute the Process from the start to the end.

1. Click Variants



You should now see the Process variants view on the right-hand side.



The Process Variant view enables us to find the most frequent variant and compare it with other variants in terms of performance (average lead Time) and the number of events (flat processes) or relations (multi-level processes).

4.2.5.1 Filter the top Five Variants

When analyzing process data, it is often essential to exclude outliers and focus on the most frequently executed process paths. Focusing on the top process variants simplifies the analysis, enabling us to concentrate on the most impactful process paths.



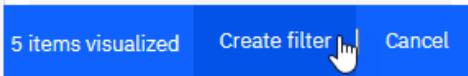
About Filters in IBM Process Mining. You can use filters to analyze the Process with a limited subset of cases that answer specific user requests. Click [here](#) to learn more about filters.

_2. Select the **check boxes** of the first 5 Variants.

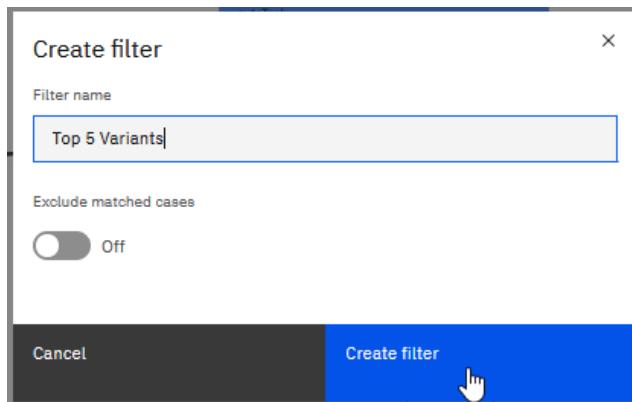
_3. If you add the percentages, you will see that the top five cases represent 70.19% of all the variants.

<input checked="" type="checkbox"/> 20.37% (11 cases) :
Steps 12
KPIs:
<input checked="" type="checkbox"/> 14.81% (8 cases) :
Steps 14
KPIs:
<input checked="" type="checkbox"/> 14.81% (8 cases) :
Steps 23
KPIs:
<input checked="" type="checkbox"/> 12.96% (7 cases) :
Steps 14
KPIs:
<input checked="" type="checkbox"/> 7.41% (4 cases) :
title 18
KPIs:

_4. In the bottom left corner, click **Create filter**.

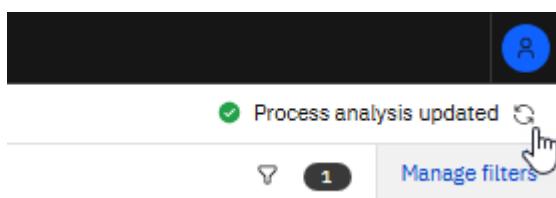


_5. For the *Filter name*, enter **Top 5 Variants** and click **Create filter**.

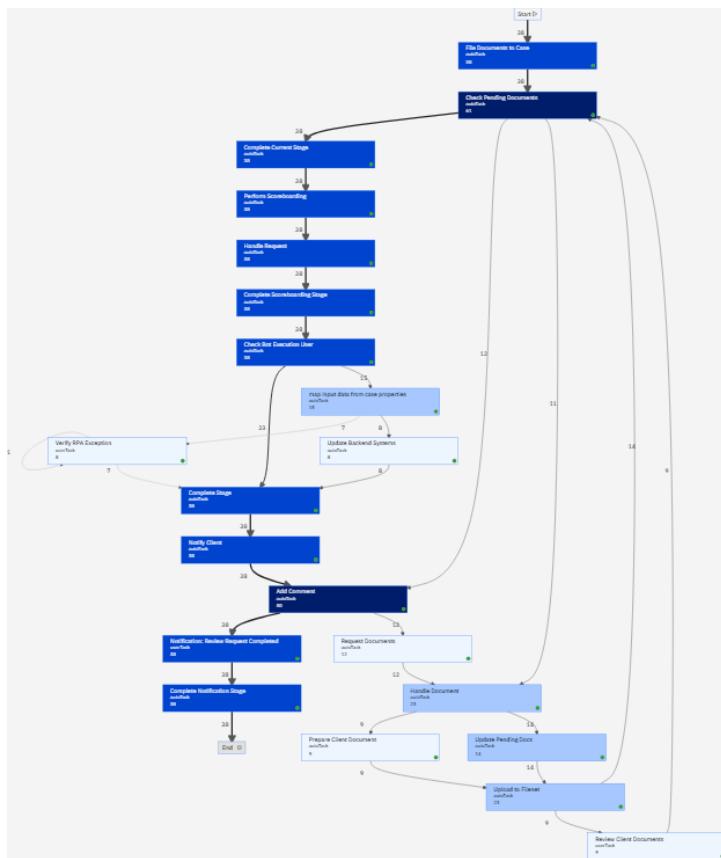


Note that if we select Exclude matched cases in the Create filter window above, the resulting filter will include the cases that belong to the selected five variants (all other variants).

_6. Click the **Refresh** icon to update the Model.



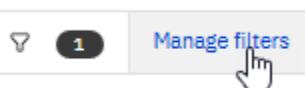
_7. The Model is now updated and shows fewer steps and connections, yet it covers 70% of all process paths (variants).



■ Note: You can permanently save this filter for later use in all process analysis tasks.

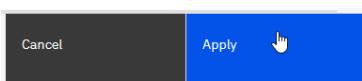
For now, let's remove this filter. It was created only for demonstration purposes. We will not need it for the remainder of this lab.

_8. Click the **Manage filters**.

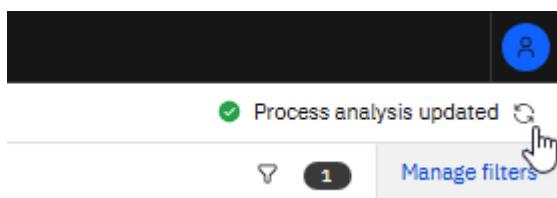


_9. Select the **Top 5 variants** filter and click the **Delete filter** (red garbage can).

_10. Click **Apply**.



_11. Click the **Refresh** icon to update the Model.

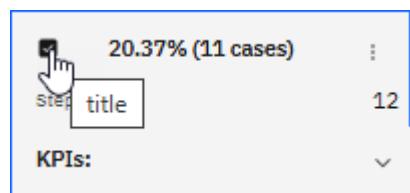


4.2.5.2 Discover Happy Path and Create a Filter

- _ 1. Let's find the fastest variant with the fewest steps! The Happy Path.
- _ 2. Click **Variants**

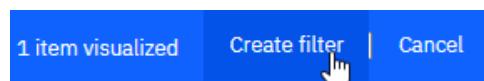


- _ 3. On the first variant, click the **checkbox** to filter out all other cases.

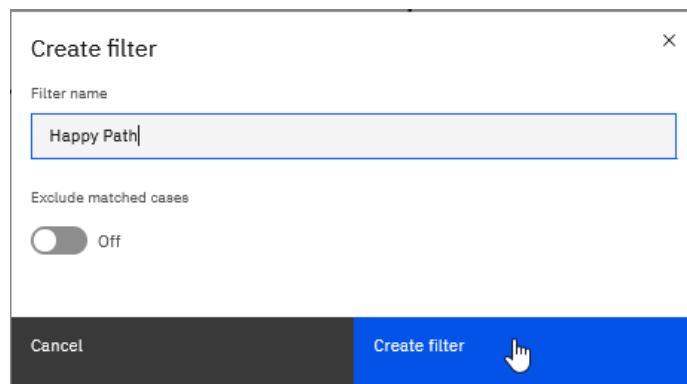


Incidentally, the most frequent variant is also a Happy Path, with the fewest steps (12).

- _ 4. Click **Create filter**



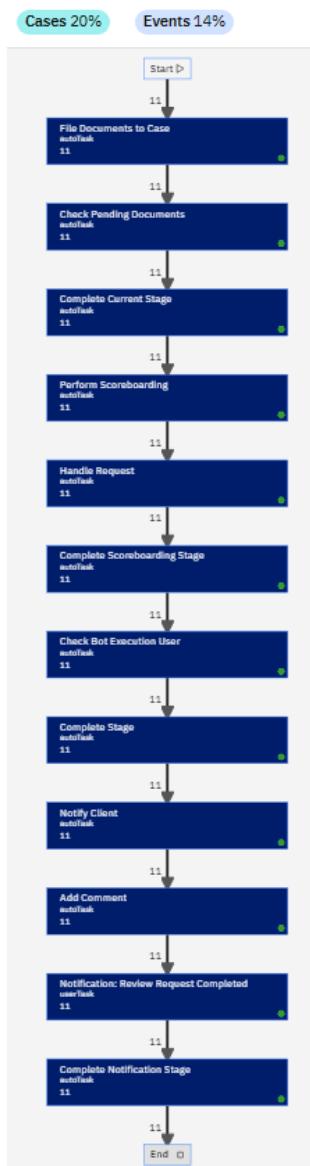
- _ 5. For the *Filter name*, enter **Happy Path** and click **Create filter**.



- _ 6. In the *Process analysis updated* window, click **Go to the analysis** to update the Model View.

_7. You should now see the Happy Path Variant.

Note that we now see the Happy Path in the Model view. 20% of the cases include 12 steps, no loops, or conditional activities. Happy Path, indeed!



Note that to keep this filter for future use, you need to save it as a Template Filter (we have already done this for you because we will use it later in this lab). However, you will learn how to create a Template Filter later in this lab.

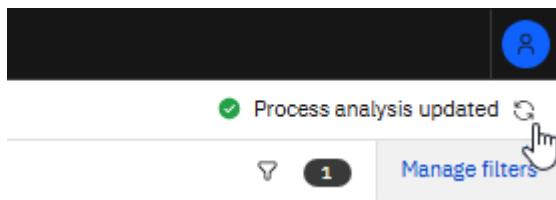
_8. Click the **Manage filters**.



_9. Select the **Happy Path** filter and click the **Delete filter** (red garbage can).

_10. Click **Apply**.

_11. Click the Refresh icon to update the Model.



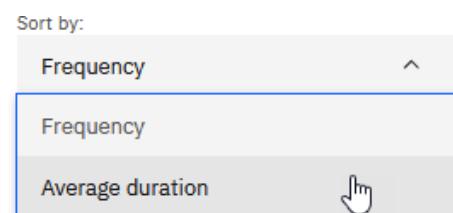
4.2.5.3 Use the Filter to Analyze the Variant with the Most Rework

Let's identify the variant with the most steps, the most Rework, and the highest cost, and then determine the root causes.

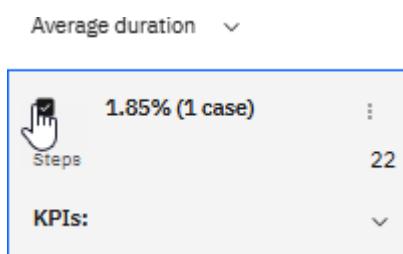
_1. Click **Variants**



_2. For Sort by, select **Average duration**.

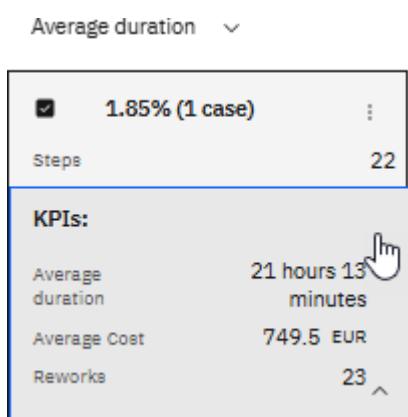


_3. On the highest duration variant, click the **checkbox** to filter out all other cases.

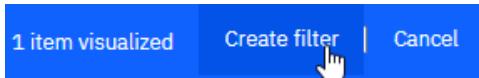


_4. Click the **KPIs** dropdown.

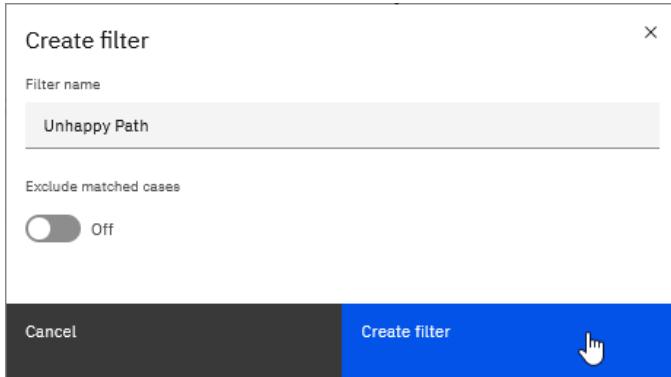
Note that the variant has 23 rework loops!



_5. Click **Create filter**



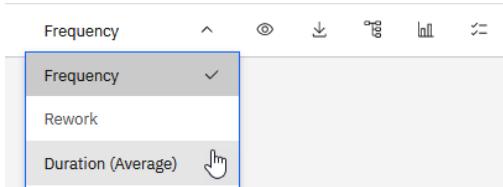
_6. For **Filter name**, enter **Unhappy Path** and click **Create filter**.



_7. In the *Process analysis updated* window, click **Go to the analysis** to update the Model View.

4.2.5.3.1 Investigate Long Case Duration

_1. Change the Model View to **Duration (Average)**



_2. Note the two areas of concern that contribute to the case duration of 21h 13m:

_3. There is a considerable delay of **4 hours and 29 minutes** between the two automated tasks. We will investigate this later when examining Model Conformance. We will discover that this transition is not conformant with the reference model.



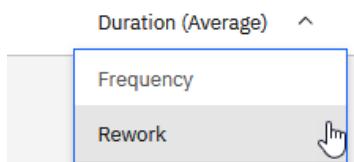
_4. Note that the *Review Client Documents* task takes **4 hours and 55 minutes** to complete. We will now further focus on this automated task.



4.2.5.3.2 Investigate a Large Number of Steps

Rework (repeating the steps in the same Case) mainly contributes to the excessive number of steps required to complete a Case.

_1. Change View mode to Rework



Note the thick rework arrows (Activity transitions)

See the Figure below to understand the Process logic where missing or inaccurate documents cause the Process to request a document – document upload request loop.

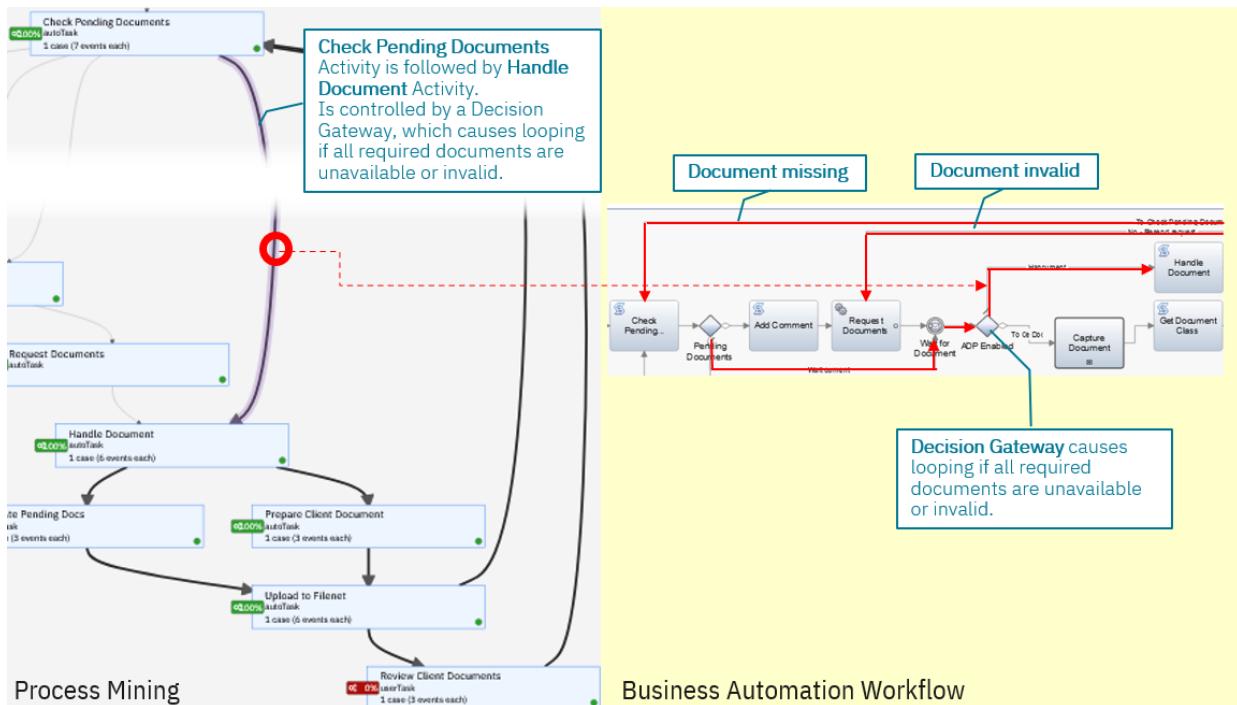
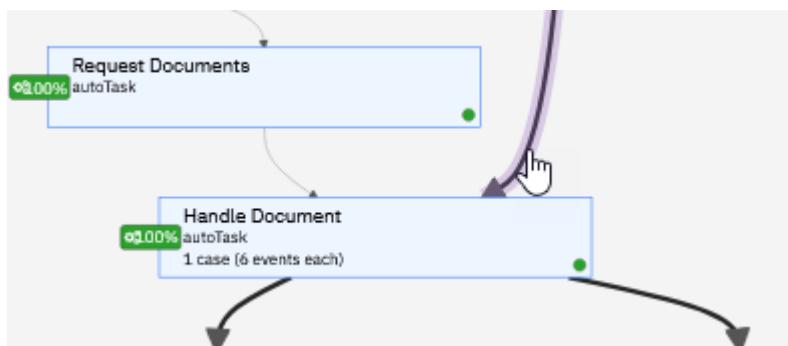


Figure 5. Document Request Upload Loop

_2. Click the thick transition arrow from *Check Pending Documents* to *Handle Document* Activity.



_3. Click **Show path statistics**.



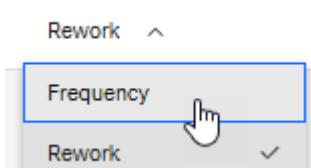
_4. Note that the loop occurred five times, and this happened only for one particular Case.

Check Pending Documents - Handle Document

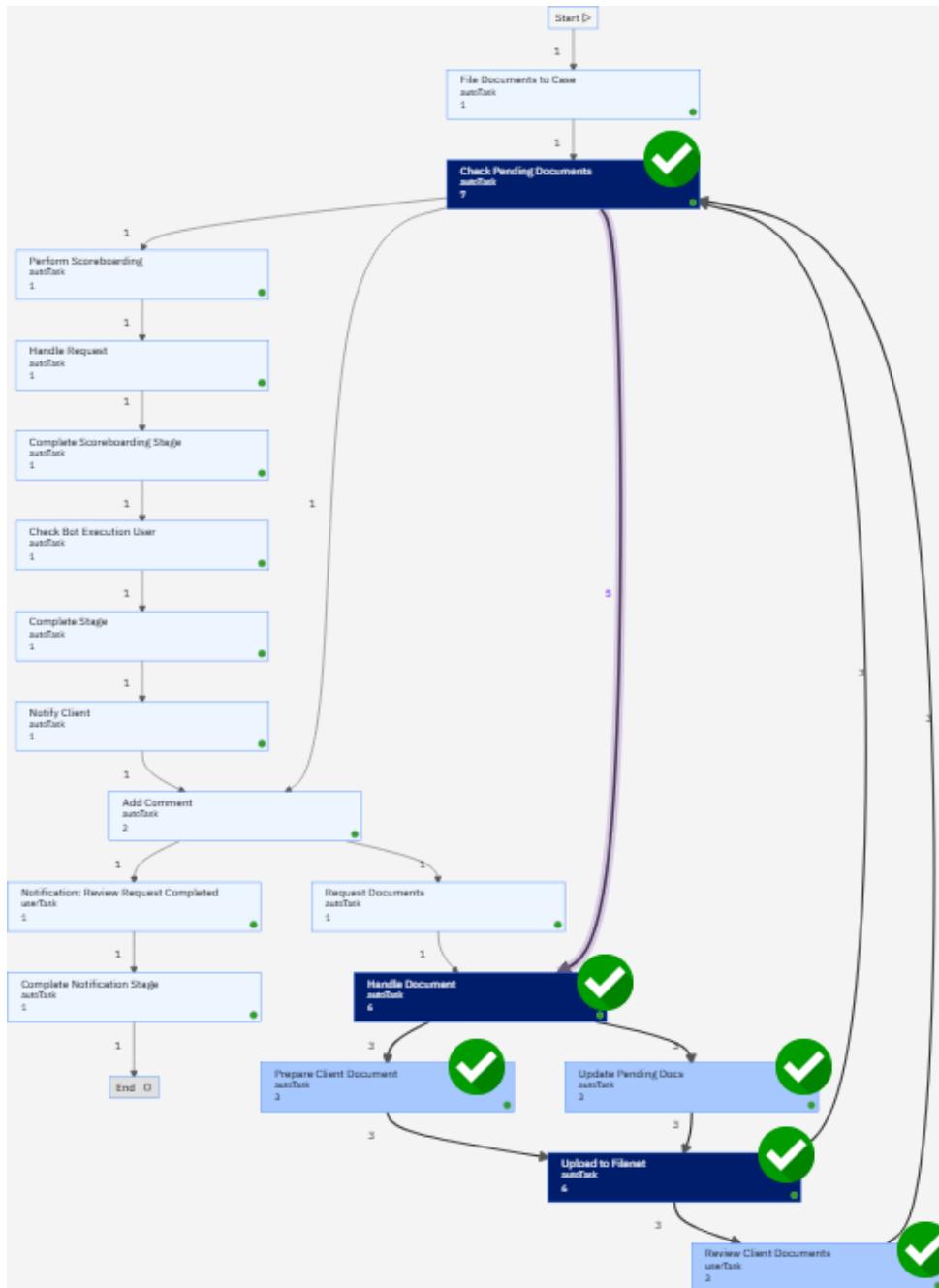
CO_ReferenceID	Count
TNHWLHQJ	5

_5. Click **x** to close the Path statistics window.

_6. Switch back to the **Frequency** View.



_7. As an exercise, use the numbers on the incoming and outgoing transactions to count the number of activities executed when looping occurs. Include the activities shown below with check marks!



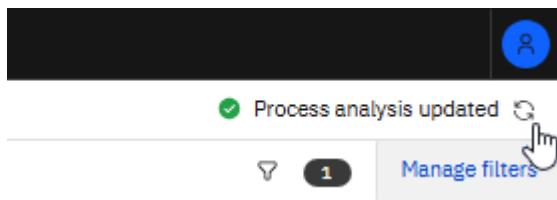
_8. Click the **Manage filters**.



_9. Select the **Unhappy Path** filter and click the **Delete filter** (red garbage can).

_10. Click **Apply**.

_11. Click the Refresh icon to update the Model.



Process Improvement Insight:

We identified a Variant with the fewest number of steps, the lowest cost, and the shortest lead time. This is the Happy Path. We can now investigate any deviations from it.

We also discovered a variant with the most steps, the most Rework, and a high cost, and then identified the root causes.

We determined the root causes: (i) a long delay between two automated activities (to be probed further) and (ii) a large number of executed Activities caused by missing or incorrect documents. The former is an IT insight, while the latter is a business decision to ensure a complete set of correct documents is supplied first.

4.2.6 Analyze Model Conformance

The Model Conformance view provides a visual conformance check between the data-derived and reference models.



The reference model (BPMN or XPDL) depicts the Process as it is understood, not as it is being executed. A reference model is compared with the derived Model to perform conformance checking and to determine activities and activity transitions that are not defined in the reference model.

Let's address why there could be non-conformance with fully orchestrated processes. After all, BPMN processes are predictable by definition! There are two reasons. The Client Onboarding was implemented as a Case that, by definition, is unstructured, allowing for unexpected process variability. The second reason is that even the structured BPMN processes (Activities in the Case) can have unexpected paths: **business fault** handling (throwing exceptions to deal with process faults) and **technical faults** that the admin resolves in the Process Admin Console. The above can cause deviations from the ideal process path defined by our Reference Model!

Note: The reference is a BPMN diagram and can be uploaded when the new Process Mining project is created. The reference model can also be added or changed after the project is created.

The screenshot shows the IBM Automation interface with the title 'IBM Automation' at the top. Below it, a navigation bar includes 'Process mining / Projects / Client Onboarding' and a status message 'Process analysis updated'. The main content area has tabs for 'Data', 'KPIs', 'Cost settings', and 'Project'. The 'Project' tab is selected, revealing a sidebar with icons for 'Project defaults', 'Reference model', 'Backup & History', 'Integration & API', and 'About'. The 'Reference model' section is expanded, showing a sub-section titled 'Reference model' with a file listed: 'Client_Onboarding_Reference_-_2022.09.16 - 2022-09-16.bpmn'. A link 'Edit reference model' is also present.

_1. Change the Model View to **Duration (Average)**.

A screenshot of a dropdown menu titled 'Frequency' with options: 'Frequency', 'Rework', and 'Duration (Average)'. The 'Duration (Average)' option is highlighted with a cursor icon.

_2. Click **Conformance** (top right).

A screenshot of the top navigation bar showing a dropdown menu with 'Duration (Average)', a search icon, and a 'Conformance' button. The 'Conformance' button is highlighted with a dark background.



Using the Model conformance panel, you can perform a visual conformance check between the data-derived Model and the reference model. You can also compare both models to analyze their similarities and differences.

_3. Note the summary of the impact of non-conformance on critical process statistics. It includes essential Case statistics, as shown below.

A screenshot of the 'Conformance' panel displaying several statistical metrics:

- Conformant cases:** 8
- Number of cases:**

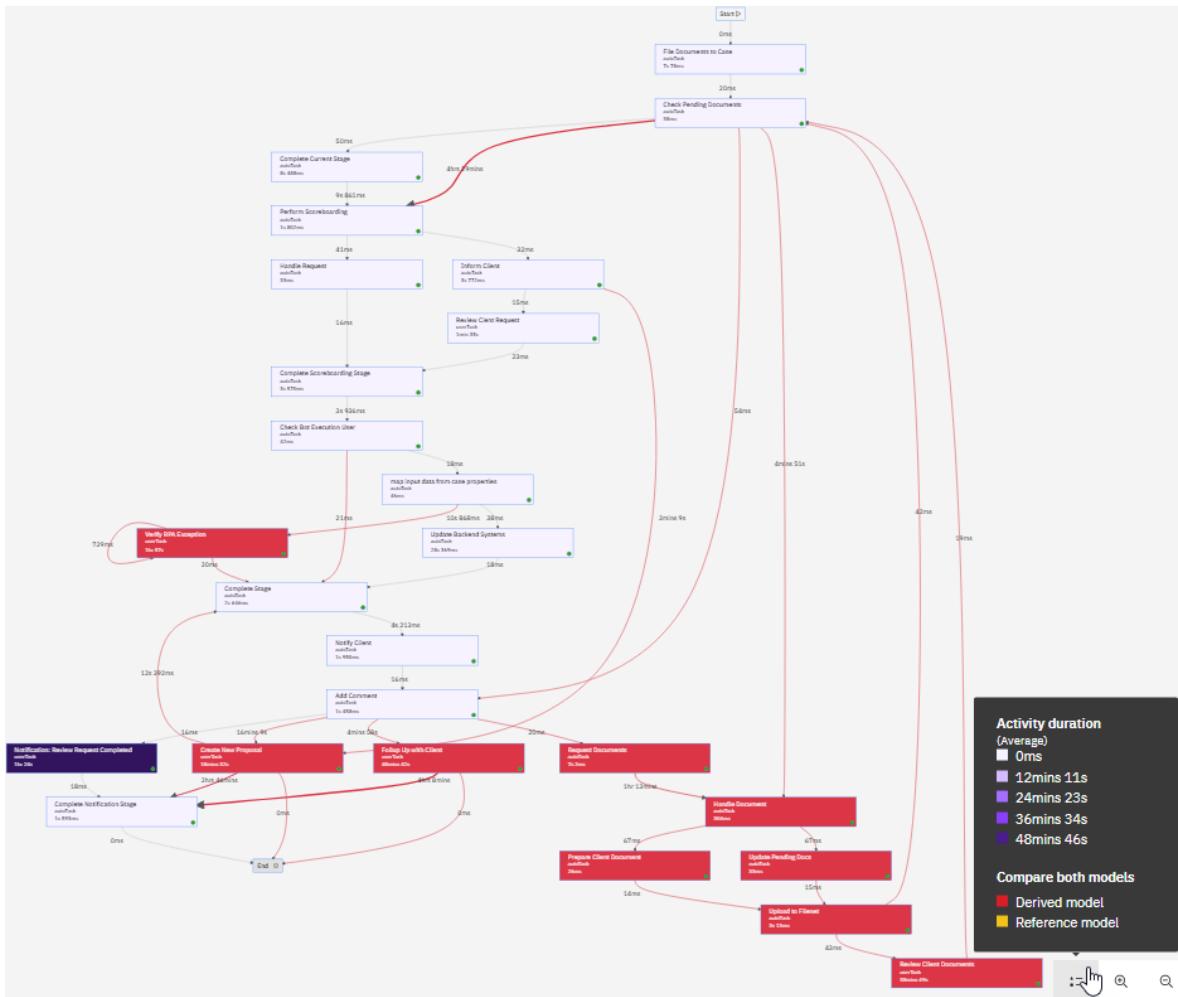
Conformant	Non-conformant
8	46
- Steps per case:**

Conformant	Non-conformant
14	19
- Case cost (EUR):**

Conformant	Non-conformant
361.50	639.66
- Average case lead time:**

Conformant	Non-conformant
3 mins 10 s	2 hrs 38 mins

4. Note that non-conformant Activities and Transitions are marked red.



4.2.6.1 Analyze an Unexpected Process Flow

1. Notice the non-conformant transition, taking **4hrs 29min**, between two Automated tasks (autoTask): *Check pending Documents* and *Perform Scoreboarding*.



2. Select the transition and then select **Show path statistics**.



3. Note that we now see the reference ID.

Path statistics

Check Pending Documents - Perform Scoreboarding		
CO.ReferenceID	Count	Wait time
TNHWHLHQJ	1	4 hours 29 minutes
Items per page: 10		1 - 1 of 1 item

_4. Click X to close the *Path statistics* window.

Process Improvement Insight:

Since both activities are automated and managed by IT, the IT organization should investigate and eliminate this process inefficiency. We can provide them with:

1. The Reference ID to identify the instance in their trace logs,
2. The Case model diagram.

The IT organization explained the issue as follows (See the Figure below):

The process instance with the reference ID **TNHWLHQJ** failed when executing the **Complete Document Stage** Activity.

This process failure caused it to get stuck at the **Review Documents** Case Stage.

The IT organization manually advanced the Workflow to the **Perform Scoreboarding** Stage using the [ACCE Admin Console](#).

After this happened, the Workflow advanced to the next stage (**Perform Scoreboarding**) and started **executing the Perform Scoreboarding Activity**.

This IT intervention took almost 5 hours!

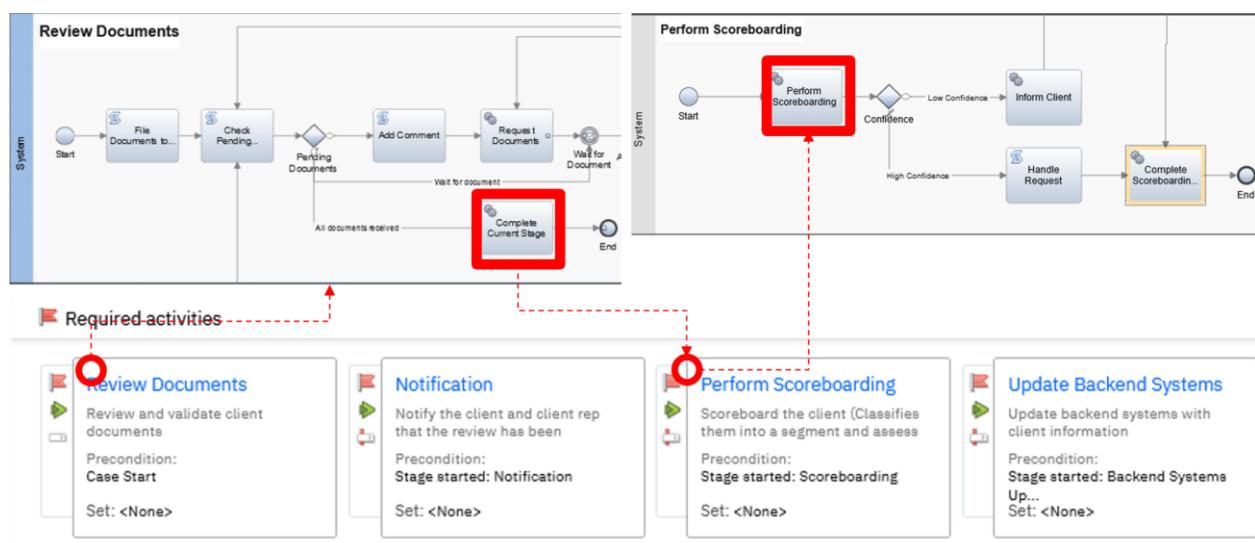
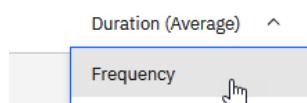


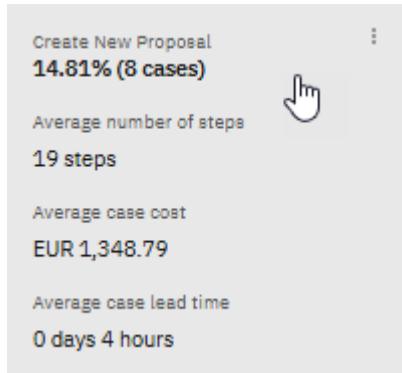
Figure 6. The Explanation of the Invalid Transition Causing a 4h 29 min Wait

4.2.6.2 Identify the Most Costly Deviant Transition

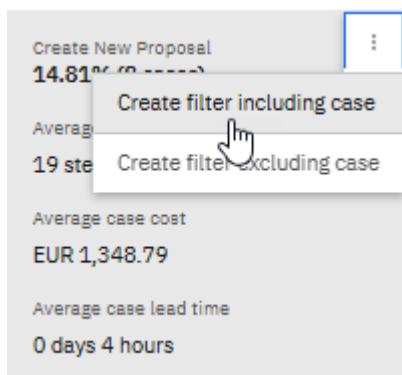
_1. For *View mode*, select **Frequency** view



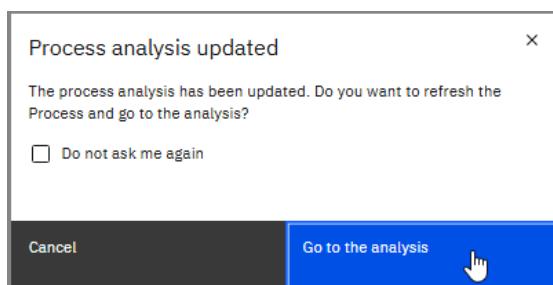
_2. Scroll down to **Create New Proposal** – one of the unexpected Activities.



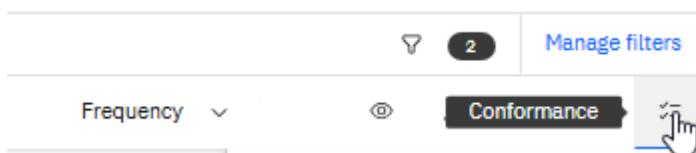
_3. Click the **vertical ellipses** and then select "Create filter including Case."



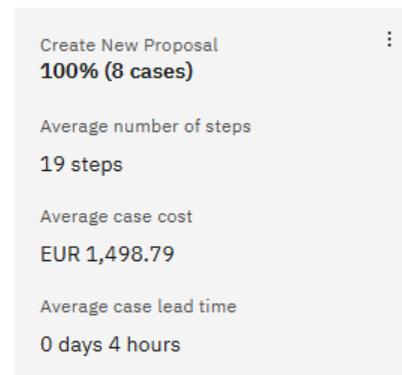
_4. In the *Process analysis updated* window, click **Go to the analysis** to update the Model View.



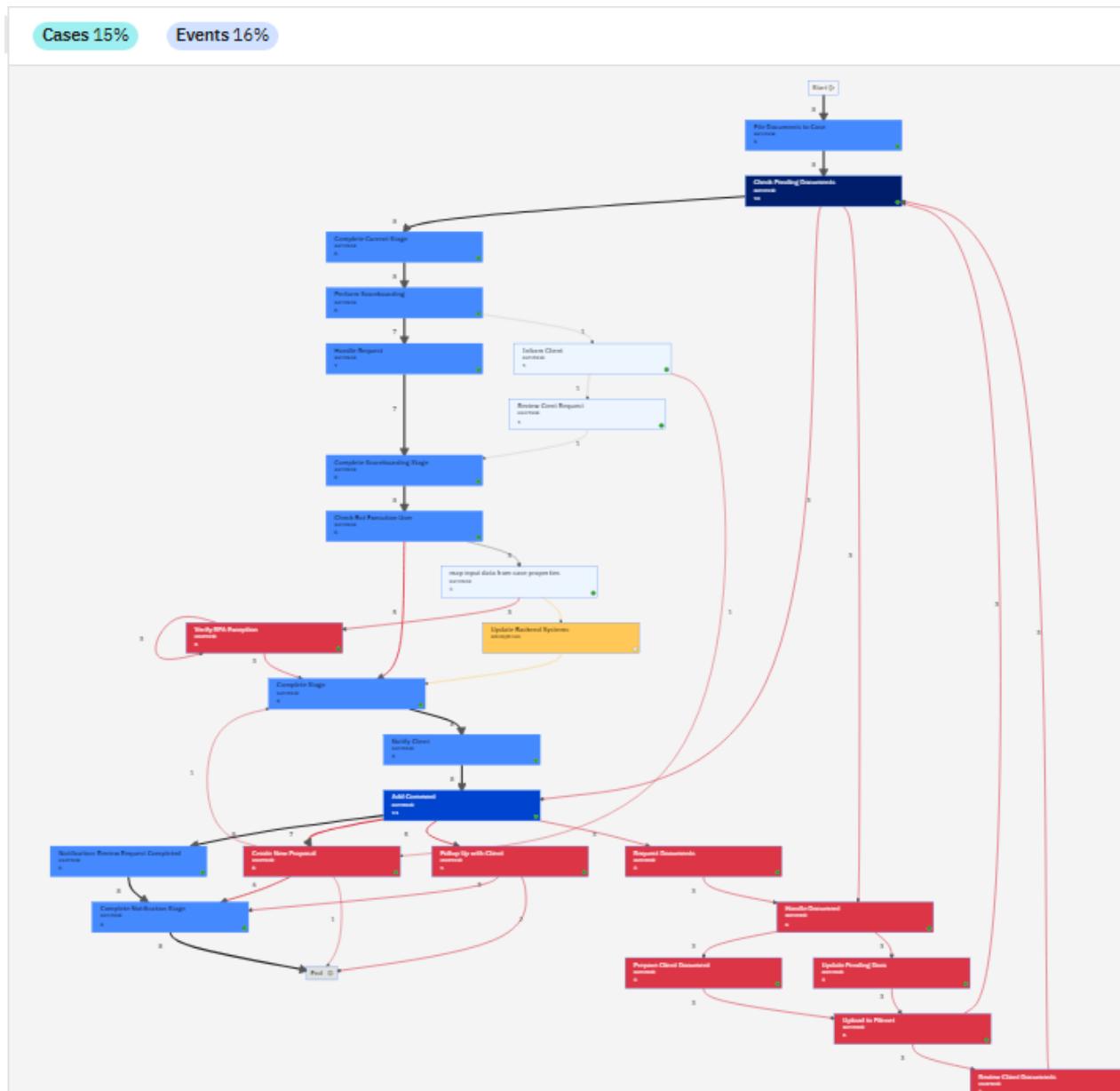
_5. Select **Conformance** again.



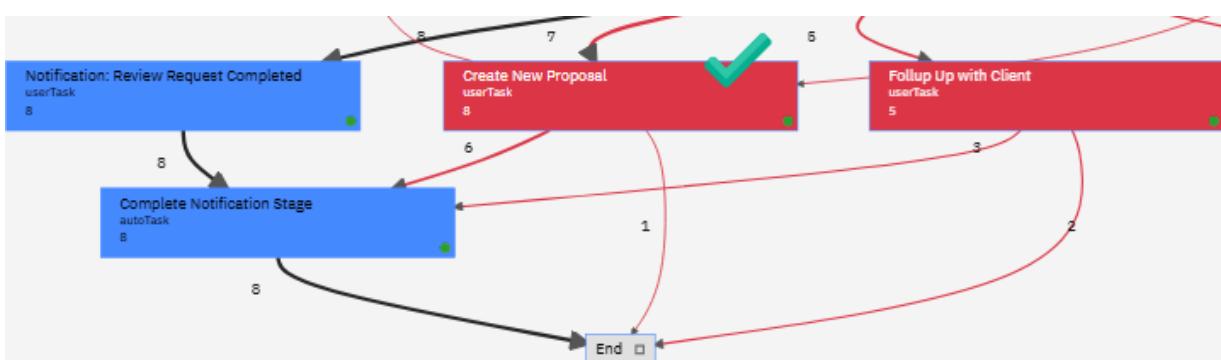
_1. Click on Create New Proposal tile



_2. You should now see the Cases (15%) that only include the Create New Proposal Activity.



_3. To find the *Create New Proposal* Activity, focus on the part of the Model close to the **End** Activity.



Business Explanation:

The two non-conformant activities, shown above in red, are causing the excessive lead time. The reason is that even though the Client is already onboarded, the real Case is completed.

However, the clock is still ticking because a physical Case cannot be completed until ALL activities are completed.

Technical Explanation [Optional Read]:

You may skip this part unless you are familiar with the IBM Workflow Programming model.

As shown in the Figure below, both Follow Up with Client and Create New Proposal are optional Activities. Note the preconditions; both are available to start when the Notification Stage is reached.

All activities^①

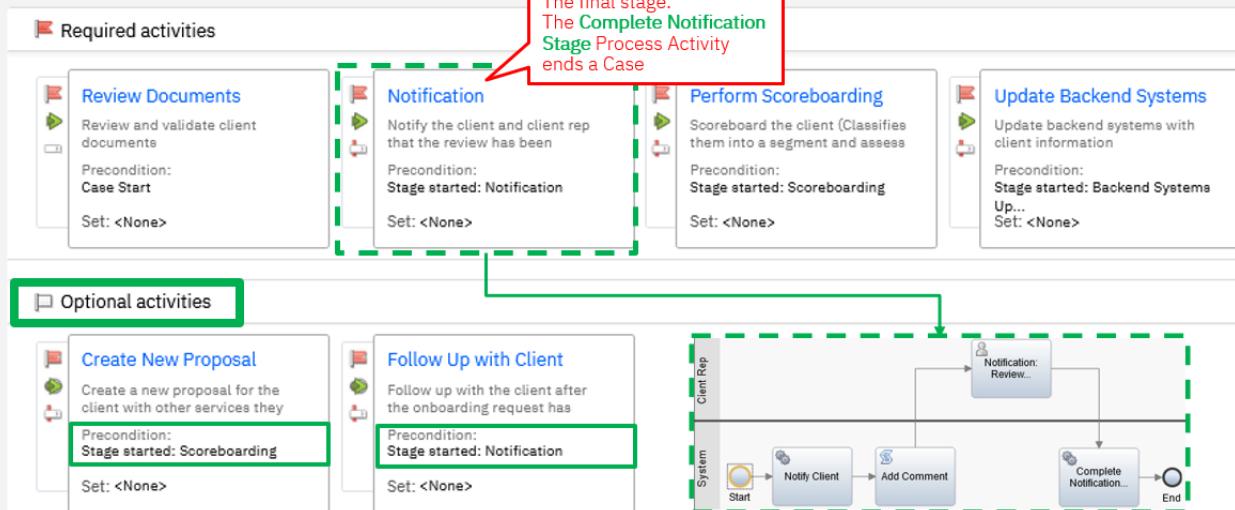
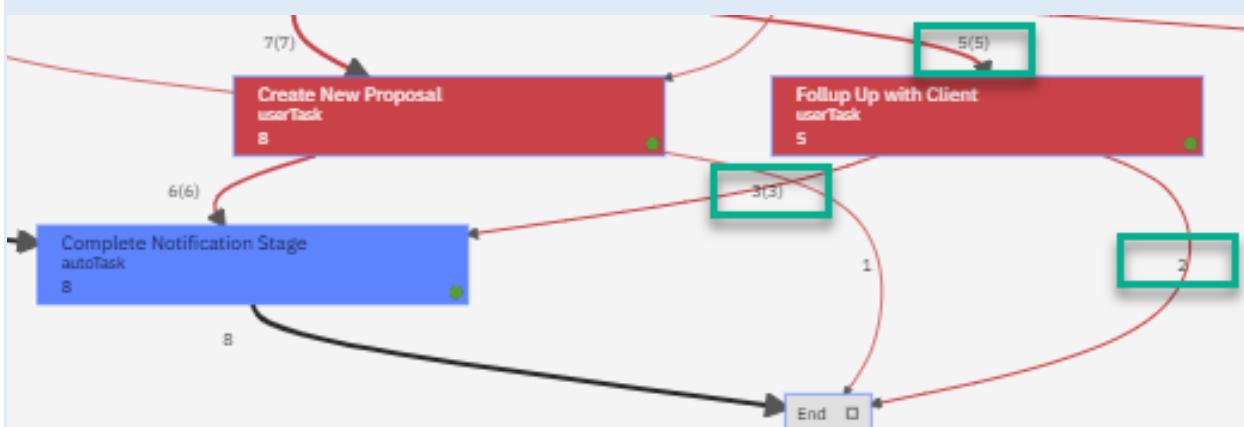


Figure 7. "Follow up with Client" - an Optional Activity Enabled in the Scoreboarding Stage



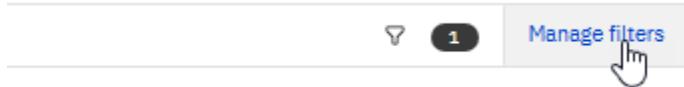
Here are key insights you can draw from the Frequency view regarding the Follow up with Client Activity:

The *Follow-up with Client Activity* was initiated before the *Notification: Review Request Completed* (a human Activity).

2 times the *Follow up with Client Activity* was completed after Case was completed (*Complete Notification Stage* activity completed)

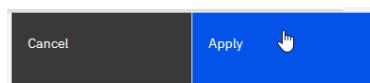
6 times the *Follow up with Client Activity* was completed **before** Case was completed (*Complete Notification Stage* activity completed). This implies that the Client Rep. delayed the Case completion until the *Create New Proposal* Activity was completed.

4. Click the **Manage filters**.

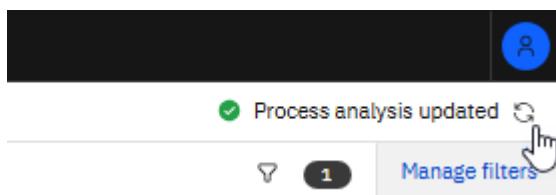


_5. Select the "Activity is..." filter and click the **Delete filter** (red garbage can).

_6. Click **Apply**.



_7. Click the **Refresh** icon to update the Model.



Process Improvement Insight:

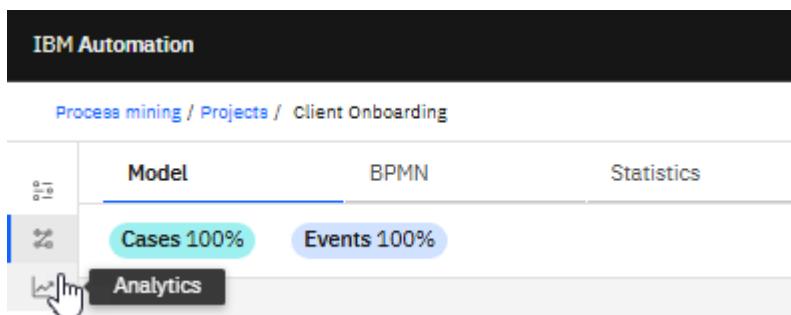
(1) Non-conformant Path Analysis. We identified an exception path not covered in the reference model. We found that when a process instance fails, the IT intervention process is excessively time-consuming (the IT intervention took almost 5 hours!) for the process admin to repair. Such incidents have a significantly negative impact on the Case Lead Time KPI. Business action involves improving the monitoring of failed process instances or modifying the Process to handle technical faults more gracefully.

(2) Non-Conformant Activity Analysis. We identified a negative impact on Case Lead Time due to an Activity not included in the reference model. Client Reps sometimes delay case completion until they complete the follow-up *with Client Activity*, negatively impacting the Case Lead Time KPI. Business actions will instruct Client Reps to complete the Case first. A long-term solution involves changing the Client Onboarding Workflow to prevent this issue from recurring.

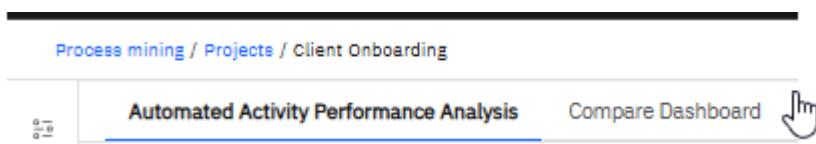
4.2.7 Compare Case Variants

The Compare page of IBM Process Mining helps you compare two different filter templates from the same or other processes. You can use the Compare Dashboard to compare two filter templates. To do so, you must create at least one filter template for the Process.

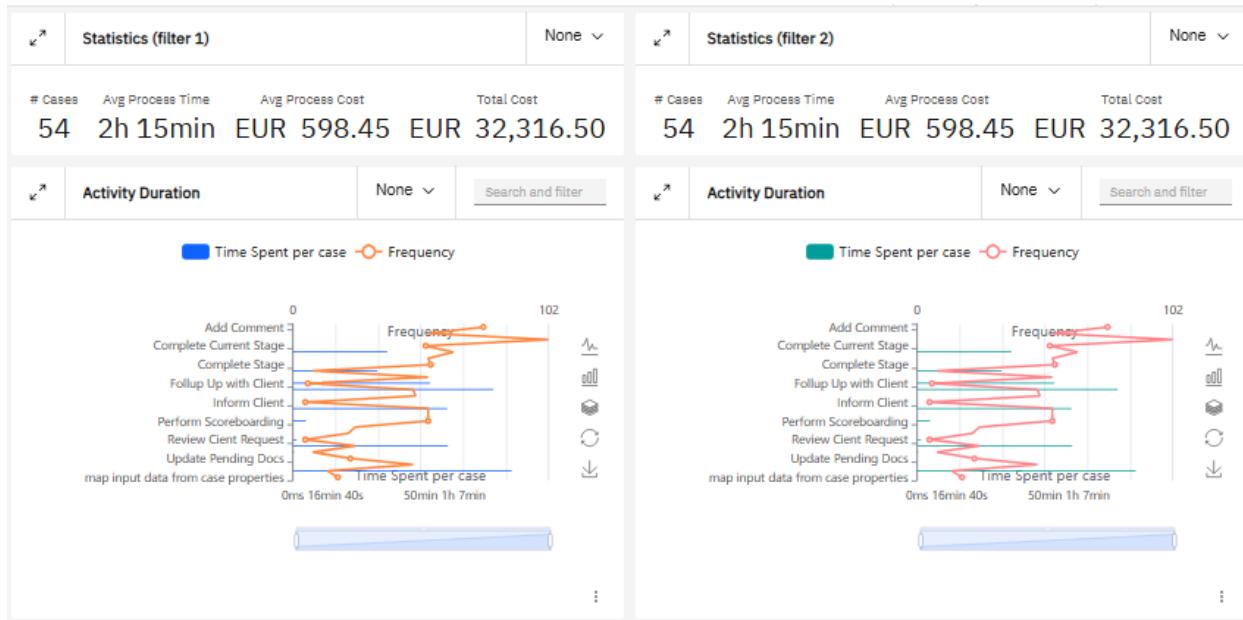
_1. Click the **Analytics** icon.



_2. Select the **Compare Dashboard**.



3. Examine the Compare Dashboard.



Note that it is organized into two columns to enable you to compare Activity Duration and process model across two different sets of data applied to the same process model.

Left column - where you can specify a Filter Template that filters the data in your current project.

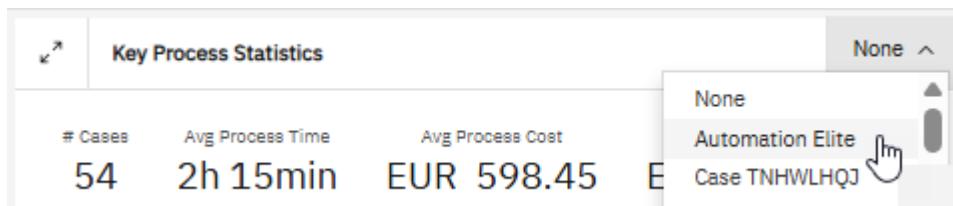
Right column - where you can specify a different Filter Template that filters either the data in your current project.

4.2.7.1 Compare Clients

Let's compare Client Onboarding Workflow metrics between two different clients. We have already created two Filter Templates that filter out cases representing two clients: Automation Elite Inc. and Legacy Consulting.

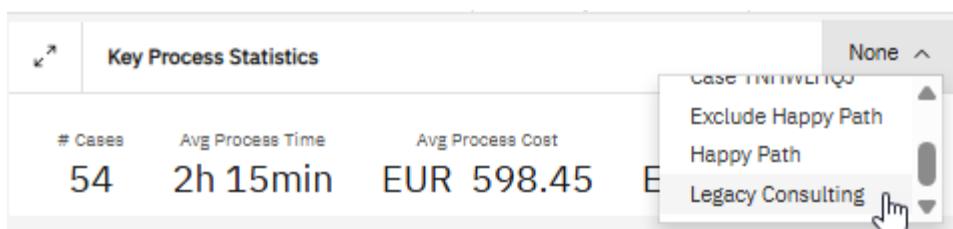
4.2.7.1.1 Configure the Template Filters

_1. In the top left widget, click **None** and select **Automation Elite** Filter Template.



_2. Select the **Authentication Elite** Filter Template for the other two widgets in the left column.

_3. In the top right widget, click **None** and select **Legacy Consulting** Filter Template.



_4. Select the **Legacy Consulting** Filter Template for the other two widgets in the right column.

4.2.7.1.2 Compare "Authentication Elite" versus "Legacy Consulting"

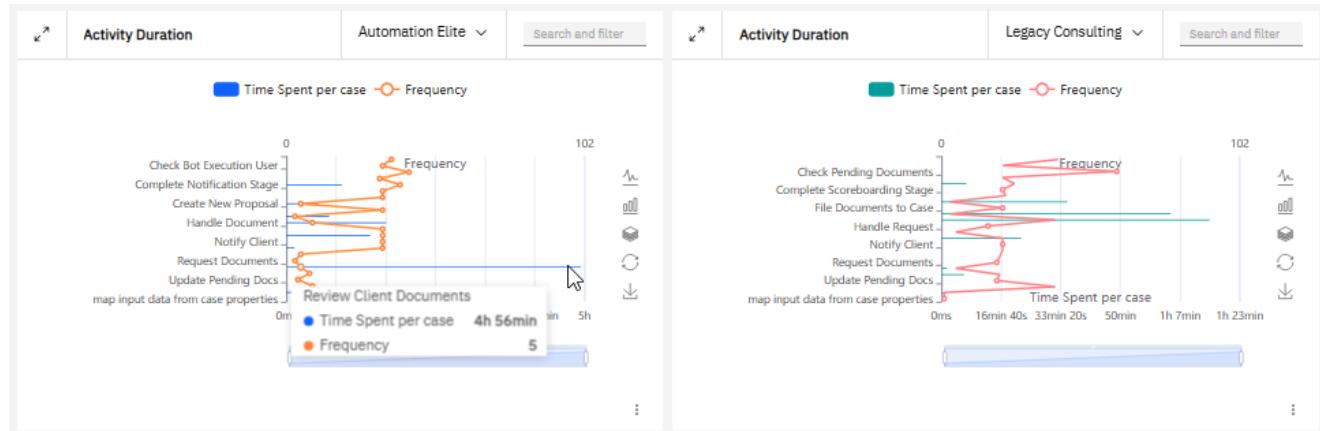
Let's examine the processing differences in onboarding these two customers.

_1. Notice some key high-level differences first.

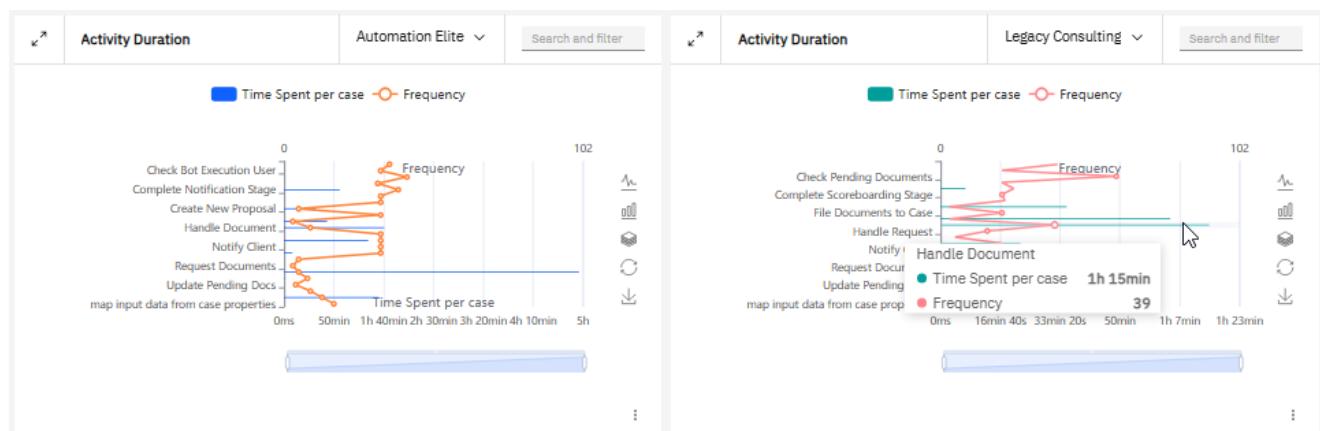
Key Process Statistics				Key Process Statistics			
# Cases	Avg Process Time	Avg Process Cost	Total Cost	# Cases	Avg Process Time	Avg Process Cost	Total Cost
33	2h 39min	EUR 619.23	EUR 20,434.50	21	1h 39min	EUR 1,042.00	EUR 21,882.00

Automation Elite has a higher average processing time but a lower average case cost.

_2. Hover the mouse over the two activities with high **Time Spent per case** statistics.



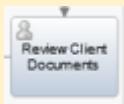
For Automation Elite, compared to Legacy Consulting, more Time was spent on the review of client documents.



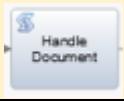
For Legacy Consulting, compared to Automation Elite, more Time was spent on the Handle Documents activity.

Business Insight:

On average, we observe that reviewing documents takes significantly longer for Automation Elite Inc. onboarding than for Legacy Consulting. Since this is a manual task, we need to investigate it from the business perspective.

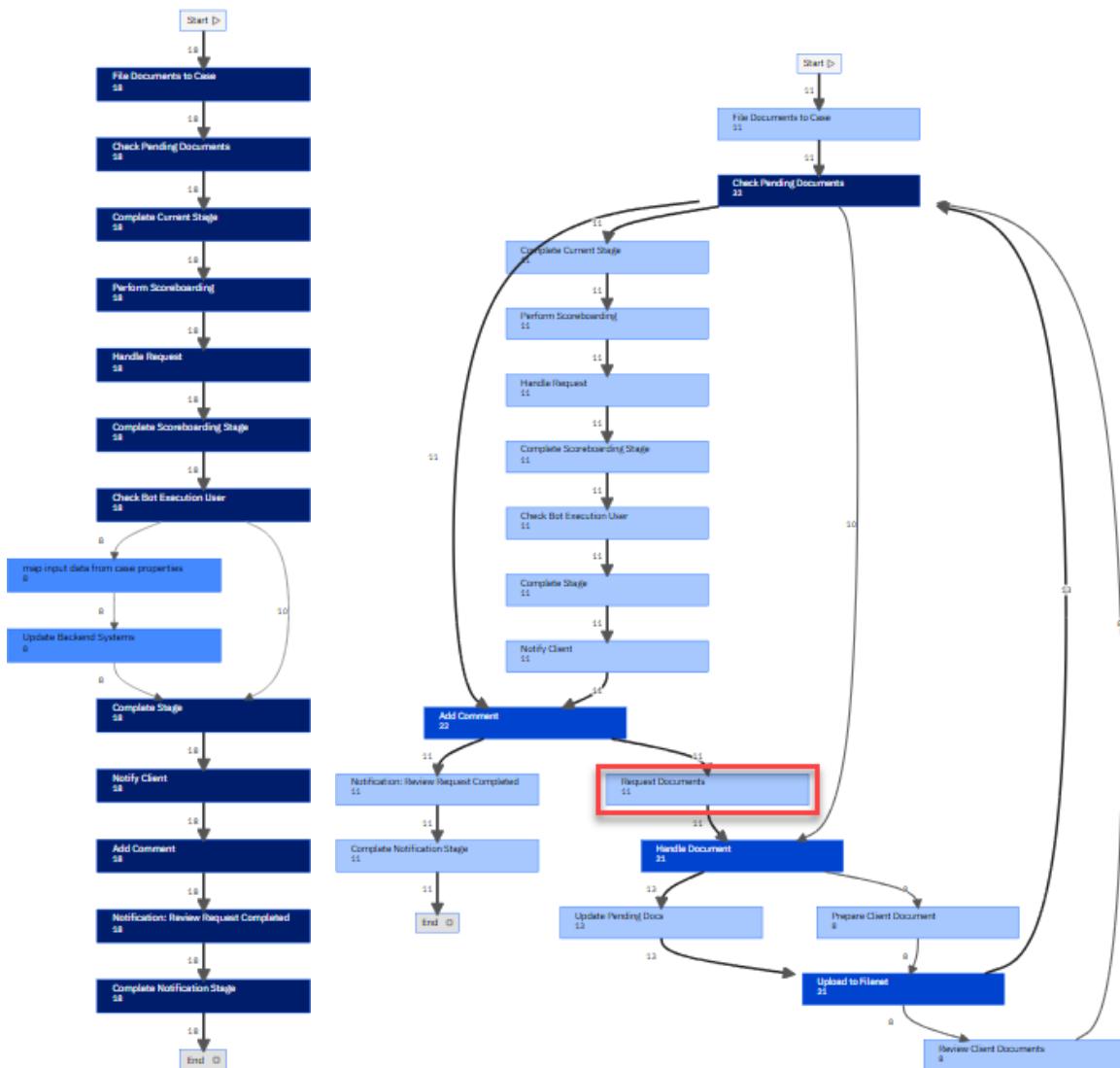


On average, we observe that the Handle Document activity takes significantly longer to complete when onboarding Legacy Consulting compared to Automation Elite Inc. Since this is an automated task, the IT team needs to investigate this.



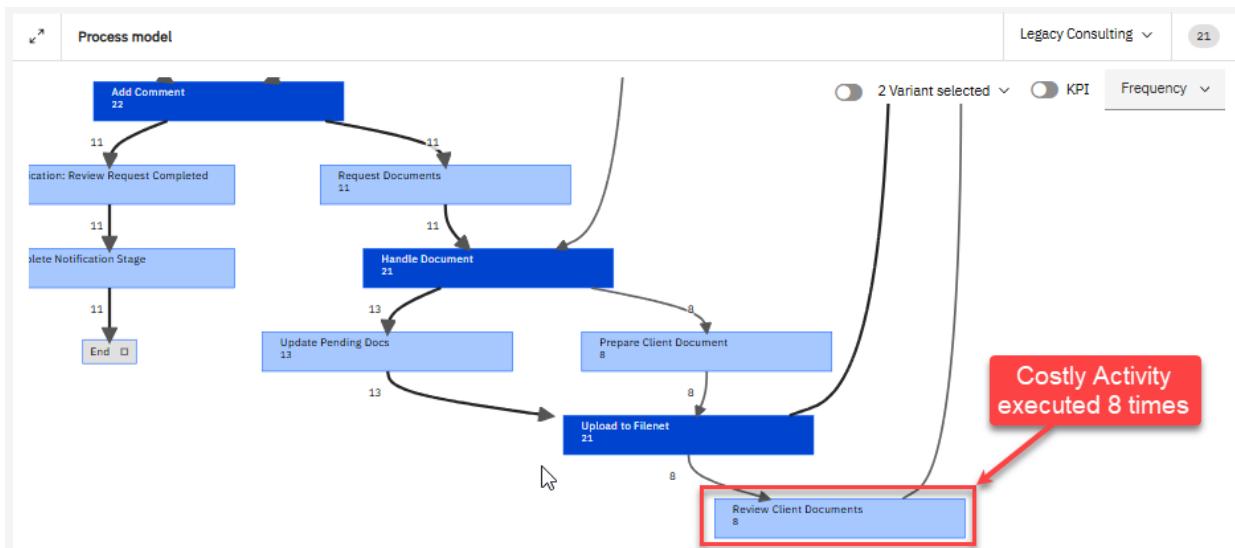
3. Examine the Process model widgets.

Note that in the Process model, widgets indicate that Legacy Consulting has multiple occurrences of the "Request Documents" Activity path, which occurs when incomplete or invalid documents are submitted.



This finding also explains the significantly higher Avg Process Cost metric. The "Request Documents" Activity path includes the very costly, manual "Review Client Documents" Activity.

Activity	Cost	Type
Review Client Documents	EUR 500.00	Manual



Process Improvement Insight:

A business and IT team should jointly investigate how to improve the integration process. The intake process should enforce document submission. Specifically, it should not start the Client Onboarding process until all documents are submitted and valid.

4. Click the **Process** icon.

Process mining / Projects / Client Onboarding

Data	KPIs
Process	working time

4.2.7.2 Compare the Performance of Focus Corp Employees

Let's compare how different Focus Corp employees (usr141 and usr143) complete Client Onboarding user tasks.

As you have just learned, to compare two data sets using the Compare Dashboard, you must first create filters to extract the Activities they completed.

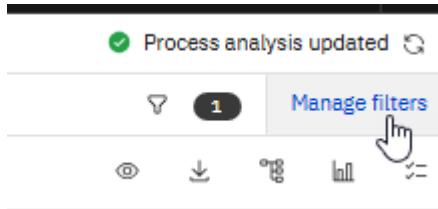
You will next create a filter for employee usr141. We have already created a filter for employee usr143.

4.2.7.2.1 Create **usr141** Filter Template

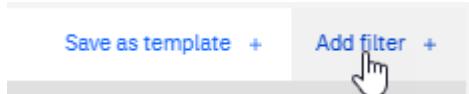


Filters allow you to analyze the Process considering a limited subset of cases that answer a specific user request.

_1. Click the **Manage filters** button.



_2. Click **Add filter +**.



_3. Follow these steps: (1) select **Process Flow**; (2) select **Resource occurrence**; (3) select **usr141**; click **Add(1)**.

The screenshot shows the "Add filters" dialog box. Step 1 (circled in green) highlights the "Process Flow" filter option under "Select filter". Step 2 (circled in green) highlights the "Resource occurrence" field under "Define filter details". Step 3 (circled in green) highlights the "usr141" selection in the list of resource occurrences. Step 4 (circled in green) highlights the "Add (1)" button at the bottom right of the dialog.

1. Select filter

- Performance**
Filter on process and activity KPIs, such as duration.
- Timespan**
Focus on specific periods of the process
- Process Flow**
Filter the process model and related insights

2. Define filter details

Select field: Resource occurrence x | 2

Filter condition: Include matched cases ▼

3. Select filter mode

Select from data Free text

Filter fields:

- Automation Script
- Automation Service
- usr140
- usr141**
- usr142
- usr143

Items per page: 10 | Page number 1 | < | >

usr141 x

Cancel 4 Add (1)

_4. Click **Save as template +**



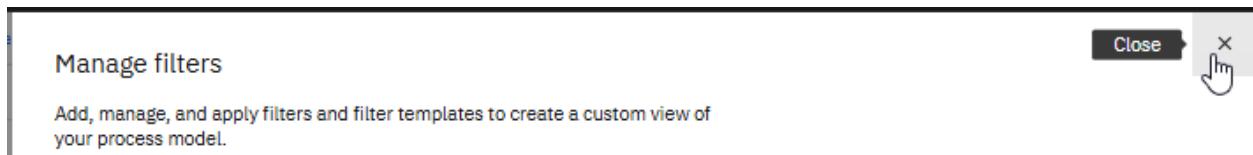
_5. For the *Filter template name*, enter **Usr 141** and then click **Create filter template**.

A screenshot of a 'Create filter template' dialog box. It has two main sections: 'Filter template details' on the left and 'Included filters' on the right. In 'Filter template details', the 'Filter template name' field contains 'Usr 141'. Below it, there's a 'Share with other in organization' section with a 'Disabled' toggle switch. In 'Included filters', there's a single entry: '- Resource is "usr141"'. At the bottom, there are 'Cancel' and 'Create filter template' buttons, with the latter having a hand cursor icon pointing at it.

_6. Select the **usr141** filter and click **Delete filter** (We do not want this filter to be our current filter!)



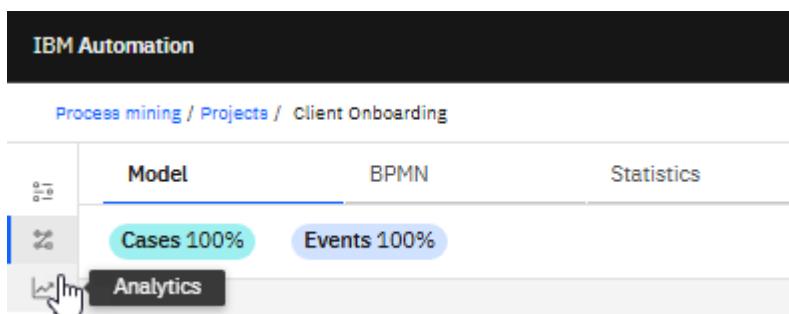
_7. Click **x** to close *Manage filters*.



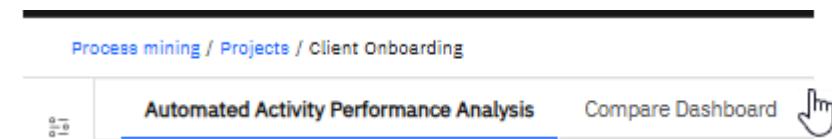
4.2.7.2 Use Template Filter to Compare Employee Performance

Let's find out which employee turns out to be more productive! As you will find out, the answer is not simple.

_1. Click the **Analytics** icon.



_2. Select the **Compare Dashboard**.



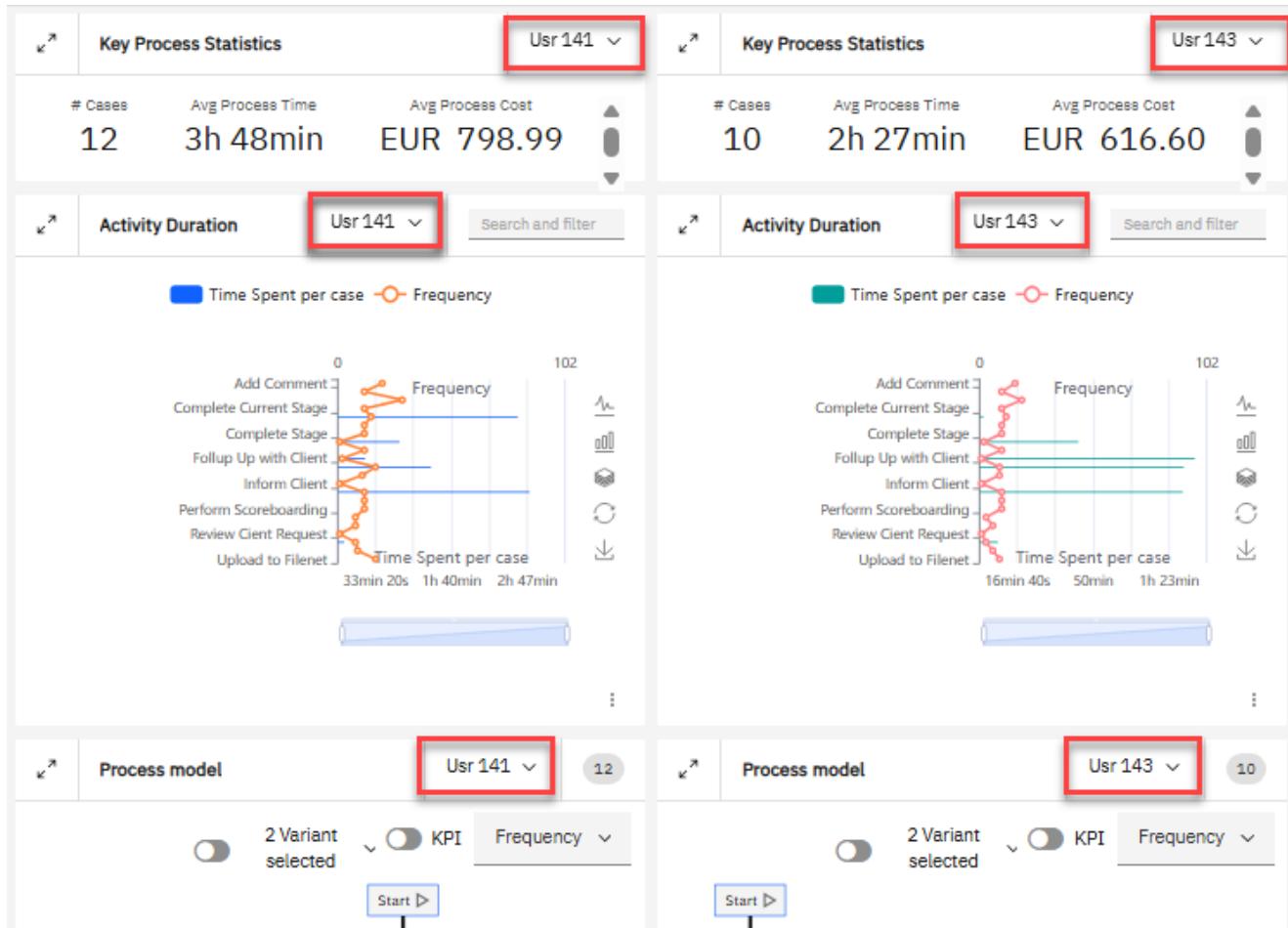
_3. For all widgets in the **left** column, change the filter from *None* to **Usr 141**.

The screenshot shows a dashboard interface with a title bar 'Key Process Statistics'. Below it are two main sections. The left section displays a summary card with '# Cases' set to 54 and 'Avg Process Time' set to 2h 15min. To the right of this is a 'None' filter dropdown menu. A mouse cursor is positioned over the 'Usr 141' option in the dropdown list, which is highlighted with a gray background.

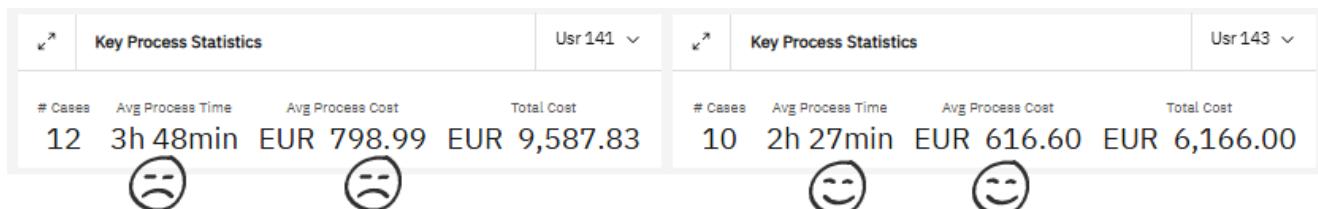
_4. For all widgets in the **right** columns, change the filter from *None* to **Usr 143**.

This screenshot is similar to the previous one, showing the same 'Key Process Statistics' dashboard. However, the right column's filter dropdown menu now shows 'Usr 143' as the selected option, indicated by a gray highlight and a cursor hovering over it.

_5. Verify that the filters are configured as shown below.



_6. Let's examine the Key Process Statistics.



Employee **Usr 143** performs better than employee **Usr 141**:

1. The **Usr 141** completes cases slower than the **Usr 143**.
2. The cost of the **Usr 143** case is lower than that of the **Usr 141** case.

We did not provide the root cause analysis. As an exercise, try to drill into the provided data to discover the performance difference highlighted above.

4.2.8 Happy Path Analysis for New Straight Through Workflow Candidate

In the "Use Filter to Discover Happy Path" section, we identified the "Happy Path" within the Client Onboarding Workflow. We will now evaluate it against instances that did not follow the "Happy Path." If the evaluation is successful, we will export the BPMN diagram and submit it to the IT Organization for consideration of implementing the Happy Path Process Variant as a fully automated Straight-Through-Process.

4.2.8.1 Happy Path Comparison

We have created two filter templates to help you save time on lab steps: Happy Path and Exclude Happy Path. We will use them to compare the Happy Path case variant with one that does not include the Happy Path cases.

- _1. For **all widgets** in the **left** column, change the filter from **None** to **Exclude Happy Path**.

The screenshot shows the 'Key Process Statistics' view with a filter dropdown open. The dropdown menu includes 'None', 'Case TNHWLHQJ', 'Exclude Happy Path' (which is selected), 'Happy Path', and 'Legacy Consulting'. The main statistics table shows 54 cases, an average process time of 2h 15min, and an average process cost of EUR 783.64.

- _2. For **all widgets** in the **right** columns, change the filter from **None** to **Happy Path**.

The screenshot shows the 'Key Process Statistics' view with a filter dropdown open. The dropdown menu includes 'None', 'Case TNHWLHQJ', 'Exclude Happy Path', 'Happy Path' (which is selected), and 'Legacy Consulting'. The main statistics table shows 54 cases, an average process time of 2h 15min, and an average process cost of EUR 783.64.

- _3. Let's examine the **Key Process Statistics** view.

The screenshot shows the 'Key Process Statistics' view with two side-by-side tables. The left table, under 'Exclude Happy Path', shows 43 cases with an average process time of 2h 29min and an average process cost of EUR 914.31. The right table, under 'Happy Path', shows 11 cases with an average process time of 1h 23min and an average process cost of EUR 272.83. Both tables include a 'Total Cost' column.

The "Happy Path" process variant is the winner! It has almost half the Average process time and nearly 1/10th the average cost.

4.2.8.2 Generate Happy Path BPMN Process

We will create a BPMN Process diagram, export it to a file, and hand it to the IT Organization.



The exported BPMN model could be imported to any BPMN-compliant editor, including IBM Blueworks Live. IBM Blueworks Live processes can also be imported to IBM Process Mining to perform simulations based on the automatically generated event data. The BPMN import transformation maps Work Time to Working Time, but does not account for Wait Time.

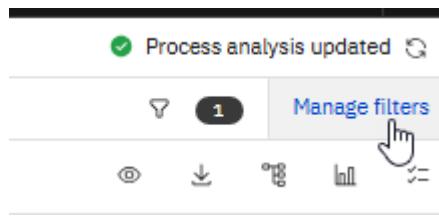
- _1. Click the **Process** icon.

The screenshot shows the 'Process mining / Projects / Client Onboarding' interface. A navigation bar at the top includes 'Process mining', 'Projects', and 'Client Onboarding'. Below this is a toolbar with icons for 'Data' and 'KPIs'. A large 'Process' icon, which is highlighted with a red box, is located in the center. Below the icon, the text 'Process working time' is visible.

4.2.8.2.1 Create BPMN Diagram

First, we will apply the Happy Path filter to include only the Happy Path Cases.

_1. Click the **Manage filters** button.

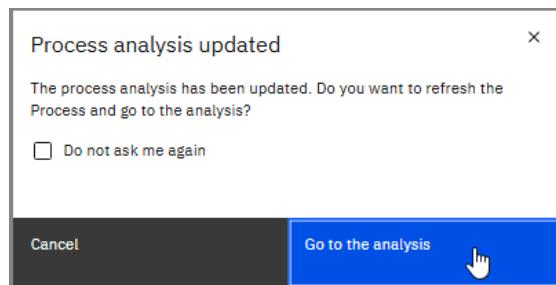


_2. Select the **Happy Path** filter, click **Apply**.

A screenshot of a "Filter template" dialog box. At the top left is a "Find templates" search bar. Below it is a table with three columns: "Template name", "Created by", and "Shared with organization". There are four rows: "Automation Elite" (created by maintenance.admin (you), No, Apply button), "Case TNHWLHQJ" (created by maintenance.admin (you), No, Apply button), "Exclude Happy Path" (created by maintenance.admin (you), No, Apply button), and "Happy Path" (created by maintenance.admin (you), No, Apply button). The "Happy Path" row is highlighted with a light gray background. A hand cursor icon is positioned over the "Apply" button next to the "Happy Path" entry.

_3. Click **Continue**.

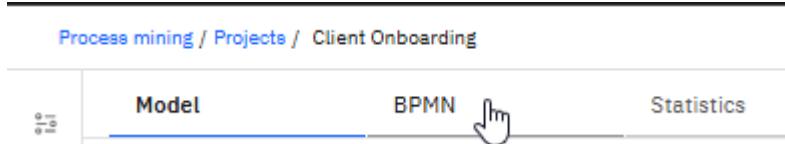
_4. In the *Process analysis updated* window, click **Go to the analysis** to update the Model View.



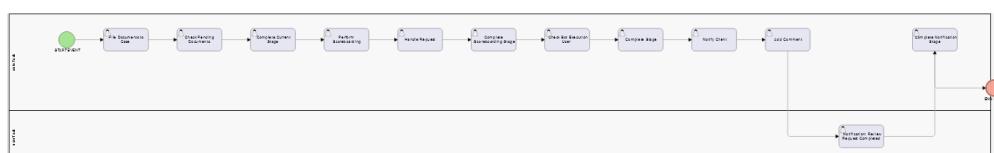
_5. You should now see the familiar Happy Path process.



_6. Click the **BPMN** tab



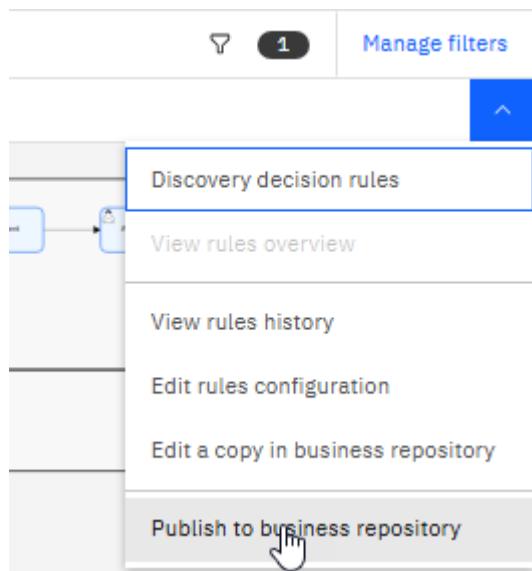
_7. You should now see the BPMN diagram of the Happy Path process.



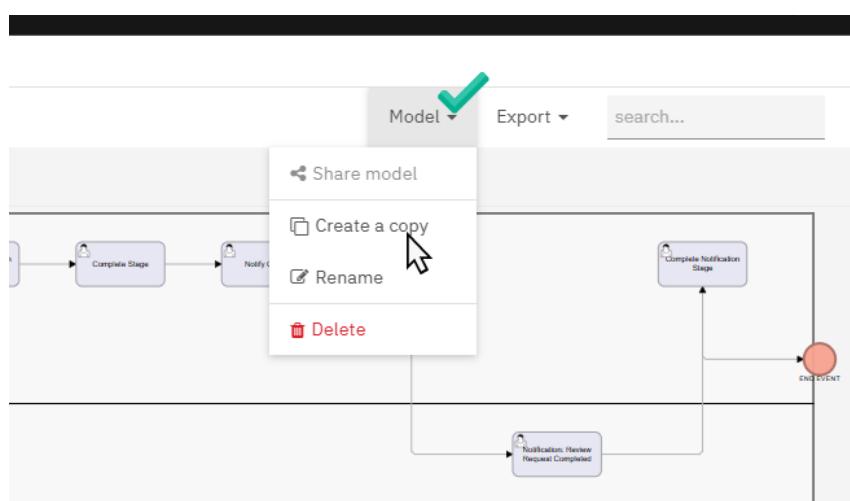
This BPMN diagram is a standard BPMN 2.0 model generated automatically by IBM Process Mining from actual data. It does not contain any decisions. However, if it did, the Decision Rules Mining capability would automatically discover the correlations within the mined data and detect decisions governing the Process. The decision could then be exported in DMN format. DMN stands for Decision Model and Notation (see <https://www.omg.org/dmn/>) format.

4.2.8.2.2 Export BPMN Diagram

_1. Click the dropdown next to **Create simulation +** and then click **Publish to business repository**.



_2. Click the **Model dropdown**, and then click **Create a copy**.



_3. For **New Name**, enter **Client Onboarding Happy Path** and then click **Create**

A screenshot of a 'Create a copy' dialog box. It contains a 'Create a copy' header, a 'New Name' section with a text input field containing 'Client Onboarding Happy Path', and a 'Cancel' and 'Create' button at the bottom. The 'Create' button is highlighted with a mouse cursor.

You should now see the BPMN diagram in edit mode, with the palette appearing on the left.



The Following Steps Are Optional, High-Level Steps Not Required To Complete The Lab.

The next step would be to export the BPMN Process. Business Process Analysis (BPA) view includes a BPMN Editor. Before exporting the BPMN Process Model, we can now make some changes in the BPMN Editor. Alternatively, you could export the Process as is and make the changes in IBM Process Designer within Business Automation Studio.

If you prefer to make the changes in the BPMN Editor, follow these steps.

Change activity types from User Task to Manual Task

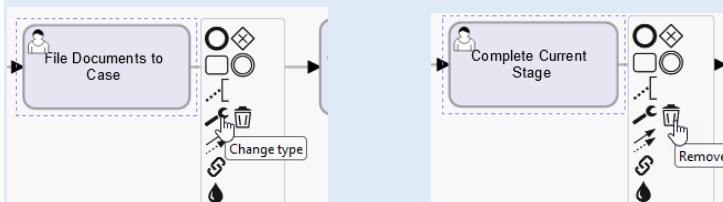


Remove Activities associated with Complete Case Stages (there are no stages in a Straight-Through-Process)

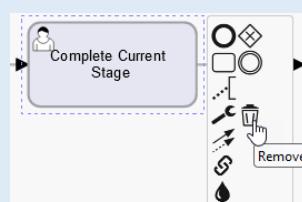


Making these model changes is not required to complete the exercise. But if you like to attempt it, here is how.

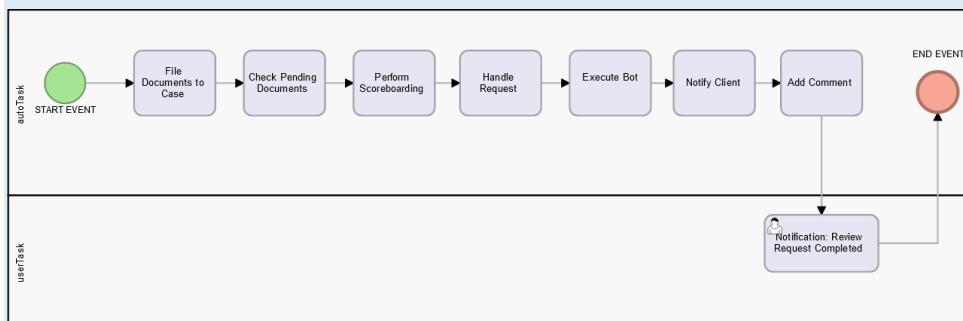
To change activity type



To delete an activity



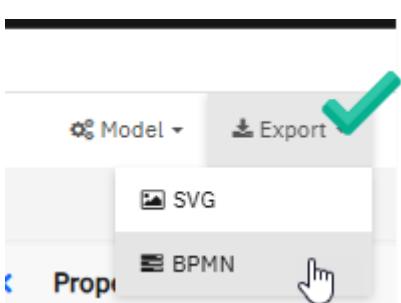
The edited flow should then look similar to this.



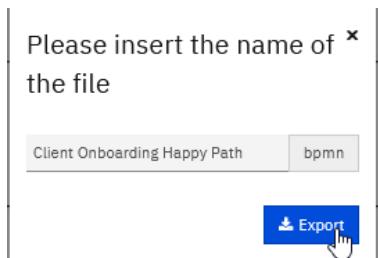
When you are done, click Save.



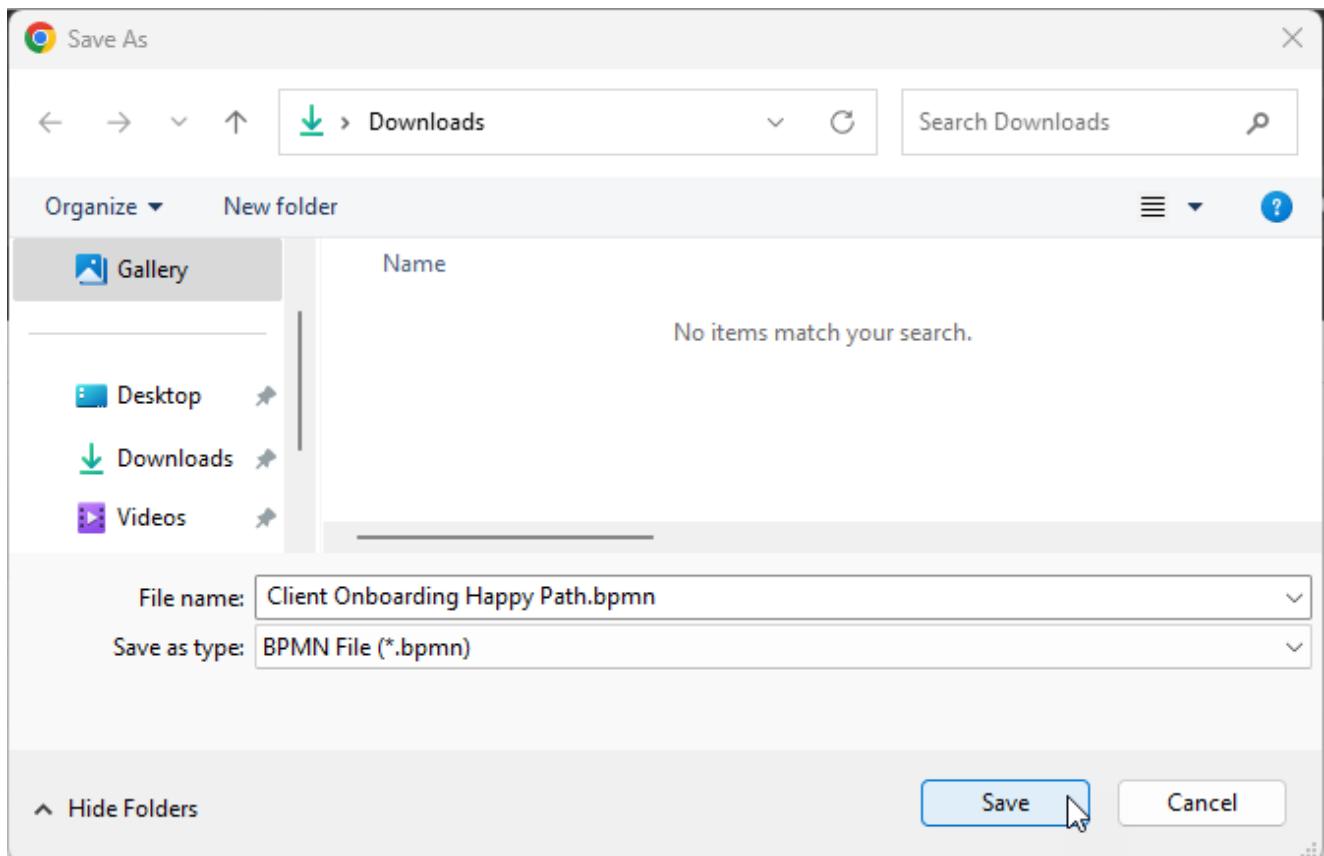
4. Click the Export dropdown and then select BPMN.



5. Click the **Export** button.



6. Click **Save** to save the Happy Path diagram in *Client Onboarding Happy Path.bpmn* file.



The Following Steps Are Optional, High-Level Steps Not Required To Complete The Lab.

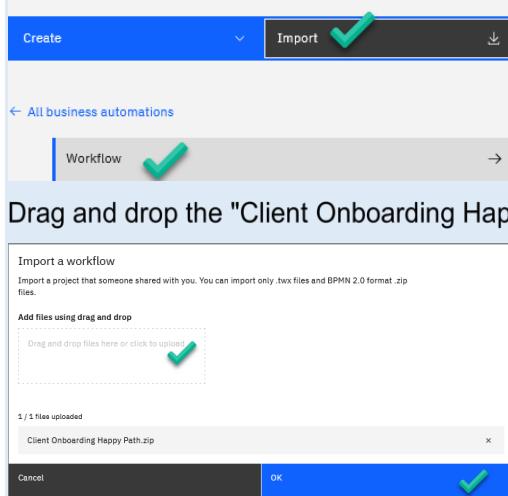
To import the BPMN file to Web Process Designer, switch to Business Automation Studio and follow these steps:

Create a zip from the "Client Onboarding Happy Path.bpmn" file

In Business Automations, select Workflow and then Import

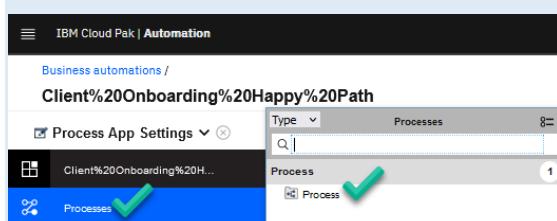
Business automations

Create or reuse automations. An automation is a collection of artifacts that fulfills a business purpose. You can publish some automation artifacts as automation services that you can call and reuse in a consistent way. [Learn more](#)

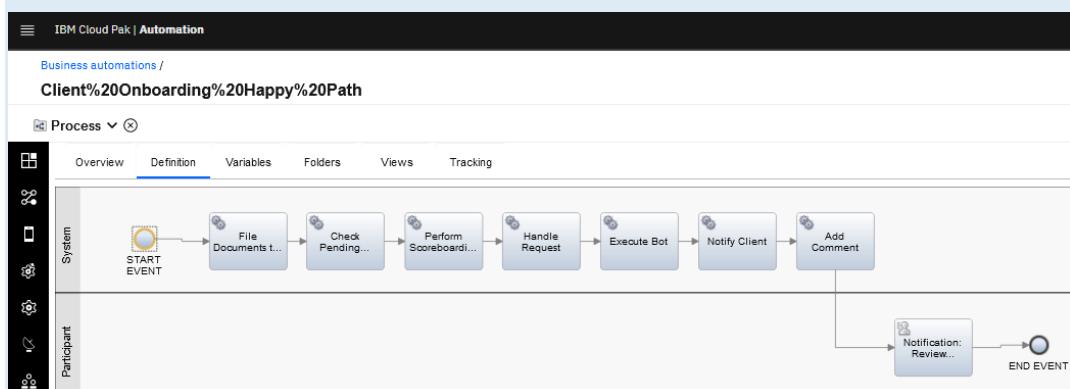


Drag and drop the "Client Onboarding Happy Path.zip" file and click OK

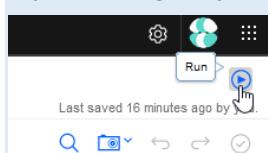
When Process Designer opens, select Process and then click Process.



The imported Process is executable!



Try executing it if you like.



Of course, the Process does not do anything because none of the activities are implemented. This would be the next step to create a BPMN Straight Through Process.

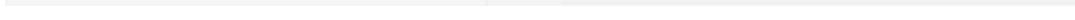
_7. Click the **Process mining** link to switch back to the Process Mining component.

IBM Automation

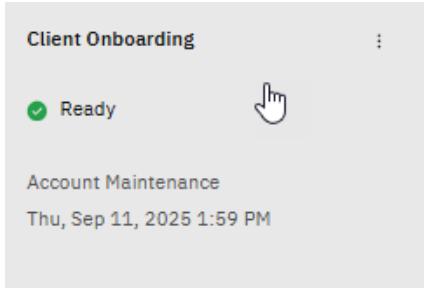
Process mining / Projects / Business repository

Business repository local Client Onboarding Ha [...] Organization: local

Create new Simulation Save Versions



_8. Reopen the **Client Onboarding** Process from the *Recent projects* list.



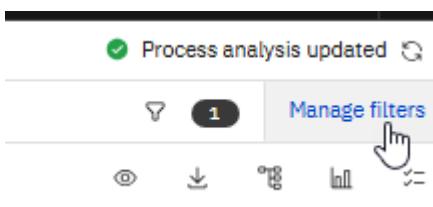
Client Onboarding

Ready

Account Maintenance

Thu, Sep 11, 2025 1:59 PM

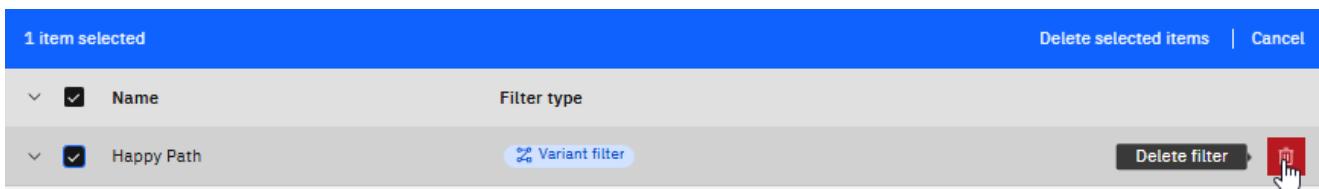
_9. Click the **Manage filters** button.



Process analysis updated

1 Manage filters

_10. Select the **Happy Path** filter and click the **Delete filter** (red garbage can).



1 item selected

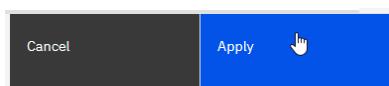
Name Filter type

Happy Path Variant filter

Delete selected items | Cancel

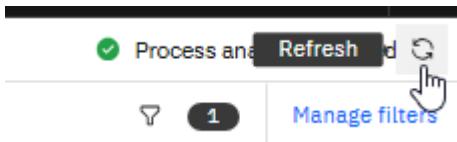
Delete filter

_11. Click **Apply**.



Cancel Apply

_12. Click **Refresh**.



Process analysis Refresh

1 Manage filters

Process Improvement Insight:

The Compare feature provided evidence (significantly lower Case Cost and Lead Time for 20% of all cases) to justify investing in a Straight Through Process (STP) version of the Client Onboarding Workflow.

When implementing the STP process, the IT organization could also consider automating the only remaining human task in the Process:



Removing this async Activity would make the Client Onboarding Happy Path Process a true STP process.,.

4.2.9 Using Dashboards to Optimize Client Onboarding Workflow

Process Dashboards are a vital feature of the Analytics component of IBM Process Mining. For each IBM Process Mining process, it is possible to create one or more **ANALYTICS** dashboards to provide critical business insights and enable the business user to monitor near-real-time critical business metrics and, if needed, dive into a problem-solving mode immediately.

Below are handy definitions of some terms we will use in this part of the lab.

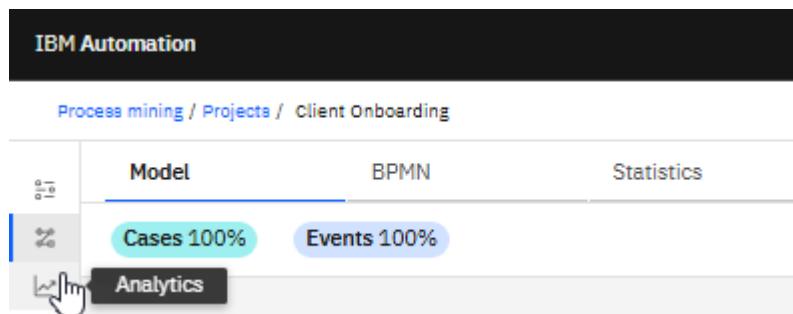
Throughput Time = Service time + Waiting Time

Service Time = End Time – Start Time

Waiting Time = Previous Activity Stop time – Next Activity Start Time

All the above metrics are available because the data is retrieved from IBM Business Automation Insights. Logs from systems that do not provide Activity End Time use different calculations for the above metrics.

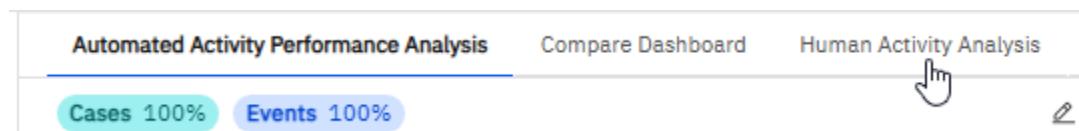
1. Click the **Analytics** icon.



4.2.9.1 Human Activity Analysis Dashboard

We have built a custom dashboard for you to identify and analyze the impact of human activities on process lead time and process cost.

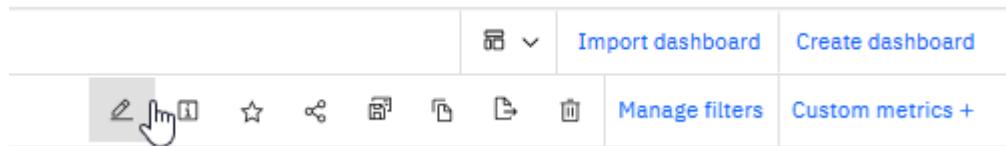
1. Select the **Human Activity Analysis** dashboard.



4.2.9.1.1 Build Average Human Activity Service Time Chart

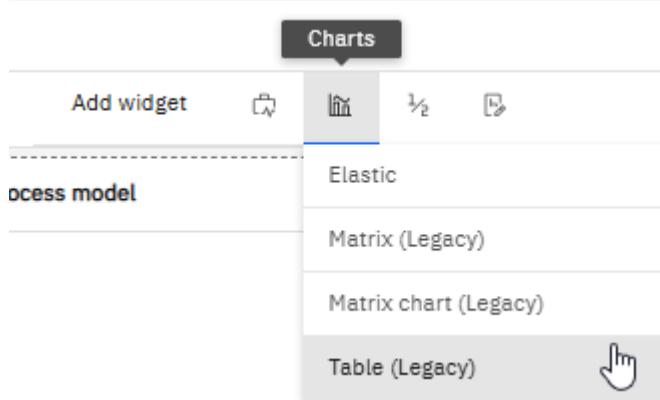
Before proceeding with the analysis, let's gain practical experience by building a chart related to Activity Service Time.

_1. Click the **Edit** button.



 Custom dashboards are built from configurable pre-built widgets (the first six categories) or user-defined custom widgets requiring IT skills (the last category in the palette ).

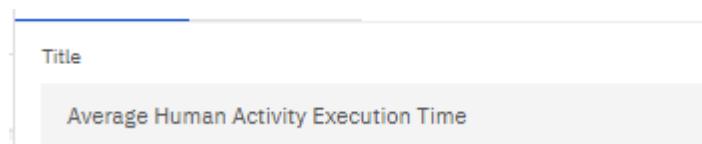
_2. From the palette, select **Charts > Table (Legacy)**



_3. Click the **Edit** to configure the new widget.



_4. For **Title**, enter **Average Human Activity Execution Time**.



_5. Click **Add new from** and select **eventlog**.



_6. Click **Add new dimension** and select **Activity**.



_7. From the dropdown, select **Activity**.

_8. Click the **Add new measure** button **three** times.



_9. For **Measures**, enter the following values.

Measure	Name	Expression	Data Type
1	Avg Total Time	Avg(servicetime+waittime)	Duration
2	Avg Service Time	Avg(servicetime)	Duration
3	Avg Wait Time	Avg(waittime)	Duration

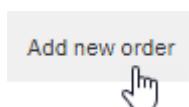
_10. Ensure the Measures look exactly as shown below:

Measures		
$\frac{1}{\cdot}$	Avg Total Time	Avg(servicetime+waittime)
$\frac{2}{\cdot}$	Avg Service Time	Avg(servicetime)
$\frac{3}{\cdot}$	Avg Wait Time	Avg(waittime)

_11. For **Filters**, enter **TYPE = 'userTask'** to ensure we only include the Human Activities.

A screenshot of a user interface for adding filters. At the top left, it says 'Filters'. Below that is a text input field containing 'TYPE = 'userTask''. A green checkmark is placed over the word 'userTask'.

_12. Click the **Add new order** button.



_13. For *order by* select **Avg Total Time**.

Order by

Avg Total Time	▼
Descending	▼

_14. The completed Chart should look exactly like this. Click **OK** to create it.

Table (Legacy)

Configuration Style Help

Title
Average Human Activity Execution Time

From
eventlog

Add new from

Dimensions
Activity

Add new dimension

Measures

Avg Total	Avg(servicetime+waittime)	Duration
Avg Servic	Avg(servicetime)	Duration
Avg Wait T	Avg(waittime)	Duration

Add new measure

Filters
TYPE = 'userTask'

Activity interval

Apply dashboard filters

Activities conformance:
Show all

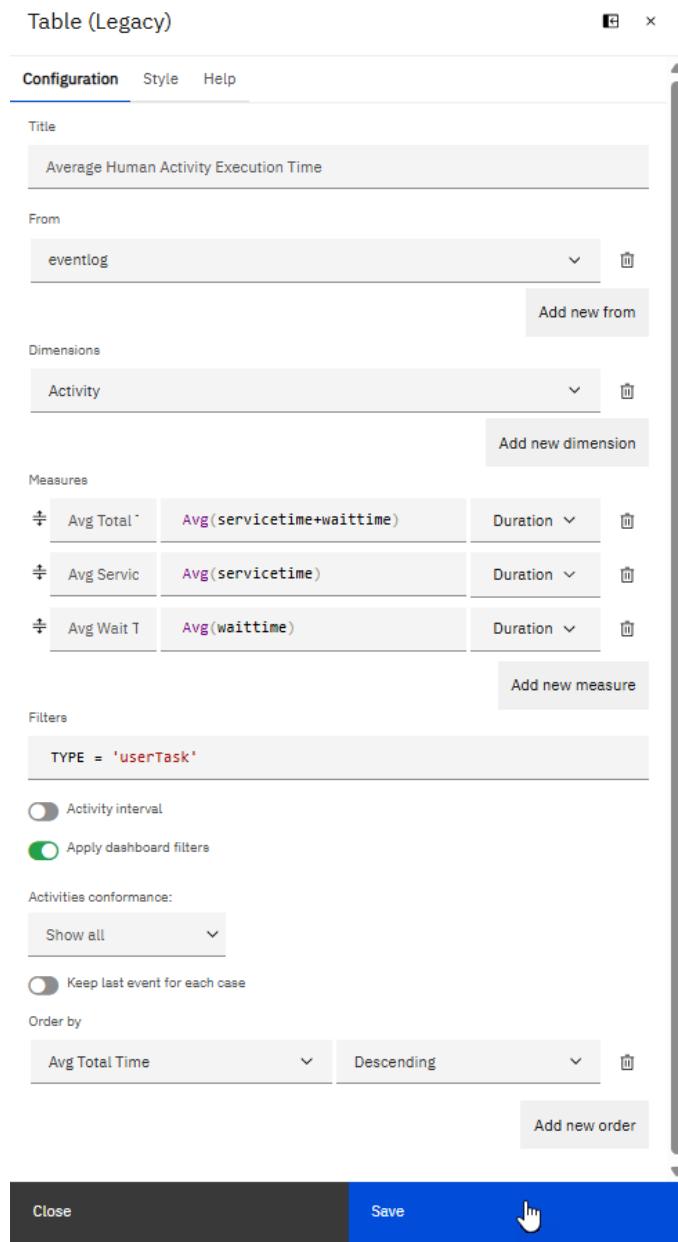
Keep last event for each case

Order by

Avg Total Time	▼
Descending	▼

Add new order

Close Save 



_15. Click **Close**.



_16. Grab the bottom right corner of the Chart to expand it to the right and down,



_17. Click **Save**

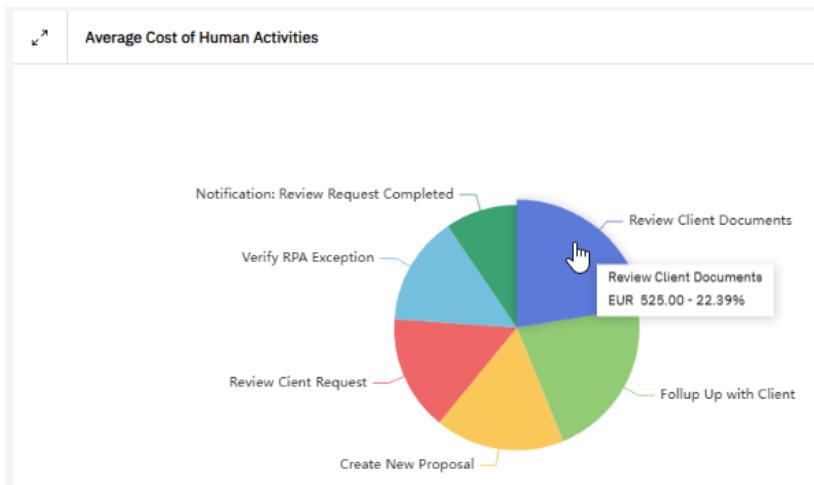


Click [here](#) to learn more about creating Dashboard Charts.

4.2.9.1.2 Human Activity Analysis

Let's focus on the two most notable aspects: the frequency, cost, and execution time. These factors are typically key in process improvement decisions. Let's find out how Process Mining can help us here!

- _1. Hover the mouse over **Review Client Documents**.

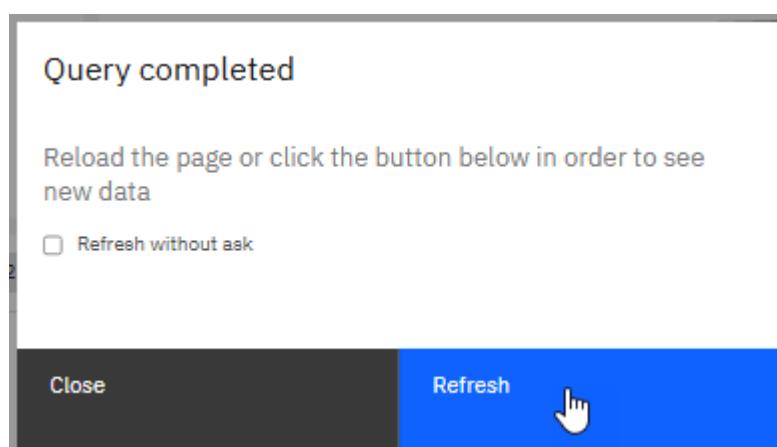


It is the most costly Activity – 22.39% of all costs.

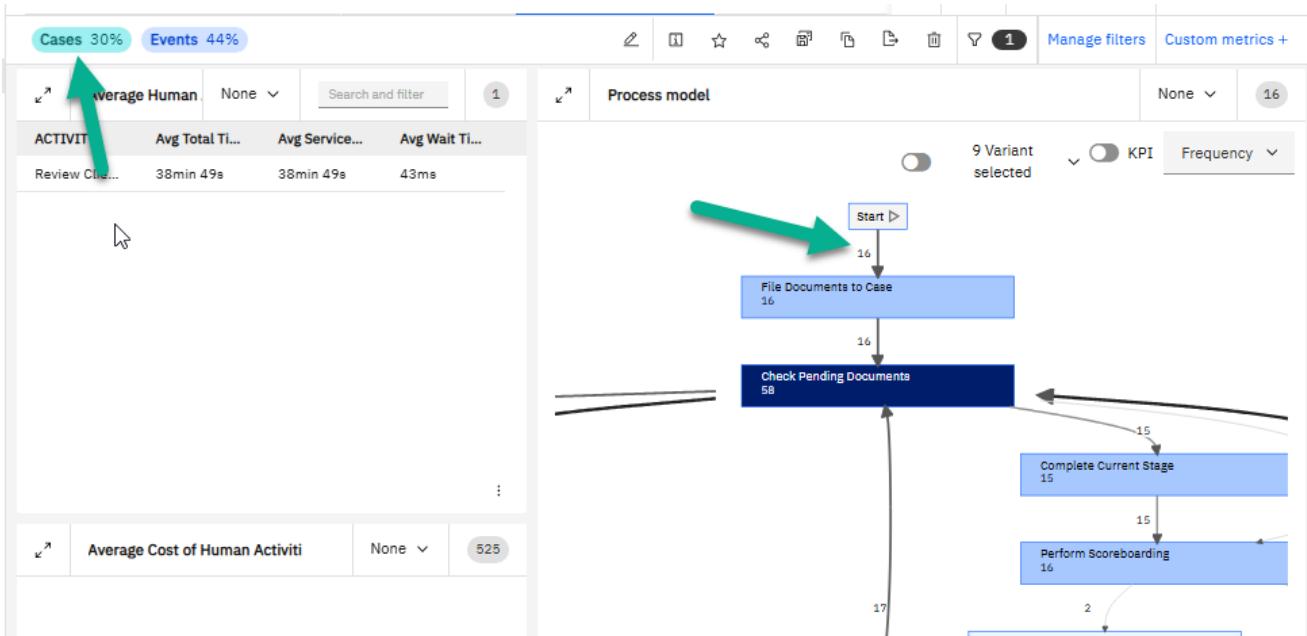
- _2. Click the **Review Client Documents** wedge.



- _3. In the Query completed window, click **Refresh**.

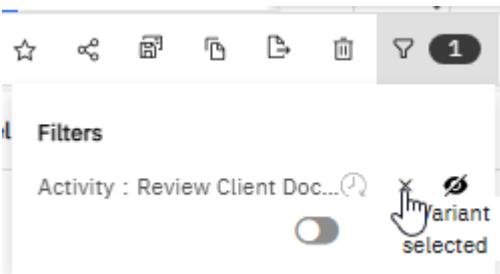


_4. The applied filter shows all Cases with Review Client Document Activity.



Note that any improvement (cost or duration) can impact 30% of all cases.
Also, note that you can use the Porcess model to explore the variants to understand why in 70% of the cases this Activity is not executed.

_5. Click the **Filters icon** and then click **x** to remove the dashboard filter.



_6. Let's examine the Average Human Activity Execution Time,

ACTIVITY	Avg Total Time	Avg Service Time	Avg Wait Time
Verify RPA Exception	1h 1min	1h 1min	7s 971ms
Notification: Review Request C...	1h	1h	16ms
Follup Up with Client	53min 40s	48min 42s	4min 58s
Review Client Documents	38min 49s	38min 49s	43ms
Create New Proposal	33min 3s	18min 32s	14min 32s
Review Client Request	1min 35s	1min 35s	15ms

What do the above metrics tell us about human activities?

Avg Service Times – indicates the duration from when an activity is claimed from the task lists to when it is completed.

Avg Wait Time – indicates how long a knowledge worker took to claim an activity, essentially how long it remained in the task list before being claimed.

For example, we observe that the Create New Proposal task, on average, remains in the task list for 14 minutes and 32 seconds before someone begins working on it.

Let's pick a row in the Average Human Activity Execution Time to see the potential impact on process improvement that an Activity may have. The more frequently it is used, the bigger the impact!

_7. Select the **Verify RPA Exception** row (the Activity with the longest Avg Total Time) and then click **Apply filter**.

Average Human Activity Execution Time		
ACTIVITY	Avg Total Time	Avg Service Time
Verify RPA Exception	1h 1min	1h 1min
Copy value	Request C...	1h
Apply filter	53min 40s	48min 42s

_8. In the Query completed window, click **Refresh**.

_9. Note that alarmingly, the RPA bot fails and needs to be fixed in 19% of all cases.

The screenshot shows the IBM Automation interface with the 'Human Activity Analysis' tab selected. On the left, there are two buttons: 'Cases 19%' and 'Events 17%'. A green arrow points to the 'Cases 19%' button. Below these buttons is a search/filter bar. To the right is a 'Process model' section displaying a vertical process flow. The steps are: 'Review Client Request', 'Complete Scoreboarding Stage', 'Check Bot Execution User', 'map input data from case properties', and 'Verify RPA Exception'. The 'Verify RPA Exception' step is highlighted with a green arrow pointing to it. The process has 4 variants selected. On the far right, there is a KPI chart and a frequency distribution graph.

Process Improvement Insight:

We identified human Activities with comparatively large Activity Costs and Total Service Time. The suggested actions are for IT and Business.

IT: Frequent failure of RPA bots need to be addressed. Every Time a bot fails, it takes over one hour to fix it. This impacts the process lead-time and costs.

Business: The Wait Time for some Human Activities is excessive. Possible causes to investigate: (i) Insufficient task workers are working on tasks? (ii) Task workers do not check the task list; perhaps they need to be notified?

4.2.9.2 Impact of Non-Conformant Activities

We will now use the 4.2.9.2 Impact of Non-Conformant Activities on Cases Dashboard to assess the impact on the Case Lead Time and Case Cost.

_1. Select the **Impact of Non Conformant Activities on Cases** dashboard.

The screenshot shows the IBM Automation interface with the 'Impact of Non Conformant Activities of Cases' tab selected. The tabs at the top are 'Automated Activity Performance Analysis', 'Compare Dashboard', 'Human Activity Analysis', and 'Impact of Non Conformant Activities of Cases'. A green arrow points to the 'Impact of Non Conformant Activities of Cases' tab.

4.2.9.2.1 Case Lead Time

_1. Notice that the **automated** Activity called **Handle Document** contributes significantly to Lead Time.

This is unexpected. Automated Activities are short-running! They are fast.



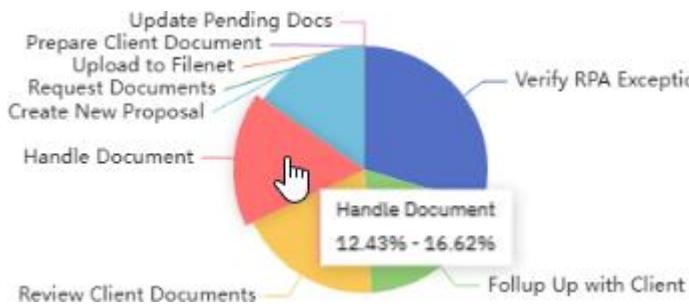
_2. Typically, automated activities are fast (low Service Time), but, as shown in the chart, there is an unexpectedly considerable Wait Time.

The Activity executes quickly, but it takes a long time to get to it. Why?

	Avg Service Time	Total Cost of Deviation	Avg Wait Time
Create New Proposal	0ms 18min 32s	EUR 0.00 EUR 3,200.00	0ms 14min 32s
Follup Up with Client	0ms 48min 42s	EUR 0.00 EUR 3,015.00	0ms 4min 58s
Handle Document	304ms 0ms	EUR 176.00 EUR 0.00	35min 57s 0ms
Prepare Client Document	27ms 0ms	EUR 91.67 EUR 0.00	67ms 0ms
Request Documents	7s 3ms 0ms	EUR 117.33 EUR 0.00	21ms 0ms
Review Client Documents	0ms 38min 49s	EUR 0.00 EUR 13,125.00	0ms 43ms
Update Pending Docs	33ms 0ms	EUR 84.33 EUR 0.00	68ms 0ms
Upload to Filenet	3s 14ms 0ms	EUR 256.00 EUR 0.00	15ms 0ms
Verify RPA Exception	0ms 1h 1min	EUR 0.00 EUR 4,725.00	0ms 7s 971ms

autoTask userTask

_3. Click the **Handle Document** wedge in the pie Chart.



_4. In the Query completed window, click **Refresh**.

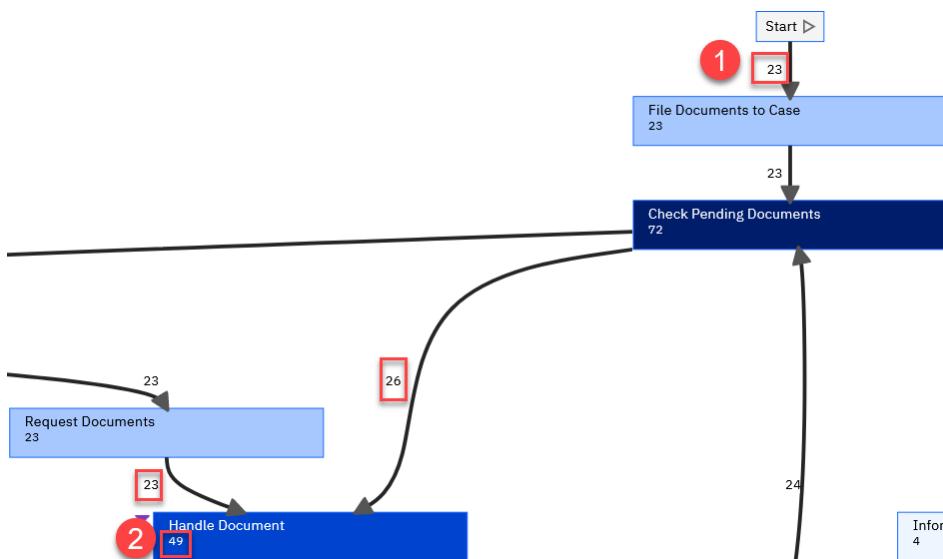
_5. Switch to the **Process model** widget, which was updated to show Cases that include the Handle Document (non-conforming Activity)

Notice:

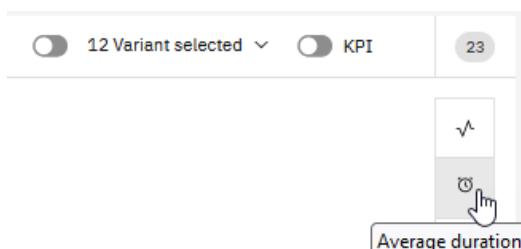
_6. We only have 23 instances,

_7. But Handle Document is invoked 49 times.

This means Rework, which adds to a Case lead time!



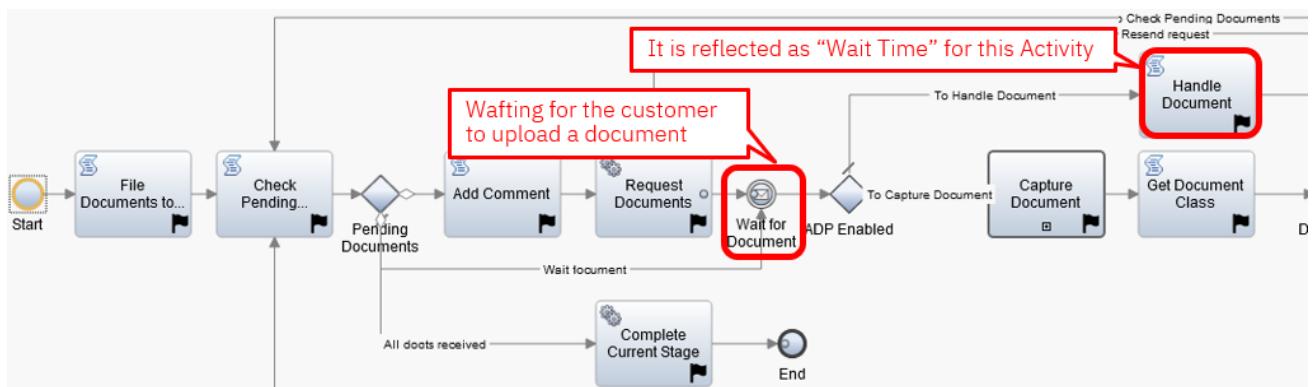
_8. On the **Process model**, select the **Average duration**.



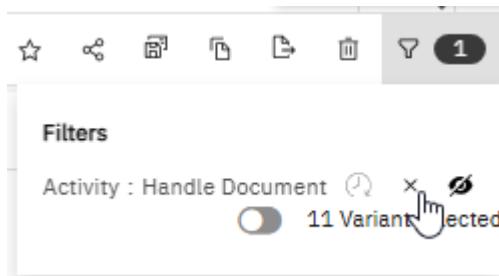
_9. Notice the long wait time!



Recall from the previous analysis that the **Wait for Document** message-receive Activity blocks the **Handle Document** Activity:



_10. Click the **Filters icon** and then click **x** to remove the dashboard filter.



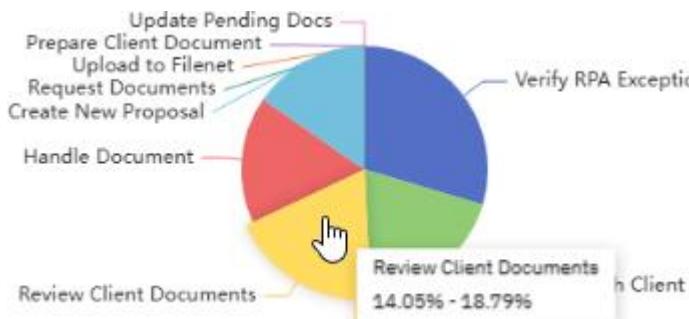
_11. In the Query completed window, click **Refresh**.

4.2.9.2.2 Case Cost

Let's focus now on a non-conformant human activity that is not optional: **Review Client Documents** Activity – it has the highest Cost of Deviation!

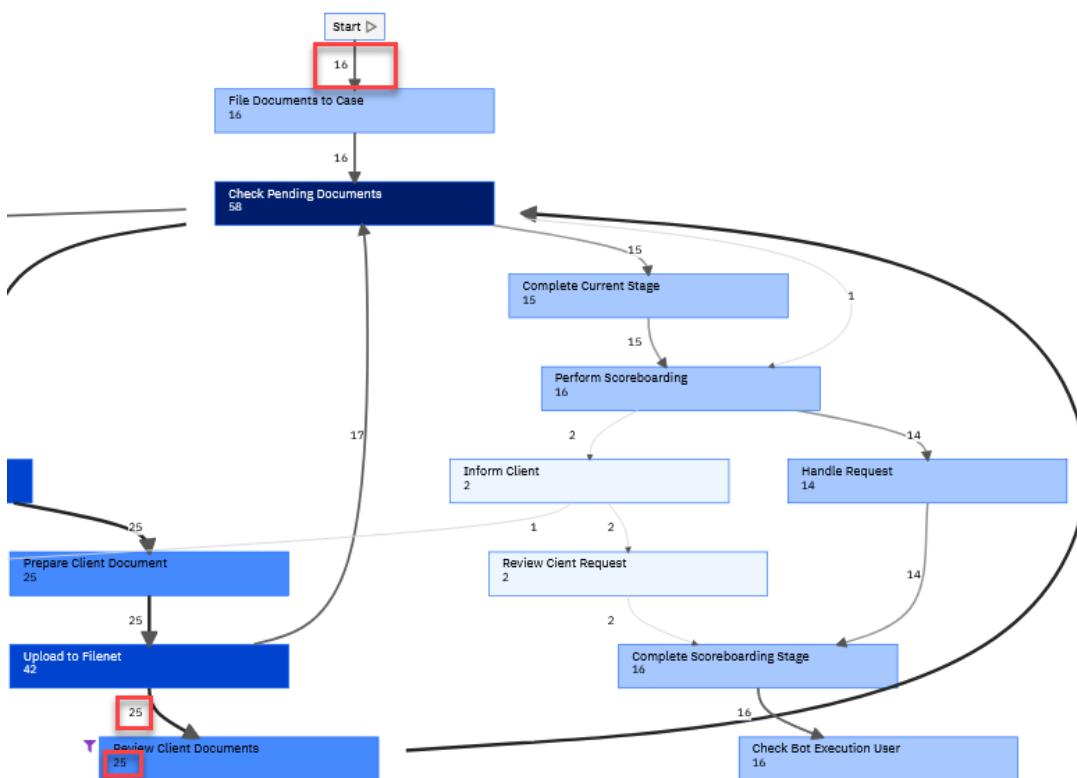
	Avg Service Time	Total Cost of Deviation	Avg Wait Time
Create New Proposal	0ms 18min 32s	EUR 0.00 EUR 3,200.00	0ms 14min 32s
Follup Up with Client	0ms 48min 42s	EUR 0.00 EUR 3,015.00	0ms 4min 58s
Handle Document	304ms 0ms	EUR 176.00 EUR 0.00	35min 57s 0ms
Prepare Client Document	27ms 0ms	EUR 91.67 EUR 0.00	67ms 0ms
Request Documents	7s 3ms 0ms	EUR 117.33 EUR 0.00	21ms 0ms
Review Client Documents	0ms 38min 49s	EUR 0.00 EUR 13,125.00	0ms 43ms
Update Pending Docs	33ms 0ms	EUR 84.33 EUR 0.00	68ms 0ms
Upload to Filenet	3s 14ms 0ms	EUR 256.00 EUR 0.00	15ms 0ms
Verify RPA Exception	0ms 1h 1min	EUR 0.00 EUR 4,725.00	0ms 7s 971ms
█ autoTask █ userTask			

- _ 1. Click the **Review Client Documents** wedge in the pie Chart to activate a Filter that shows only the Cases that include this Activity.



- _ 2. In the Query completed window, click **Refresh**.

- _ 3. Notice we only have 16 instances, but the Review Client Documents Activity is invoked 25 times. This means Rework, which adds to the Case Cost.



Process Improvement Insight:

(1) Case Lead Time. We discovered that the Average Wait time of an automated non-conformant Handle Document Activity was a key contributor to Case Lead Time in one of the variants. With the help of the IT organization, we identified that waiting for clients to upload documents was the root cause.

(2) Case Cost. We found that the Cost of an automated non-conformant Review Client Documents Activity was a significant factor in case cost. Additionally, this Activity was involved in rework loops and contributed to high Case Costs.

Business action involves ensuring that customers provide all necessary documents accurately when requesting a new service for the first Time.

4.3 Lab Summary

This lab demonstrated how IBM Process Mining leverages the Client Onboarding event data captured in BAI to identify automation and business improvement opportunities.

The primary objective was to introduce you to the rich features and functions of IBM Process Mining through the experiential learning of identifying process improvement opportunities.
Thank you for completing this lab!

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