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# SAP Signavio Process Intelligence User Guide

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# 1 What Is SAP Signavio Process Intelligence?

SAP Signavio Process Intelligence is a tool that enables in-depth process analysis, optimizing operations, improving customer service, and identifying compliance violations. It provides insights into process flow, root causes of issues, and performance bottlenecks, making it valuable for various scenarios and organizations.

The processes that run in your organization continuously leave traces of data behind in places such as your ERP and CRM systems. SAP Signavio Process Intelligence is about analyzing this data to gain insights into the exact flow of your processes.

The following scenarios serve as example use cases for SAP Signavio Process Intelligence:

- You manage some production facilities. Although they use the same equipment, resources, and processes, some facilities are more productive than others. You want to find out why that is the case and optimize operations based on your findings.
- You run a customer service center. You notice that more customers with apparently trivial problems are waiting long for a response from the support team. You need to find out why your support process is going badly in these cases.
- You're a risk manager in a financial organization. In the past, rare cases with risky transactions were overlooked. Now, you want to identify such cases before the transactions are carried out. Unfortunately, you don't have the resources to identify cases with non-compliant behavior.

SAP Signavio Process Intelligence can be the solution for all scenarios. It's best suited to evaluate process data according to your needs and gain deep insights into your processes.

## Related Information

[Get Started with SAP Signavio Process Intelligence \[page 7\]](#)

## 1.1 Get Started with SAP Signavio Process Intelligence

This guide explains how to use the SAP Signavio Process Intelligence application.

## Audience

### Data Specialists and Developers

Use this guide to find out how to extract data from source systems and modeling event logs, using our features for process data management.

## **Analysts, Process Owners, Transformation Leads, and Change Drivers**

Use this guide to find out how to analyze and improve your company's business processes, using our features for process analysis and mining as well as actions.

## **Key Steps**

On a high level, these are the key steps for your journey through the application:

1. Clearly define the business challenge that you want to solve, for example:
  - Identify the root causes of poorly performing processes.
  - Detect and visualize compliance violations.
  - Monitor process performance and act on critical cases and performance bottlenecks.
2. To deliver actionable insights, SAP Signavio Process Intelligence needs your process data. To provide this data, do either of the following:
  - Use the features for process data management to extract, transform, and load data into a process: You can connect your source system with SAP Signavio Process Intelligence and extract data. Using process data pipelines, the data can be transformed and loaded into a process. For more information, see [Process Data Management \[page 48\]](#).
  - Create a process: Create a process and upload your event and case data to it. For more information, see [Creating A Process \[page 20\]](#) and [Upload process data files \[page 41\]](#).
3. Analyze the process data, using these features:
  - Generate insights to learn about data correlations and process anomalies, see [Insights \[page 461\]](#).
  - Build investigations and dashboards with widgets that visualize your process and mining results, see [Process Mining \[page 309\]](#).
  - Use pre-defined or custom metrics to accelerate the time to insight, see [Work with Metrics \[page 480\]](#).
  - Set up actions to inform others about mining results or further process the results in other SAP or non-SAP applications, see [Actions \[page 530\]](#).

## **Related Information**

[Access to SAP Signavio Process Intelligence \[page 9\]](#)

[Log In to SAP Signavio Process Intelligence \[page 10\]](#)

[About the User Interface \[page 11\]](#)

## 1.1.1 Access to SAP Signavio Process Intelligence

Understand the prerequisites for access to SAP Signavio Process Intelligence and how to grant access.

### Prerequisites

- Users must have an account for SAP Signavio Process Transformation Suite, see [Signing Up](#).
- The workspace a user logs in to must have a valid Process Intelligence license.

### Grant Access

Access to SAP Signavio Process Intelligence is controlled using feature sets.

#### ⓘ Note

If your workspace has a valid Process Intelligence license, the *SAP Signavio Process Intelligence* feature set is active for all users in this workspace by default.

To restrict access to SAP Signavio Process Intelligence, a workspace administrator needs to deactivate the Process Intelligence feature set for users who aren't meant to access the product. This is done in SAP Signavio Process Manager, see [Activate feature sets](#).

### Feature Sets for SAP Signavio Process Intelligence

The following feature sets are available for SAP Signavio Process Intelligence by default:

Feature set	Description
<a href="#">SAP Signavio Process Intelligence</a>	Allow users to access SAP Signavio Process Intelligence
<a href="#">SAP Signavio Process Intelligence - Create Process</a>	Allow users to create processes in SAP Signavio Process Intelligence

Find an overview over all feature sets of SAP Signavio Process Transformation Suite in section [Activate feature sets](#).

### Feature Sets for Process Data Management

#### ⓘ Note

The feature sets for process data management are only available on request.

Please contact our SAP Signavio service experts from the [SAP for Me portal](#).

Read more in section [Access Requirements for Process Data Management \[page 52\]](#).

## 1.1.2 Log In to SAP Signavio Process Intelligence

How to log in to SAP Signavio Process Transformation Suite and get access to all SAP Signavio products. How to log in when you received a shared link.

### Browser Compatibility

SAP Signavio supports all popular browsers. For a detailed description of the supported browsers, see [Browser Compatibility](#).

### Log In With Your Account Credentials

After you've created your SAP Signavio Process Transformation Suite account (see [Signing Up](#)), use your account email and password to log in.

In the case that your workspace administrator has created the account for you, you received an email to reset your password. When SSO is enabled for your workspace, you log in using a shared link.

1. Go to the login page:
  - <https://app-au.signavio.com> (region: Australia)
  - <https://app-ca.signavio.com> (region: Canada)
  - <https://editor.signavio.com> (region: Europe)
  - <https://app-jp.signavio.com> (region: Japan)
  - <https://app-kr.signavio.com> (region: Korea)
  - <https://app-sgp.signavio.com> (region: Singapore)
  - <https://app-us.signavio.com> (region: US)
2. Enter your account email and password and click *Login*.  
If you receive the error message that the login with email and password is disabled, SSO is enforced for your workspace and you need to log in using a shared link.
3. Select your workspace and choose *Login*. SAP Signavio Process Collaboration Hub launchpad opens.
4. In the top navigation bar, choose the SAP Signavio product that you need, using the  app switcher.

### Log In Using a Shared Link

When SSO is enabled for your workspace, you log in through a shared link. The link is shared with you, for example, in an invitation email or on a wiki page.

### Note

We recommend that you bookmark the shared link for future logins. Depending on your workspace configuration, you might only be able to log in to SAP Signavio Process Transformation Suite through the shared link.

1. Select the link.
2. Follow the steps you see on the screen. Your account is authenticated by a third-party application.
3. After successful login, the SAP Signavio Process Collaboration Hub launchpad opens.
4. In the top navigation bar, choose the SAP Signavio product that you need, using the  app switcher.

## Related Information

[About the User Interface \[page 11\]](#)

[Process Data Management \[page 48\]](#)

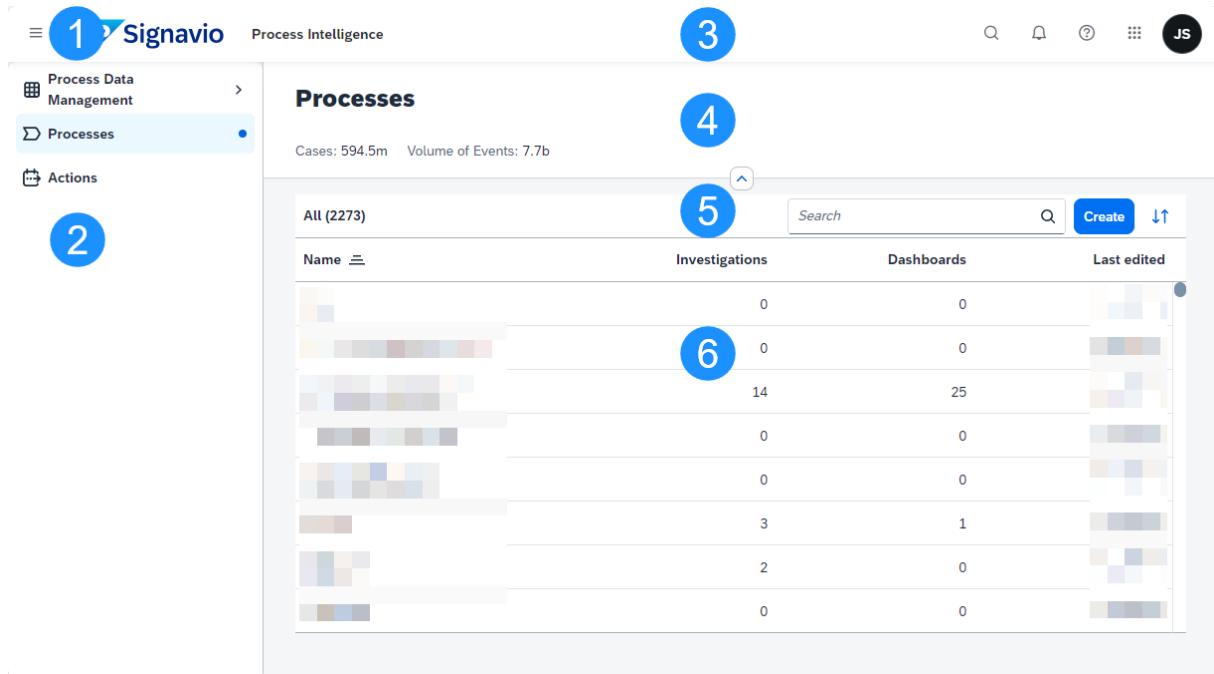
[Process Mining \[page 309\]](#)

[Actions \[page 530\]](#)

### 1.1.3 About the User Interface

Learn to navigate SAP Signavio Process Intelligence, access features for process data management, process analysis, and automation.

This image is interactive. Hover over each area for a description. Select highlighted areas for more information.



- [#unique\\_12/unique\\_12\\_Connect\\_42\\_subsection-im5 \[page 13\]](#)
- [#unique\\_12/unique\\_12\\_Connect\\_42\\_subsection-im1 \[page 12\]](#)
- [#unique\\_12/unique\\_12\\_Connect\\_42\\_subsection-im2 \[page 12\]](#)
- [#unique\\_12/unique\\_12\\_Connect\\_42\\_subsection-im4 \[page 13\]](#)
- [#unique\\_12/unique\\_12\\_Connect\\_42\\_subsection-im3 \[page 12\]](#)
- [#unique\\_12/unique\\_12\\_Connect\\_42\\_subsection-im6 \[page 13\]](#)

## 1 - Toggle for the Side Bar

Use the toggle to expand or collapse the left side bar.

## 2 - Side Bar

Use the side bar to access available feature areas:

- [Process Data Management \[page 48\]](#) to get process data from source systems into SAP Signavio Process Intelligence, transform raw data into process data models, and load them into a process for analysis and mining.
- [Processes \[page 19\]](#) to do a deep-dive analysis on process performance and how your processes are actually run.
- [Actions \[page 530\]](#) to create automations that query process data and act on the results, for example, by performing a task or starting a process.

## 3 - Navigation Bar

The navigation bar provides options to search, check notifications, open help resources, check the workspace ID, switch to other SAP Signavio solutions, and open your user profile. For more information, see [Navigation Bar \[page 13\]](#).

## 4 - Header Menu

The header menu provides you with the following features:

- Breadcrumbs for navigating to items or searching for them, see [Breadcrumb search \[page 17\]](#).
- Renaming by selecting the title of the item that is currently open.
- Tabs for navigating to the elements of an opened item, for example:
  - Connections, source data, data views, business objects, and more for process data pipelines
  - Dashboards, investigations, metrics, variables, insights, actions, and more for a process
  - Results and the history for actions

## 5 - Top Menu

The top menu provides options like create, search, filter, sort, and more. Which options are available depends on the context that you're currently in.

## 6 - Work Area

Manage and configure your process data pipelines, processes, and actions including everything that they contain here, like source data and connections, dashboards, investigations and metrics, or tasks and integrations, respectively.

## Related Information

[Navigation Bar \[page 13\]](#)

[Notifications \[page 14\]](#)

[Search \[page 17\]](#)

### 1.1.3.1 Navigation Bar

Discover the actions you can take with the SAP Signavio Process Intelligence navigation bar at the top of your view.

#### Check Your Location

This navigation bar displays the label of SAP Signavio Process Intelligence. This identification of your current working product is useful if you navigate back and forth between other SAP Signavio products and workspaces.

#### Check Your Available Actions

The navigation bar allows for quick access to common functions across SAP Signavio products. Each product displays a navigation bar with its own product-specific available icons.

## Actions for SAP Signavio Process Intelligence

- SAP Signavio *Logo*: Select the logo to navigate back to your current working product's home page.
- (*Search*): Use the search function to find content that is specific to your current SAP Signavio product. For example, search for investigations or processes within SAP Signavio Process Intelligence.

### Note

The search results open in SAP Signavio Process Collaboration Hub.

- (*Notifications*): Check a list of your active or past notifications. For more information, see [Notifications \[page 14\]](#).
- (*Feedback*): Provide feedback regarding your experience using SAP Signavio products. You may offer feedback on the product that you are currently using by selecting the feedback button. If you wish to comment on another SAP Signavio product, simply navigate to that product and select the feedback button. Your feedback is invaluable in enhancing the user experience and takes only a minute of your time.
- (*Help*): Select this icon to choose from a list of help resources. Also, check the [Workspace ID](#) here.
- (*Product Switcher*): Choose this icon to view a list of SAP Signavio products to which you can navigate. Your view reflects the products you are able to access. If you are a workspace administrator, you can also choose [User Management](#) here.
- (**JM** *User Profile Menu*): This icon displays **your own initials** as the logged-in user. Choose this icon to view a drop-down menu with the following options:
  - Profile settings: Select your email address from the drop-down menu to open the [My Profile](#) tab. Make changes to your personal data, language preference, or password. Here, you can also view your groups and licenses.
  - Personal settings: Choose this option to toggle your notifications.
  - Workspaces: Choose this option to change workspaces if you are a member of more than one workspace.
  - Logout: Choose this option to log out of SAP Signavio Process Intelligence.

## Related Information

[Access to SAP Signavio Process Intelligence \[page 9\]](#)

### 1.1.3.2 Notifications

Read about the notifications available in SAP Signavio Process Intelligence. Select the links below to learn more.

[In-App Notifications \[page 15\]](#)

Learn about in-app notifications and when you receive them.

[Email Notifications \[page 16\]](#)

Learn which email notifications are available, and how to enable them.

## Related Information

[Actions \[page 530\]](#)

[Comments \[page 477\]](#)

[Insights \[page 461\]](#)

### 1.1.3.2.1 In-App Notifications

Learn about in-app notifications and when you receive them.

In the header,  ([Notifications](#)) shows you the number of new notifications. Select the icon to open notifications.

The following options are available:

- Open the insight or action by selecting a notification
- Mark one or all notifications as read
- Stop notifications for a specific item

## Actions

You're notified about new results for an action you created or are assigned to.

For more information, see [Viewing Action Results \[page 563\]](#).

## Insights

You're notified for the following:

- An insight is assigned to you.
- Someone modifies an insight you created or are assigned to.
- Someone deletes an insight you created or are assigned to.
- Someone posts a new comment.
- Someone mentions you in a comment.

### Note

In order to be notified about a new comment on an insight, you must have previously commented on the insight.

## Related Information

[Actions \[page 530\]](#)

[Comments \[page 477\]](#)

[Insights \[page 461\]](#)

[Notifications \[page 14\]](#)

[Email Notifications \[page 16\]](#)

### 1.1.3.2.2 Email Notifications

Learn which email notifications are available, and how to enable them.

#### Context

You can choose to receive email notifications for the following events:

##### Insights:

- An insight is assigned to you.
- Someone modifies an insight you created or are assigned to.
- Someone deletes an insight you created or are assigned to.
- Someone posts a new comment.
- Someone mentions you in a comment.

##### Note

In order to be notified about a new comment on an insight, you must have previously commented on the insight.

#### Procedure

1. In the [Navigation Bar](#), open your [User Profile Menu](#) by selecting the icon displaying your initials.
2. Select [Personal Settings](#).
3. Use the toggles to enable or disable email notifications for each event type.

## Related Information

[Comments \[page 477\]](#)

[Insights \[page 461\]](#)

[Notifications \[page 14\]](#)

[In-App Notifications \[page 15\]](#)

### 1.1.3.3 Search

Get to know the different search options in SAP Signavio Process Intelligence.

#### Global Search

With the search option in the top navigation bar, you can search for content from the complete SAP Signavio Process Transformation Suite.

To find content specific for SAP Signavio Process Intelligence, limit your search to the content types [PI Processes](#) or [Investigations](#). The search results open in SAP Signavio Process Collaboration Hub.

Read more on search filters and search operators in section [Search](#).

#### Object-Specific Search

When you select a process, a process data pipeline, a dashboard, or any other object, you've the following options to find other objects of the same type:

- Search on overview pages  
When you select an object in the side panel, an overview opens. Most overviews provide you with a search field or a search option to find objects of the same type.
- Breadcrumb search  
In a breadcrumb, choose  and start typing in the search field.

Actions / Order pending approval

Order

Created By: S

Results

Actions

Search  Q

Order pending approval

Created By

This screenshot shows a user interface for SAP Signavio Process Intelligence. At the top, there's a breadcrumb navigation: 'Actions / Order pending approval'. Below it, the word 'Order' is displayed in large, bold letters. To the right, there's a timestamp '4:18:52 (UTC)'. On the left, there's a sidebar with a 'Results' tab selected. Under 'Results', there's a section labeled 'Created By' which lists three entries, each represented by a small gray rectangular icon. A modal dialog box is open in the center, titled 'Actions'. It contains a search bar with the placeholder 'Search' and a magnifying glass icon. Below the search bar, the text 'Order pending approval' is highlighted with a blue underline. The rest of the dialog box is mostly empty and grayed out.

## 2 Processes

Understand how to identify and provide process data in general, and learn how to view the volume of uploaded process data as well as the last upload date.

### Identify Process Data

There are two common approaches to process data identification:

- Based on a process  
Define the beginning and end of your process and identify all tasks and events in between.
- Based on business objects  
Identify business documents involved in the process and track their lifecycle. For example, business documents can be orders and invoices.

Once the scope of the data is determined, extract the data from your applications and provide it to SAP Signavio Process Intelligence.

### Provide Process Data

For data provision, you've got the following options:

- Manually upload process data that is available as CSV or XES files.
- Connect to an SAP or non-SAP system and extract, transform, and load data into a process. This option is available for both cloud and on-premises systems.
- Use the API to upload process data that is available as XES files.

### Process Data Volume

A workspace administrator can view the number of processes, cases, and events in the data store.

To view this information, choose  [Processes](#) in the sidebar. In the header menu, the number of cases and events are displayed. The number of processes is in the column header of the processes list.

### Last Data Upload

When you open a process, you can view when the last data upload took place in the header menu.

The date and time are displayed according to your browser's timezone setting.

The information is updated in these cases:

- With each new data upload, whether data was uploaded manually or using the API or a process data pipeline
- When the merge strategy is changed
- When uploaded data is deleted

## Related Information

[Prepare a process \[page 20\]](#)

[Upload process data files \[page 41\]](#)

[Process Data Management \[page 48\]](#)

[Data Upload API](#)

## 2.1 Prepare a process

This section explains the following:

- How to create, edit, configure, and delete processes
- How to define and grant access to the process data with process views
- How to grant access to a process with roles

### 2.1.1 Creating A Process

Learn the steps and prerequisites for creating a process in SAP Signavio Process Intelligence.

## Prerequisites

You need the feature set for process creation in SAP Signavio Process Intelligence to use these functions. A workspace administrator can assign this feature set to you.

## Context

Create processes in SAP Signavio Process Intelligence for the end-to-end processes you want to analyze.

The creator of a process has the manager role for this process automatically. To grant access to a process, users must be assigned a role. Read more in section [Roles and user management \[page 31\]](#).

## Procedure

1. Open SAP Signavio Process Intelligence and if the process overview isn't opened by default, choose  (*Processes*) in the sidebar.
2. Choose *Create*, enter a process name, and confirm with *Create*.

## Results

The process is created and the settings page opens. You can configure the process now or later.

For example, you can select a system type and a process type. When you choose the system type, it sets system-specific default values for variables in metrics. If you select the process type, the system suggests process-specific metrics when you set up the metrics collection.

Continue with providing event log data to the process. For example, upload an event log manually or link the process to a process data pipeline.

## Related Information

- [Process Settings \[page 21\]](#)
- [Upload process data files \[page 41\]](#)
- [Linking a Process \[page 256\]](#)
- [Process Data Pipelines \[page 235\]](#)
- [The Metric Collection \[page 487\]](#)
- [Add Metrics to a Process \[page 496\]](#)

## 2.1.2 Process Settings

Learn about process settings: data upload, API connection, custom attributes, process views, as well as user and role management.

### Note

The settings available to you depend on the role you have been assigned for the process. Read more in section [Roles and user management \[page 31\]](#).

## Opening the Process Settings

To open the process settings, follow these steps:

1. Open the drop-down menu  on the top-left corner of the screen. The menu slides out from the side.
2. Select [Processes](#). The list of processes is displayed.
3. Open your process and select  in the header menu.

The settings page opens and displays the different settings in tabs. The settings are described below.

## Data

Here, you can do the following:

- [Provide process data \[page 22\]](#)
- [Select a source system type \[page 22\]](#)
- [View and delete uploaded data \[page 23\]](#)
- [Set the merge strategy \[page 23\]](#)
- [Delete the process \[page 23\]](#)

## Provide Process Data

To be able to run an investigation, you need to provide data for your process. You have the following options:

- Upload process data as files. Read more in section [Upload process data files \[page 41\]](#).
- Link a process data pipeline. A data pipeline defines how to extract data from a data connection. Read more in section [Manage process data pipelines \[page 235\]](#).

## Select a Source System Type

You can select a source system to provide default values for metric variables. Read more in section [Assigning Values to Variables \[page 510\]](#).

## Select Process Types

If you select a set of process types, the metric library can recommended metrics matching those choices. The [Select process type](#) dropdown contains a list of process types, each with a checkbox. You can select multiple process types.

Read more in [The Metric Library \[page 491\]](#)

## **View and Delete Uploaded Data**

You can check or delete the data that has been uploaded to a process under [Event log history](#):

- To view imported data, click [View imported data](#).
- To delete imported data, click  and confirm. Read more in section [Delete process data \[page 46\]](#).

## **Set the Merge Strategy**

Define how to process existing and new data when uploading more or new data to a process. Read more in section [Set the merge strategy for data uploads \[page 25\]](#).

## **Delete the Process**

Read more in section [Edit and delete a process \[page 24\]](#).

## **API**

Create and manage the access token of the process. With the access token, you can connect to a process using the API, for example to upload process data. Read more in section [Manage API access to a process \[page 35\]](#).

On this page, you also find the following information:

- *Process ID*: ID of your process
- *Tenant ID*: ID of your workspace
- *Upload Endpoint*: endpoint to upload files using API requests

You find supported API requests in section [SAP Signavio Process Intelligence API](#).

## **Data Views**

Define which process data is accessible to users. Read more in section [Define and grant access to process data with process views \[page 26\]](#).

## **Users**

Grant users access to the process. You can assign them roles and process views. Read more in section [Roles and user management \[page 31\]](#).

## Related Information

[Process Mining \[page 309\]](#)  
[Process Data Management \[page 48\]](#)

### 2.1.3 Editing and Deleting a Process

Learn how to rename a process, edit process settings, and delete a process in SAP Signavio Process Intelligence. A workspace administrator can activate the necessary feature sets for you.

#### Prerequisites

- You have the feature sets for process creation and process editing in SAP Signavio Process Intelligence. A workspace administrator can activate these feature sets for you.
- You have the manager role for the process, see [Roles and user management \[page 31\]](#).

#### Renaming the Process and Editing the Process Settings

Follow these steps:

1. Open your process.
2. To rename the process, choose in the header menu and provide a new name.
3. To change the process settings, select in the header menu and apply your changes as required.

#### Deleting a Process

##### Note

When you delete a process, the following applies:

- Investigations, dashboards, and uploaded process data are deleted.
- Actions created for the process are deactivated with their next scheduled run.
- Any process data pipeline linked to the process stops uploading data.

Follow these steps:

1. Open your process and select in the header menu.

2. On the settings page, select *Delete Process*.
3. Confirm all options in the dialog and select *Delete Process*.  
The process is deleted.

## Related Information

[Process Settings \[page 21\]](#)

[Investigations \[page 312\]](#)

[Dashboards \[page 329\]](#)

[Managing Actions and Their Tasks \[page 561\]](#)

## 2.1.4 Set the merge strategy for data uploads

Learn how to define your process merge strategy.

If a process already has data and you want to upload more or new data, you need to specify how new and existing data is processed. This is done with the merge strategy.

### ⓘ Note

The merge strategy applies only to event logs. For the upload of case attribute logs, the following applies:

- The merge strategy doesn't affect the upload of case attribute logs.
- When you upload a new case attribute log, data is added to the existing data.
- When you upload additional case attribute logs, data is replaced for existing case IDs.

To set the merge strategy, follow these steps:

1. Select the process on the *Processes* overview and choose *Process settings*.  
The settings page opens.
2. Under *Process views*, click *Merge strategy* and choose one of the following options:

<b>Overwrite</b>	Incoming event data overwrite the existing event data.
<b>Update and Append</b>	Existing events that match with an incoming event on case ID, event name, and timestamp are replaced.  Incoming events without a match are appended.
<b>Append</b>	Default option  All incoming event data are appended to the existing event data.  This can result in duplicate events.

#### **Overwrite and Delete**

Incoming event data overwrite the existing event data and delete attributes that no longer exist.

The following applies:

- If process views use attributes that don't exist in a newer version of the data, the upload fails. To resolve, remove the attribute from the process view and upload again. Read how to edit process views in section [Define access to process data with process views \[page 26\]](#).
  - If widgets use attributes that no longer exist after a data upload, these widgets need to be reconfigured.
- 

3. Confirm with [Save](#).

## **Related Information**

[Upload process data files \[page 41\]](#)

## **2.1.5 Define Access with Process Views**

With process views, you either define which process data your users can view, or you use them to grant access to dashboards.

For each process, separate process views must be created by a user with the manager role. Using a process view across several processes isn't possible.

Users with the manager role have access to all process views. If users with the analyst role are assigned to more than one process view, they can switch between the process views, for example, when creating an action or viewing a dashboard.

SAP Signavio users viewing widgets and investigations in other applications of the SAP Signavio Process Transformation Suite must also be assigned to a process view.

## **Process View Types**

A process view can have one of the following purposes:

- Control which data users can view investigations and dashboards, generated insights or value cases
- Grant access to a specific dashboard

Type	Description
Control access to process data	<p>You specify which portion of the process data users are allowed to access by hiding or filtering attributes. Also, you assign the users or groups who are allowed to view or work with the data.</p> <p>The <a href="#">Complete attribute set (default)</a> process view is a process view of this type.</p>
Control access to dashboards	<p>You specify the users or groups who are allowed to access the dashboard to which the process view is assigned.</p> <div style="background-color: #f0f0f0; padding: 10px;"> <p><b> ⓘ Note</b></p> <p>Process views of this type aren't available for selection in the process view switcher on dashboards.</p> </div>

## The 'Complete attribute set (default)' Process View

The process view [Complete attribute set \(default\)](#) is available in all processes by default. This process view grants access to the complete data set of a process and can't be changed. Filtering or hiding data using this process view isn't possible.

To restrict access to the process data for users or groups, additional process views need to be created, usually one process view for each stakeholder group.

## Actions, Investigations, and Dashboards

To ensure that users only access the process data for which they're authorized, the system requires assigning a process view whenever an action, investigation, or a dashboard is created.

## Process View Switcher

If users are assigned to multiple process views, they can switch between the process views on a dashboard. This changes the dashboard data only for the user. However, the assigned process view of the dashboard isn't changed.

Switching the process view is done using the drop-down menu in the upper right corner of a dashboard. The selection is saved to the user's browser storage. When users switch the browser or clear the browser storage, the dashboard opens again with the assigned process view.

Only process views that control data access are available for selection in the process view switcher.

## 2.1.5.1 Creating Process Views

Read how to create process views that define which process data users can view or that grant users access to dashboards.

### For Data Access

Follow these steps:

1. Open your process and select  in the header menu.
2. On the settings page, select the *Process Views* tab and add a process view.
3. On the configuration page, enter a name.
4. On the *What is visible* tab, hover over a column header and choose an option:
  - *Filter*: Limit the data set in this column. The filter options depend on the data type.
  - *Hide*: Hide the data of this column completely.
5. On the *Who can see* tab, assign the users who need access to the data.

#### Note

You can only select a group if you're part of the group. Workspace administrators can select all groups without being part of the groups themselves.

6. Confirm with *Save*.  
The process view is created and is effective immediately. Now, you can assign it to investigations and dashboards.

### For Dashboard Access

#### Note

Process views of this type aren't available for selection in the process view switcher on dashboards.

Follow these steps:

1. Open your process and select  in the header menu.
2. On the settings page, select the *Process Views* tab and add a process view.
3. On the configuration page, enter a name.
4. Activate the option *Use for access-control only*.
5. On the *Who can see* tab, assign the users who need access to the dashboard.

#### Note

You can only select a group if you're part of the group. Workspace administrators can select all groups without being part of the groups themselves.

6. Confirm with [Save](#).

The process view is created and is effective immediately. Now, you can assign it to dashboards.

## Related Information

[Create, edit, and delete dashboards \[page 330\]](#)

[Add and duplicate an investigation \[page 313\]](#)

[Changing the Process View \[page 332\]](#)

### 2.1.5.2 Editing and Deleting Process Views

Read how to edit and delete process views.

#### Editing Process Views

##### Note

If insights exist for a process view, changes to the process view aren't applied to existing insights with data snapshots. So, any data snapshot is still visible to anyone with access to the process view. If you want to restrict a process view, we recommend creating a new process view and re-assign the users. Read more on insights in section [Insights \[page 461\]](#).

To edit a process view, follow these steps:

1. Open your process and select [Process settings](#).  
The settings page opens.
2. Under [Process views](#), choose the process view you want to change.  
The configuration page opens.
3. Apply your changes.
4. Confirm with [Save](#).  
Changes are applied immediately.

#### Deleting a Process View

When you delete a process view, the following applies:

- Investigations, dashboards, actions, and insights created with this process view are deleted.
- The users added to the process view lose view access to the investigations or dashboards.

##### Note

Deleting a process view can't be undone.

To delete a process view, follow these steps:

1. Open your process and select *Process settings*.  
The settings page opens.
2. Under *Process views*, choose the process view you want to delete.  
The configuration page opens.
3. Click *Delete View*.
4. Confirm all options and delete the process view.  
The process view is deleted.

## 2.1.6 Custom Attributes for Event-Level Analysis

Learn how to manage your custom attributes. There are two types of custom attributes: event-count attributes and duration attributes.

When you configure a widget, you can use the attributes from the event log to specify what data is displayed. Also, you can create your own attributes for event-level analysis.

### Creating Custom Attributes

1. To open your process, choose  $\Sigma$  (*Processes*) in the sidebar, then select your process from the list.
2. Choose the *Custom Attributes* tab and select *Create*.
  1. Enter the name of your custom attribute.
  2. Entering a description is optional.
  3. Choose between a *Duration* or *Event-Count* custom attribute.
    - Event-count attributes count events.
    - Duration attributes measure the duration between events, between timestamp attributes or between events and timestamp attributes. For example, the time between receiving a customer order and receiving payment.
3. In the *SIGNAL* panel, you can build your custom attribute.
  - For duration custom attributes, drag and drop an attribute to the *First Event* panel and another to the *Last Event* panel.
  - For event-count custom attributes, drag and drop attributes to the *Events* panel.
  - You can view your custom attribute as a SIGNAL query by selecting *SIGNAL* above the center panel.
  - The *Data Preview* panel shows the first 10 results of your custom attribute data.
4. Select *Create* to save your custom attribute and return to the *Custom Attributes* tab.

### Deleting Custom Attributes

1. Navigate to the *Custom Attributes* tab of your process.
2. There are two ways to delete a custom attribute. To delete one or more custom attributes:

1. Select the custom attributes that you want to delete.
  2. Select  ([Delete](#)).
  3. Confirm with [Delete](#).
3. To delete a single custom attribute:
1. On your custom attribute, select  ([More](#)).
  2. Select  [Delete](#).
  3. Confirm with [Delete](#).

#### Note

- You can't delete custom attributes if they're being used in a widget or filter.
- Deleting a custom attribute can't be undone.

## Importing and Exporting Custom Attributes

1. To import or export your custom attribute, navigate to the [Custom Attributes](#) tab of your process.
2. • To export a custom attribute, select your custom attributes and select [Export](#). The export is saved to your default downloads location in .json format.
  - To import custom attributes, select [Import](#). Choose your custom attributes file and select [Import](#).

## Using and Editing Custom Attributes

To use your custom attribute, open your dashboard or investigation and create or edit your widget. Your custom attribute is listed in the [Attributes](#) panel. For more information, see [Building Widgets - New User Experience \[page 358\]](#).

The [Usage](#) tab shows the widget and the investigation or dashboard where your custom attribute is used. The [History](#) tab shows a list of edits that have been made to the custom attribute.

To edit your custom attribute, select your custom attribute. Make your changes and select [Save](#).

### 2.1.7 Roles and user management

Learn how to assign roles to users for process access in SAP Signavio Process Intelligence. Managers have full data set access, analysts have limited access, and consumers can only view. Workspace administrators can access all processes. Use it to efficiently manage user access and roles in your organization.

Access to a process is controlled with roles.

To grant other users access to your process, you assign a role to them. The role determines whether a user can access the complete data set, create and customize process analysis, or only consume the result of a process analysis.

The following applies:

- The user who creates a process is automatically given the manager role.
- Every process must have at least one manager.
- A user can have different roles for different processes.
- A role can be assigned to users and user groups. The users and user groups from the SAP Signavio user management are available for the role assignment. Read more in section [Manage users and groups](#).

## Roles

The following roles exist:

Role	Description
Manager	<p>Users with the manager role have access to the complete data set in the process. They can do the following:</p> <ul style="list-style-type: none"><li>• add and delete process data</li><li>• add users to the process</li><li>• remove users from the process</li><li>• delete a process</li><li>• add process views</li><li>• create, edit, and delete dashboards</li><li>• create, edit, and delete investigations</li><li>• export and import dashboards</li><li>• export and import investigations</li><li>• add metrics to a process, edit, and delete them</li><li>• create and manage the API access token for the process</li><li>• set up and manage data pipelines</li></ul> <p><b> ⓘ Note</b></p> <p>Dedicated feature sets are available for the work with data pipelines. Read more in section <a href="#">Access to process data management features [page 247]</a>.</p> <ul style="list-style-type: none"><li>• create, generate, edit, and delete insights, comment on insights or save them as widgets</li><li>• create, edit, or delete value cases</li></ul>

Role	Description
Analyst	<p>Users with the analyst role can only access the process data that has been determined for them in a process view. They can do the following:</p> <ul style="list-style-type: none"> <li>• create, edit, and delete dashboards</li> <li>• create, edit, and delete investigations</li> <li>• create, generate, edit, and delete insights, comment on insights or save them as widgets</li> <li>• create, edit, or delete value cases</li> </ul> <p>Analysts can't edit process views.</p>
Consumer	<p>Consumers can only view investigations and widgets in SAP Signavio Process Collaboration Hub and SAP Signavio Process Manager.</p> <p>They can do the following:</p> <ul style="list-style-type: none"> <li>• view dashboards</li> <li>• view investigations</li> <li>• create, generate, edit, and delete insights, and comment on insights</li> <li>• view value cases or link and remove an initiative from a value case</li> </ul> <p>They can't edit the defined data set or any process view.</p>

## Workspace Administrators

Workspace administrators can see all processes of a workspace, regardless of whether they have a role in a process.

When workspace administrators want to interact with a process, for example to upload data, they need to grant themselves access to the process by assigning themselves a role.

## Grant access to a process

To grant access to a process, you add a user or user group to a process and assign a role.

Follow these steps:

1. Open your process and select  ([Settings](#)).
2. On the [Process Settings](#) page, go to the [Users](#) tab and select [Add User](#).
3. Enter the name of the user or user group that you want to add.
4. Select a role.
5. For analysts or consumers, select one or more process views. Managers can see and analyze all process views, by default.

6. Confirm with [Save](#).

The selected users can now access the process data or view the dashboards and investigations, depending on their role.

## Remove access to a process

Follow these steps:

1. Open your process and select  ([Settings](#)).
2. On the [Process Settings](#) page, go to the [Users](#) tab and select the user or user group you want to remove from the process.
3. In the side panel, choose [Remove user](#).

The user is removed and can no longer access the process.

## User group 'All SAP Signavio Process Intelligence users (default)'

Users with a license for SAP Signavio Process Intelligence are automatically added to the group **All SAP Signavio Process Intelligence Users (default)**.

This group is a transitional measure to reduce disruption for existing users. It exists only in SAP Signavio Process Intelligence and is not part of the SAP Signavio user management. The group provides users with unrestricted access to processes created before August 14, 2019. New license holders are added to this group automatically. For processes created after August 14, 2019, the group can't be added. These newer processes are only visible to users who have been given access.

When you remove this group from a process, the process is only visible to users who have been given access.

### Note

- If you create process views for processes created before August 14, 2019, anyone has access as long as the **All SAP Signavio Process Intelligence Users (default)** is listed as a user.
- When you don't have the manager role and remove **All SAP Signavio Process Intelligence Users (default)**, you lose access to the process.
- The group can only be removed and not added to processes.

## Related Information

[Displaying Widgets in Other SAP Signavio Applications \[page 349\]](#)

[Define Access with Process Views \[page 26\]](#)

[Share an investigation with other SAP Signavio Process Intelligence users \[page 317\]](#)

[Share a dashboard with other SAP Signavio Process Intelligence users \[page 335\]](#)

[Who Can Work With Value Cases \[page 521\]](#)

## 2.1.8 Manage API access to a process

How to create and manage the access token of a process. With the access token, users can connect to the process using API requests, for example, to upload process data.

### ⓘ Note

You need the manager role for your process to use this function.

You can connect to a process using the API, for example, to upload data to a process. For that, you need to create an access token.

An access token is created for each process and is thus valid only for this one process.

### Create an access token

Follow these steps:

1. Open your process.  
The investigation overview opens.
2. Select *Process settings > API*.
3. To create an access token, click *New token*.

The access token is created. To copy it to the clipboard, click .

### Renew the access token

When you renew the access token, the existing access token is replaced by a new one. Applications or features using the previous access token can no longer access the process.

### ⓘ Note

The previous access token can't be restored.

Follow these steps:

1. Open your process.  
The investigation overview opens.
2. Select *Process settings > API*.
3. To renew the access token, click *Renew token*.

The previous access token is replaced by a new one. To copy it to the clipboard, click .

## Invalidate the access token

When you invalidate the access token, the existing access token is deleted. Applications or features using the access token can no longer access the process.

### Note

The deleted access token can't be restored.

Follow these steps:

1. Open your process.  
The investigation overview opens.
2. Select [Process settings > API](#).
3. To invalidate the access token, click [Invalidate token](#).  
The access token is deleted.

## Related Information

[Data Upload API](#)

[Roles and user management \[page 31\]](#)

## 2.1.9 OData Views

OData views allow SAP Signavio Process Intelligence users to store SIGNAL queries providing relevant analytical results. These results can then be shared in third-party systems, for example SAP Analytics Cloud, using the SIGNAL OData API.

## Use Cases

For analytical results derived in process analysis, this feature enables their secure and timely distribution outside of SAP Signavio Process Intelligence. Users can develop dashboards in third-party systems based on the underlying analytical results from process analysis. Depending on the third-party system used, the data behind these dashboards could be configured to update on a regular basis, such as daily or weekly.

Again depending on the third-party system used, access rights to the dashboard could be managed to configure roles. For example, the author might be allowed to edit or perform manual data refreshes, whereas a viewer could be restricted to reading a static version of the dashboard based on the last refresh.

## SIGNAL OData API

The SIGNAL OData API is used to retrieve the result from an OData view in SAP Signavio Process Intelligence, which makes it accessible to external systems without exposing the underlying data model.

For more information about what prerequisites are required to use the API, how access to OData views is controlled, and what API requests are available, see [SIGNAL OData API](#).

### 2.1.9.1 Generating API Access Tokens

Learn how to create OData tokens, user-scoped authentication tokens possessing the same permissions as the users who create the tokens. These tokens are needed to access OData views using the SIGNAL OData API.

#### Prerequisites

The feature set “SAP Signavio Process Intelligence – Signal OData API” is activated for you. This is explained further in [User Access](#).

You have the analyst or manager role for the process, see [Roles and user management \[page 31\]](#).

#### Context

To expose your OData views to any third-party tool, you need to create an OData token.

##### ⓘ Note

This token is used to securely authenticate a user to external systems. Its scope is limited exclusively to the secure authentication of SIGNAL OData API requests for OData views.

OData tokens are user-based, but not specific to processes. The tokens you create in one process are available in any other processes where you have the analyst or manager role.

Each token is set up with an expiration time, ranging from one day up to a year.

##### ⚠ Restriction

You can create a maximum of 100 tokens. Exceeding this limit causes requests to return a 422 error.

#### Procedure

1. Open your process and select  ([Settings](#)).

2. On the [Process Settings](#) page, go to the *OData Views* tab and select [Create API Access Token](#).
3. Enter a name, considering these aspects:
  - Names can only include these characters: numbers, letters, underscores, and hyphens.
  - You can't change the name afterwards.
4. Choose an expiration time. By default, tokens expire after 90 days.
5. Confirm with [Create](#).

## Results

The token is generated.

### ⚠ Caution

Make sure to copy the token now. If you leave this page or start another task here, you're not going to see the token again.

## Related Information

[Creating OData Views \[page 38\]](#)

### 2.1.9.2 Creating OData Views

Learn how to create OData views in SAP Signavio Process Intelligence.

## Prerequisites

You have the analyst or manager role for the process, see [Roles and user management \[page 31\]](#).

## Context

With an OData view, you save the result of a SIGNAL query. The result can be accessed by external applications via the SIGNAL OData API.

## Procedure

1. Open your process and select  ([Settings](#)).
2. On the [Process Settings](#) page, go to the *OData Views* tab and select [Create OData View](#).
3. Enter a name and a description, considering these aspects:
  - The name must be unique across all processes in the workspace.
  - You can't change the name afterwards.
  - The name is displayed in the application that consumes the query result.
4. Enter your SIGNAL query in the code editor and confirm with [Create](#).

### Note

The following restrictions apply to the SIGNAL query used for an OData view:

- Selecting all columns (SELECT \*) is not supported.
- All columns must be given an alias name. This name must start with a letter or underscore and be followed by at most 127 letters, underscores, or digits. Even when enclosed in double quotes, alias names must not contain white spaces or special characters.
- Applying the same alias to more than one column in the same query is invalid and causes an error.
- The use of the process ID in the FROM statement is mandatory. It's not possible to use THIS\_PROCESS as a process ID. You find the process ID in the SIGNAL view in the query editor of a saved widget or action.

## Results

The OData view is created.

## Related Information

[Aliases](#)

[The SIGNAL code editor](#)

[Editing and Deleting OData Views](#)

## 2.1.9.3 Editing and Deleting OData Views

Learn how to edit or delete OData views in SAP Signavio Process Intelligence.

### Prerequisites

You have the analyst or manager role for the process, see [Roles and user management \[page 31\]](#).

### Context

OData views produce data that is shared in third-party applications via the SIGNAL OData API. Modifications, whether editing or deletion, made to an OData view affect the shared data in these third-party applications.

### Procedure

1. Open your process and select ([Settings](#)).
2. On the [Process Settings](#) page, go to the [OData Views](#) tab and choose an option:
  - Choose (Edit) to apply changes.

#### Note

The following restrictions apply to the SIGNAL query used for an OData view:

- Selecting all columns (SELECT \*) is not supported.
  - All columns must be given an alias name. This name must start with a letter or underscore and be followed by at most 127 letters, underscores, or digits. Even when enclosed in double quotes, alias names must not contain white spaces or special characters.
  - Applying the same alias to more than one column in the same query is invalid and causes an error.
  - The use of the process ID in the FROM statement is mandatory. It's not possible to use THIS\_PROCESS as a process ID. You find the process ID in the SIGNAL view in the query editor of a saved widget or action.
- Choose (Delete) to delete the OData view.

### Results

The OData view is updated or deleted.

## Related Information

The SIGNAL code editor

## 2.2 Provide Data as Files

### 2.2.1 Upload process data files

Learn how to upload data files, the supported data types and formats, and how to view your upload status and uploaded data.

For the upload of your process data files, the following applies:

- When using zipped CSV or XES files, each zipped file can only contain one file.
- To update the data in your process, upload new files. You can't edit uploaded data.
- Process data is only uploaded in full. If the upload fails at any point, no data is uploaded at all.

Read more on supported files types in section [Data file types \[page 44\]](#).

### Upload CSV files

Follow these steps:

1. Open your process and select *Process settings* tab.  
The settings page opens. The *Data* tab is displayed by default.  
If a process already has data and you want to upload more or new data, you need to specify how new and existing data are processed. Read how to do this in section [Set the merge strategy for event data \[page 25\]](#).
2. To upload data, drag your file to the import area or click *browse* to select the file.
3. In the import settings dialog, you can change the log type and the parsing properties. To do so, follow these steps:
  1. Click *File properties*.  
The dialog with detected file properties opens.
  2. Apply your changes.
  3. Confirm with *Continue*.
4. Assign a data type to each column. To do so, select the data type from the drop-down list in each column header. Consider the details in the following sections:
  - [Event log \[page 42\]](#)
  - [Case attribute log \[page 42\]](#)
  - [Data types \[page 42\]](#)
5. Confirm with *Import*.  
The CSV file is uploaded and you're redirected to the process settings page.

## Event log

For the upload of event logs, the following applies:

- SAP Signavio Process Intelligence detects the mandatory columns `Case ID`, `Activity`, and `End Timestamp` and checks if the data has the required qualities.
- For other columns, a data type is suggested. Accept the suggestion or select a different type.
- For columns with timestamps, select a format or enter your own.

## Case attribute log

For the upload of case attribute logs, the following applies:

- If SAP Signavio Process Intelligence doesn't detect the mandatory columns of an event log, you're asked to select the mandatory columns in the data set or to change the log type.
- A data type is suggested for all columns. You can accept the suggestions in bulk or select different types.

## Data types

These data types are available for the data upload:

<b>Choice</b>	For columns that contain multiple options, for example different suppliers or locations.  You can group choice data, for example in a bar chart.
<b>Text</b>	For text attributes only shown in the case table, for example free text fields which exist only once in the data set.  Data formatted as text can't be used for grouping.
<b>Number</b>	For numbers that aren't currencies
<b>Currency</b>	For monetary values
<b>Date time</b>	For dates and time not in a timestamp format  Also specify the format. To do so, select a format or enter your own. Read more in section <a href="#">Timestamp notation and formats [page 43]</a> .
<b>Ignore</b>	For column data you don't want to upload

## Timestamp notation and formats

The following notation is used:

Notation	Description	Example
YYYY	year	1970 1971 ... 2029 2030
MM	month	01 02 ... 11 12
DD	day of month	01 02 ... 30 31
HH	hour	00 01 ... 22 23
mm	minute	00 01 ... 58 59
ss	second	00 01 ... 58 59
SSS	millisecond	000 001 ... 998 999
Z	UTC offset	-07:00 -06:00 ... +06:00 +07:00
T or space character	separator between date and time information	T: 2021-05-07T09:04:07 space: 07.05.2021 09:06:34

The following formats are available:

Format	Example
YYYY-MM-DDTHH:mm:ss	2021-05-07T09:04:07
YYYY-MM-DDTHH:mm:ss.SSS	2021-05-07T09:04:16.300
YYYY-MM-DDTHH:mm:ssZ	2021-05-07T09:04:44+02:00
YYYY-MM-DDTHH:mm:ss.SSSZ	2021-05-07T09:05:02.516+02:00
YYYY-MM-DD HH:mm:ss	2021-05-07 09:05:18
YYYY-MM-DD HH:mm:ss.SSS	2021-05-07 09:05:55.029
YYYY-MM-DD HH:mm:ssZ	2021-05-07 09:06:05+02:00
YYYY-MM-DD HH:mm:ss.SSSZ	2021-05-07 09:06:20.383+02:00
DD.MM.YYYY HH:mm:ss	07.05.2021 09:06:34
DD.MM.YYYY HH:mm:ss.SSS	07.05.2021 09:06:43.235

## Upload XES files

Follow these steps:

1. Open your process and select *Process settings* tab.  
The settings page opens. The *Data* tab is displayed by default.  
If a process already has data and you want to upload more or new data, you need to specify how new and existing data are processed. Read how to do this in section Set the merge strategy for event data.
2. Drag the file to the import area or click *browse* to select the file.

The XES file is uploaded directly.

## Upload status

Under *Process settings > Data > Event log history*, you can check the status of uploaded logs.

The following statuses are available:

- *Processing*: Currently an upload or a deletion is running.
- *Import settings missing*: The file can't be uploaded until you assign a data type to each column. To complete the upload, click *Import settings*.
- *File not imported*: The file upload failed. Hover over  to get more details.
- *Deleted*: This process data has been deleted from the process.

## View uploaded data

To view uploaded process data, open *Process settings > Data* and click *View imported data*.

## Related Information

[Data file types \[page 44\]](#)

[Delete process data \[page 46\]](#)

## 2.2.2 Data file types

Learn about the supported file types, and the requirements for event logs and case attribute logs, for the upload of process data to SAP Signavio Process Intelligence.

The following data file types are supported:

- XES
- CSV
- ZIP (CSV or XES)
- GZ (CSV or XES)

## Supported characters in column names

Column names in process data files can contain only alpha-numeric and the following special characters:

- a-z
- A-Z
- 0-9
- §±!@#\$%^\*()\_-+=[]{}~\|/.>? äöüÄÖÜß

Uploading process data files will fail if any column name contains other characters.

## XES files

XES files contain all data from a process.

## CSV files

CSV files contain either an event log or a case attribute log.

Each log type needs to be uploaded as a separate file.

## Event log

This log contains the core properties of all events that occurred during the specified process.

The following applies:

- The event log is mandatory for a process investigation.
- For each event, the event log must contain the following columns:
  - Case ID: The unique identifier of the case to which an event is assigned. This ID can occur multiple times, as there can be multiple events per case ID.
  - Activity: The name of the event, for example **Invoice received**.
  - End Timestamp: Date and time when the event was finished. The timestamp format must be the same for all timestamps in a column.
- In the mandatory columns, each cell must contain a value in the expected data format.
- The event log can have more attribute columns. These attributes always refer to one type of event.
- The optional columns can contain empty cells.
- All entries of an attribute column must have the same data format.

Example of an event log:

```
Case ID;Activity;Timestamp
100430031000112060012015;Create FI invoice by vendor;2021-01-12T00:00:00.000
100430031000112060012015;Post invoice in FI;2021-01-08T14:26:02.000
```

```
100430031000112060012015;Clear open item;2021-02-12T23:59:59.000
```

## Case attribute log

This log contains properties that provide more details about the cases. Properties can be, for example, invoice due date, customer type, user name, country, order amount, or type of goods.

The properties apply to a case in general, and aren't related to specific events.

The following applies:

- The case attribute log is optional for a process investigation.
- It must also contain the Case ID column.
- Every row includes the case ID because the attributes in the other columns are related to a specific case.
- Each cell in the case ID column must contain a value in the expected data format. Other columns can contain empty cells.
- All entries of an attribute column must have the same data format.

Example of a case attribute log:

```
Case ID;invoice duedate;invoice value;material group  
100430031000112060012015;2021-04-06T14:32:37.000;175.38;A001  
100430031000112070012015;2021-06-10T06:45:38.000;0.41;  
100430031000112080012015;2021-06-19T14:48:50.000;0.20;
```

## 2.2.3 Delete process data

Learn how to delete process data.

To delete process data, you have the following options:

- [Delete a process \[page 24\]](#)
- [Manually delete process data \[page 46\]](#)
- Use the API to delete uploaded data from a process, read more in section [SAP Signavio Process Intelligence API](#)

### Manually delete data from a process

#### Note

Deleting process data can't be undone.

Follow these steps:

1. Open your process. The process overview page opens.

2. In the event log history on the *Data* tab, click  for the log to delete and confirm.  
The data is deleted.

## Related Information

[Data Upload API](#)

# 3 Process Data Management

Learn about extracting raw data from source systems into SAP Signavio Process Intelligence, transforming the data into an event log, and preparing it for process analytics.

The intended audiences are those who acquire data from various supported source systems, perform data modeling, manage, and prepare data for process analytics.

Using the Process Data Management features, you can extract and transform large volumes of your data, and load it into a process. The transformed data can then be used for further process analytics. The goal is to help organizations optimize the use of data for making strategic decisions to improve business outcome.

Process Data Management follows a data processing approach that involves:

1. Systematically extracting data from your source systems, hosted in the cloud or on premise
2. Performing transformations on the data
3. Generating an event log (process data) for the transformed data, and
4. Loading the transformed data into a process for analysis and process mining

For process analytics, it's essential to have an event log where each event corresponds to a case, an activity, and a time-stamp. Essentially, an event log can be considered as a collection of cases (traces), with each case representing a sequence of events.

Using event log, you can perform conformance checking, for example, validate if reality, as recorded in the event log, conforms to the defined process data model.

## ⓘ Note

It's important to have a basic understanding of SQL to add or customize the extraction and transformation rules. This knowledge helps you to fine-tune the transformation rules and tailor them to your specific business requirement.

## What You'll Find

The chapters in the Process Data Management covers the following:

- [Navigating and Finding Process Data Management Content \[page 50\]](#)  
Use the decision tree diagram to get guidance on how to navigate through Process Data Management features.
- [Access Requirements for Process Data Management \[page 52\]](#)  
Find how to get access to the process data management feature sets in SAP Signavio Process Intelligence.
- [Connect to Source Systems \[page 62\]](#)  
How to connect with available cloud and on-premise systems.
- [Extract Data from Source Systems \[page 174\]](#)  
How to create and manage source data, link source data to a connection, customize data tables, and two different ways to extract data - Standard and advanced.

- [Upload Data Using the Ingestion API \[page 222\]](#)  
How to upload data into SAP Signavio Process Intelligence using Ingestion API and required access token.
- [Uploading Data Manually \[page 229\]](#)  
How to upload data in zipped CSV files and extract.
- [Transform and Load Data \[page 234\]](#)  
How to transform data and load it in a process using process data pipelines.

## Features

Following are the features that provide a comprehensive solution for effective process data management:

Feature	Description
<b>Connections</b>	<p>Establishes a connection between SAP Signavio Process Intelligence and your source system, hosted in the cloud or on-premises. Different connection types, enterprise systems, cloud storage / warehouse, database, and other (APIs, and more) are available.</p> <p>Creating a connection is the first step in the process of extracting large volumes of data from your source systems.</p>
<b>Source Data</b>	<p>Using Source Data, you define which tables data is extracted from a connected source system and loaded into SAP Signavio Process Intelligence.</p> <p>The data extraction is configured in Source Data; You can customize tables and columns, define criteria for extraction, and extract the required data.</p> <p>Except Manual upload, every Source Data must be linked to a connection. With Manual upload, you can directly import zipped CSV files into SAP Signavio Process Intelligence.</p>
<b>On-premises Extractors</b>	<p>An on-premises extractor is installed and operated within company's own physical infrastructure.</p> <p>Using on-premises extractor, you can connect your on-premises source systems to Process Data Management in SAP Signavio Process Intelligence, then extract, transform, and load data.</p>

Feature	Description
<b>Process Data Pipelines</b>	<p>A Process Data Pipeline carries out the data processing tasks - extract, transform, and load. Using this feature, you can define data transformation rules and connect to a process in which you want to load the transformed data.</p> <p>A process data pipeline contains all settings necessary to run a pipeline like a connection that enables a link to the source system, link to as many source data as needed, data views, business objects with their case attributes and event collectors, and a query editor to define transformation rules.</p>
<b>Processes</b>	<p>With Processes, you provide data for the analysis of a business process. You can load the data into a process using any of the following ways:</p> <ul style="list-style-type: none"> <li>• Connect to a process data pipeline to automatically load the transformed data</li> <li>• Ingest data using the Data Upload API</li> </ul>

### 3.1 Navigating and Finding Process Data Management Content

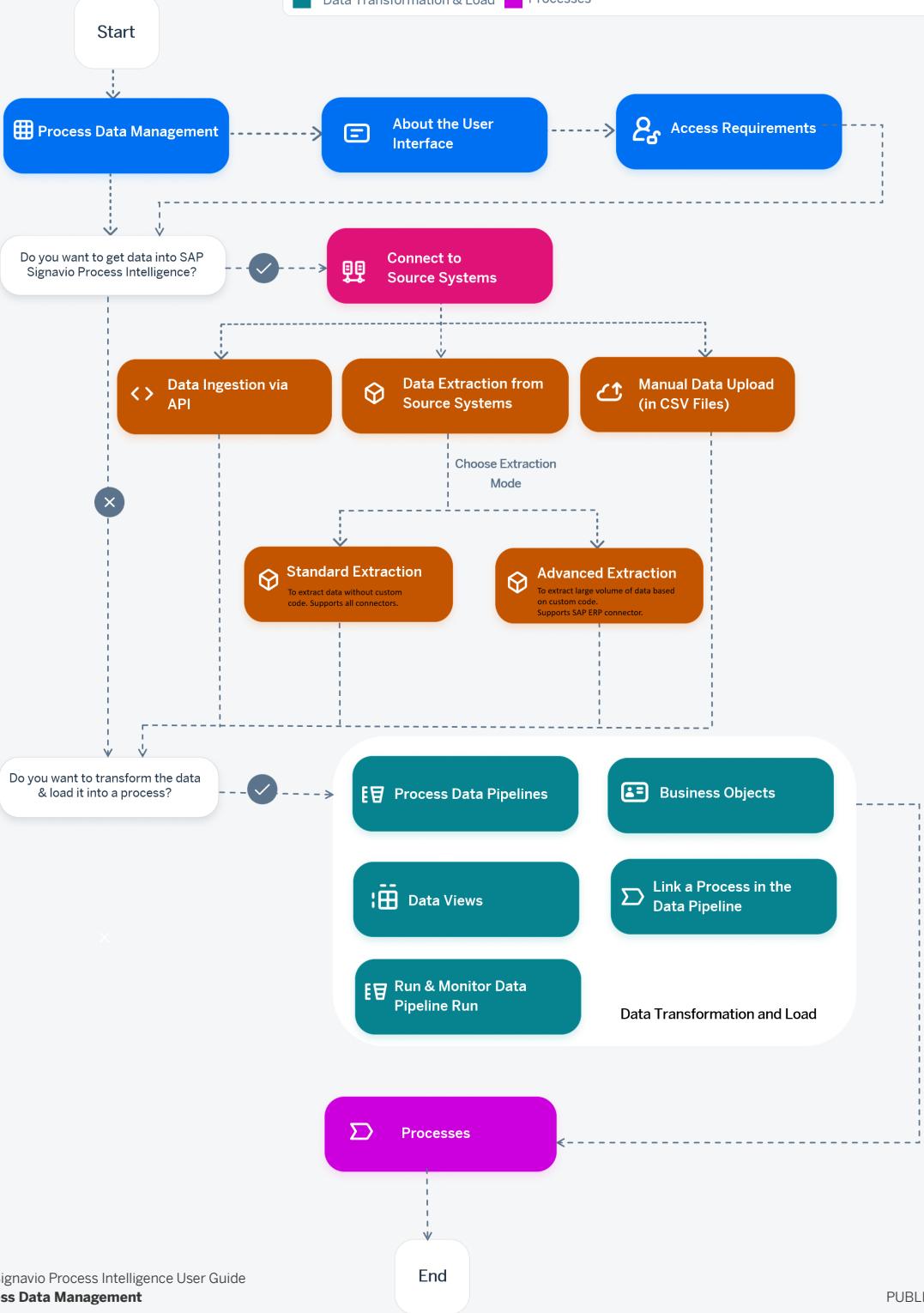
As a user, you can take advantage of help topics, organized into categories that focus on what you want to achieve.

Use the decision tree diagram to get guidance on how to navigate through Process Data Management features. **Hover over each area for a description. Click highlighted areas to open the topics.**

## Help Topics

Follow the path to familiarize yourself with Process Data Management features

Select the colored boxes to jump to the help topics



- [Process Data Management \[page 48\]](#)
- [About the User Interface \[page 11\]](#)
- [Access Requirements for Process Data Management \[page 52\]](#)
- [Connect to Source Systems \[page 62\]](#)
- [Get Data into SAP Signavio Process Intelligence \[page 169\]](#)
- [Upload Data Using the Ingestion API \[page 222\]](#)
- [Manual Upload \[page 226\]](#)
- [Standard Data Extraction \[page 185\]](#)
- [Advanced Data Extraction \[page 208\]](#)
- [Process Data Pipelines \[page 235\]](#)
- [Business Objects \[page 262\]](#)
- [Data Views \[page 274\]](#)
- [Linking a Process \[page 256\]](#)
- [Run Data Pipelines \[page 291\]](#)
- [Processes \[page 19\]](#)

## 3.2 Access Requirements for Process Data Management

Find how to get access to the feature sets for process data management in SAP Signavio Process Intelligence and learn about the different roles in process data management..

Before you start requesting access to the feature sets for process data management, make sure that you're aware of the SAP Signavio Process Intelligence access requirements.

### ① Note

The feature sets for process data management are only available on request.

Please contact our SAP Signavio service experts from the [SAP for Me portal](#).

Once the features sets for process data management are available in a workspace, workspace administrators have access to them by default.

For other users, workspace administrators need to enable the feature sets for process data management in the SAP Signavio Process Manager under [Setup](#) [Manage Access Rights](#) [User Groups](#) [Feature Sets](#).

Read more on user management in section [Manage Users and Access Rights](#).

Feature Set	Description
<a href="#">SAP Signavio Process Intelligence - Data Integration</a>	<p>Work with connections, source data, and on-premises extractors.</p> <p>What you can do with these objects will depend on your role as described in <a href="#">Access Roles [page 53]</a>.</p>

Feature Set	Description
<a href="#">SAP Signavio Process Intelligence - Data Modeling</a>	<p>Work with process data pipelines.</p> <p>What you can do with process data pipelines will depend on your role as described in <a href="#">Access Roles [page 53]</a>.</p>

## Access Roles

Access to folders and objects is controlled from the Repository by workspace administrators. For more information on the Repository, see [Repository \[page 59\]](#).

Users can be granted access to the entire Repository (root folder) or to specific folders or objects within the Repository. When a user is granted access to a folder, they have that level of permission to all folders and objects within that folder. A user can be granted a higher level of permission to an object or folder than they have on the parent folder but not a lower level of permission than they have on the parent folder. There are three roles that can be granted to an object or folder: viewer, editor, and manager. In addition to the three roles that can be granted, an editor who creates an object is designated as owner of that object, which grants the same permission level as manager on that object. The following table describes the capabilities of these roles:

Role	Capabilities
Viewer	View the object
Editor	<p>All capabilities of viewer</p> <p>Change objects (see object-specific actions table)</p> <p>Rename folders and objects</p> <p>Create objects and folders</p>
Manager	<p>All capabilities of editor</p> <p>Move objects and folders (to folders to which you have at least editor access)</p> <p>Delete objects and folders</p>
Owner	All capabilities of manager

### ⓘ Note

The role of owner is automatically granted to the editor who has created the object. This is applicable only for objects and not folders.

Let's now examine what these roles mean for each object within the feature sets.

SAP Signavio Process Intelligence - Data Integration (Source Data, Connections, and On-Premises Extractors)

<b>Role</b>	<b>Connection</b>	<b>Source Data</b>	<b>On-Premises Extractor</b>
Viewer	View connection configuration  Preview data of existing tables in the source data (if linked connection is valid)	View existing tables and their columns and configuration.  All capabilities of viewer	View and copy parameters to clipboard  All capabilities of viewer
Editor	All capabilities of viewer  Change connection configuration  Rename connections  Create connections	All capabilities of viewer  Link source data to a connection (you must have at least viewer role for the connection)  Add and change table columns and configuration  Extract tables  Delete tables  Rename source data  Create source data	All capabilities of viewer  Rename on-premises extractors  Create on-premises extractors
Manager	All capabilities of editor  Move connections to a different folder to which you have at least editor access  Delete connections	All capabilities of editor  Move source data to a different folder to which you have at least editor access  Delete source data	All capabilities of editor  Move on-premises extractors to a different folder to which you have at least editor access  Delete on-premises extractors

SAP Signavio Process Intelligence - Data Modeling (Process Data Pipelines)

<b>Role</b>	<b>Process Data Pipelines</b>
Viewer	View linked connections and source data (if viewer role is granted for these objects)  View data view definitions  View business objects  View collector script definitions  View transformation status and history  Preview data view and collector script results  Export pipeline (if viewer role is granted for the source data)  Link and unlink a process to a process data pipeline (manager role is required on the process)

Role	Process Data Pipelines
Editor	All capabilities of viewer Add, create, and delete data views Add, create, and delete business objects Modify attribute collector scripts Add, create, and delete event collector scripts Link connection and source data to a process data model (you must have at least viewer role for the source data) Unlink connection and source data from process data models Schedule transformation execution Run T&L (Transform and Load). You must have at least viewer permission for the source data. Run ETL (Extract, Transform, and Load). You must have at least editor role for the source data. Rename process data pipelines Create process data pipelines
Manager	All capabilities of editor Move process data pipelines to a different folder to which you have at least editor access Delete process data pipelines

Read more on user management in section [Manage Users and Access Rights](#).

## Changes in Feature Sets

As of the April 2025 release, the previous feature sets ETL - Superuser Role, ETL - Analyst Role, and ETL - Analyst Role were replaced by the new feature sets [SAP Signavio Process Intelligence - Data Integration](#) and [SAP Signavio Process Intelligence - Data Modeling](#). Users who had these feature sets have been granted the following feature sets and roles:

- ETL - Superuser Role: Both the [SAP Signavio Process Intelligence - Data Integration](#) and [SAP Signavio Process Intelligence - Data Modeling](#) feature sets and manager role on all folders and object types.
- ETL - Analyst Role: Both the [SAP Signavio Process Intelligence - Data Integration](#) and [SAP Signavio Process Intelligence - Data Modeling](#) feature sets. Viewer role for Process Data Pipelines folder. Viewer role for Source Data folder. No permission for Connections or On-Premises Extractors folders.
- ETL - Reader Role: Only the [SAP Signavio Process Intelligence - Data Modeling](#) feature set. Viewer role for Process Data Pipelines folder. No permission for Source Data, Connections, or On-Premises Extractors folders.

### Note

After the April 2025 release, the old feature sets ETL - Superuser Role, ETL - Superuser Role, and ETL - Analyst Role will remain in SAP Signavio Process Manager for a period of time. However, they no longer have any functionality and cannot be used to control access.

## Required Changes for Administrators

After the April 2025 release, a user who is not a member of a group will have both the *SAP Signavio Process Intelligence - Data Integration* and *SAP Signavio Process Intelligence - Data Modeling* feature sets assigned but will not have access to any objects. If required, a workspace administrator needs to grant these users the appropriate role on the objects and folders.

With the old ETL Analyst role, users could create and delete business objects/event collectors in a process data pipeline. As of the April 2025 release, these users will have both the *SAP Signavio Process Intelligence - Data Integration* and *SAP Signavio Process Intelligence - Data Modeling* feature sets assigned and have the viewer role on the Process Data Pipelines and Source Data folders. In process data pipelines, these users will no longer be able to change business objects/event collectors and won't be able to run data transformations and load transformed data into a process. If a user needs to continue to carry out these tasks, a workspace administrator must grant the editor role on the required process data pipeline. This will also enable Run T&L (Transform and Load) functionality if viewer role is granted on the linked source data.

## New Folders

As of the April 2025 release, existing customers automatically had the following folders created in the Repository in the tenant language if they already had objects of that type in the system:

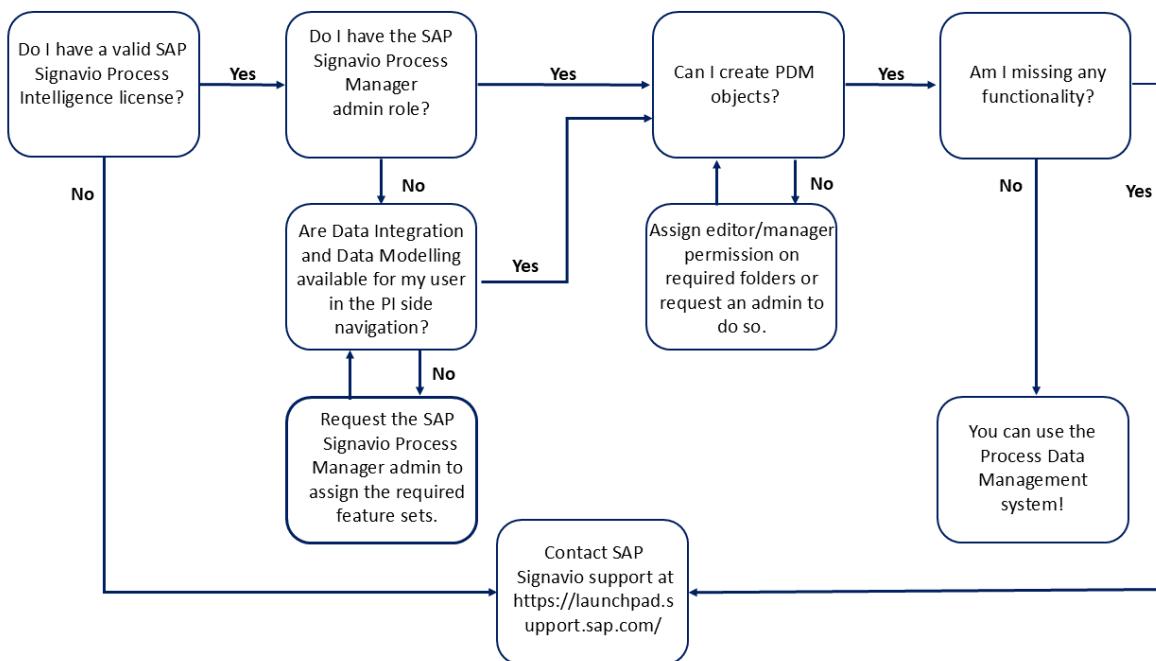
- Process Data Pipelines
- Source Data
- Connections
- On-Prem Extractors

If you were an existing user who did not have that object type, then the corresponding folder was not created. For example, a user who had only process data pipelines would only have had the Process Data Pipelines folder created in the Repository. New users after the April 2025 release do not automatically have these folders created.

As of the April 2025 release, any existing process data management objects with no name were renamed to underscore "\_".

## Role Permissions Flow

The following flow chart shows how to get access to the feature sets for process data management: *SAP Signavio Process Intelligence - Data Integration* and *SAP Signavio Process Intelligence - Data Modeling*.



### 3.3 Regions, IP Addresses, and URLs

Find the IP addresses and application URLs for different regions.

The following table provides the regions and their allowed IP addresses.

#### ⓘ Note

The provided IP addresses are applicable only for the following connectors:

- SAP RFC On-premises
- SAP Datasphere
- SAP HANA
- SAP SuccessFactors

Region	NAT IPs (Egress, IPs for requests from SAP Signavio Process Intelligence to customer system)	IPs (Ingress, Incoming requests from customer system to SAP Signavio Process Intelligence )	Application URLs
Europe (EU)	3.68.26.78 3.67.68.183 18.192.165.143	15.197.210.108 3.33.194.113	<a href="https://editor.signavio.com/">https://editor.signavio.com/</a>

Region	NAT IPs (Egress, IPs for requests from SAP Signavio Process Intelligence to customer system)	IPs (Ingress, Incoming requests from customer system to SAP Signavio Process Intelligence )	Application URLs
Australia (AU)	13.236.49.140 52.64.193.78 54.66.30.251	15.197.160.99 3.33.176.107	<a href="https://app-au.signavio.com/">https://app-au.signavio.com/</a>
United States (US)	18.235.204.147 50.16.9.226 54.205.22.53	15.197.195.116 3.33.199.117	<a href="https://app-us.signavio.com/">https://app-us.signavio.com/</a>
Canada (CA)	3.97.198.20 3.98.70.54 35.183.74.254	13.248.209.104 76.223.73.85	<a href="https://app-ca.signavio.com/">https://app-ca.signavio.com/</a>
Japan (JP)	52.192.122.249 18.179.115.110 54.199.38.209	15.197.222.72 3.33.181.86	<a href="https://app-jp.signavio.com/">https://app-jp.signavio.com/</a>
Singapore (SGP)	18.142.166.36 13.229.192.158 52.220.13.226	52.223.61.103 35.71.167.112	<a href="https://app-sgp.signavio.com/">https://app-sgp.signavio.com/</a>
South Korea (KR)	3.38.89.68 43.200.231.93 13.125.122.170	52.223.2.126 35.71.180.116	<a href="https://app-kr.signavio.com/">https://app-kr.signavio.com/</a>

## 3.4 Accessing Your Process Data Management Folders and Objects

Learn where to access your process data management folders and objects.

Process data management objects and folders can be accessed from the following side navigation menu items in SAP Signavio Process Intelligence:

-  ([Repository](#))
 

You see the [Repository](#) menu item in your side navigation when you have at least one of the two process data management feature sets assigned:

  - [SAP Signavio Process Intelligence - Data Integration](#)  
Work with source data, connections, and on-premises extractors.
  - [SAP Signavio Process Intelligence - Data Modeling](#)  
Work with process data pipelines.

The Repository acts as central storage for process data pipelines, source data, connections, and on-premises extractors. In the Repository, you see all objects (process data pipelines, source data, connections, and on-premises extractors) and folders for which you have at least the viewer role. For more information about the Repository, see [Repository \[page 59\]](#). For more information about feature

sets, see [Access Requirements for Process Data Management \[page 52\]](#), and for information about access roles, see [Access Roles \[page 53\]](#).

-  [\(Data Integration\)](#)

You see the [Data Integration](#) menu item in your side navigation when you have the [SAP Signavio Process Intelligence - Data Integration](#) feature set assigned. You can work with source data, connections, and on-premises extractors from the [Source Data](#), [Connections](#), and [On-Premises Extractors](#) views under [Data Integration](#).

-  [\(Data Modeling\)](#)

You see the [Data Modeling](#) menu item in your side navigation when you have the [SAP Signavio Process Intelligence - Data Modeling](#) feature set assigned. You can work with process data pipelines from the [Process Data Pipelines](#) view under [Data Modeling](#).

#### [Repository \[page 59\]](#)

View, organize, and work with objects.

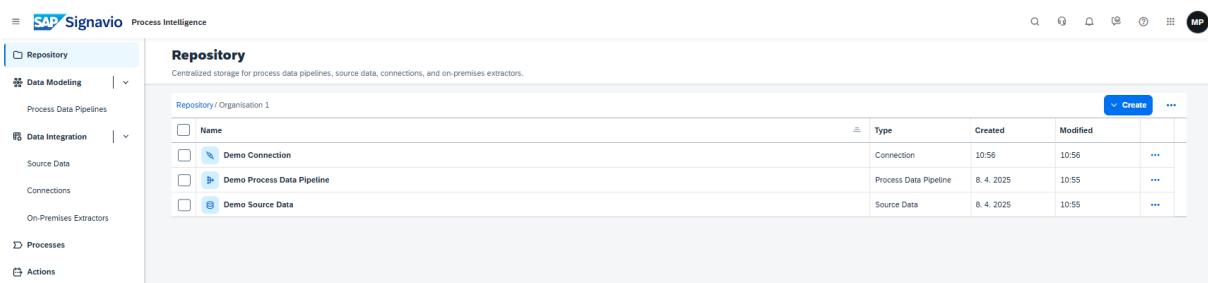
#### [Creating Objects and Folders \[page 61\]](#)

Learn more about creating objects and folders.

## 3.4.1 Repository

View, organize, and work with objects.

The Repository acts as central storage for process data pipelines, source data, connections, and on-premises extractors. In the Repository, you see all objects (process data pipelines, source data, connections, and on-premises extractors) and folders to which you have at least the viewer role.



What you can do with these objects and folders will depend on the feature sets that you have been assigned and the role that you have on the object and folder. It works as follows:

- [\*What can I see in the Repository?\*](#)

In the Repository, you can see an object or folder if you have viewer role on that folder or object. For more information on the roles for process data management, see [Access Roles \[page 53\]](#).

- [\*Which objects can I access in the Repository?\*](#)

You can open an object and view its details page if you have the relevant feature set assigned for that object type. You need the SAP Signavio Process Intelligence - Data Integration feature set assigned to open source data, connections, and on-premises extractors. To open process data pipelines, you need the SAP Signavio Process Intelligence - Data Modeling feature set assigned. For more information on feature sets, see [Access Requirements for Process Data Management \[page 52\]](#). If you have only one feature set assigned, you may see objects relating to the other feature set that you have at least the viewer role on but you will not be able to open the details pages for these objects and you will receive a message that you don't have the feature set enabled when you click these objects.

- [What can I do with objects and folders in the Repository?](#)

Whether you can view, edit, or edit and manage an object or folder will depend on the role (viewer, editor, or manager) that you have on the object or folder. For more information on the roles for process data management, see [Access Roles \[page 53\]](#).

You can create folders if you have editor or manager role on the folder in which you want to create the new folder. To create a new folder, from the folder header, choose [\(More Actions\)](#) [New Folder](#). You can create objects if you have at least one of the feature sets assigned and the editor role on a folder. To create a new object, from the folder header, choose [Create](#) and select the object type that you want to create from the list. The object types available depend on the feature sets that you have been assigned. For more information, see [Creating Objects and Folders \[page 61\]](#).

As well as working in the Repository, you can also access your objects from the sidebar under [\(Data Integration\)](#) and [\(Data Modeling\)](#) if you have the required feature set assigned. For example, if you have the SAP Signavio Process Intelligence - Data Integration feature set assigned, you can access a connection under [Data Integration](#) [Connections](#). Or if you have the SAP Signavio Process Intelligence - Data Modeling feature set assigned, you can access a process data pipeline under [Data Modeling](#) [Process Data Pipelines](#). Objects in these views are organized in a flat list though you can view the details of the parent folder of the object.

You can sort and filter the entries in the Repository. To sort the entries, click a column header and choose [Sort Ascending](#) or [Sort Descending](#). To filter a column, click the column header and enter a value in the [Filter](#) field.

## Available Actions

In the Repository, under [\(More Actions\)](#) to the right of the screen, you can see the actions that are available to you for a folder or object. The actions available to you will depend on the role that you have for that folder or object. For more information, see [Access Roles \[page 53\]](#).

Administrators can manage access to folders and objects by choosing [\(More Actions\)](#) [Manage Access](#). They can change the level of access that a user group or individual user has to a folder or object or remove access altogether. Administrators can choose from user groups and users that have already been added in SAP Signavio Process Manager to the workspace. User groups or individual users can be given the viewer, editor, or manager role on folders or objects. For more information, see [Access Roles \[page 53\]](#).

**Parent topic:** [Accessing Your Process Data Management Folders and Objects \[page 58\]](#)

## Related Information

[Creating Objects and Folders \[page 61\]](#)

## 3.4.2 Creating Objects and Folders

Learn more about creating objects and folders.

### Creating Folders

In the Repository, you can create folders if you have editor or manager permission on the folder in which you want to create the new folder. To create a new folder, from the folder header, choose  (More Actions) [New Folder](#).

### Creating Objects

You can create objects both in the Repository and the views under *Data Integration* (Source Data, Connections, and On-Premises Extractors) and the view under *Data Modeling* (Process Data Pipelines). The following are the requirements before you can create each of the process data management object types:

- Process data pipeline: You must be assigned the SAP Signavio Process Intelligence – Data Modeling feature set and have editor or manager permission on the folder in which you want to create the new process data pipeline. For more information, see [Creating a Process Data Pipeline \[page 251\]](#).
- Source data: You must be assigned the SAP Signavio Process Intelligence – Data Integration feature set and have editor or manager permission on the folder in which you want to create the new source data. For more information, see [Creating a Source Data \[page 178\]](#).
- Connection: You must be assigned the SAP Signavio Process Intelligence – Data Integration feature set and have editor or manager permission on the folder in which you want to create the new connection. For more information, see [Creating a Connection \[page 135\]](#).
- On-premises extractor: You must be assigned the SAP Signavio Process Intelligence – Data Integration feature set and have editor or manager permission on the folder in which you want to create the new on-premises extractor. For more information, see [Create an On-Premises Extractor in SAP Signavio Process Intelligence \[page 149\]](#).

When you create an object from the Repository, the *Repository* field on the creation page is preselected with the folder from which you selected the *Create* button. The *Create* button is only active from folders to which you have at least editor or manager permission.

When you create an object from the views under *Data Integration* (Source Data, Connections, and On-Premises Extractors) and the view under *Data Modeling* (Process Data Pipelines), Repository is preselected if you have editor permission on the root folder. If you don't have editor permission on the root folder, no folder is preselected and you have to select a folder.

**Parent topic:** [Accessing Your Process Data Management Folders and Objects \[page 58\]](#)

## Related Information

[Repository \[page 59\]](#)

## 3.5 Connect to Source Systems

Get an overview of connecting to source systems.

Connections establish a link between your source systems and SAP Signavio Process Intelligence. This enables the transfer of data from your source data system and SAP Signavio Process Intelligence.

It allows you to access and analyze your data within the SAP Signavio Process Intelligence platform.

**You can connect to cloud systems and on-premises systems.**

Connections also define from where a data pipeline can extract the data. You can create new connections as well as manage existing ones.

**To connect with your source system:**

1. Determine your source system, an enterprise system, database, cloud, or API.
2. Gather your connection details, authentication credentials, host or server name, and any additional parameters.
3. Create a connection by choosing the appropriate connection type. Make sure the connection is valid.

**Select the links below to learn more about each topic.**

[Connection Types and Available Connectors \[page 62\]](#)

Here you can find the list of available connectors for data pipelines. The connectors link the source systems to SAP Signavio Process Intelligence.

[Security Recommendations for Connectors \[page 131\]](#)

View security recommendations of all connectors in SAP Signavio Process Intelligence.

[Managing Connections \[page 134\]](#)

Connections define from where a data pipeline will extract the data. You can create new connections as well as manage existing ones using filtering and sorting.

### 3.5.1 Connection Types and Available Connectors

Here you can find the list of available connectors for data pipelines. The connectors link the source systems to SAP Signavio Process Intelligence.

SAP Signavio Process Intelligence enables you to connect with both cloud and on-premises systems. This allows you to access data from various source systems, regardless of their hosting environment.

## List of Connectors

### Note

Except for SAP Datasphere and SAP Cloud Integration, all the connectors listed can establish connection with source systems hosted on both cloud and on-premises environments. SAP Datasphere and SAP Cloud Integration support only cloud environment.

The following connectors are available:

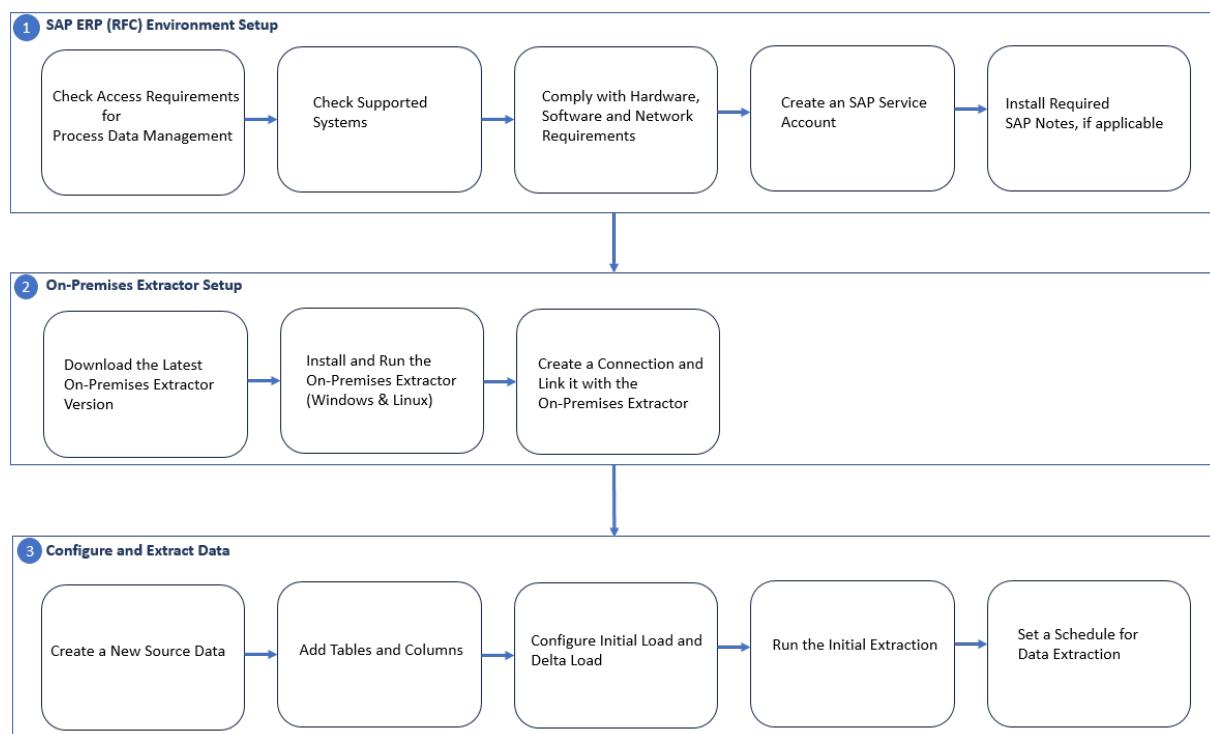
Connectors	Notes/Usage Recommendations
<b>Enterprise systems</b>	
SAP ERP (SAP RFC)	RFC compatible SAP systems. For a list of supported systems, see <a href="#">Supported Systems and RFC Usage [page 65]</a> .
SAP S/4HANA CDS Views	
SAP SuccessFactors	
ServiceNow	
Jira Software	
<b>Cloud storage / Warehouse</b>	
AWS Athena	Read more in the <a href="#">Usage Recommendations [page 95]</a> section.
AWS S3	Read more in the <a href="#">Usage Recommendations [page 96]</a> section.
Google BigQuery	
Snowflake	
SAP Datasphere	
<b>Database</b>	
SAP HANA	
MySQL	
PostgreSQL	
MongoDB	
<b>Other</b>	
Ingestion API	Read more in <a href="#">Usage Recommendations</a> section.
Microsoft SQL Server	
OData (Open Data Protocol)	
Elastic Search	
SAP Cloud Integration	
Legacy Manual Upload (Manual CSV Upload)	

### 3.5.1.1 SAP ERP (RFC)

Learn about the high-level steps involved while connecting with SAP ERP through RFC function module.

The following interactive image provides the high-level steps to connect with the SAP ERP system hosted on-premises through RFC function module, and extract the data. **Hover over each area for a description.**

**Click highlighted areas to open the topics.**



- [Access Requirements for Process Data Management \[page 52\]](#)
- [Supported Systems and RFC Usage \[page 65\]](#)
- [Hardware, Software, and Network Requirements \[page 143\]](#)
- [SAP Service Account and Required Access \[page 67\]](#)
- [Required and Use Case Specific SAP Notes \[page 66\]](#)
- [Download and Verify the On-Premises Package \[page 146\]](#)
- [Install and Run the On-Premises Extractor on Windows and Linux \[page 147\]](#)
- [Create a Connection and Link it with the On-Premises Extractor \[page 151\]](#)
- [Creating a Source Data \[page 178\]](#)
- [Managing Tables for Data Extraction \[page 180\]](#)
- [Manual \[page 195\]](#)
- [Running the Initial Load Extraction \[page 220\]](#)
- [Scheduling the Data Extraction \[page 221\]](#)

#### [Supported Systems and RFC Usage \[page 65\]](#)

Find out the SAP ERP supported systems and their versions, and RFC usage.

#### [Required and Use Case Specific SAP Notes \[page 66\]](#)

Get a list of required and recommended SAP Notes for working with SAP ERP (SAP RFC) connector.

#### [SAP Service Account and Required Access \[page 67\]](#)

Learn how to create an SAP service account and the access required for SAP service user.

#### [Setting Up a New User to Access SAP Tables with RFC \[page 69\]](#)

Set up a user to access SAP Tables through the RFC function module.

#### [Connector - SAP ERP \(RFC\) \[page 73\]](#)

Learn how to connect with your SAP ERP source system through RFC function module.

#### [SAP ERP \(RFC\) Connector Related Errors \[page 77\]](#)

Find solutions to common errors in the SAP ERP (RFC) connector.

## Related Information

[Creating a Connection \[page 135\]](#)

[Set Up and Manage On-Premises Extractors \[page 144\]](#)

[Advanced Data Extraction \[page 208\]](#)

### 3.5.1.1.1 Supported Systems and RFC Usage

Find out the SAP ERP supported systems and their versions, and RFC usage.

**You can establish a connection with any ABAP system version that's compatible with an RFC function module, RFC\_READ\_TABLE.**

Using the standard RFC function module, RFC\_READ\_TABLE, you can extract data from the SAP database tables. The RFC function module can be used for ABAP systems with SAP Basic component version 7.40 and above.

For instance, the following non-complete list contains product versions with minimum SAP Basis 7.40.

- SAP ERP (SAP ECC) 6.0 with Enhancement Package 7 and 8

#### Note

Ensure that your SAP ERP (SAP ECC) version is compatible with SAP Notes listed in the Prerequisites section. Review the information about **supported packages** included in each SAP Note.

- SAP S/4HANA (All versions)
- SAP for Utilities (IS-U) for SAP ERP 6.0 with Enhancement Package 7 and 8
- SAP Business Warehouse (SAP BW) 7.5

**Parent topic:** [SAP ERP \(RFC\) \[page 64\]](#)

## Related Information

[Required and Use Case Specific SAP Notes \[page 66\]](#)  
[SAP Service Account and Required Access \[page 67\]](#)  
[Setting Up a New User to Access SAP Tables with RFC \[page 69\]](#)  
[Connector - SAP ERP \(RFC\) \[page 73\]](#)  
[SAP ERP \(RFC\) Connector Related Errors \[page 77\]](#)

### 3.5.1.1.2 Required and Use Case Specific SAP Notes

Get a list of required and recommended SAP Notes for working with SAP ERP (SAP RFC) connector.

#### Required SAP Notes

##### ⚠ Caution

Your SAP Basis version must include the functionality of the following list of SAP Notes. If not, install the necessary SAP Notes. If you are not compliant, you will not be able to extract your process enterprise data.

- [2246160](#)
- [3297175](#)
- [3139000](#)

For instructions on how to install SAP Notes, see [Note Assistant | SAP Help Portal](#).

##### ⓘ Note

Make sure that you implement *correction instructions* in all SAP Notes. Also, check the supported packages information available in each SAP Note.

#### Use Case Specific SAP Notes

##### ⓘ Note

The following SAP Notes are optional, but need to be installed based on the specific use case.

SAP Notes for Specific Use Cases

Reason	SAP Note
Program error: SQL injection check too strict	<a href="#">3268727</a>

Reason	SAP Note
Functionality enhancement	<a href="#">3390051</a>
Error handling for incorrect call	<a href="#">3407292</a>
Missing information	<a href="#">382318</a>

**Parent topic:** SAP ERP (RFC) [page 64]

## Related Information

- [Supported Systems and RFC Usage \[page 65\]](#)
- [SAP Service Account and Required Access \[page 67\]](#)
- [Setting Up a New User to Access SAP Tables with RFC \[page 69\]](#)
- [Connector - SAP ERP \(RFC\) \[page 73\]](#)
- [SAP ERP \(RFC\) Connector Related Errors \[page 77\]](#)

### 3.5.1.1.3 SAP Service Account and Required Access

Learn how to create an SAP service account and the access required for SAP service user.

Get an SAP service user account to work with the RFC function. For information about SAP service user creation, see [Setting Up a New User to Access SAP Tables with RFC \[page 69\]](#).

## Required Access for SAP Service User

### Authorizations and Functions to Access SAP Tables

- |                                  |   |
|----------------------------------|---|
| View table authorization objects | <ul style="list-style-type: none"><li>• S_RFC</li><li>• S_TABU_NAM</li><li>• S_TABU_DIS</li></ul> |
|----------------------------------|---|

## Authorizations and Functions to Access SAP Tables

---

View RFC authorization objects	<ul style="list-style-type: none"><li>• DDIF_FIELDINFO_GET</li><li>• RFCPING</li><li>• RFC_GET_FUNCTION_INTERFACE</li><li>• RFC_GET_STRUCTURE_DEFINITION</li><li>• RFC_GET_SYSTEM_INFO</li><li>• RFC_GET_UNICODE_STRUCTURE</li><li>• RFC_READ_TABLE</li><li>• SLDAG_CHECK_FOR_UNICODE</li><li>• /OSP/GET_DECIMAL_NOTATION</li><li>• SYSTEM_RESET_RFC_SERVER</li></ul> <p>User need to be added to the function group <b>SYSU</b>.</p>
View SAP tables	<ul style="list-style-type: none"><li>• DD02L</li><li>• DD02T</li><li>• DD05Q</li><li>• TFDIR</li><li>• AQGQCAT</li><li>• AQLQCAT</li><li>• TCDOB</li><li>• CDHDR</li><li>• CDPOS</li><li>• DDFTX</li><li>• DD07T</li></ul> <p>In addition to the above tables, you must provide all the table names or authorization groups for tables that you want to extract. For example, if you're using an O2C template, add all the table names, or add authorization groups such as VA for all the tables in sales order processing.</p>

**Parent topic:** [SAP ERP \(RFC\) \[page 64\]](#)

## Related Information

[Supported Systems and RFC Usage \[page 65\]](#)

[Required and Use Case Specific SAP Notes \[page 66\]](#)

[Setting Up a New User to Access SAP Tables with RFC \[page 69\]](#)

[Connector - SAP ERP \(RFC\) \[page 73\]](#)

[SAP ERP \(RFC\) Connector Related Errors \[page 77\]](#)

### 3.5.1.1.4 Setting Up a New User to Access SAP Tables with RFC

Set up a user to access SAP Tables through the RFC function module.

Make sure you check the following requirements:

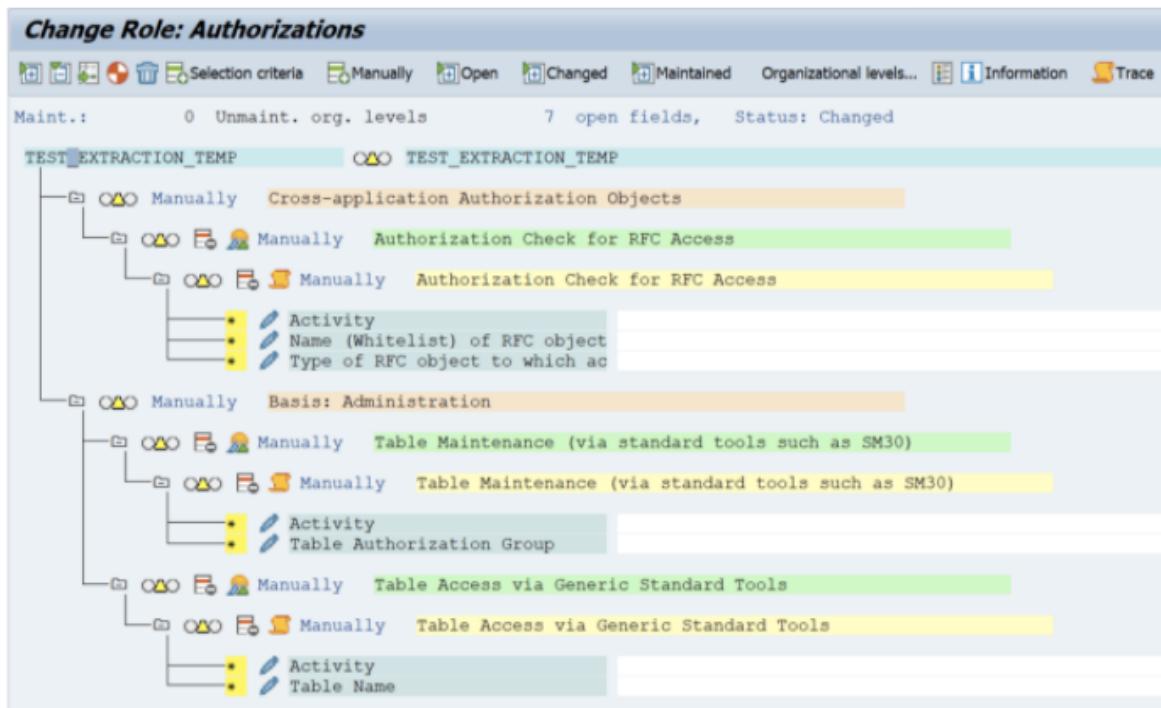
- [SAP Service Account and Required Access \[page 67\]](#)
- [Supported Systems and RFC Usage \[page 65\]](#)

To familiarize yourself with SAP authorization, see the [SAP Authorization Concept](#).

1. Create a new role (TEST\_EXTRACTION) by following the steps in [SAP Guide and Assigning SAP Authorizations to the RFC User](#).
2. Open the *Change Authorization Data* tab and acknowledge the warning.
3. Select *Do not select templates*.
4. Go to /nPFCG.
5. Enter a new role name, for example SIGNAVIO\_EXTRACTION and select *Single Role*.
6. Select  to save the role.
7. On the *Authorization* tab, select  to manually add the following Authorization Objects, which enable the authorization checks for different functions and tables:
  - S\_RFC
  - S\_TABU\_NAM
  - S\_TABU\_DIS



8. Choose the role name at the top of the list and select to display the lowest level of each entry:

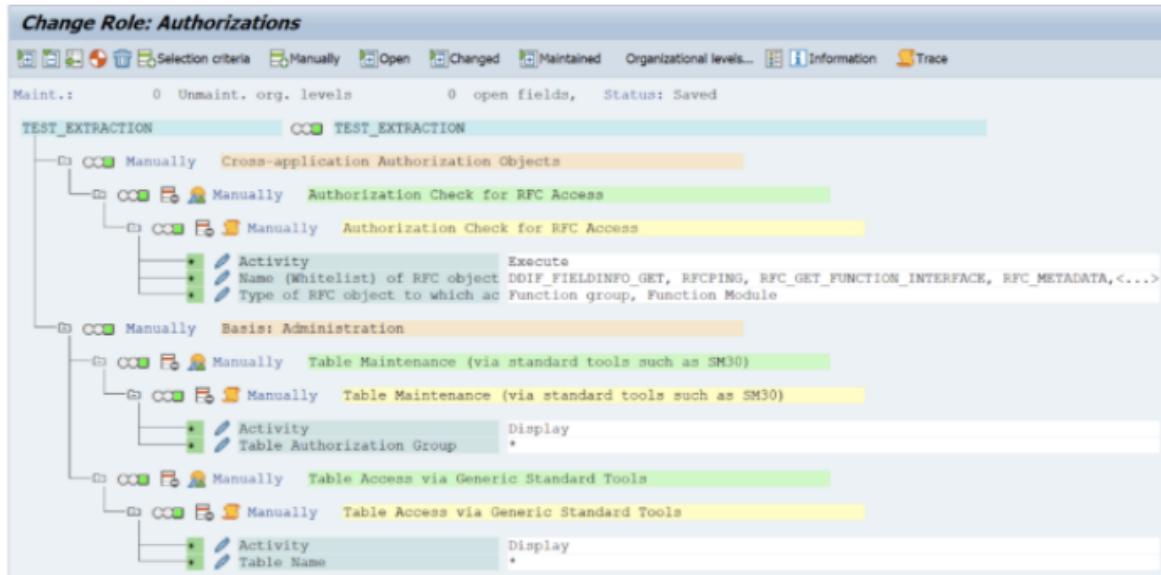


9. To edit each of the nodes, select .

For required authorizations and functions to access SAP tables, see [SAP Service Account and Required Access \[page 67\]](#).

- For more information on RFC access authorization check, see [S\\_RFC](#).
- For more information on displaying table access through generic standard tools (), see [S\\_TABU\\_NAM](#).
- For information on table maintenance through standard tools such as SM30, see [S\\_TABU\\_DIS](#).

This is what it looks like when everything is configured:

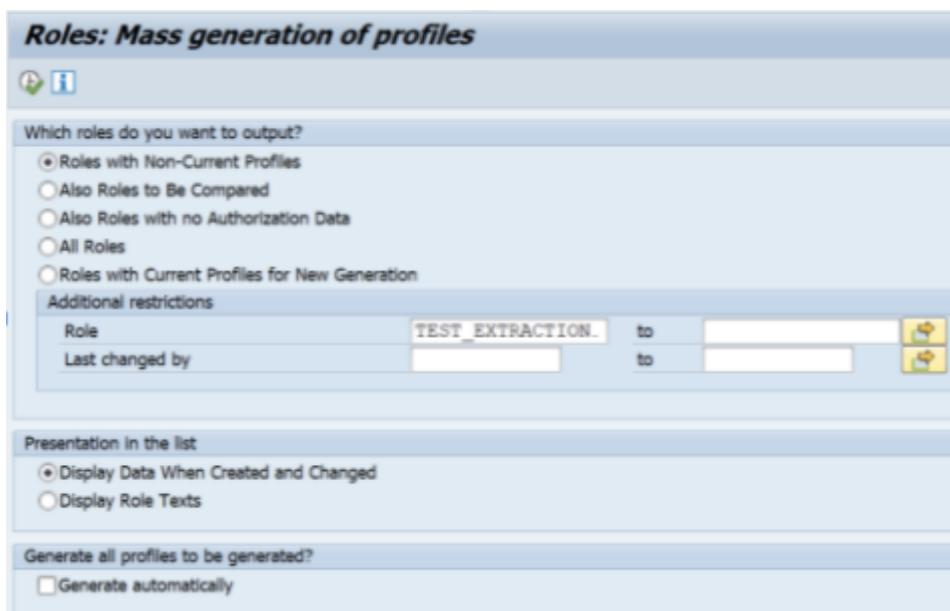


10. Save the role authorizations. Consider the following:

- If it's your first time creating it, enter the name for the profile, for example SIGNAVIO.
- Only up to 10 characters are allowed.
- If you're editing an existing role with an existing profile, then click  to update the profile.

11. Go to /nSUPC.

12. Enter the role name, for example SIGNAVIO\_EXTRACTION, and execute.



**Roles: Mass generation of profiles**

Which roles do you want to output?

Roles with Non-Current Profiles  
 Also Roles to Be Compared  
 Also Roles with no Authorization Data  
 All Roles  
 Roles with Current Profiles for New Generation

Additional restrictions

Role	TEST_EXTRACTION	to	
Last changed by		to	

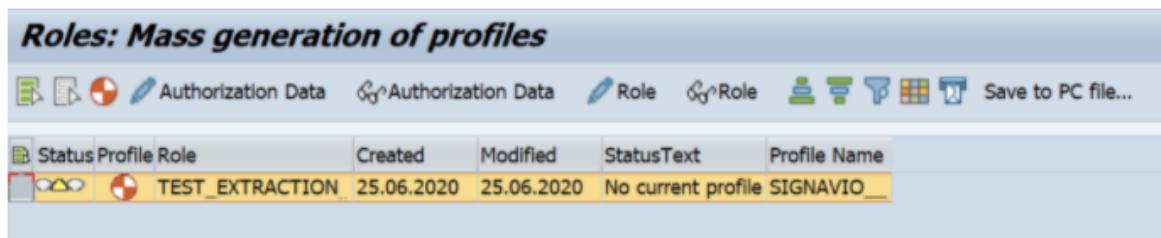
Presentation in the list

Display Data When Created and Changed  
 Display Role Texts

Generate all profiles to be generated?

Generate automatically

The role is listed in the table.



Status Profile Role	Created	Modified	StatusText	Profile Name
TEST_EXTRACTION	25.06.2020	25.06.2020	No current profile	SIGNAVIO

13. In the column , select that row.

14. Click .

A dialog window opens.

15. Click [Online](#).

16. To apply the roles and profiles to a new user, go to /nsU01.

17. Enter the user name, for example SIGNAVIO, and click [Create](#).

18. In the [Logon Data](#) tab, select [User Type](#) based on your organization's roles and authorization policy. For example, Dialog, system, communication, service. For more information, see [User types](#).

### ⓘ Note

Instead of providing authorization to function modules DDIF\_FIELDINFO\_GET, RFCPING and RFC\_GET\_FUNCTION\_INTERFACE, it's also possible to give permission to call them by adding the following roles in the *Roles* tab:

- SAP\_BC\_JSF\_COMMUNICATION
- SAP\_BC\_JSF\_COMMUNICATION\_RO
- SAP\_BC\_JSF\_COMMUNICATION\_NAMED

19. On the *Roles* tab, add the role SIGNAVIO\_EXTRACTION or the name of the role you created.

20. If one of the entries is in a red status, click *User master record*.

The entry changes to a green status:

The screenshot shows the SAP Fiori User Master Record interface. The top navigation bar includes tabs for Address, Logon Data, SNC, Defaults, Parameters, Roles, Profiles, Groups, and Personalization. The Roles tab is active. Below the tabs is a toolbar with icons for search, user creation, user modification, user deletion, user lock, user unlock, user activation, user deactivation, user password change, user password reset, and user password expiration. A button labeled 'Go to Role' is present, along with a note 'User master record'. The main area is titled 'Role Assignments' and contains a table with the following data:

Status	Role	Type	Start Date	Change Date
Green	SAP_BC_JSF_COMMUNICATION	Group	25.06.2020	31.12.2020
Green	SAP_BC_JSF_COMMUNICATION_NAMED	Group	25.06.2020	31.12.2020
Green	SAP_BC_JSF_COMMUNICATION_RO	Group	25.06.2020	31.12.2020
Green	TEST_EXTRACTION	Group	25.06.2020	31.12.2020

21. On the *Profiles* tab, check if the following profiles are added automatically:

- SIGNAVIO: This is added automatically when the SIGNAVIO\_EXTRACTION role is added in the *Roles* tab.
- T-I3550107: Only if SAP\_BC\_JSF\_COMMUNICATION\_RO role is added in the *Roles* tab.
- T-I3551007: Only if SAP\_BC\_JSF\_COMMUNICATION role is added in the *Roles* tab.

The screenshot shows the SAP Fiori User Master Record interface. The top navigation bar includes tabs for Address, Logon Data, SNC, Defaults, Parameters, Roles, Profiles, Groups, and Personalization. The Profiles tab is active. Below the tabs is a toolbar with icons for search, user creation, user modification, user deletion, user lock, user unlock, user activation, user deactivation, user password change, user password reset, and user password expiration. A button labeled 'Go to Profile' is present, along with a note 'Assigned Authorization Profiles'. The main area is titled 'Assigned Authorization Profiles' and contains a table with the following data:

Profile	Type	Description
SIGNAVIO_	Text	Profile for role TEST_EXTRACTION_TEMP

22. Test the new user with the SAP Signavio connector to see if it works.

## Related Information

[Function module RFC\\_READ\\_TABLE](#)

[Authorization in RFC\\_READ\\_TABLE](#)

[Errors related to on-premises source systems \[page 167\]](#)

**Parent topic:** SAP ERP (RFC) [page 64]

## Related Information

[Supported Systems and RFC Usage \[page 65\]](#)

[Required and Use Case Specific SAP Notes \[page 66\]](#)

[SAP Service Account and Required Access \[page 67\]](#)

[Connector - SAP ERP \(RFC\) \[page 73\]](#)

[SAP ERP \(RFC\) Connector Related Errors \[page 77\]](#)

### 3.5.1.1.5 Connector - SAP ERP (RFC)

Learn how to connect with your SAP ERP source system through RFC function module.

Make sure you're familiar with the following requirements:

- [Supported Systems and RFC Usage \[page 65\]](#)
- [Required and Use Case Specific SAP Notes \[page 66\]](#)
- [SAP Service Account and Required Access \[page 67\]](#)
- [Setting Up a New User to Access SAP Tables with RFC \[page 69\]](#)

The following table shows the list of credentials to connect with the SAP ERP source system through RFC function module.

Credential	Description
Username	The username used to authenticate to the SAP system.
Password	The password used to authenticate to the SAP system.
Host	Host name of the target system.
Client	The client authenticating to the SAP system.
System Number	The number by which the target system is defined. Used when setting the host connection property.
Tables	This property restricts the tables reported to a subset of the available tables, for example Tables=TableA,TableB,TableC.

Credential	Description												
Extra Connection Arguments	<ul style="list-style-type: none"> <li>• <b>Timeout</b> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li>• <b>Views</b> Restricts the views reported to a subset of the available tables, for example, <code>Views=ViewA,ViewB,ViewC</code>.</li> <li>• <b>ReadTableFunction</b> The function to use for reading table data.</li> <li>• <b>Pagesize</b> You can change the pagesize based on your needs, ranging from 5,000 to 1 million rows. The default value is 50,000.</li> <li>• <b>SNCMode</b> A boolean value that enables SAP Secure Network Connection. Set this to true to use SAP Secure Network Connection, for example: <code>SNCMode=true</code></li> <li>• <b>SNCName</b> An optional input with the name of your SAP Secure Network Connection.</li> <li>• <b>SNCQop</b> The level of protection of your SAP Secure Network Connection:</li> </ul> <table border="1"> <thead> <tr> <th>Protection level</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Authentication only</td> </tr> <tr> <td>2</td> <td>Integrity protection (authentication)</td> </tr> <tr> <td>3</td> <td>Privacy protection (integrity and authentication)</td> </tr> <tr> <td>8</td> <td>Default protection</td> </tr> <tr> <td>9</td> <td>Maximum protection</td> </tr> </tbody> </table>	Protection level	Description	1	Authentication only	2	Integrity protection (authentication)	3	Privacy protection (integrity and authentication)	8	Default protection	9	Maximum protection
Protection level	Description												
1	Authentication only												
2	Integrity protection (authentication)												
3	Privacy protection (integrity and authentication)												
8	Default protection												
9	Maximum protection												

Example:

`SNCQop=8`

- **SNCPartnerName**  
The application server's SAP Secure Network Connection name. This is a required input when using SAP Secure Network Connection.
- **SNCLibPath**

Credential	Description
	<p>An optional input, which includes the path and file name of the external library. The default is the system-defined library as defined in the environment variable <code>SNC_LIB</code>.</p> <ul style="list-style-type: none"> <li>• <code>x509Certificate</code> An authentication parameter that's used to log in and access applications. It's an alternative for authenticating with user ID and password. If you use certificate-based authentication with SNC, the value entered in the password field is ignored.</li> <li>• <code>MessageServer</code> An authentication parameter that's used to connect the SAP ERP system and SAP Signavio Process Intelligence. This lets you use the load-balancing functionality in the RFC compatible SAP system. The <code>MessageServer</code> format must be: <code>/H/&lt;host&gt;/S/&lt;port&gt;</code>.</li> </ul>

### ❖ Example

Example with an application server's hostname (`ldcsqm7.wdf.sap.corp`) and port number (19363):

```
MessageServer=/H/
ldcsqm7.wdf.sap.corp/S/
19363;SystemId=QM7;Group=PUBLIC
```

`MessageServer=<YOUR_MESSAGE_SERVER>;SystemId=<YOUR_SYSTEM_ID>;Group=<YOUR_GROUP>`  
You can get all these necessary details from SAP GUI Logon screen. For example, if you're working with Windows OS, see [https://help.sap.com/docs/sap\\_gui\\_for\\_windows/63bd20104af84112973ad59590645513/64dba409f8484e8ea5f8de81f74d4112.html?version=800.07](https://help.sap.com/docs/sap_gui_for_windows/63bd20104af84112973ad59590645513/64dba409f8484e8ea5f8de81f74d4112.html?version=800.07). In this example, the `MessageServer` field contains the application host name (`abcdefg.wdf.sap.corp`) and the port number (123456).

- `InitialValueMode=InitialValue`  
The `InitialValueMode` property is used within the SAP driver to control how null values and initial/default values from SAP are handled and represented in the data retrieved. By default, the `InitialValueMode` property is set to null. This means that any initial values (default values as defined by SAP) are treated as null in the results returned by the SAP driver. By setting `InitialValueMode` to `InitialValue`, the original default value will be extracted.
- `ReplaceInvalidDatesWithNull=True`

Credential	Description
	<p>Replaces invalid dates in your data with a null value. The date must be in the ISO-8601 format.</p> <ul style="list-style-type: none"> <li>• <code>ReplaceInvalidTypesWithNull=True</code> Replaces invalid data types other than date in your dataset with a null value. The time must be in the Unix time or ISO-8601 format.</li> <li>• <code>ReadTableDelimiter</code> By default, the tilde "~" character is the column delimiter but you can change this. For example, <code>ReadTableDelimiter=#</code></li> </ul>

## Usage Recommendations

- The data extraction of large tables like CDPOS, CDHDR, BSEG, BKPF requires an elaborate partitioning strategy to run without errors. Read more in the section [Partition Strategies \[page 193\]](#).
- Extracting data from CDS Views is now supported. To connect CDS Views of SAP S/4HANA systems that are running in the public and private cloud, you can use the SAP S/4HANA connector. Read more in the [Connector - SAP S/4HANA \[page 86\]](#) section.

## Allowed IP Addresses

The Firewall allows data through specific IP addresses. For the list of IPs, see the Regions, IP Addresses, and URLs section.

## Security Recommendations

- Use On-Premises extractor with SNC for both encryption and authentication.
- For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)

Create source data using your connection and customize tables.

### 3. Extract Data from Source Systems [page 174]

Extract data using either of the following modes of extraction:

- Standard extraction
- Advanced extraction

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

**Parent topic:** [SAP ERP \(RFC\) \[page 64\]](#)

## Related Information

[Supported Systems and RFC Usage \[page 65\]](#)

[Required and Use Case Specific SAP Notes \[page 66\]](#)

[SAP Service Account and Required Access \[page 67\]](#)

[Setting Up a New User to Access SAP Tables with RFC \[page 69\]](#)

[SAP ERP \(RFC\) Connector Related Errors \[page 77\]](#)

[Regions, IP Addresses, and URLs \[page 57\]](#)

[Creating a Connection \[page 135\]](#)

## 3.5.1.1.6 SAP ERP (RFC) Connector Related Errors

Find solutions to common errors in the SAP ERP (RFC) connector.

When extracting data while connected to the SAP ERP system, you can encounter any of the following errors:

If a problem continues, please contact our SAP Signavio service experts from the [SAP for Me portal](#).

### Failed to Convert to Datatype: 'date'

If your data has an unsupported date format, then the following error occurs:

```
ExtractionJob failed | source-system: SAP exception:  
java.lang.IllegalArgumentException cause: java.sql.SQLException: Error obtaining  
value 'SP00:PB33KG:341WPW:I2:P:$' for column '<columnname>'. Failed to convert  
to datatype: 'date'.  
The original datatype of the column is: 'date'. Original Exception: Error  
parsing date value [SP00:PB33KG:341WPW:I2:P:$]
```

Solution:

The date must be in the ISO-8601 format. To fix the error, add the following argument in the *Extra Connection Arguments* field on your connector configuration screen and then extract data.

```
ReplaceInvalidDatesWithNull=True
```

## Failed to Convert to Datatype: 'time'

If your data has an unsupported time format, then the following error occurs:

```
ExtractionJob failed | source-system: SAP
exception: java.lang.IllegalArgumentException
cause: java.sql.SQLException: Error obtaining value '0' for column
'<columnname>'. Failed to convert to datatype: 'time'. The original datatype of
the column is: 'time'.
Original Exception: Error parsing date value [0].
```

Solution:

The time must be in the Unix time or ISO-8601 format. To fix the error, add the following argument in the *Extra Connection Arguments* field on your connector configuration page and then extract data.

```
ReplaceInvalidTypesWithNull=True
```

This argument replaces invalid data types other than date in your dataset with a null value.

## Null Values in Extracted Column

In some cases, the value of the column is extracted as null, even though the original default value is a different one.

Example:

When extracting data from SAP ERP through the RFC connector, the field ERZET with value '00:00:00' is extracted as NULL.

When extracting data from SAP ERP through the RFC connector, the field VBTYP from the table LIKP with an empty string value ('') is extracted as NULL.

Solution:

To extract the same values in source data, add the following argument in the *Extra Connection Arguments* field on your connector configuration page.

```
InitialValueMode=InitialValue
```

By setting `InitialValueMode` to `InitialValue`, the previously mentioned `ERZET` field will be extracted as '00:00:00' and the `VBTYP` field will be extracted as an empty string ('').

### ⓘ Note

This change is applied to the values of all the tables linked to that connection.

## Duplicate Rows in Extracted Table

When extracting data from SAP ERP ECC systems, sometimes you encounter duplicate entries in the extracted table.

Solution:

Add the following argument in the *Extra connection arguments* field in the SAP ERP (RFC) connection.

```
RFCReadTableOptions=USE_ET_DATA_4_RETURN,GET_SORTED;Pagesize=20000
```

You can change the Pagesize based on your need, ranging from 5000 to 1 million.

## No memory available to extend the index of an internal table

When performing advanced extractions from SAP ERP systems, sometimes you encounter the following exception. This is due to the fetching entries more than 500.000 in one logical partition.

```
Exception in Advanced Extractor occurred by  
com.signavio.pex.sap.exception.ConnectorException  
java.sql.SQLException  
No memory available to extend the index of an internal table`
```

Solution:

Each complex script must have multiple partitions to fetch few entries from each partition. The entries extraction limit per partition is set to nearly 500.000 in our system.

For example, let's assume that GJAHR 2020-2023 for BSEG has the following logical partition:

BSEG for GJAHR 2023

BSEG for GJAHR 2022

BSEG for GJAHR 2021

BSEG for GJAHR 2020

If one of the partitions is greater than a limit set in our system ~500.000, the extraction fails with an out-of-memory issue.

Assuming that we have 750.000 entries for 2022 and company codes are equally distributed across BSEG for 2022, the solution could be to add BUKRS = (0001, A100, A200, A201). Then we have the following logical partitions:

BSEG for GJAHR 2023 and BUKRS = 0001

BSEG for GJAHR 2023 and BUKRS = A100

BSEG for GJAHR 2023 and BUKRS = A200

BSEG for GJAHR 2023 and BUKRS = A201

BSEG for GJAHR 2022 and BUKRS = 0001 => assume 300.000

BSEG for GJAHR 2022 and BUKRS = A100 => assume 150.000

BSEG for GJAHR 2022 and BUKRS = A200 => assume 250.000

BSEG for GJAHR 2022 and BUKRS = A201 => assume 50.000

.....

BSEG for GJAHR 2020 and BUKRS = A201

Now, the partition size is lowered from 750.000 to 300.000. This will not lead to out-of-memory issues.

## Tilde "~" Acting As Delimiter on Extracted Table

By default, the tilde "~" character is the column delimiter. Where a table contains a tilde "~" character, the information after the tilde in the cell is pushed into the next column to the right and the information in all subsequent columns of that row is pushed one column to the right.

Solution:

To replace the tilde "~" character as the column delimiter, add the following argument in the *Extra connection arguments* field in the SAP ERP (RFC) connection.

ReadTableDelimiter=<Delimiter character>

For example, ReadTableDelimiter=#

**Parent topic:** [SAP ERP \(RFC\) \[page 64\]](#)

## Related Information

[Supported Systems and RFC Usage \[page 65\]](#)

[Required and Use Case Specific SAP Notes \[page 66\]](#)

[SAP Service Account and Required Access \[page 67\]](#)

[Setting Up a New User to Access SAP Tables with RFC \[page 69\]](#)

[Connector - SAP ERP \(RFC\) \[page 73\]](#)

## 3.5.1.2 Connector - SAP Signavio Process Insights

Learn about the required credentials for establishing a connection between SAP Signavio Process Insights and SAP Signavio Process Intelligence.

Stage	Released
Technology Behind	cdata.jdbc:odata.jar
Version	22.0.8370.0

## Overview

Connects to SAP Signavio Process Insights.

For information about the steps required in your SAP BTP subaccount before you can load data from SAP Signavio Process Insights to SAP Signavio Process Intelligence, see [Prepare to Connect SAP Signavio Process Insights](#).

## OAuth Authentication

Credential	Description
OAuth Client Id	The OAuth Client Id used to authenticate to SAP Signavio Process Insights. This corresponds to the <code>uaa.clientid</code> from the service key for the service instance in your SAP BTP subaccount.  For more information, see <a href="#">Getting Your Service Key Details [page 85]</a> .
OAuth Client Secret	The OAuth Client Secret used to authenticate the OAuth Client Id. This corresponds to the <code>uaa.clientsecret</code> from the service key.
Service Root	For information about completing this field, see <a href="#">Service Root with Region Information [page 82]</a> .
OAuth Access Token Url	The OAuth Access Token Url is used to retrieve the access token. This corresponds to the <code>uaa.url</code> from the service key.  <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"><p><b> ⓘ Note</b> The suffix <code>/oauth/token</code> must be added.</p><p>So the final format of the URL should be: <code>&lt;uaa.url from service key&gt;/oauth/token</code>.</p></div>

Credential	Description
Target Currency	<p>All monetary values from the extracted data are converted to the target currency specified here. The target currency specified here must be a currency that is available in SAP Signavio Process Insights, for example, USD, EUR, or GBP.</p> <p><b>① Note</b></p> <p>We do not recommend changing the target currency after data has already been loaded because this might result in inconsistent values.</p> <p>Currencies are converted based on the conversion rates from the SAP Market Rates Management, Internal Plan. Monetary values for documents and items are converted from their original currency into the target currency you select. Conversion is based on the latest available conversion rate and is independent of the posting date of a document. SAP Signavio Process Insights requests the latest conversion rates from SAP Market Rates Management, internal plan on a daily basis.</p> <p>For more information, see the <i>SAP Market Rates Management, internal plan</i> documentation on SAP Help Portal.</p>

#### [Service Root with Region Information \[page 82\]](#)

Learn how to complete the *Service Root* field for the SAP Signavio Process Insights connector.

#### [Getting Your Service Key Details \[page 85\]](#)

Get the service key information required to set up the connection between SAP Signavio Process Intelligence and SAP Signavio Process Insights. You will find your service key details in SAP BTP.

### **3.5.1.2.1    Service Root with Region Information**

Learn how to complete the *Service Root* field for the SAP Signavio Process Insights connector.

In the *Service Root* field, enter the URL in the format <root-URL>/api/<service>/v1/, where you can find the information for <root-URL> in the following table.

**① Note**

The root URLs for eu10 and eu20 need to be handled differently to the root URLs for other region IDs.

Infrastructure Provider	Region	Region ID	Root URL
Amazon Web Services	Australia (Sydney)	ap10	<a href="https://bpiproxy.cfapps.ap10.hana.ondemand.com">https://bpiproxy.cfapps.ap10.hana.ondemand.com</a>
Amazon Web Services	Canada (Montreal)	ca10	<a href="https://bpiproxy.cfapps.ca10.hana.ondemand.com">https://bpiproxy.cfapps.ca10.hana.ondemand.com</a>
Amazon Web Services	Europe (Frankfurt)	eu10	<a href="https://bpiproxy.cfapps.eu10-004.hana.ondemand.com">https://bpiproxy.cfapps.eu10-004.hana.ondemand.com</a>
Amazon Web Services	Europe (Frankfurt)	eu11	<a href="https://bpiproxy.cfapps.eu11.hana.ondemand.com">https://bpiproxy.cfapps.eu11.hana.ondemand.com</a>
Amazon Web Services	Japan (Tokyo)	jp10	<a href="https://bpiproxy.cfapps.jp10.hana.ondemand.com">https://bpiproxy.cfapps.jp10.hana.ondemand.com</a>
Amazon Web Services	U.S. East (VA)	us10	<a href="https://bpiproxy.cfapps.us10.hana.ondemand.com">https://bpiproxy.cfapps.us10.hana.ondemand.com</a>
Amazon Web Services	Asia Pacific (Singapore)	ap11	<a href="https://bpiproxy.cfapps.ap11.hana.ondemand.com">https://bpiproxy.cfapps.ap11.hana.ondemand.com</a>
Amazon Web Services	Asia Pacific (Seoul)	ap12	<a href="https://bpiproxy.cfapps.ap12.hana.ondemand.com">https://bpiproxy.cfapps.ap12.hana.ondemand.com</a>

Infrastructure Provider	Region	Region ID	Root URL
Microsoft Azure	Europe (Netherlands)	eu20	<p><code>https://bpaplug-and-gain.cfapps.eu20.hana.ondemand.com/</code></p> <p>or</p> <p><code>https://bpaplug-and-gain-001.cfapps.eu20-001.hana.ondemand.com</code></p>
			<p><b>① Note</b></p> <p>Please check the <code>uaa.url</code> field in your service key to confirm the region information that applies in your case.</p>
Microsoft Azure	U.S. West (WA)	us20	<code>https://bpaplug-and-gain.cfapps.us20.hana.ondemand.com</code>

<service> specifies which data (process flows and performance indicators) you want to extract from SAP Signavio Process Insights. The supported services are described in the following table.

Service	Description
EventLogsService	This service is relevant for the entry point for process landscape analysis.
Finance_I2CService	This service is relevant for the <a href="#">Value Accelerator for Analysis of Invoice to Cash</a> .
Finance_I2PService	This service is relevant for the <a href="#">Value Accelerator for Analysis of Invoice to Pay</a> .
ManufacturingService	This service is relevant for the <a href="#">Value Accelerator for Analysis of Plan to Fulfill</a> .
AssetManagementService	This service is relevant for the <a href="#">Value Accelerator for Analysis of Acquire to Decommission</a> .
SourcingAndProcurementService	This service is relevant for the <a href="#">Value Accelerator for Analysis of Source to Pay</a> .
SalesService	This service is relevant for the <a href="#">Value Accelerator for Analysis of Lead to Cash</a> .
RecordToReportService	This service is relevant for the <a href="#">Value Accelerator for Analysis of Record to Report Processes (Financial Closing)</a> .

## 3.5.1.2.2 Getting Your Service Key Details

Get the service key information required to set up the connection between SAP Signavio Process Intelligence and SAP Signavio Process Insights. You will find your service key details in SAP BTP.

### Prerequisites

- The SAP Signavio Process Insights tenant has already been set up and has data available that you want to send to SAP Signavio Process Intelligence.
- A service instance has been created with the `api-plan` service plan. This is the same plan used for the analytical API of SAP Signavio Process Insights.
- Your SAP BTP user has the [Subaccount Administrator](#) role collection for the subaccount in which the service instance of the SAP Signavio Process Insights API service was created.  
You can see whether you have this authorization in the SAP BTP cockpit by navigating to the subaccount and choosing [Users](#). If you don't have this role collection, a subaccount administrator can assign it to you. See [Add Members to Your Subaccount](#).
- Your user has the [Org Manager](#) role in your organization.  
You can see whether you have this authorization in the SAP BTP by navigating to the subaccount and choosing  [Cloud Foundry](#) . If you don't have this role, an org manager can assign it to you. See [Add Org Members Using the Cockpit](#).
- Your user has the [Space Developer](#) role in the space created by the booster.  
You can see whether you have this role in the SAP BTP cockpit by navigating to the subaccount, choosing  [Cloud Foundry](#) , opening the relevant space, and choosing [Space Members](#). If you haven't yet been added to the space, a space manager can add you as a member and assign the Space Developer role.

### Context

When a service instance is created in your subaccount for SAP Signavio Process Insights using the `api-plan` service plan, a service key is also created for that service instance in the SAP BTP cockpit.

The service key contains the following parameters that are required to connect your SAP Signavio Process Intelligence system to your SAP Signavio Process Insights tenant:

- `uaa.clientid` and `uaa.clientsecret`: Client ID and client secret used to authenticate to SAP Signavio Process Insights. Enter the `uaa.clientid` value into the [OAuth Client Id](#) field in the SAP Signavio Process Insights connector and the `uaa.clientsecret` value into the [OAuth Client Secret](#) field.
- `uaa.url`: Token endpoint to generate the authorization token. Enter this value into the [OAuth Access Token Url](#) field in the SAP Signavio Process Insights connector.

## Procedure

1. In the SAP BTP cockpit, navigate to your subaccount and choose [Instances and Subscriptions](#).
2. Under [Instances](#), select the service instance for SAP Signavio Process Insights.
3. Under [Service Keys](#), choose the link for the key that was created for the service instance.
4. Copy or download the JSON so you have the details on hand.

### ⚠ Caution

Outside of the SAP BTP cockpit, service keys must be stored securely since it's the key that allows data to be sent to your tenant. If you need a service key, create the service key directly in the SAP BTP cockpit, and access it from there whenever you need it.

## Next Steps

Now that you have the service keys details, you can use them as you create the connection to SAP Signavio Process Insights. For more information about creating this connection, see [Connector - SAP Signavio Process Insights \[page 80\]](#).

For general information about how to create a connector, see [Creating a Connection](#) in the *SAP Signavio Process Intelligence User Guide*.

### 3.5.1.3 SAP S/4HANA CDS Views

Learn how to connect with your SAP S/4HANA CDS Views source system.

Stage	Released
Technology Behind	cdata.jdbc.odata.jar
Version	22.0.8370.0

## Overview

You can connect to SAP S/4HANA systems, on-premise, public cloud and private cloud, and extract data using Cloud Data Integration (CDI) adapter. The adapter provides access to the business objects in the connected source system.

Using an CDI adapter, you can access the Core Data Service (CDS) extraction views available in SAP S/4HANA Cloud.

## Prerequisites

- **For SAP S/4HANA Public Cloud**
  - A communication arrangement for Cloud Data Integration (CDI) scenario SAP\_COM\_0531. For more information, see [Integrating CDI](#) on SAP Help Portal.
- **For SAP S/4HANA On-premise**
  - SAP S/4HANA 1909 or later.
    - The minimum required version of SAP Basis component is 7.54.
    - Published service groups, CDI and CDI\_CDS in your SAP Gateway Foundation for OData V4. For more information, see [Service Group Publishing](#) on SAP Help Portal.
- **For SAP S/4HANA Private Cloud**
  - SAP S/4HANA 1909 or later.
    - The minimum required version of SAP Basis component is 7.54.

Credential	Description
Username	Name of the user that was used as communication user in the communication arrangement.
Password	Password used to authenticate the user.
Host	SAP S/4HANA system's host name.
Client	The three-digit unique code of the client to use in the source system for this connection. If no value provided, the system's default client is used. For example, 100.

Credential	Description
Extra Connection Arguments	<ul style="list-style-type: none"> <li><b>Timeout</b> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li><b>UseClientSidePaging</b> A boolean value that determines whether the connector or source system controls pagination. The default value is False. If set to true, extraction performance increases and memory consumption on the source system decreases, but the records that are deleted during extraction are skipped.</li> <li><b>PageSize</b> The maximum number of results to return per page from SAP S/4HANA systems. The default value is PageSize=1000.</li> <li><b>ReplaceInvalidTypesWithNull</b> A boolean value that determines whether extracted fields with invalid data type values to be replaced with a null value. The default value is False. If set to true, the invalid data type values are extracted as null values.</li> <li><b>SSLServerCert</b> The server certificate thumbprint. This value is only needed if the server requests the certificate while connecting through TLS/SSL. For example, SSLServerCert=1b1f3f6f55e510b4929f35b2e256cf4871d5c8d.</li> </ul>

### ⓘ Note

If the client certificate isn't configured, the connector only supports basic authentication, which is logging in with a user name and password.

## Security Recommendations

- For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.
- Use HTTPS if possible.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

## Related Information

[Template for Invoice-to-Cash in SAP S/4HANA Cloud, public edition](#) ↗

[Use data transformation templates \[page 236\]](#)

<https://editor.signavio.com/g/statics/pi-etl/documentation/solutions/templates-intro> ↗

### 3.5.1.4 Connector - SAP SuccessFactors

Learn how to connect with your SAP SuccessFactors source system.

Stage	Released
Technology Behind	cdata.jdbc.sapsuccessfactors.jar
Version	22.0.8307.0

## Overview

Connects to SAP SuccessFactors API.

Credential	Description
Username	The username provided for authentication with the SAP SuccessFactors database.
Password	The password used to authenticate the user.

Credential	Description
Host	Set this to the URL of the server where your SAP SuccessFactors instance is hosted.
Company ID	Unique identifier of your company. This is required to authenticate.
Extra Connection Arguments	<ul style="list-style-type: none"> <li>• <b>Timeout</b> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li>• <b>Views</b> Restricts the views reported to a subset of the available tables, for example <code>Views=ViewA,ViewB,ViewC</code>.</li> <li>• <b>Tables</b> This property restricts the tables reported to a subset of the available tables, for example <code>Tables=TableA,TableB,TableC</code>.</li> <li>• <b>PseudoColumns</b> This property indicates whether or not to include pseudo columns as columns to the table.</li> </ul>

## IP Addresses Allow List

The Firewall allows data through specific IP addresses. For the list of IPs, see the Regions, IP Addresses, and URLs section.

## Security Recommendations

Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

## Related Information

[Regions, IP Addresses, and URLs \[page 57\]](#)

### 3.5.1.5 Connector - ServiceNow

Find the required credentials for ServiceNow connector, and high-level information on how to create a connector and extract data.

Stage	Released
Technology Behind	cdata.jdbc.servicenow.jar
Version	22.0.8370.0

## Overview

You can connect to the instances hosted on ServiceNow and third-party sites.

Credential	Description
Username	The username provided for authentication with the ServiceNow database.
Password	The password used to authenticate the user.
Instance	For instances in the ServiceNow domain, enter the name of the instance.  For instances hosted on third-party sites, enter an arbitrary value in the <i>Instance</i> field and then pass URL parameter in the <i>Extra Connection Arguments</i> .

Credential	Description
Extra Connection Arguments	<ul style="list-style-type: none"> <li>• <b>Timeout</b> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li>• <b>Pagesize</b> The maximum number of results to return per page from ServiceNow. While extracting data, there can be issues such as missing rows and session time out. In such cases, use the following extra connection arguments: <code>Timeout=600;Pagesize=2500</code></li> <li>• <b>URL = &lt;&lt; Enter the link to your instance&gt;&gt;</b> For instances hosted on third-party sites, pass this extra connection argument. For example, <code>URL=https://sm-dev.kl.com</code>.</li> </ul>

## Security Recommendations

Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

### 3.5.1.6 Connector - Jira Software

Find the credentials for Jira Software connector, and how to create a connection and extract data.

Stage	Released
Technology Behind	cdata.jdbc.jira.jar
Version	22.0.8370.0

## Overview

Connects to Jira Software.

Credential	Description
Username	The user account used to authenticate to the Jira Software database, for example <code>john.doe</code> .
Password	The password used to authenticate the user.
Enterprise URL	The URL to your Jira endpoint, for example <code>https://jira.acme.com/</code> .

Credential	Description
Extra Connection Arguments	<ul style="list-style-type: none"> <li>• <b>Timeout</b> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li>• <b>SSLClientCert</b> The TLS/SSL client certificate store for SSL client authentication, for example <code>SSLClientCert=ROOT</code>. Read more in section <a href="#">Values for SSLClientCert [page 108]</a>.</li> <li>• <b>SSLClientCertType</b> The type of key store containing the TLS/SSL client certificate, for example <code>SSLClientCertType=USER</code>. Read more in section <a href="#">Values for SSLClientCertType [page 109]</a>.</li> <li>• <b>SSLClientCertPassword</b> The password for the TLS/SSL client certificate, for example <code>SSLClientCertPassword=mypassword</code>.</li> <li>• <b>SSLClientCertSubject</b> The subject of the TLS/SSL client certificate, for example <code>SSLClientCertSubject=CN=www.server.com, OU=test, C=US, E=support@company.com</code>. Read more in section <a href="#">Values for SSLClientCertSubject [page 109]</a>.</li> <li>• <b>SSLServerCert</b> The certificate to be accepted from the server when connecting using TLS/SSL. Read more in section <a href="#">Values for SSLServerCert [page 110]</a>.</li> </ul>

## Security Recommendations

- Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.
- Use HTTPS if possible.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.

### 3. Extract Data from Source Systems [page 174]

Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

## 3.5.1.7 Connector - AWS Athena

Find the credentials for AWS Athena connector, and how to create a connection and extract data.

Stage	Released
Technology Behind	AthenaJDBC42
Version	2.0.35.1001

## Overview

Connects to an AWS S3 bucket via AWS Athena.

Credential	Description
AWS Access Key ID	Your AWS account access key. You access this value from your AWS security credentials page.
AWS Secret Access Key	Your AWS account secret key. You access this value from your AWS security credentials page.
AWS Region	The hosting region for your Amazon Web Services.
S3 Bucket	The name of the S3 bucket, for example <code>test-bucket</code> .
Schema	Name of the schema stored in a data catalog in AWS Athena.
Athena Workgroup	Work group of the executed queries.
Extra Connection Arguments	Timeout: The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.

## Usage Recommendations

- When you use this connector, do not extract the columns `c_key` and `c_fetchdate` as these are internally created from the connector itself.
- No validation: This field can't be validated when testing the connection. The validation won't detect any errors related to information provided in this field. If the information in this field isn't correct, the operations will fail later on, for example preview, extract, even if the validation is successful.

## Security Recommendation

Access key rotation, periodically rotate access keys or do so immediately if there is any suspicion that an access key may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

### 3.5.1.8 Connector - AWS S3

Find the credentials for AWS S3 connector, and how to create a connection and extract data.

## Overview

Connects to an AWS S3 bucket and extracts CSV, TSV, or TXT files.

Credential	Description
AWS Access Key ID	Your AWS account access key. You access this value from your AWS security credentials page.
AWS Secret Access Key	Your AWS account secret key. You access this value from your AWS security credentials page.
AWS Region	The hosting region for your AWS.
S3 Bucket	The name of the S3 bucket, for example <code>test-bucket</code> .
Delimiter Character	Character that separates the columns in the CSV, TSV, or TXT file.

## Usage Recommendations

- All files must be in the S3 bucket root directory.
- If there are two files with the same name but different extensions, the adapter picks one of them. Note that `schema.ini` won't configure the table for the duplicate files (NAME).
- File names must be unique. The file extension must match with the delimiter set up in the connection.

## Security Recommendation

Access key rotation, periodically rotate access keys or do so immediately if there is any suspicion that an access key may have been compromised.

## Customize the Schema Discovery Process

To customize the driver behavior when discovering the schema of the files, add the file `schema.ini` in your bucket in the same location where all the files exists. In the `schema.ini` file you can specify the format of a text file you want to model as a table and you can also define the columns of the table. The driver uses a definition in `schema.ini` if one exists and the file name otherwise to report the table.

### Define Tables in `schema.ini`

Any section in `schema.ini` must begin with the file name including the file extension enclosed in square brackets.

Example:

```
[InvoicesFile.txt]
```

### Specify Whether The File Contains Headers

With the `ColNameHeader` property, you can specify whether the file contains a header or not.

Example:

```
ColNameHeader=True
```

## Specify the File Format

You can set the `Format` property to the format of the file. The following values are possible:

- `CSVDelimited`
- `TabDelimited`
- `Delimited` (custom character)

For example, the following is equivalent to `CSVDelimited`:

```
Format=Delimited( , )
```

By default, TXT files are processed as CSV files with headers.

## Specify the Format of Date/Time/Datetime Fields

The `DateTimeFormat` property can be set for date, time, and datetime type columns. All standard formats are supported.

Example 1:

```
DateTimeFormat=M/d/yyyy
```

Example 2:

```
DateTimeFormat=yyyy-M-dTHH:mm:ss.SSSZ
```

## Define Columns

There are two ways to define columns based on the fields in your text files:

- Define the column names in the file's first row, the header row. When you connect to an AWS S3 bucket, the driver determines the data type.
- Define the column number, name, data type, and width in `schema.ini`. Columns defined this way override columns initially accepted from the header row. You can ignore a file's header row by specifying `ColNameHeader=False` in the file's section in `schema.ini`.

To define a column in `schema.ini`, use the following format: `Coln=ColumnName DataType [WidthWidth]`

Example:

```
Col2=A Text Width 100
```

If you set a column to a fixed length, it is mandatory to define the width of each column as well (see above).

## Example for schema.ini

```
[Jerrie's travel expense.csv]
ColNameHeader=True
Format=Delimited(,)
DateTimeFormat=M/d/YYYY
Col1=Date Text
Col2=A Text
Col3=B Text
Col4=C Text
Col5=Total Text
Col6=Date Text
Col7=D Text
Col8=E Text
Col9=F Text
Col10=G Text
Col11=rate numeric
```

```
[invoices.csv]
ColNameHeader=True
Format=Delimited(,)
DateTimeFormat=d/M/YYYY
Col1=id numeric
Col2=invoicedate date
Col3=total numeric
```

## Supported Data Types

The following data types are supported:

- boolean
- date
- time
- datetime
- decimal
- double
- tinyint
- smallint
- integer
- bigint
- float
- string
- text
- longtext
- char
- varchar
- nvarchar

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)

Create a connection to your source system.

2. [Creating a Source Data \[page 178\]](#)

Create source data using your connection and customize tables.

3. [Extract Data from Source Systems \[page 174\]](#)

Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

### 3.5.1.9 Connector - Google BigQuery

Find the credentials for Google BigQuery connector, and how to create a connection and extract data.

Stage	Released
Technology Behind	cdata.jdbc.googlebigquery.jar
Version	22.0.8370.0

## Overview

Connects to version 2.0 of the Google BigQuery Web services API.

Credential	Description
Project ID	Your Google Cloud Platform Project ID.
Service User Key	You can download the Service key from a Google Service Account.
Extra Connection Arguments	Timeout: The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.

#### → Remember

- The Google BigQuery connector can retrieve results only if destination tables are defined. This is because the maximum response size for queries written to temporary tables is 10 GB. Including a destination table in your query gives results without any query or extraction errors. Read more in <https://cloud.google.com/knowledge/kb/bigquery-response-too-large-to-return-consider-setting-allowlarge-results-to-true-in-your-job-configuration-000004266>.

- You need the necessary permissions to extract data from Google BigQuery. See [https://cloud.google.com/bigquery/docs/writing-results#required\\_permissions](https://cloud.google.com/bigquery/docs/writing-results#required_permissions).  
This connector currently requires the role `bigrquery.tables.new/update` to create or update the destination table. This table is used to partition larger volumes of extracted data.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

### 3.5.1.10 Connector - Snowflake

Find the credentials for Snowflake connector, and how to create a connection and extract data.

Stage	Released
Technology Behind	cdata.jdbc.snowflake.jar
Version	22.0.8370.0

## Overview

Connects to Snowflake hosted on cloud and on-premises.

Credential	Description
Username	The username provided for authentication with the Snowflake database.
Password	The user's password.
Host	The URL of the Snowflake database.
Warehouse	The name of the Snowflake warehouse.

Credential	Description
Database	The name of the Snowflake database.
Schema	The schema of the Snowflake database.
Extra Connection Arguments	Timeout: The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.

## Security Recommendation

Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

### 3.5.1.11 Connector - Azure Data Lake Storage

Find the credentials for Azure Data Lake Storage Gen2 connector, and learn how to create a connection and extract data.

Stage	Released
Technology Behind	cdata.jdbc.csv.jar
Version	23.0.8839.0

## Overview

Connects to an Azure Data Lake Storage Gen2 and extracts CSV, TSV, or TXT files.

Credential	Description
OAuth Client Id	The OAuth Client Id of a custom created Azure OAuth app.
OAuth Client Secret	The OAuth Client Secret of a custom created Azure OAuth app.
Location	The path to the files stored. Starts with the name of the filesystem followed by the path to the files to be extracted. Schema: filesystem/path-to-files. For example: exports/2024/12 or exports/2000-2010/2008.
Azure Tenant	The name or ID of the Azure tenant containing the Azure Data Lake Gen2.
Azure Storage Account	The name of the Azure storage account.
Delimiter Character	Character that separates the columns in the CSV, TSV, or TXT file. To specify a tab as a delimiter set this value to TabDelimited.
Extra Connection Arguments	<ul style="list-style-type: none"><li>• IncludeSubdirectories: Whether to read files from nested folders. In the case of a name collision, table names are prefixed by the underscore-separated folder names. Can be set to true or false. Default is false.</li><li>• DirectoryRetrievalDepth: Limit the subfolders recursively scanned when IncludeSubdirectories is enabled. Can be set to any positive number. -1 specifies that all subfolders are scanned. Default value is -1.</li><li>• Timeout: The value in seconds until the timeout error is thrown, and the operation is canceled, for example 10 for a timeout after 10 seconds.</li><li>• NullValues: A comma separated list which will be replaced with nulls if these are found in the CSV file.</li><li>• PushEmptyValuesAsNull: Indicates whether to read the empty values as empty or as null. Can be set to true or false. The default value is false.</li></ul>

## How to Create a Custom Azure OAuth Application

See section on Azure Data Principal [here](#). For authentication, use the client secret and not the certificate option.

## Security Recommendation

Regularly change the OAuth Client Secret and do so immediately if there is any suspicion that the secret has been compromised.

## Define Tables in schema.ini

Any section in `schema.ini` must begin with the file name including the file extension enclosed in square brackets.

Example:

```
[InvoicesFile.txt]
```

## Specify Whether The File Contains Headers

With the `ColNameHeader` property, you can specify whether the file contains a header or not.

Example:

```
ColNameHeader=True
```

## Specify the File Format

You can set the `Format` property to the format of the file. The following values are possible:

- `CSVDelimited`
- `TabDelimited`
- `Delimited` (custom character)

For example, the following is equivalent to `CSVDelimited`:

```
Format=Delimited(,)
```

By default, TXT files are processed as CSV files with headers.

## Specify the Format of Date/Time/Datetime Fields

The `DateTimeFormat` property can be set for date, time, and datetime type columns. All standard formats are supported.

Example 1:

```
DateTimeFormat=M/d/yyyy
```

Example 2:

```
DateTimeFormat=yyyy-M-dTHH:mm:ss.SSSZ
```

## Define Columns

There are two ways to define columns based on the fields in your text files:

- Define the column names in the file's first row, the header row. When you connect to an AWS S3 bucket, the driver determines the data type.
- Define the column number, name, data type, and width in `schema.ini`. Columns defined this way override columns initially accepted from the header row. You can ignore a file's header row by specifying `ColNameHeader=False` in the file's section in `schema.ini`.

To define a column in `schema.ini`, use the following format: `Coln=ColumnName DataType [WidthWidth]`

Example:

```
Col2=A Text Width 100
```

If you set a column to a fixed length, it is mandatory to define the width of each column as well (see above).

## Example for `schema.ini`

```
[Jerrie's travel expense.csv]
ColNameHeader=True
Format=Delimited(,)
DateTimeFormat=M/d/yyyy
Col1=Date Text
Col2=A Text
Col3=B Text
Col4=C Text
Col5=Total Text
Col6=Date Text
Col7=D Text
Col8=E Text
Col9=F Text
Col10=G Text
Col11=rate numeric
```

```
[invoices.csv]
ColNameHeader=True
Format=Delimited(,)
DateTimeFormat=d/M/yyyy
Col1=id numeric
Col2=invoicedate date
Col3=total numeric
```

## Supported Data Types

The following data types are supported:

- boolean
- date
- time
- datetime
- decimal
- double
- tinyint
- smallint
- integer
- bigint
- float
- string
- text
- longtext
- char
- varchar
- nvarchar

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

### 3.5.1.12 Connector - SAP HANA

Stage	Released
-------	----------

Technology Behind	cdata.jdbc.saphana.jar
Version	22.0.8472.0

## Overview

Connects to a SAP HANA database, hosted on-premises or on cloud.

Credential	Description
Username	The user account provided for authentication with the SAP HANA database.
Password	The password used to authenticate the user.
Host	The name of the server running SAP HANA database.
Port	The port of the SAP HANA database.
Database	The name of the SAP HANA database.

Credential	Description
Extra Connection Arguments	<ul style="list-style-type: none"> <li><b>Timeout</b> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li><b>Views</b> Restricts the views reported to a subset of the available views, for example Views=ViewA,ViewB,ViewC.</li> <li><b>Tables</b> This property restricts the tables reported to a subset of the available tables, for example Tables=TableA,TableB,TableC.</li> <li><b>SSLClientCert</b> The TLS/SSL client certificate store for SSL client authentication, for example SSLClientCert=ROOT. Read more in section <a href="#">Values for SSLClientCert [page 108]</a>.</li> <li><b>SSLClientCertType</b> The type of key store containing the TLS/SSL client certificate, for example SSLClientCertType=USER. Read more in section <a href="#">Values for SSLClientCertType [page 109]</a>.</li> <li><b>SSLClientCertPassword</b> The password for the TLS/SSL client certificate, for example SSLClientCertPassword=mypassword.</li> <li><b>SSLClientCertSubject</b> The subject of the TLS/SSL client certificate, for example SSLClientCertSubject=CN=www.server.com, OU=test, C=US, E=support@company.com. Read more in section <a href="#">Values for SSLClientCertSubject [page 109]</a>.</li> <li><b>SSLServerCert</b> The certificate to be accepted from the server when connecting using TLS/SSL. Read more in section <a href="#">Values for SSLServerCert [page 110]</a>.</li> </ul>

## Values for SSLClientCert

Value	Description
MY	A certificate store holding personal certificates with their associated private keys.
CA	Certifying authority certificates.
ROOT	Root certificates.

Value	Description
SPC	Software publisher certificates.

## Values for SSLClientCertSubject

Value	Description
CN	Common Name. This is commonly a host name like www.server.com.
O	Organization
OU	Organizational Unit
L	Locality
S	State
C	Country
E	Email Address

## Values for SSLClientCertType

Value	Description
USER - default	For Windows, this specifies that the certificate store is a certificate store owned by the current user. Note that this store type is not available in Java.
MACHINE	For Windows, this specifies that the certificate store is a machine store. Note that this store type is not available in Java.
PFXFILE	The certificate store is the name of a PFX (PKCS12) file containing certificates.
PFXBLOB	The certificate store is a string (base-64-encoded) representing a certificate store in PFX (PKCS12) format.
JKSFILE	The certificate store is the name of a Java key store (JKS) file containing certificates. Note that this store type is only available in Java.
JKSBLOB	The certificate store is a string (base-64-encoded) representing a certificate store in JKS format. Note that this store type is only available in Java.
PEMKEY_FILE	The certificate store is the name of a PEM-encoded file that contains a private key and an optional certificate.
PEMKEY_BLOB	The certificate store is a string (base64-encoded) that contains a private key and an optional certificate.

Value	Description
PUBLIC_KEY_FILE	The certificate store is the name of a file that contains a PEM- or DER-encoded public key certificate.
PUBLIC_KEY_BLOB	The certificate store is a string (base-64-encoded) that contains a PEM- or DER-encoded public key certificate.
SSHPUBLIC_KEY_FILE	The certificate store is the name of a file that contains an SSH-style public key.
SSHPUBLIC_KEY_BLOB	The certificate store is a string (base-64-encoded) that contains an SSH-style public key.
P7BFILE	The certificate store is the name of a PKCS7 file containing certificates.
PPKFILE	The certificate store is the name of a file that contains a PuTTY Private Key (PPK).
XMLFILE	The certificate store is the name of a file that contains a certificate in XML format.
XMLBLOB	The certificate store is a string that contains a certificate in XML format.

## Values for SSLServerCert

Value	Example
a full PEM Certificate	-----BEGIN CERTIFICATE----- MIICChT5CAe4CAQAwDQYJKoZIhv.....Qw== -----END CERTIFICATE-----
a path to a local file containing the certificate	C:\cert.cer
the public key	-----BEGIN RSA PUBLIC KEY----- MIKLfMA0GCSq.....AQAB -----END RSA PUBLIC KEY-----
the MD5 Thumbprint	ecadbdda5a36929c58a1e9e09828d70e4
the SHA1 Thumbprint	34a9274826ae0819f2ec14b4a3d904f801ccb150d

## IP Addresses Allow List

The Firewall allows data through specific IP addresses. For the list of IPs, see the Regions, IP Addresses, and URLs section.

- To get the allowed IP address for Managed Private Cloud, contact your customer success manager.
- A secure websocket and HTTPS traffic to the IP addresses need to be allowed on TCP port 443.

## Security Recommendations

- Enable encryption using `useSSL` extra connection argument.
- If possible, use a client certificate for authentication.
- For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

## Related Information

[Regions, IP Addresses, and URLs \[page 57\]](#)

### 3.5.1.13 Connector - MySQL

Find the credentials for MySQL connector, and how to create a connection and extract data.

Stage	Released
Technology Behind	cdata.jdbc.mysql.jar
Version	22.0.8370.0

## Overview

Connects to MySQL version 5.0 to 8.0.

Credential	Description
Username	The user account used to authenticate to the MySQL Server database.
Password	The password used to authenticate the user.
Host	The name of the server running MySQL Server.
Port	The port of the MySQL Server.
Database	<p>The name of the MySQL Server database. Default databases:</p> <ul style="list-style-type: none"> <li>• mysql</li> <li>• information_schema</li> <li>• performance_schema</li> <li>• sys</li> </ul>
Extra Connection Arguments	Timeout: The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.

## Security Recommendation

Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

### 3.5.1.14 Connector - PostgreSQL

Find the credentials for PostgreSQL connector, and how to create a connection and extract data.

Stage	Released
Technology Behind	cdata.jdbc.postgresql.jar
Version	22.0.8370.0

## Overview

Connects to PostgreSQL databases version 7.4 and later.

Credential	Description
Username	The username used to authenticate to the PostgreSQL database.
Password	The password used to authenticate the user.
Host	The host name or IP address of the server.
Port	The port number of the PostgreSQL server.
Database	The name of the PostgreSQL database.
Extra Connection Arguments	Timeout: The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.

## Security Recommendation

Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

### 3.5.1.15 Connector - MongoDB

Learn about the parameters needed to connect with your MongoDB database.

Stage	Released
Technology Behind	cdata.jdbc.mongodb.jar
Version	22.0.8370.0

## Overview

Connects to a MongoDB database, whether it's installed and run on cloud or on-premises.

The following table shows the essential details for connecting with your MongoDB, whether it's a cloud deployment or on-premises.

Parameters	Description
Username	The username provided for authentication with the MongoDB database.
Password	The password used to authenticate the user.
Host	The host name or IP address of the MongoDB server.
Port	The port number of the MongoDB server.
Database	The name of the MongoDB database that you want to read from and write to.

Parameters	Description
Authentication Database	<p>The MongoDB database that contains user's authentication data.</p> <p>When you enable authentication in MongoDB, you typically have user credentials stored in a dedicated MongoDB database (often the "admin" database) for security reasons. MongoDB challenge-response authentication mechanism uses the user name and password for authentication.</p> <p>If you don't pass values to this parameter, the driver uses the default value, admin.</p> <p>You need this parameter to authenticate properly with another database on the server. Once authenticated, you can switch to the database you intend to work with.</p>

#### ⓘ Note

You need both the parameters, Database and Authentication Database to properly authenticate with a different database on the server.

For example, if your credentials are stored in the "admin" database, but you want to work with data in the "mynewdata" database, then you need to set the *Authentication Database* to "admin" and the Database to "mynewdata" during the connection process.

Parameters	Description
Extra Connection Arguments	<ul style="list-style-type: none"> <li>• <b>Timeout</b> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li>• <b>UseSSL</b></li> <li>• <b>DNSServer</b> Set this to the hostname of a DNSServer that can resolve the necessary DNS entries.</li> <li>• <b>SSLClientCert</b> The TLS/SSL client certificate store for SSL client authentication, for example SSLClientCert=ROOT.</li> <li>• <b>SSLClientCertType</b> The type of key store containing the TLS/SSL client certificate, for example SSLClientCertType=USER.</li> <li>• <b>SSLClientCertPassword</b> The password for the TLS/SSL client certificate, for example SSLClientCertPassword=mypassword.</li> <li>• <b>SSLClientCertSubject</b> The subject of the TLS/SSL client certificate, for example SSLClientCertSubject=CN=www.server.com, OU=test, C=US, E=support@company.com.</li> <li>• <b>SSLServerCert</b> The certificate to be accepted from the server when connecting using TLS/SSL.</li> </ul> <p>For detailed information on SSL Certs, see the <a href="#">Connector - SAP HANA [page 106]</a> section.</p>

To establish a connection with MongoDB database installed on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence.

## Security Recommendations

- Enable encryption using `useSSL` extra connection argument.
- Use certificate authentication.
- For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your cloud system and extract data:

1. [Creating a Connection \[page 135\]](#)

Create a connection to your source system, MongoDB.

2. [Creating a Source Data \[page 178\]](#)

Create source data using your connection and customize tables.

3. [Extract Data from Source Systems \[page 174\]](#)

Extract data using either of the following modes of extraction:

- Standard extraction
- Advanced extraction

To extract data from your MongoDB database available on-premises, refer to the [On-Premises Extractor \[page 138\]](#) section.

### 3.5.1.16 Connector - Ingestion API

Stage	Released
Version	1.0

## Overview

Connects third-party source system to SAP Signavio Process Intelligence.

Credential	Description
API endpoint	The endpoint URL generated when you create a connection with Ingestion API source system. Use the endpoint URL to connect your third-party source systems to SAP Signavio Process Intelligence.
Token	The token generated when you create a connection with Ingestion API source system. Use the token to connect your third-party source systems to SAP Signavio Process Intelligence.

## Prerequisites

Before uploading, make the following checks and preparations in your data to avoid encountering errors.

### Verify dates and times:

- Ensure dates and times use supported data types. These include:
  - Date
  - Timestamp (millisecond precision)
  - Time (millisecond precision)
- Convert date and timestamp formats in files to milliseconds before upload. For example:  
**Fri Jun 24 2022 10:58:41 GMT+0200** becomes **1656061121670** milliseconds

### Ensure the data includes no invalid characters:

- Replace NULL values with an empty string in files. Not all NULL value types are detected.
- Column names must not contain special characters. Only characters from the character class [A-Za-z\_] are valid for column names. For example, column names must not contain spaces.
- Avoid spaces in the names of uploaded files.
- Avoid spaces in the specified table name in the schema.

### Pseudonymize the data on your source system before uploading.

- SAP Signavio Process Intelligence doesn't support pseudonymizing the uploaded data.

## Uploading Data

Once you're ready to upload, follow these steps:

1. Set up data ingestion by creating an ingestion connection, source data, or process data pipeline in SAP Signavio Process Intelligence. Read more in section [Setting Up Source Data \[page 223\]](#).

#### ⓘ Note

- Connections to the Ingestion API are authenticated by an access token. This token can't be refreshed once you have created an Ingestion API connection. To get a new token, delete the existing connection and create a new connection. See [Ingestion API Authentication](#) for more information.
- Only one connection can be linked to one source data for data ingestion.

2. Call the API using the API credentials and upload the data. Read more in the sections [Ingestion Request](#) and [Ingestion Status Request](#).

#### ⓘ Note

- The duration between API calls that upload data to the same source must be at least 30 seconds. Otherwise, you get a timeout error.
- If the size of the CSV or TSV file exceeds 150 MB, we recommend you split it into multiple files of maximum 150 MB each. You can then make multiple upload requests using the same schema.
- API calls mustn't contain more than five files per call.

3. Run the initial transformation and load. Pipeline logs are generated to provide transformation and load information. Read more in section [Running the Transformation and Load \[page 297\]](#).

Once uploaded, the data is ready for investigation. Read how to define and grant access to process data in section [Prepare a process \[page 20\]](#) and how to analyze data in section [Process Mining \[page 309\]](#).

## Uploading to an Existing Dataset

If you upload to an existing dataset, consider the following:

- Your data must conform to the existing data ingestion schema. The Ingestion API can't be used to modify the schema.
- The primary key of your new data must be the same as that of the existing data. The primary key of an existing ingestion table cannot be modified.
- If you upload data for existing records which were added in earlier requests, it is assumed you're performing an update. Pushing data to the same table with the same primary keys overwrites existing data. Note that this doesn't apply to duplicate records uploaded in the same request. It is expected that all records in a single upload request are unique.

### 3.5.1.17 Connector - Manual CSV Upload

Stage	Released
Technology Behind	cdata.jdbc.csv.jar AthenaJDBC42-unsigned
Version	22.0.8369.0 2.0.16.1000

Before using the manual CSV upload connector, read the requirements and considerations for CSV files. See [Upload process data as CSV files \[page 135\]](#).

## Overview

Once the data is uploaded, it gets parsed via the CSV CDATA driver and then the connection is backed by an AWS Athena database for the extractor to read data from it.

## Current Limitations

The TIME column type is not supported.

## 3.5.1.18 Connector - Elasticsearch

Find the credentials for Elasticsearch connector, and how to create a connection and extract data.

Stage	Released
Technology Behind	cdata.jdbc.elasticsearch.jar
Version	22.0.8370.0

### Overview

Connects to Elasticsearch v2.2.0 and above via the REST API.

Credential	Description
API Key ID	The APIKey ID to authenticate to Elasticsearch.
API Key	The APIKey used to authenticate to Elasticsearch.
Host	The host name or IP address of the Elasticsearch REST server.
Port	The port for the Elasticsearch REST server.
Extra Connection Arguments	Timeout: The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.

### Security Recommendations

- API key rotation, periodically rotate the API key or do so immediately if there is any suspicion that an API key may have been compromised.
- Use HTTPS if possible.

### Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option [\*This datasource connects to an on-premises system\*](#) while setting up a connection in SAP Signavio Process

Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

### 3.5.1.19 Connector - OData (Open Data Protocol)

Find the credentials for OData connector, and how to create a connection and extract data.

Stage	Released
Technology Behind	cdata.jdbc.odata.jar
Version	22.0.8370.0

## Overview

This adapter connects to OData 2.0, 3.0, and 4.0 services. The OData webservice needs to support `$select` queries as follows:

```
GET /Accounts?$select=accountid HTTP/1.1
```

If this isn't supported, the OData webservice won't be able to select individual fields from a table or entity.

## Authentication

When configuring an OData (Open Data Protocol) connector, two authentication methods are available:

- Basic
- OAuth

### ⓘ Note

OAuth 1.0 isn't supported.

## Basic Authentication

Credential	Description
Username	The user account used to authenticate to the OData database.
Password	The password used to authenticate the user.

Credential	Description
Service Root	URL to the organization root or the OData services file, for example <code>https://MySite/MyOrganization</code> .
Extra Connection Arguments	<ul style="list-style-type: none"> <li>• <code>Timeout</code> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li>• <code>AuthScheme</code> The scheme used for authentication. Accepted entries are: <ul style="list-style-type: none"> <li>• <code>NONE</code></li> <li>• <code>BASIC</code></li> <li>• <code>DIGEST</code></li> <li>• <code>NTLM</code> (for Windows AD authentication)</li> <li>• <code>NEGOTIATE</code> (for Kerberos authentication)</li> </ul> </li> <li>• <code>CustomUrlParams</code> Custom query string parameters that you want to include in the request (URL encoded), for example: <ul style="list-style-type: none"> <li>• <code>field1=value1&amp;field2=value2&amp;field3=value3</code></li> <li>• <code>company=MyCompany</code></li> </ul> </li> <li>• <code>SSLServerCert</code> The certificate that you want to accept from the server when connecting using TLS/SSL.</li> <li>• <code>CustomHeaders</code> Set a custom HTTP header. The headers must be in the following format, <code>CustomHeaders="header:value"</code>, for example: <ul style="list-style-type: none"> <li>• <code>CustomHeaders="Prefer: odata.maxpagesize=1000"</code></li> </ul> </li> <li>• <code>UseClientSidePaging</code> Set to true for client-side paging.</li> </ul>

## OAuth Authentication

Credential	Description
OAuth Client Id	The OAuth Client Id used to authenticate to the OData database.
OAuth Client Secret	The OAuth Client Secret used to authenticate the OAuth Client Id.
Service Root	URL to the organization root or the OData services file, for example <code>https://MySite/MyOrganization</code> .

Credential	Description
OAuth Access Token Url	The OAuth Access Token Url used to retrieve access token.
Extra Connection Arguments	<ul style="list-style-type: none"> <li>• <b>Timeout</b> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li>• <b>CustomUrlParams</b> Custom query string parameters that you want to include in the request (URL encoded), for example:           <ul style="list-style-type: none"> <li>• <code>field1=value1&amp;field2=value2&amp;field3=value3</code></li> <li>• <code>company=MyCompany</code></li> </ul> </li> <li>• <b>SSLServerCert</b> The certificate that you want to accept from the server when connecting using TLS/SSL.</li> <li>• <b>CustomHeaders</b> Set a custom HTTP header. The headers must be the following format, "header: value", for example:           <ul style="list-style-type: none"> <li>• <code>"Prefer: odata.maxpagesize=1000"</code></li> </ul> </li> </ul>

## Security Recommendations

- Use HTTPS and OAuth if possible.
- For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.
2. [Creating a Source Data \[page 178\]](#)  
Create source data using your connection and customize tables.
3. [Extract Data from Source Systems \[page 174\]](#)  
Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

## 3.5.1.20 Connector - Microsoft SQL Server

Find the credentials for Microsoft SQL Server connector, and how to create a connection and extract data

Stage	Released
Technology Behind	cdata.jdbc.sql.jar
Version	22.0.8370.0

### Overview

Connects to the TDS protocol to the following systems:

- SQL Server versions 2008, 2012, 2014, 2016, and 2019
- Azure SQL Server
- Azure Data Warehouse instances

Credential	Description
Username	The user account used to authenticate to the Microsoft SQL Server database.
Password	The password used to authenticate the user.
Host	The name of the server running Microsoft SQL Server.
Port	The port of the Microsoft SQL Server.
Database	The name of the SQL Server database.
Extra Connection Arguments	Timeout: The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.

### Security Recommendations

- Enable encryption using `Encrypt` extra connection argument.
- Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

### Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)  
Create a connection to your source system.

## 2. Creating a Source Data [page 178]

Create source data using your connection and customize tables.

## 3. Extract Data from Source Systems [page 174]

Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

### 3.5.1.21 Connector - SAP Cloud Integration

Connect to SAP Cloud and extract data from the integrated applications.

Stage	Released
Technology Behind	cdata.jdbc.odata.jar
Version	22.0.8370.0

#### ⓘ Note

Currently, SAP Cloud Integration only supports full data extraction. If you want to filter out specific data and extract only the data you need, use the Ingestion API. For information on the Ingestion API, see [Upload Data Using the Ingestion API \[page 222\]](#).

### Basic Authentication

When configuring SAP Cloud Integration connector, you'll use the basic authentication method.

Credential	Description
Username	The user account used to authenticate to the SAP Cloud Integration.
Password	The password used to authenticate the user.
Service Root	URL to the organization root or the SAP Cloud services file, for example <code>https://MySite/MyOrganization</code> .

Credential	Description
Extra Connection Arguments	<ul style="list-style-type: none"> <li>• <b>Timeout</b> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li>• <b>CustomUrlParams</b> Custom query string parameters that you want to include in the request (URL encoded), for example: <ul style="list-style-type: none"> <li>• <code>field1=value1&amp;field2=value2&amp;field3=value3</code></li> <li>• <code>company=MyCompany</code></li> </ul> </li> <li>• <b>SSLServerCert</b> The certificate that you want to accept from the server when connecting using TLS/SSL.</li> <li>• <b>CustomHeaders</b> Set a custom HTTP header. The headers must be in the following format, <code>CustomHeaders="header:value"</code>, for example: <ul style="list-style-type: none"> <li>• <code>CustomHeaders="Prefer:odata.maxpagesize=1000"</code></li> </ul> </li> </ul>

## Security Recommendation

Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

### 3.5.1.22 Connector - SAP Datasphere

Find the credentials for SAP Datasphere connector, and how to create a connection and extract data.

Stage	Released
Technology Behind	cdata.jdbc.saphana.jar
Version	22.0.8472.0

## Overview

Connects to SAP Datasphere, hosted in the cloud environment.

To set up a connection with SAP Datasphere connector, you need information such as username, password, host, port, and database. This information is available in the Open SQL schema linked to the SAP Datasphere with which you want to connect.

For information on obtaining Open SQL schema connection information, see [Connect to your Open SQL Schema](#) section in SAP Help portal.

Credential	Description
Username	The user account obtained from Open SQL schema to authenticate with SAP Datasphere.
Password	The password obtained from Open SQL schema to authenticate.
Host	The name of the server running SAP Datasphere, obtained from Open SQL schema.
Port	443
Database	H00

Credential	Description
Extra Connection Arguments	<ul style="list-style-type: none"> <li><b>Timeout</b> The value in seconds until the timeout error is thrown, canceling the operation, for example 10 for a timeout after 10 seconds.</li> <li><b>Views</b> Restricts the views reported to a subset of the available views, for example Views=ViewA,ViewB,ViewC.</li> <li><b>Tables</b> This property restricts the tables reported to a subset of the available tables, for example Tables=TableA,TableB,TableC.</li> <li><b>SSLClientCert</b> The TLS/SSL client certificate store for SSL client authentication, for example SSLClientCert=ROOT. Read more in section <a href="#">Values for SSLClientCert [page 128]</a>.</li> <li><b>SSLClientCertType</b> The type of key store containing the TLS/SSL client certificate, for example SSLClientCertType=USER. Read more in section <a href="#">Values for SSLClientCertType [page 129]</a>.</li> <li><b>SSLClientCertPassword</b> The password for the TLS/SSL client certificate, for example SSLClientCertPassword=mypassword.</li> <li><b>SSLClientCertSubject</b> The subject of the TLS/SSL client certificate, for example SSLClientCertSubject=CN=www.server.com, OU=test, C=US, E=support@company.com. Read more in section <a href="#">Values for SSLClientCertSubject [page 129]</a>.</li> <li><b>SSLServerCert</b> The certificate to be accepted from the server when connecting using TLS/SSL. Read more in section <a href="#">Values for SSLServerCert [page 130]</a>.</li> </ul>

## Values for SSLClientCert

Value	Description
MY	A certificate store holding personal certificates with their associated private keys.
CA	Certifying authority certificates.
ROOT	Root certificates.

Value	Description
SPC	Software publisher certificates.

## Values for SSLClientCertSubject

Value	Description
CN	Common Name. This is commonly a host name like www.server.com.
O	Organization
OU	Organizational Unit
L	Locality
S	State
C	Country
E	Email Address

## Values for SSLClientCertType

Value	Description
USER - default	For Windows, this specifies that the certificate store is a certificate store owned by the current user. Note that this store type is not available in Java.
MACHINE	For Windows, this specifies that the certificate store is a machine store. Note that this store type is not available in Java.
PFXFILE	The certificate store is the name of a PFX (PKCS12) file containing certificates.
PFXBLOB	The certificate store is a string (base-64-encoded) representing a certificate store in PFX (PKCS12) format.
JKSFILE	The certificate store is the name of a Java key store (JKS) file containing certificates. Note that this store type is only available in Java.
JKSBLOB	The certificate store is a string (base-64-encoded) representing a certificate store in JKS format. Note that this store type is only available in Java.
PEMKEY_FILE	The certificate store is the name of a PEM-encoded file that contains a private key and an optional certificate.
PEMKEY_BLOB	The certificate store is a string (base64-encoded) that contains a private key and an optional certificate.

Value	Description
PUBLIC_KEY_FILE	The certificate store is the name of a file that contains a PEM- or DER-encoded public key certificate.
PUBLIC_KEY_BLOB	The certificate store is a string (base-64-encoded) that contains a PEM- or DER-encoded public key certificate.
SSHPUBLIC_KEY_FILE	The certificate store is the name of a file that contains an SSH-style public key.
SSHPUBLIC_KEY_BLOB	The certificate store is a string (base-64-encoded) that contains an SSH-style public key.
P7BFILE	The certificate store is the name of a PKCS7 file containing certificates.
PPKFILE	The certificate store is the name of a file that contains a PuTTY Private Key (PPK).
XMLFILE	The certificate store is the name of a file that contains a certificate in XML format.
XMLBLOB	The certificate store is a string that contains a certificate in XML format.

## Values for SSLServerCert

Value	Example
a full PEM Certificate	-----BEGIN CERTIFICATE----- MIICChT5CAe4CAQAwDQYJKoZIhv.....Qw== -----END CERTIFICATE-----
a path to a local file containing the certificate	C:\cert.cer
the public key	-----BEGIN RSA PUBLIC KEY----- MIKLfMA0GCSq.....AQAB -----END RSA PUBLIC KEY-----
the MD5 Thumbprint	ecadbdda5a36929c58a1e9e09828d70e4
the SHA1 Thumbprint	34a9274826ae0819f2ec14b4a3d904f801ccb150d

## Allowed IP Addresses

The Firewall allows data through specific IP addresses. For the list of IPs, see the Regions, IP Addresses, and URLs section.

## Security Recommendations

- Enable encryption using `useSSL` extra connection argument.

- If possible, use a client certificate for authentication.
- For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

## Connecting and Extracting Data

Following are the high-level steps to connect with your source system and extract data:

1. [Creating a Connection \[page 135\]](#)

Create a connection to your source system.

2. [Creating a Source Data \[page 178\]](#)

Create source data using your connection and customize tables.

3. [Extract Data from Source Systems \[page 174\]](#)

Extract data using the standard mode of extraction.

To establish a connection with your source system hosted on-premises, you need to enable the option *This datasource connects to an on-premises system* while setting up a connection in SAP Signavio Process Intelligence. For information on how to connect with on-premises system, see [Set Up and Manage On-Premises Extractors \[page 144\]](#)

## Related Information

[Regions, IP Addresses, and URLs \[page 57\]](#)

## 3.5.2 Security Recommendations for Connectors

View security recommendations of all connectors in SAP Signavio Process Intelligence.

Connectors	Security Recommendations
<b>Enterprise systems</b>	
SAP ERP (SAP RFC)	<ul style="list-style-type: none"> <li>• Use On-Premises extractor with SNC for both encryption and authentication.</li> <li>• For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.</li> </ul>

Connectors	Security Recommendations
SAP S/4HANA CDS Views	<ul style="list-style-type: none"> <li>For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.</li> <li>Use HTTPS if possible.</li> </ul>
SAP SuccessFactors	Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.
ServiceNow	Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.
Jira Software	<ul style="list-style-type: none"> <li>Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.</li> <li>Use HTTPS if possible.</li> </ul>
<b>Cloud storage / Warehouse</b>	
AWS Athena	Access key rotation, periodically rotate access keys or do so immediately if there is any suspicion that an access key may have been compromised.
AWS S3	Access key rotation, periodically rotate access keys or do so immediately if there is any suspicion that an access key may have been compromised.
Google BigQuery	No recommendations.
Snowflake	Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.
SAP Datasphere	<ul style="list-style-type: none"> <li>Enable encryption using <code>UseSSL</code> extra connection argument.</li> <li>If possible, use a client certificate for authentication.</li> <li>For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.</li> </ul>
Azure Data Lake Storage	Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.
<b>Database</b>	

Connectors	Security Recommendations
SAP HANA	<ul style="list-style-type: none"> <li>Enable encryption using <code>UseSSL</code> extra connection argument.</li> <li>If possible, use a client certificate for authentication.</li> <li>For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.</li> </ul>
MySQL	Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.
PostgreSQL	Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.
MongoDB	<ul style="list-style-type: none"> <li>Enable encryption using <code>UseSSL</code> extra connection argument.</li> <li>Use certificate authentication.</li> <li>For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.</li> </ul>
<b>Other</b>	
Ingestion API	Read more in the Ingestion API <a href="#">Usage Recommendations</a> section.
Microsoft SQL Server	<ul style="list-style-type: none"> <li>Enable encryption using <code>Encrypt</code> extra connection argument.</li> <li>Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.</li> </ul>
OData (Open Data Protocol)	<ul style="list-style-type: none"> <li>Use HTTPS and OAuth if possible</li> <li>For basic authentication, it's recommended to periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.</li> </ul>
Elastic Search	<ul style="list-style-type: none"> <li>API key rotation, periodically rotate the API key or do so immediately if there is any suspicion that an API key may have been compromised.</li> <li>Use HTTPS if possible.</li> </ul>
SAP Cloud Integration	Password rotation, periodically rotate passwords or do so immediately if there is any suspicion that a password may have been compromised.

### 3.5.3 Managing Connections

Connections define from where a data pipeline will extract the data. You can create new connections as well as manage existing ones using filtering and sorting.

For each process data pipeline, you need to specify from where to extract the data. For that, you set up a connection and link it with your process data pipeline.

A connection can contain the following:

- Credentials and connection parameters for accessing a source system that is hosted in a cloud or on-premises environment
- A link to an on-premises extractor in case of a source system hosted in an on-premises environment
- Raw process data uploaded manually as zipped CSV files

A connection can be used by multiple process data pipelines.

**Select the links below to learn more about each topic.**

[Viewing Connections \[page 134\]](#)

Learn how to get to the Connections feature in SAP Signavio Process Intelligence and view the available options.

[Creating a Connection \[page 135\]](#)

How to create a connection that connects SAP Signavio Process Intelligence with a source system.

[Revalidating the Credentials \[page 136\]](#)

How to revalidate the credentials in the connection if the link to a source system is lost.

[Editing and Deleting Connections \[page 137\]](#)

How to change a connection or delete it. Changing a connection requires entering the password for the source system.

#### 3.5.3.1 Viewing Connections

Learn how to get to the Connections feature in SAP Signavio Process Intelligence and view the available options.

To view the connections, open  [\(Data Integration\)](#)  [Connections](#) in the sidebar.

The connections overview page appears with the following options:

Available Option	Description
Create	Create a new connection.
	Sort connections by ascending or descending order. In addition, sort by name, connection type, status, on-premises, created by, and created at.

Available Option	Description
	<p>Filter connections based on name, connection type, status, on-premises, created by, and created at.</p> <p>To apply filter, select  . In the <i>View Settings</i> popup, select the filter option from the list and then <i>Ok</i>. To clear all active filters, select <i>Reset</i>.</p> <p>The number next to the  option indicates the active filters.</p>
	<p>Shows available connections in a card view.</p> <p>Each card shows the status of the connection. For example, Valid and Invalid.</p> <p>Each card has an action menu  with <i>Rename</i> and <i>Delete</i>.</p>
	<p><b> ⓘ Note</b></p> <p>Your assigned feature set determines which options appear in the action menu. For information on feature sets, see <a href="#">Access Requirements for Process Data Management [page 52]</a></p>
	<p>Shows available connections in table form.</p> <p>You can sort the available connections in ascending or descending order using the options  or  next to some column names in a table.</p>
	<p>Type to search the connections.</p>

### 3.5.3.2 Creating a Connection

How to create a connection that connects SAP Signavio Process Intelligence with a source system.

You can create a connection for the following:

- Systems hosted on Cloud (SaaS applications)
- Systems hosted on-premises

You can upload raw process data manually using the Source Data feature. For information on how to upload the data in zipped CSV files, see [Uploading Data Manually](#) section.

For information on the connection types and list of connectors, see [Connection Types and Available Connectors \[page 62\]](#) section.

**ⓘ Note**

To create a connection, you need the SAP Signavio Process Intelligence - Data Integration feature set and editor or manager permission on the folder in which you want to create the connection. Your administrator can enable these for you. For more information, see [Access Requirements for Process Data Management \[page 52\]](#).

## Connecting to a System

Follow these steps:

1. Open  [\(Repository\)](#) or  [\(Data Integration\)](#)  in the sidebar.
2. Select [Create](#) or  [Create](#)  (in the Repository). The page for creating a connection opens.
3. Enter a name for the connection.
4. In the [Repository](#) field, if a folder is not already selected, select one.  
When you create a connection from the Repository, the [Repository](#) field is preselected with the folder from which you selected  [Create](#)  . When you create a connection under  [Data Integration](#) , Repository is preselected if you have editor or manager permission on the root folder. If you don't have editor or manager permission on the root folder, no folder is preselected and you have to select a folder.
5. Select the connection type from the available categories.
6. For some connection types you have the option to connect using an on-premises extractor. If you want to use this option, select the [Use On-Premises Extractor](#) checkbox and select the extractor from the list available.  
Read more in the [On-Premises Extractor \[page 138\]](#) section.
7. Enter the configuration details for your connector.
8. Select the tables from which you want to extract the data. For information on predefined tables, see the [SAP Signavio Value Accelerators for SAP Signavio Process Intelligence](#) guide.
9. Depending on the connector, you can add connection parameters in the [Extra Connection Arguments](#) field.
10. Confirm with [Create](#) or you can choose to test the connection before creating.
11. The connection is set up.

Once you've established a valid connection, the next step is to create a source data using this connection.

## Related Information

[Uploading Data Manually \[page 229\]](#)

[Managing Source Data \[page 176\]](#)

[On-Premises Extractor \[page 138\]](#)

[Creating a Source Data \[page 178\]](#)

### 3.5.3.3 Revalidating the Credentials

How to revalidate the credentials in the connection if the link to a source system is lost.

Once you've created a valid connection and if something has changed in the connection type, for example, if the user password has been changed, then the connection becomes invalid in SAP Signavio Process Intelligence. Then, you need to revalidate the credentials.

Invalid connections are highlighted in red.

To revalidate the credentials, follow these steps:

1. Open  [\(Repository\)](#) or  [\(Data Integration\)](#)  in the sidebar.
2. Choose the connection that you want to revalidate.  
The details page for the connection opens.
3. To reconnect using the existing credentials, click [Revalidate](#).
4. If the connection succeeds, confirm with [Save](#).  
If the connection fails, enter valid credentials and confirm with [Save](#).  
The credentials are validated and the connection is highlighted in green.

### 3.5.3.4 Editing and Deleting Connections

How to change a connection or delete it. Changing a connection requires entering the password for the source system.

#### Editing a Connection

##### Note

You need to confirm changes to a connection by re-entering the password. Because of that, the connection is marked as invalid as soon as you start editing a connection.

##### Note

To edit a connection, you need editor or manager permission on the connection.

Follow these steps:

1. Open  [\(Repository\)](#) or  [\(Data Integration\)](#)  in the sidebar.
2. Choose the connection that you want to edit.  
The details page opens.
3. Choose [Edit](#).
4. Make your changes.
5. To save the changes, click [Save](#).
6. Re-enter the password and click [Submit](#).  
The changes are applied to the connection.

#### Deleting a Connection

##### Note

Deleting a connection that is linked to a process data pipeline breaks the source data. Then, data can no longer be extracted.

Deleting a connection can't be undone.

### ⓘ Note

To delete a connection, you need manager permission on the connection.

Follow these steps:

1. Open  ([Repository](#)) or  ([Data Integration](#))  in the sidebar.
2. Choose the connection, select  (More), then [Delete](#).  
A confirmation dialog opens.
3. To confirm deletion, confirm in the dialog and click [Delete](#).  
The connection is deleted.

## 3.6 On-Premises Extractor

How to create a connection that links Process Intelligence with a source system.

An on-premises extractor is installed and operated within company's own physical infrastructure. The primary function of an on-premises extractor is to collect and extract data from various sources hosted in your company's environment.

Using on-premises extractor, you can connect your on-premises source systems to Process Data Management in SAP Signavio Process Intelligence.

You can set up and run the on-premises extractor in either of the following ways:

- Download and install manually. Then, run the extractor using commands.  
See the [Set Up and Manage On-Premises Extractors \[page 144\]](#) section.
- Set up and run an on-premises extractor using Docker.  
See the [On-Premises Extractor Setup Using Docker \[page 153\]](#) section.

## Authentication

Authentication between the on-premises extractor and the process data management bridge is handled through the ID and the secret of the extractor. Both parameters are used in the on-premises extractor. The secret is stored in the config.env file like the rest of the on-premises extractor configuration but it is not sent as a request header. We do not send the secret because it is used solely for encrypting the authentication message. Only the extractor ID and the encrypted authentication message are sent with each request. The parameters are configured when connecting the on-premises package on the server with the on-premises extractor in SAP Signavio Process Intelligence, read more in section [Set up the connection to an on-premises system \[page 144\]](#).

## Encryption

The secret is used to authenticate the on-premises extractor instance when connecting to the process data management bridge.

The authentication process is as follows:

1. The on-premises extractor uses the secret to get a temporary encryption key.
2. The on-premises extractor uses the temporary encryption key to encrypt the ID, and the result passes as another HTTP header.
3. The original secret is used to decrypt the authentication header and if it can match the decrypted value to the ID, then the authentication is successful, if not, it's denied.

## Certificates

Client-side certificates aren't used when connecting an on-premises extractor and the process data management bridge.

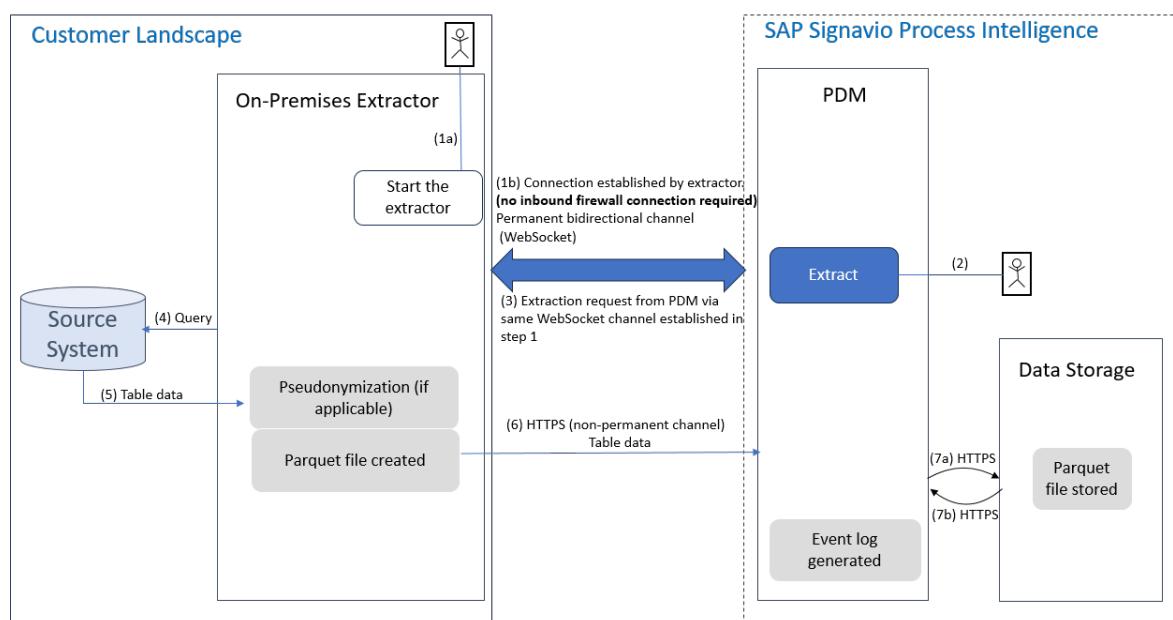
## Communication

The on-premises extractor and the process data management bridge communicate using HTTPS and Secure WebSocket.

### 3.6.1 How the On-Premises Extractor Works

Get a quick technical overview of how the on-premises extractor works.

The following illustration provides the high-level overview of the systems and components involved when you establish a connection between on-premises systems and SAP Signavio Process Intelligence.



The data flow between the source system on your on-premises and SAP Signavio Process Intelligence is described as follows:

1. You start the on-premises extractor, which establishes the initial connection to Process Data Management. Note that this initial connection can only be started from the on-premises extractor (so you only need to enable outbound communication for your firewall). After the channel is established, the on-premises extractor polls Process Data Management for extraction requests.
2. You start the extraction in Process Data Management.
3. This extraction request is sent to the on-premises extractor via the permanent bidirectional WebSocket channel established in step 1.
4. The on-premises extractor receives the extraction request (by way of its polls of Process Data Management for extraction requests) and queries the source system.
5. The source system responds and sends the table data to the on-premises extractor. If applicable, pseudonymization happens at this point.
6. The parquet file for the table data is created in the on-premises extractor and sent via an HTTPS channel to Process Data Management. This is not a permanent channel. A new channel is established for each table.
7. The table data is written from Process Data Management to data storage via HTTPS and in storage it is encrypted using AES-256. The extraction is now complete. Process Data Management can read the data from storage for use in generating event logs.

When you create a process data pipeline that has a transformation script and run the pipeline, the data is transformed and an event log is generated. This event log is further uploaded into the process defined in your process data pipeline. You can then use this data available in the process for data analysis and process data mining.

## Related Information

[Set up the connection to an on-premises system \[page 144\]](#)

[Create a process data pipeline \[page 251\]](#)

## 3.6.2 Components Overview

Read an overview about of all the components used when setting up a on-premises system and SAP Signavio Process Intelligence.

Before setting up your connection to an on-premises system there are component descriptions you need to know before implementing the connection.

The following table provides a description of each component used when connecting to an on-premises system:

Component	Description
connection	In SAP Signavio Process Intelligence, you set up a connection for process data management data pipelines to specify from where to extract the data. For example, a connection contains credentials and connection parameters for accessing a source system.  You need to create at least one connection for each on-premises extractor. Read more in section <a href="#">Manage connections [page 134]</a> .
on-premises extractor	The on-premises extractor is a configuration in SAP Signavio Process Intelligence. It is used to connect to the on-premises package. The on-premises extractor itself needs to be connected to a connection.  You need to set up an on-premises extractor for each on-premises package.
on-premises package	The on-premises package is a software package enabling data transmission from the source system to SAP Signavio Process Intelligence. You need to install the package on the server.
on-premises system	This is the source system that stores your business process data, for example SAP. Your company hosts the source system in an on-premises environment.
proxy server	To provide an additional security layer for communication with the server, you can use a proxy server. The configuration of the proxy server is handled by the customer.
server	The server is a physical or virtual server on which you install the on-premises package.  The server needs to be located in the same network as the source system so that it can reach the system with data.

## Related Information

[Set up the connection to an on-premises system \[page 144\]](#)

### 3.6.3 Security Considerations for On-Premises Extractor

Learn more about some of the security considerations when using the on-premises extractor.

#### Security Considerations

Priority	Secure Operations Map	Title	Default Setting or Behavior	Last Update	Index
Critical	Secure SAP Code	Security Fixes	The on-premises extractor is an application deployed by you, the customer. SAP Signavio can't update the software component automatically.	April 11, 2024	PI-SSR-0001
Critical	Authentication	Encryption, Data in Transit	The on-premises extractor doesn't expose any endpoint to the Internet. The on-premises extractor is used to connect to your internal systems. The connection settings are configured by customers. We highly recommend using secure protocols.	April 11, 2024	PI-SSR-0002
Critical	Authentication	Access Control	The on-premises extractor sends data to SAP Signavio Process Intelligence endpoints. The configuration is loaded from a config.env file.	April 11, 2024	PI-SSR-0003
Critical	Secure SAP Code	Security Fixes	To run, the on-premises extractor depends on a Java SDK. The Java SDK is an on-premises software component, which you must patch regularly.	April 11, 2024	PI-SSR-0004

Priority	Secure Operations Map	Title	Default Setting or Behavior	Last Update	Index
Advanced	Security Hardening	Encryption, Data in Transit	By default, the service supports all cipher suites used by your Java virtual machine.	April 11, 2024	PI-SSR-0006

## 3.6.4 System Requirements

Find out what's needed to setup the on-premises extractor.

Before you get started with setting up the on-premises extractor, make sure you've met the following prerequisites.

- [Hardware, Software, and Network Requirements \[page 143\]](#)
- [Access Requirements for Process Data Management \[page 52\]](#)

### 3.6.4.1 Hardware, Software, and Network Requirements

List of on-premises server requirements needed before connecting to an on-premises server with SAP Signavio Process Intelligence.

Before setting up an process data management on-premises connector in SAP Signavio Process Intelligence to your on-premises server, the following requirements and configuration is required.

#### Hardware

- A server, for example Azure machine, AWS EC2 or GCP instance, or a virtual machine, or a physical server
- Greater than 50 GB of free disk space
- RAM, Minimum 20 GB
- CPU, minimum X86-64 architecture with quad core processor

#### Software

- Windows OS:
  - [64 bit Windows 10](#) or later
  - [Windows Server 2019](#)

- MacOS:
  - [MacOS 11](#) or later
- Linux OS:
  - [Ubuntu 18.04 LTS](#) or later
  - [Red Hat Enterprise Linux 7](#) or later
  - [SUSE Enterprise Linux \(SLES\) 12 or 15](#)
  - [Oracle Linux 6 or 7](#)
- [OpenJDK 17](#)  
If you're using an earlier or later version of Java, upgrade/downgrade to Java 17. Then, download and install the latest version of the on-premises extractor. For more information, see [Download, verify, and install the on-premises package \[page 146\]](#).

If you run into issues, see the [Errors related to on-premises source systems \[page 167\]](#) section.

## Server Configuration

- The server is located in the same network as the source system so that it can reach the system with data. The firewall allows access through specific IP addresses. For the list of IP addresses, see the Regions and IP Addresses section.
- The on-premise data sources can be connected to your cloud through Managed Private Cloud. To get the Managed Private Cloud IP address, contact your customer success manager.
- A secure websocket and HTTPS traffic to the IP addresses need to be allowed on TCP port 443.
- Specific latency requirements don't apply.

## Related Information

[Regions, IP Addresses, and URLs \[page 57\]](#)

## 3.6.5 Set Up and Manage On-Premises Extractors

Steps to set up the connection from SAP Signavio Process Intelligence to an on-premises system.

To set up the connection between your on-premises system and SAP Signavio Process Intelligence, follow these steps:

1. [Set up the on-premises server \[page 145\]](#)
2. [Prepare access to your source system \[page 145\]](#)
3. [Download and Verify the On-Premises Package \[page 146\]](#)
4. Install the on-premises package:
  - [Install and Run the On-Premises Extractor on Windows and Linux \[page 147\]](#)
  - [Set Up the On-Premises Package as a Service on Linux and Run the Extractor \[page 148\]](#)

5. Create an On-Premises Extractor in SAP Signavio Process Intelligence [page 149]
6. Connect the On-Premises Package on the Server with the On-Premises Extractor and Run the Extractor [page 150]
7. Create a Connection and Link it with the On-Premises Extractor [page 151]

### 3.6.5.1 Set Up the On-Premises Server

Read how to configure your on-premises server for the on-premises connector.

The first step is to set up your on-premises server that the process data management on-premises connector in SAP Signavio Process Intelligence connects to.

Set up the on-premises server using the requirements listed in the Hardware, Software, and Network Requirements section.

After setting up the on-premises server, get required access to your source system. For this, see Prepare Access to your Source System section.

#### Related Information

[Prepare Access to Your Source System \[page 145\]](#)

[Hardware, Software, and Network Requirements \[page 143\]](#)

### 3.6.5.2 Prepare Access to Your Source System

Read how to prepare access to your SAP or other source systems, which are used with on-premises connector.

After setting up your on-premises server, the next step is to provide access to your source system.

#### SAP Source Systems

To provide access to your SAP system, follow these steps:

1. In your SAP system, install a custom RFC function. Read more in section [Supported Systems and RFC Usage \[page 65\]](#).
2. Get the SAP credentials for the connector. For SAP ERP, read more in section [Connector - SAP ERP \(RFC\) \[page 73\]](#).
3. If you want to secure the connection of your SAP source system, you can enable SAP Secure Network Connection. Read more in section [Connector - SAP ERP \(RFC\) \[page 73\]](#).

## Other Source Systems

To provide access to your source system, get the source system credentials for the connector. Read about the credentials for each connector in section [Connection Types and Available Connectors \[page 62\]](#).

After preparing access to your source system, download and install the on-premises package on server. For this, see [Download and Verify the On-premises Package](#) section

## Related Information

[Download and Verify the On-Premises Package \[page 146\]](#)

[Install and Run the On-Premises Extractor on Windows and Linux \[page 147\]](#)

[Set Up the On-Premises Package as a Service on Linux and Run the Extractor \[page 148\]](#)

### 3.6.5.3 Download and Verify the On-Premises Package

Read how to download, verify, and install the on-premises connector on your on-premises server.

Previous step: [Prepare access to your connection type \[page 145\]](#)

After providing access to your connection type, follow these steps:

1. [Download the on-premises package \[page 146\]](#)
2. [Verify the on-premises package \[page 147\]](#)
3. [Install and Run the On-Premises Extractor on Windows and Linux \[page 147\]](#)
4. [Set Up the On-Premises Package as a Service on Linux and Run the Extractor \[page 148\]](#)

## Download the On-Premises Package

Follow these steps:

1. Open  [\(Data Integration\) > On-Premises Extractors](#) in the sidebar.
2. To download the on-premises package, click [Download New Version](#).  
The download package dialog opens.
3. Under [New On-Premises Extractor](#) in the dialog, click [Download New Version](#).  
The file is saved to your browser's download folder.
4. Copy the SHA256 checksum hash value, by clicking [Copy to clipboard](#).  
Use the copied SHA256 checksum hash value to verify the integrity of the downloaded extractor package.
5. Copy the on-premises package to your on-premises server.

## Verify the On-Premises Package

To verify the integrity of the on-premises package, run the package file through a checksum tool on the on-premises server. Compare the file hash value from the checksum tool with the copied hash value from the [Download the on-premises package \[page 146\]](#) section. If the hash values match, the package is secure and can be installed on the on-premises server.

After installing the on-premises package, you need to create an on-premises extractor in SAP Signavio Process Intelligence.

## Related Information

[Create an On-Premises Extractor in SAP Signavio Process Intelligence \[page 149\]](#)

### 3.6.5.4 Install and Run the On-Premises Extractor on Windows and Linux

Find the steps for installing the on-premises package on Windows and Linux servers, and subsequently executing the extractor using script.

## Context

After downloading and verifying the on-premises package, you need to install it on the server of your choice, Windows or Linux.

### ⓘ Note

**For Linux:** If you prefer to manually install and run the on-premises extractor on your Linux machine, follow these steps. However, if you want to run on-premises package as a service, then refer to the [Install the On-premises Package as a Service on Linux](#) and [Run the Extractor](#) section.

Before you get started, make sure you met the requirements listed in the [Hardware, Software, and Network Requirements](#) section.

Follow these steps:

## Procedure

1. Unzip the on-premises package.
2. Save the unzipped package to the server. You can save the file anywhere on the server.

3. Create an On-Premises Extractor in SAP Signavio Process Intelligence [page 149]
4. Connect the On-Premises Package on the Server with the On-Premises Extractor and Run the Extractor [page 150]

## Related Information

[Hardware, Software, and Network Requirements \[page 143\]](#)

[Connect the On-Premises Package on the Server with the On-Premises Extractor and Run the Extractor \[page 150\]](#)

### 3.6.5.5 Set Up the On-Premises Package as a Service on Linux and Run the Extractor

Follow the provided steps to install and run the On-premises Package as a Service on Linux. Link the extractor with a connection after installation.

#### ⓘ Note

We recommend creating a non-root Linux user named `etluser` to run only the on-premises extractor. In addition, make sure a home directory is also created for the `etluser`.

You can create a non-root linux user named `etluser` by running the command `sudo useradd -m etluser`. Alternatively, you can use an existing non-root user by changing the variable `User=<name>` in the `extractor.service` file.

After downloading, save the unzipped package in the non-root Linux user's home directory.

Before you start installing and running the extractor, make sure that the following conditions are also met:

- Java Runtime Environment version 17
- 50 GB of free disk space
- A running virtual machine

Follow these steps:

1. Modify the `extractor.service` file, replacing `<PATH_TO_ON_PREM_EXTRACTOR_DIRECTORY>` with the path of the on-premises extractor directory.
2. Locate and open the `start.sh` file.
3. In the file, locate the line `export ETL_TMP_DIR=.../etltmp`, where `ETL_TMP_DIR` is the environment variable and `.../etltmp` is the directory.  
The directory stores temporary data during the extraction process. You can also set the variable to point to a different directory. If the directory doesn't already exist, it is then created when the on-premise extractor starts up.
4. Run `ls -l` from the parent of the directory defined in the `ETL_TMP_DIR` and make sure the `etluser`, or the user who is set in the `extractor.service` file, has write access to the defined directory. For example, write access to the `.../etltmp` directory.

5. Copy the modified `extractor.service` file to the `/etc/systemd/system` folder.
6. To start the on-prem extractor as a service, stop the running extractor and run `systemctl start extractor.service`.
7. • To check the status of the service, run `systemctl status extractor.service`.  
 • To reload `systemd` configuration, run `systemctl daemon-reload`.  
 • To enable the autostart at boot time, run `systemctl enable extractor.service`.  
 • To check the logs, run `journalctl -u extractor.service -f`.

After installing and running the on-premises extractor, you need to link the extractor with an existing or new connection.

## Related Information

[Create a Connection and Link it with the On-Premises Extractor \[page 151\]](#)

### 3.6.5.6 Create an On-Premises Extractor in SAP Signavio Process Intelligence

Read how to create an on-premises extractor in SAP Signavio Process Intelligence.

After downloading, verifying, and installing the on-premise package on your on-premises server, the next step is to create an on-premises extractor in SAP Signavio Process Intelligence.

#### ⓘ Note

To create an on-premises extractor, you need the feature set SAP Signavio Process Intelligence  
 – Data Integration and editor or manager permission on the folder in which you want to create the on-premises extractor. Your administrator can enable these for you.

Follow these steps:

1. Open  [\(Repository\)](#) or  [\(Data Integration\)](#)  [On-Premises Extractors](#) in the sidebar.
2. Select [Create](#) or  [Create](#)  [On-Premises Extractor](#) (in the Repository). The page for creating an on-premises extractor opens.
3. Enter a name for the on-premises extractor.
4. In the [Repository](#) field, if a folder is not already selected, select one.  
 When you create an on-premises extractor from the Repository, the [Repository](#) field is preselected with the folder from which you selected  [Create](#)  [Connection](#). When you create an on-premises extractor under  [Data Integration](#)  [Connections](#), Repository is preselected if you have editor or manager permission on the root folder. If you don't have editor or manager permission on the root folder, no folder is preselected and you have to select a folder.
5. Confirm with [Create](#).  
 The extractor is created.

After creating an on-premises extractor in SAP Signavio Process Intelligence, the next step is to connect the on-premises package on the server with the on-premises extractor and run it.

## Related Information

[Connect the On-Premises Package on the Server with the On-Premises Extractor and Run the Extractor \[page 150\]](#)

### 3.6.5.7 Connect the On-Premises Package on the Server with the On-Premises Extractor and Run the Extractor

Read how to connect the on-premises package on the on-premises server with the on-premises extractor in SAP Signavio Process Intelligence.

After creating an on-premises extractor in SAP Signavio Process Intelligence, the next step is to connect the on-premises package on the server with the on-premises extractor in SAP Signavio Process Intelligence.

Follow these steps:

1. Open  [\(Data Integration\)](#)  [On-Premises Extractors](#) in the sidebar.
2. To copy extractor parameters, select  [\(More\)](#)  [Copy Parameter to Clipboard](#) for the extractor that you want to connect.
3. Go to the on-premises package on the server and open the file config.env with any text editor.
4. Paste the extractor parameters and save the file.

## Run the On-Premises Extractor

1. Run the start script:
  - start.bat for Windows servers
  - start.sh for Mac server and for manually running on Linux server.
2. To check whether the connection was successful, open the overview page of on-premises extractors in SAP Signavio Process Intelligence and check the *Status* column.

After running the on-premises extractor, link the extractor with a new or existing connection.

## Related Information

[Create a Connection and Link it with the On-Premises Extractor \[page 151\]](#)

### 3.6.5.8 Create a Connection and Link it with the On-Premises Extractor

Read how to create a connection in SAP Signavio Process Intelligence and link it to the on-premises extractor.

After connecting the on-premises package on the on-premises server with the on-premises extractor in SAP Signavio Process Intelligence, the next step is to create a connection and then link it to the extractor you created in SAP Signavio Process Intelligence.

#### ⓘ Note

To create a connection, you need the SAP Signavio Process Intelligence - Data Integration feature set and editor or manager permission on the folder in which you want to create the connection. Your administrator can enable these for you. For more information, see [Access Requirements for Process Data Management \[page 52\]](#).

Follow these steps:

1. Open □ (*Repository*) or ⚙▶ (*Data Integration*) ▶ *Connections* ▶ in the sidebar.
2. Select *Create* or ▶ *Create* ▶ *Connection* ▶ (in the Repository). The page for creating a connection opens.
3. Enter a name for the connection.
4. In the *Repository* field, if a folder is not already selected, select one.  
When you create a connection from the Repository, the *Repository* field is preselected with the folder from which you selected ▶ *Create* ▶ *Connection* ▶. When you create a connection under ▶ *Data Integration* ▶ *Connections* ▶, Repository is preselected if you have editor or manager permission on the root folder. If you don't have editor or manager permission on the root folder, no folder is preselected and you have to select a folder.
5. Select the connection type from the available categories.
6. For some connection types you have the option to connect using an on-premises extractor. If you want to use this option, select the *Use On-Premises Extractor* checkbox and select the extractor from the list available.  
Read more in the [On-Premises Extractor \[page 138\]](#) section.
7. Enter the configuration details for your connector.
8. Select the tables from which you want to extract the data. For information on predefined tables, see the [SAP Signavio Value Accelerators for SAP Signavio Process Intelligence](#) guide.
9. Depending on the connector, you can add connection parameters in the *Extra Connection Arguments* field.
10. Confirm with *Create* or you can choose to test the connection before creating.
11. The connection is created and linked with the on-premises extractor.

The connection is set up. You can set up process data pipelines using this connection.

## Related Information

[Creating a Process Data Pipeline \[page 251\]](#)

[Manage On-Premises Extractors and Packages \[page 152\]](#)

[Update the On-Premises Package \[page 152\]](#)

## 3.6.5.9 Manage On-Premises Extractors and Packages

How to manage on-premises extractors and packages. On-premises extractors and packages are necessary to connect SAP Signavio Process Intelligence with a data system that is hosted locally.

You can manage on-premises extractors and packages in the following ways:

- [Update the On-Premises Package \[page 152\]](#)
- [Delete an On-Premises Extractor \[page 153\]](#)

### ⓘ Note

An extractor can't be edited. You need to create a new extractor for changes, read more in section [Set up the connection to an on-premises system \[page 144\]](#).

### 3.6.5.9.1 Update the On-Premises Package

Learn how to upgrade to the latest version of on-premises extractor.

We provide new versions of the on-premises package through the user interface.

To see whether an update is available:

Open  [\(Data Integration\)](#) ➤ [On-Premises Extractors](#) in the sidebar.

If a newer version of your on-premises package is available, this is indicated with  in the [Version](#) column. On the on-premises extractors page, select  to find the new version steps, template documentation, public documentation, and release notes.

To update the on-premises package, follow these steps:

1. Download the on-premises package.

#### ⓘ Example

*Follow these steps:*

1. Open  [\(Data Integration\)](#) ➤ [On-Premises Extractors](#) in the sidebar.
2. To download the on-premises package, select  .  
The file is saved to your browser's download folder.

2. Install the on-premises package on the server.

#### ⓘ Example

*Follow these steps:*

1. Unzip the on-premises package.
2. Save the unzipped package to the server.
3. Connect the on-premises package on the server with the on-premises extractor in SAP Signavio Process Intelligence.

## ❖ Example

Follow these steps:

1. Open  [\(Data Integration\)](#)  [On-Premises Extractors](#) in the sidebar.
2. To copy extractor parameters, go to the on-premises package on the server and copy the file `config.env` from the existing connector.
3. Paste the file `config.env` at the location where the updated on-premise package is saved. You are prompted to replace the file. Click Ok.
4. Run the start script:
  - `start.bat` for Windows servers
  - `start.sh` for Linux and Mac servers
5. Open the overview of on-premises extractors in SAP Signavio Process Intelligence and check in the *Status* column whether connecting was successful.

The updated on-premises package is set up.

### 3.6.5.9.2 Delete an On-Premises Extractor

Read how to delete an on-premises extractor in SAP Signavio Process Intelligence.

#### ⓘ Note

Deleting an extractor can't be undone.

#### ⓘ Note

To delete an on-premises extractor, you need manager permission on the extractor.

Follow these steps:

1. Open  [\(Repository\)](#) or  [\(Data Integration\)](#)  [On-Premises Extractors](#) in the sidebar.
2. Select  (More), then [Delete](#) for the extractor that you want to delete.  
A confirmation dialog opens.
3. Confirm in the dialog and click [Delete](#).  
The on-premises extractor is deleted.

### 3.6.6 On-Premises Extractor Setup Using Docker

Learn how to set up the connection from SAP Signavio Process Intelligence to an on-premises system using Docker.

You can use Docker as an alternative method to install and run the on-premises extractor. With Docker, setting up a connection with the on-premises extractor is now faster and simpler. It reduces operational costs and enables you to upgrade to the latest version of the extractor with a quick command run.

### Note

- You can install the on-premises extractor using Docker on both Linux and Windows.
- It's recommended to have a basic knowledge of Docker.

## How to Install On-Premises Extractor Using Docker

At a high-level, the following steps are involved in installing the on-premises extractor using Docker.

1. Ensure that you meet all the system requirements, access permissions, and Docker requirements.  
See the [Requirements for On-Premises Extractor Setup Using Docker \[page 155\]](#) section.
2. Create an on-premises extractor in SAP Signavio Process Intelligence user interface.  
This generates extractor parameters, which need to be copied and used while setting up the environment for an on-premises extractor.  
See the [Create an On-Premises Extractor in SAP Signavio Process Intelligence \[page 149\]](#) section.
3. If you're using a Windows system, skip to the next step. If you're using a Linux system, you need to create a user named **etluser** and add that user to the user group named **docker**.  
See the [Creating a User \(Linux\) \[page 156\]](#) section.
4. Set up the environment to install the on-premises extractor through Docker.  
See the [Preparing the Environment for On-Premises Extractor \(Linux and Windows\) \[page 157\]](#) section.
5. Log in to the SAP's Docker repository using your S-User name.  
See the [Logging into the Docker Repository \[page 160\]](#) section.
6. Run the on-premises extractor using the `run` command. When you run the command, the docker image pulls the specified version of the on-premises extractor and runs the extractor.  
See the [Running the On-Premises Extractor Using Docker \(Linux and Windows\) \[page 160\]](#) section.
7. Create a new connection in SAP Signavio Process Intelligence user interface and link this connector to it.  
See the [Create a Connection and Link it with the On-Premises Extractor \[page 151\]](#) section.
8. Create a source data and perform the extraction.  
See the [Creating a Source Data \[page 178\]](#) section.

## Related Information

[Updating the On-Premises Extractor Version \(Linux and Windows\) \[page 163\]](#)

[Stopping and Deleting the On-Premises Extractor \(Linux and Windows\) \[page 167\]](#)

## 3.6.6.1 Requirements for On-Premises Extractor Setup Using Docker

Find out the prerequisites for using the on-premises extractor through Docker.

Before setting up the on-premises extractor using Docker, make sure you've met all the following requirements:

- [Hardware, Software, and Network Requirements \[page 143\]](#)
- [Access Requirements for Process Data Management \[page 52\]](#)
- [Set Up the On-Premises Server \[page 145\]](#)
- [Prepare Access to Your Source System \[page 145\]](#)
- [Docker Environment Requirements \(Linux and Windows\) \[page 155\]](#)
- [Creating a User \(Linux\) \[page 156\]](#)

### ⓘ Note

Only Linux users need to create a new user named `etluser`. Windows users don't require this.

### 3.6.6.1.1 Docker Environment Requirements (Linux and Windows)

Find out what's needed to configure and run the on-premises extractor using Docker.

Before you start using Docker for configuring the on-premises extractor, make sure you've met the following requirements in addition to the prerequisites listed in the Requirements for On-premises Extractor Setup Using Docker section.

#### Linux

- Working Docker environment.
- Necessary permissions to create a new user named `etluser` and add that user to the user group named `docker`.
- Permission to create a directory. Make sure that the `etluser` has write access to that directory.
- An on-premises extractor was created in the SAP Signavio Process Intelligence user interface.

#### Windows

- Working Docker environment.
- Rights to create a directory.
- An on-premises extractor was created in the SAP Signavio Process Intelligence user interface.

### ⓘ Note

It's recommended that you install Docker Desktop on your Windows machine.

## Related Information

[Requirements for On-Premises Extractor Setup Using Docker \[page 155\]](#)

[Creating a User \(Linux\) \[page 156\]](#)

### 3.6.6.1.2 Creating a User (Linux)

Learn how to create a new user using your Linux system.

## Context

Once you've met all the requirements to setup the on-premises extractor using Docker, create the user named `etluser` and add that user to the user group named `docker`. Then, you can prepare the environment for the on-premises extractor and log into SAP's Docker repository.

### ⓘ Note

Ensure that you've got the necessary permissions to create a new user on your Linux system. Then add that user to the `docker` user group.

User creation is only required for audience working with Linux systems.

## Procedure

1. To create a new user, `etluser`, run:

```
sudo useradd -rm etluser
```

2. To add the user to the `docker` user group, run:

```
sudo usermod -aG docker etluser
```

## Related Information

[Requirements for On-Premises Extractor Setup Using Docker \[page 155\]](#)

[Preparing the Environment for On-Premises Extractor \(Linux and Windows\) \[page 157\]](#)

## 3.6.6.2 On-Premises Extractor Initial Configuration Using Docker

Learn how to install and run the on-premises extractor with Docker.

Before getting started, make sure that you've met all the prerequisites.

To install and run the extractor, follow these steps:

1. [Create an On-Premises Extractor in SAP Signavio Process Intelligence \[page 149\]](#)
2. [Preparing the Environment for On-Premises Extractor \(Linux and Windows\) \[page 157\]](#)
3. [Logging into the Docker Repository \[page 160\]](#)
4. [Running the On-Premises Extractor Using Docker \(Linux and Windows\) \[page 160\]](#)

### Related Information

[Requirements for On-Premises Extractor Setup Using Docker \[page 155\]](#)

## 3.6.6.2.1 Preparing the Environment for On-Premises Extractor (Linux and Windows)

Learn how to configure the environment for the on-premises extractor on Linux and Windows machines.

### Prerequisites

- Check if you've met all the requirements listed in the [Docker Environment Requirements \(Linux and Windows\) \[page 155\]](#) section.
- For Linux systems, make sure you've created a new user named `etluser` and added that user to the user group named `docker`.

### Context

Once you've created the on-premises extractor in SAP Signavio Process Intelligence, you need to configure the on-premises extractor.

# Linux

## Procedure

1. Create a working directory, for example, in your home directory, by running:

```
mkdir -p ~/onprem-extractor/etltmp/logs
```

Running this command creates a directory called `onprem-extractor`, along with a sub-directory called `etltmp`. The `etltmp` contains another sub-directory called `logs`.

2. Make sure that the `etluser` has write access to the directory. To do so,

1. Change the owner of the directory to the `etluser` by running:

```
sudo chown -R etluser:etluser ~/onprem-extractor
```

2. Grant write permission to the owner of the directory (`etluser`):

```
sudo chmod -R u+w ~/onprem-extractor/etltmp
```

3. Switch to the working directory by running:

```
cd ~/onprem-extractor
```

4. Switch to the `etluser` by running:

```
sudo su etluser
```

5. Copy the extractor parameters from SAP Signavio Process Intelligence user interface.

1. Open  [\(Data Integration\)](#)  [On-Premises Extractors](#) in the sidebar.

2. To copy the extractor parameters, select  [\(More\)](#)  [Copy Parameter to Clipboard](#) for the extractor that you want to connect.

6. Paste the copied parameters into the configuration file `config.env` using either of the following ways:

1. **Recommended:** Create the `config.env` file manually in the working directory, `onprem-extractor`, using the file explorer of your choice. Paste the parameters in the `config.env` file.

2. Alternatively, you can run the following command:

```
echo "<<extractor_credentials>>" > config.env
```

Replace the "`<<extractor_credentials>>`" with the copied parameters and make sure that the credentials are within quotes.

After substituting the `extractor_credentials` with the actual values, the command looks like the following:

```
echo "EXTRACTOR_ID=value  
EXTRACTOR_SECRET=value  
WEBSOCKET_SERVER_ADDRESS=value" > config.env
```

### Caution

Running the `echo` command stores the extractor credentials in the console's command history.

The `etluser` has write access to the working directory `onprem-extractor`, which contains a valid `config.env` file.

## Next Steps

[Logging into the Docker Repository \[page 160\]](#)

# Windows

## Procedure

1. Create a working directory, for example in your home directory with `etltmp\logs` sub-directory. To do so, run the command:

```
# the directory needs to be created with specific sub-directories
```

```
mkdir %HOMEDRIVE%&%HOMEPATH%\onprem-extractor\etltmp\logs
```

Running this command creates a directory called `onprem-extractor`, along with a sub-directory called `etltmp`. The `etltmp` contains another sub-directory called `logs`.

2. Switch to the working directory by running:

```
cd %HOMEDRIVE%&%HOMEPATH%\onprem-extractor
```

3. Copy the extractor parameters from SAP Signavio Process Intelligence user interface.

1. Open  [\(Data Integration\)](#)  [On-Premises Extractors](#)  in the sidebar.
2. To copy the extractor parameters, select  [\(More\)](#)  [Copy Parameter to Clipboard](#)  for the extractor that you want to connect.

4. Paste the copied parameters into the configuration file `config.env` of your working directory, `onprem-extractor`.

Create the `config.env` file manually in the working directory using the file explorer of your choice. Paste the parameters in the `config.env` file.

The working directory, `onprem-extractor`, exists with a valid `config.env` file.

## Next Steps

[Logging into the Docker Repository \[page 160\]](#)

### 3.6.6.2.2 Logging into the Docker Repository

Learn how to log into the SAP-provided Docker repository.

#### Context

Once you've prepared the environment for the on-premises extractor, the next step is to log into SAP's Docker repository.

#### Procedure

1. To log in to the Docker repository, run:

```
docker login -u <>YOUR_S-USERNAME>>
73555000100900006498.dockersrv.base.repositories.cloud.sap
```

Enter your S-User name in the <>YOUR\_S-USERNAME>>. For example,

```
docker login -u S891035
73555000100900006498.dockersrv.base.repositories.cloud.sap
```

2. When prompted, enter the password for your S-User name.

```
# Type your password and hit Enter.
Password:
```

3. After successful login, the following confirmation message is displayed.

Login Succeeded.

### 3.6.6.2.3 Running the On-Premises Extractor Using Docker (Linux and Windows)

Learn how to run the on-premises extractor using the Docker image.

#### Context

Once you've prepared the environment for the on-premises extractor and logged in to SAP's Docker repository, you must download a specific version of the extractor and run it.

You can get the latest version of the on-premises extractor from the SAP Signavio Process Intelligence user interface. Open the [On-Premises Extractors](#) from the sidebar and hover over the option to view the version number.

For more information on how to use Docker, refer to the official documentation of Docker at <https://docs.docker.com/>.

## Linux

### Prerequisites

Ensure that you've the following:

- Logged in to SAP's Docker repository
- Set up the environment for the on-premises extractor
- Created a new user named `etluser` and added to the user group named `docker`

### Procedure

1. In the following command, substitute the `<>` (available at two places in the command) with the new version of the on-premises extractor you've downloaded. Ensure that the working directory contains the `config.env` file, which was created while preparing the environment. Then, execute the command in the working directory to run the extractor.

```
docker run \
--detach \
--env-file config.env \
--env ETLUSER_UID=$(id -u) \
--volume ./etltmp/logs:/etltmp/logs \
--name sap-signavio-pi-onprem-extractor-<> \
--restart unless-stopped \
--memory 8g \
--hostname=docker-$(hostname) \
73555000100900006498.dockersrv.base.repositories.cloud.sap/sap-signavio-pi-
onprem-extractor:<>
```

When you run the command, the Docker image pulls the specified version of the on-premises extractor and runs the extractor. If the command is successful, the container ID in which the on-premises extractor is running will be displayed in the console.

2. Switch to the SAP Signavio Process Intelligence user interface and check if the on-premises extractor status is connected.
3. To view the list of containers, run the command:

```
docker container ls
```

For more information on how to use Docker, refer to the official documentation of Docker.

## Next Steps

Create a connection and link it to the on-premises extractor. Then, create a source data and perform the test extraction.

See the [Creating a Source Data \[page 178\]](#) and [Create a Connection and Link it with the On-Premises Extractor \[page 151\]](#) sections.

## Windows

### Prerequisites

Ensure that you've the following:

- Logged in to the SAP Docker repository
- Environment setup for the on-premises extractor

### Procedure

1. In the following command, substitute the <> (available at two places in the command) with the new version of the on-premises extractor you've downloaded. Ensure that the working directory contains the config.env file, which was created while preparing the environment. Then, execute the command in the working directory to run the extractor.

```
docker run ^
--detach ^
--env-file config.env ^
--env ETLUSER_UID=0 ^
--volume .\etltmp\logs:/etltmp/logs ^
--name sap-signavio-pi-onprem-extractor-<> ^
--restart unless-stopped ^
--memory 8g ^
73555000100900006498.dockersrv.base.repositories.cloud.sap/sap-signavio-pi-
onprem-extractor:<>
```

When you run the command, the Docker image pulls the specified version of the on-premises extractor and runs the extractor.

For more information on how to use Docker, refer to the official documentation of Docker.

2. After executing this command, you'll be asked to allow Docker access to the logs directory in your working directory. Select **Yes**.
3. Switch to the SAP Signavio Process Intelligence user interface and check if the on-premises extractor status is connected.

## Next Steps

Create a connection and link it to the on-premises extractor. Then, create a source data and perform the test extraction.

See the [Creating a Source Data \[page 178\]](#) and [Create a Connection and Link it with the On-Premises Extractor \[page 151\]](#) sections.

### 3.6.6.3 Updating the On-Premises Extractor Version (Linux and Windows)

Learn how to update the on-premises extractor to the new version.

You can configure and run the new version of the on-premises extractor using Docker.

To update the version of the on-premises extractor, follow these steps:

#### Step 1: Create a New On-Premises Extractor in SAP Signavio Process Intelligence

You need to create an on-premises extractor in SAP Signavio Process Intelligence user interface.

For information on how to create, see the [Create an On-Premises Extractor in SAP Signavio Process Intelligence \[page 149\]](#) section.

#### Step 2: Set the Environment for the New Version of On-Premises Extractor

For setting up the environment for the new on-premises extractor version, the working folder name must be unique. When creating the working directory, choose a different name than the already running extractor. For example, onprem-extractor-new (a new extractor name) instead of onprem-extractor (an old extractor name).

##### ⓘ Note

All the commands in this step use onprem-extractor-new as the working directory name for the new extractor version.

When setting the environment, make sure that you substitute the correct name of the new working directory and the new version of the on-premises extractor into the commands.

When obtaining credentials from the user interface, get them from the newly created extractor.

Once the new extractor is installed and tested, you can delete the old extractor.

#### Linux

Prerequisites:

- A new user named `etluser` was created and added to the `docker` user group.
  - A new on-premises extractor in SAP Signavio Process Intelligence.
1. Create a working directory, for example, in your home directory, by running:

```
mkdir -p ~/onprem-extractor-new/etltmp/logs
```

2. Make sure that the `etluser` has write access to the directory. To do so,
  - Change the owner of the directory to the `etluser` by running:

```
sudo chown -R etluser:etluser ~/onprem-extractor-new
```

Substitute the correct name of the new directory in the command.

- Grant write permission to the owner of the directory (`etluser`):

```
sudo chmod -R u+w ~/onprem-extractor-new/etltmp
```

Substitute the correct name of the new directory in the command.

3. Switch to the working directory by running:

```
cd ~/onprem-extractor-new
```

Substitute the correct name of the new directory in the command.

4. Switch to the `etluser` by running:

```
sudo su etluser
```

5. Copy the extractor parameters from the SAP Signavio Process Intelligence user interface.

1. Open  [\(Data Integration\)](#)  [On-Premises Extractors](#) in the sidebar.  
2. To copy the extractor parameters, select  [\(More\)](#)  [Copy Parameter to Clipboard](#) for the extractor that you want to connect.

6. Paste the copied parameters into the configuration file `config.env` using either of the following ways:

- **Recommended:** Create the `config.env` file manually in the working directory using the file explorer of your choice. Paste the parameters in the `config.env` file.
- Alternatively, you can run the following command:  
`# Replace <<extractor_credentials>> with your new extractor credentials, and make sure that the credential text is quoted.`

```
echo "<<extractor_credentials>>" > config.env
```

Replace the "`<<extractor_credentials>>`" with the copied parameters. Make sure that the parameters are enclosed in quotes.

After substituting the `extractor_credentials` with the actual values, the command looks like the following:

```
echo "EXTRACTOR_ID=value
EXTRACTOR_SECRET=value
WEBSOCKET_SERVER_ADDRESS=value" > config.env
```

## Windows

**Prerequisite:** Ensure that you've already created a new on-premises extractor in SAP Signavio Process Intelligence.

1. Create a working directory, for example, in your home directory, by running:

```
mkdir %HOMEDRIVE%&%HOMEPATH%\on-prem-extractor-new\etltmp\logs
```

For example, `mkdir %HOMEDRIVE%&%HOMEPATH%\onprem-extractor-new\etltmp\logs`.

2. Switch to the working directory by running:

```
cd %HOMEDRIVE%&%HOMEPATH%\onprem-extractor-new
```

Substitute the correct name of the new directory in the command.

3. Copy the extractor parameters from the SAP Signavio Process Intelligence user interface.

1. Open  [\(Data Integration\)](#)  [On-Premises Extractors](#) in the sidebar.
2. To copy the extractor parameters, select  [\(More\)](#)  [Copy Parameter to Clipboard](#) for the extractor that you want to connect.
4. Paste the copied parameters into the configuration file `config.env`.  
Create the `config.env` file manually in the working directory using the file explorer of your choice. Paste the parameters into the `config.env` file.

## Step 3: Log in to the Docker Repository

The commands for logging into the SAP provided Docker repository are the same for both Linux and Windows systems.

For commands, see the [Logging into the Docker Repository \[page 160\]](#) section.

## Step 4: Run the On-Premises Extractor

### Linux

1. Substitute the `<<version>>` (available at two places in the command) with the new extractor version and execute this command in the working directory to run the extractor:

```
docker run \
--detach \
--env-file config.env \
--env ETLUSER_UID=$(id -u) \
--volume ./etltmp/logs:/etltmp/logs \
--name sap-signavio-pi-onprem-extractor-<<version>> \
--restart unless-stopped \
--memory 8g \
--hostname=docker-$(hostname) \
73555000100900006498.docker.srv.base.repositories.cloud.sap/sap-signavio-pi-
onprem-extractor:<<version>>
```

2. Switch to SAP Signavio Process Intelligence user interface and check if the on-premises extractor status is connected. Perform a test extraction.  
If the new extractor isn't working properly, don't perform the next step, which is deleting the old version of the extractor.
3. If the new extractor works, link the new extractor to the existing connection.

## Windows

1. Substitute the <> with the new extractor version and execute this command in the working directory to run the extractor:

```
docker run ^
--detach ^
--env-file config.env ^
--env ETLUSER_UID=0 ^
--volume .\etltmp\logs:/etltmp/logs ^
--name sap-signavio-pi-onprem-extractor-<> ^
--restart unless-stopped ^
--memory 8g ^
73555000100900006498.dockersrv.base.repositories.cloud.sap/sap-signavio-pi-
onprem-extractor:<>
```

2. After executing this command, you'll be asked to allow Docker access to the logs directory in your working directory. Select Yes.
3. Switch to SAP Signavio Process Intelligence user interface and check if the on-premises extractor status is connected. Perform a test extraction.  
If the new extractor isn't working properly, don't perform the next step, which is deleting the old version of the extractor.
4. If the new extractor works, link the new extractor to the existing connection.

## Step 5: Stop and Delete the Old On-Premises Extractor

### Linux

1. Get the Docker container with the running on-premise extractor by running the command:

```
docker ps --filter "name=sap-signavio-pi-onprem-extractor"
```

2. Find the extractor by version and copy its CONTAINER ID.
3. Stop and delete the on-premise extractor container.

```
docker rm -f <>
```

Substitute the <> with your actual container ID.

4. Delete the old extractor in SAP Signavio Process Intelligence user interface.

### Windows

1. In Docker Desktop, locate the container running the on-premise extractor.
2. Stop and delete the container using the Docker Desktop user interface.
3. Delete the old extractor in SAP Signavio Process Intelligence user interface.

## Related Information

[Create a Connection and Link it with the On-Premises Extractor \[page 151\]](#)

### **3.6.6.4 Stopping and Deleting the On-Premises Extractor (Linux and Windows)**

Learn how to stop the running extractor and then delete it.

#### **Prerequisites**

You need an on-premises extractor that's already running.

## **Linux**

#### **Procedure**

1. Get the Docker container with the running on-premise extractor by running the command:

```
docker ps --filter "name=sap-signavio-pi-onprem-extractor"
```

2. Find the extractor by version and copy its CONTAINER ID.
3. Stop and delete the on-premise extractor container by running:

```
docker rm -f <<containerId>>
```

Replace the <<containerId>> with your actual container ID.

4. Delete the old extractor in SAP Signavio Process Intelligence user interface.

## **Windows**

#### **Procedure**

1. In Docker Desktop, locate the container running the on-premise extractor.
2. Stop and delete the container using the Docker Desktop user interface.
3. Delete the old extractor in SAP Signavio Process Intelligence user interface.

### **3.6.7 Errors Related to On-Premises Source Systems**

Find solutions to common errors with data pipelines.

Find solutions to errors that can occur when using the on-premises source systems.

## FileNotFoundException Hadoop Not Set

When running the `start.bat` script the following error occurs in the terminal:

```
exception: java.lang.RuntimeException: java.io.FileNotFoundException:  
java.io.FileNotFoundException: HADOOP_HOME and hadoop.home.dir are unset.
```

Solution:

Install the latest version of [Microsoft VC++](#) to resolve this error.

## Java OutOfMemory Exception

When using the on-premises connector, a Java 'OutOfMemory' exception occurs.

Solution:

### ⓘ Note

This solution is only applicable to non-Windows servers. For Windows servers, please contact our SAP Signavio service experts from the [SAP for Me portal](#).

Edit the `start.sh` script and increase the memory allocation in the first line of the script below:

```
java -jar -Xms2g -Xmx4g -XX:MetaspaceSize=128m -  
XX:MaxMetaspaceSize=1024m -Djava.library.path=${CWD}/ -Djava.io.tmpdir=/etltmp  
-XX:+ExitOnOutOfMemoryError \  
-XX:+CrashOnOutOfMemoryError \  
-XX:+HeapDumpOnOutOfMemoryError \  
-XX:ErrorFile=/etltmp/hs_errlogs/core/hs_err_core_pid.$$.`date +%Y%m%d%H%M`.log \  
-XX:HeapDumpPath=/etltmp/heapdump/core/core.bin.$$.`date +%Y%m%d%H%M` \ ./pi-etl-  
extractor-* .jar
```

## Extracted Incorrect Numeric Data Type Values

When extracting data with the on-premises extractor connected to the RFC function module, the numeric data type values are split off into multiples or fractions of the actual value. This is due to the misinterpretation of decimal separators. For example, the actual value is 15.000 USD and the extracted value is 15 USD.

Solution:

Install the [SAP Note 3297175](#), and rerun the extraction.

## 3.7 Get Data into SAP Signavio Process Intelligence

Learn different ways to get your process data into SAP Signavio Process Intelligence.

Process data can reside in different databases, in the cloud, or in files. SAP Signavio Process Intelligence offers the following ways to help you bring in your process data and start analyzing it.

- Data extraction
- Manual data upload
- APIs

### Data Extraction

Connect to your source data systems and extract data. Depending on your use case, perform extraction in **Standard or Advanced mode**. SAP Signavio Process Intelligence offers various extraction options, each with its own purpose.

For more information, see [Data Extraction Options \[page 169\]](#).

### Manual Data Upload

Upload your data manually into a process, or use the Manual upload connection type to upload data as zipped CSV files.

For detailed information, see [Manually Upload Data \[page 226\]](#).

### Using APIs

Using Ingestion API or Data Upload API.

For information about uploading and ingesting data, see [Data Upload and Ingestion Options \[page 171\]](#).

### 3.7.1 Data Extraction Options

Learn about the extraction types, different extraction options, and modes of extraction.

To understand the extraction options, you must first comprehend the extraction types and how data is extracted based on the configuration in the Source Data.

The following are the main data extraction types, along with specifics on what is considered during data extraction:

Extraction Type	Data Extraction Considerations
Initial load	<ul style="list-style-type: none"><li>• If the partition strategy is configured, partitions are considered.</li><li>• Delta filter is ignored.</li><li>• SQL filter is considered.</li></ul>

Extraction Type	Data Extraction Considerations
Delta load	<ul style="list-style-type: none"> <li>If the partition strategy is configured with a date/time column and this column is also in the delta filter, the partition for this column is considered. In any other case, the partitions aren't considered.</li> <li>If the delta filter is configured, then it's considered.</li> <li>SQL filter is considered.</li> </ul>

## Extraction Options

The functionality of extraction options varies based on where they're available within SAP Signavio Process Intelligence:

Extraction Options in SAP Signavio Process Intelligence	Functionality
<a href="#">Extract</a> button in <a href="#">Source Data &gt; Configuration</a> screen.	Performs initial load extraction for the selected table.
<a href="#">Extract</a> option available in the table details view screen of Source Data.	Performs delta load for the selected table.
<a href="#">Extract</a> option available in the Source Data header menu.	Performs delta load for selected tables on the Source Data screen.
<a href="#">Run ETL</a> (manually or automatically) in a Process Data Pipeline.	Performs delta load for all the Source Data tables in a pipeline.

## Modes of Extraction

You can extract data from your source system using either of the following modes:

- [Standard Data Extraction \[page 185\]](#)
- [Advanced Data Extraction \[page 208\]](#)

## Related Information

[Creating a Source Data \[page 178\]](#)

## 3.7.2 Data Upload and Ingestion Options

Find different ways to ingest and upload data, and also their use cases.

The different ways to ingest and upload data into SAP Signavio Process Intelligence are as follows:

- [Data ingestion \[page 171\]](#)
- [Manually upload data \[page 171\]](#)

### Data Ingestion

Data ingestion is a process of loading data from one or more sources into SAP Signavio Process Intelligence. Once the data is ingested, it can be transformed, making it available for querying and analyzing data.

The following table contains different ways to ingest data:

Ways to Ingest Data	Use Cases	Input Data
Data ingestion through connectors  Different types of connections such as, SAP ERP, AWS S3, Service Now, Big-Query and more to link with process data pipeline and source data systems.	Connect your source systems with SAP Signavio Process Intelligence for the extraction and transformation of your process data to make it available for process mining or process analysis.  Refer to Creating a Connection section.	Data is ingested into SAP Signavio Process Intelligence depending on the source system that is hosted in a cloud environment.
Data Ingestion API	Use this API to ingest your data into SAP Signavio Process Intelligence for transforming, creating event logs, and loading the final event logs into a process. You need to add your ingestion API credentials and the data is ingested from your source system, which is connected with that API.  Refer to the Ingestion API section.	Supports CSV and TSV file formats

### Manually Upload Data

You can manually upload data into SAP Signavio Process Intelligence and process data management system. If you ingest raw data, it can be transformed and loaded into the system to query and analyze data. If you ingest the final event logs or transformed data, it can then be analyzed in the SAP Signavio Process Intelligence.

The following table contains different ways to upload data:

Ways to upload data	Use Cases	Input Data
Manual CSV upload connector	<p>Use this connector to manually upload the raw data into the SAP Signavio system as zipped CSV files.</p> <p>Read more about the connector in <a href="#">Connector - Manual CSV Upload</a> section and about uploading process data as CSV files in <a href="#">Creating a Connection</a> section.</p>	Raw data in zipped CSV files
Manually upload data directly into a process	<p>Use this option to manually upload data directly into a process. You create a process in SAP Signavio Process Intelligence and upload data to it.</p> <p>Read more in the <a href="#">Upload Process Data Files</a> and <a href="#">Process Settings</a> sections.</p>	<p>Supports CSV and XES file formats</p> <p>Read more about file types in the <a href="#">Data file types [page 44]</a> section.</p>
Data upload API, also known as event log upload API	<p>Use this API if you have already extracted, transformed and loaded data into a system outside of SAP Signavio and want to load your final event logs into a process to analyze the data.</p> <p>Read more about uploading data into a process through an API in <a href="#">Data upload API</a> section.</p>	Final event logs in CSV and XES file formats

## Related Information

[Creating a Connection \[page 135\]](#)

[Upload Data Using the Ingestion API \[page 222\]](#)

[Connector - Manual CSV Upload \[page 119\]](#)

[Upload process data files \[page 41\]](#)

[Process Settings \[page 21\]](#)

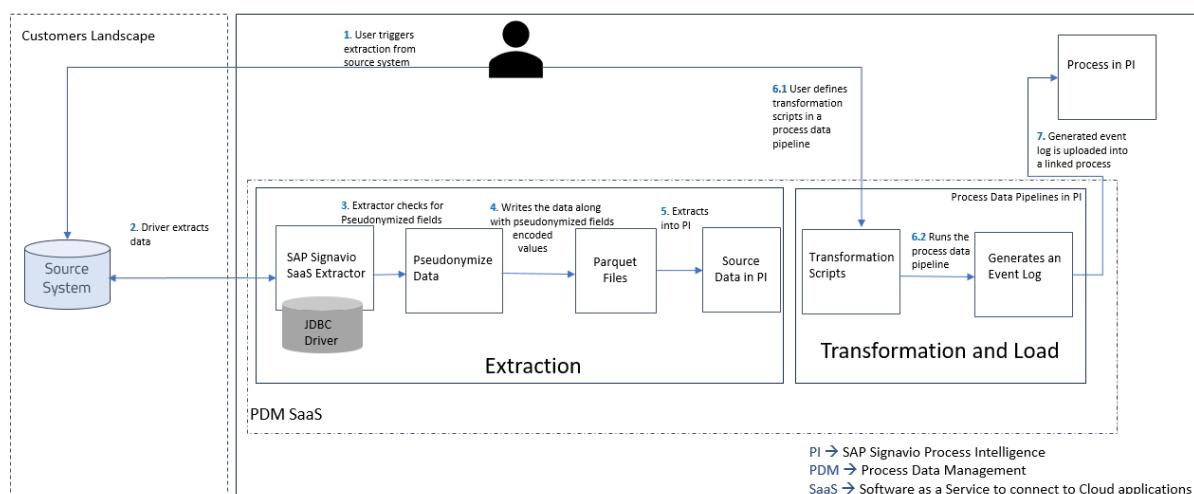
### 3.7.3 How the Data is Extracted from SaaS Applications

Get a quick technical overview of the data extraction from SaaS applications, and how the pseudonymization happens during data extraction.

#### Data Extraction from SaaS Applications with Pseudonymization

Pseudonymization replaces personally identifiable data with artificial pseudonyms. The pseudonymization happens before the data reaches SAP Signavio Process Intelligence. During the data extraction process, the SaaS extractor checks the data from the source system for pseudonymized fields. When configured for pseudonymization, the extractor encodes the data before it reaches the SAP Signavio Process Intelligence application.

The following illustration provides the high-level overview of the systems and components involved when you establish a connection between a SaaS application and SAP Signavio Process Intelligence.



The data flow between the SaaS application and SAP Signavio Process Intelligence is described as follows:

- When the user triggers the data extraction in SAP Signavio Process Intelligence, the extractor utilizes the JDBC driver to extract the data from the connected source system.  
This extraction process returns a Java object with data to the SAP Signavio Process Intelligence application. The SAP Signavio Process Intelligence application sequentially processes (record-by-record basis) each data record within a Java object.

#### ⓘ Note

The Java object is stored in memory until it's processed, and then the object is deleted by Java's garbage collector.

- The SAP Signavio SaaS extractor checks the retrieved data for pseudonymized fields.
- If the field is configured for pseudonymization, the application encodes the field and then writes the encoded values to the parquet file.  
The application encodes the text values into hexadecimal values using the SHA3-256 algorithm.
- For further processing, the parquet files are stored in the temp directory, which is created by the application.

- The data in the form of parquet files is transferred to the SAP Signavio Process Intelligence through the connection type that you've created as part of the setup.

#### Note

The *Table Preview* tab within the *Source Data* feature also displays the pseudonymized data retrieved from the source system with its placeholder values. The data accessible in the *Table Preview* tab is obtained directly by returning the Java object to the SAP Signavio Process Intelligence application. It doesn't need to be written to the parquet files.

- When you create a process data pipeline with transformation script and run the pipeline, the data is transformed and an event log is generated. This event log is uploaded into the process linked in your process data pipeline.
- The data available in the process can be used for data analysis and process data mining.

## Related Information

[How the On-Premises Extractor Works \[page 139\]](#)

### 3.7.4 Extract Data from Source Systems

Learn how to get started with extracting data from source systems.

Data extraction is the process of getting data from a given source into SAP Signavio Process Intelligence for further processing and analysis. The data can come from various sources such as, enterprise systems, cloud storage or warehouse, database, CSV file uploads, APIs, and other.

**To extract data from source systems, you need the following:**

- A valid connection with your source system.
- A source data using the valid connection.
- The Source Data with tables and columns from which you want to extract data.
- Tables and columns configuration:
  - Make certain columns as key columns.
  - Pseudonymize the personally identifiable data.
  - Add column descriptions
  - Prepare initial load to extract data based on your criteria.
  - Set delta filters if you want to periodically extract data from your source system.

**Select the links below to learn more about each topic.**

[Use Cases of Standard and Advanced Extraction \[page 175\]](#)

This section explains the use cases of two modes of extraction, standard and advanced.

[Managing Source Data \[page 176\]](#)

Find how to customize source data to define which data is extracted from a connected source system and loaded into SAP Signavio Process Intelligence.

[Managing Tables for Data Extraction \[page 180\]](#)

You can customize the data extraction by adding or removing tables and columns to or from source data. You can also add column descriptions.

## Related Information

[Connection Types and Available Connectors \[page 62\]](#)

[Creating a Connection \[page 135\]](#)

### 3.7.4.1 Use Cases of Standard and Advanced Extraction

This section explains the use cases of two modes of extraction, standard and advanced.

#### When to Use Standard Extraction

Data extraction can be handled easily using SAP Signavio Process Intelligence user interface components, without using the custom code. The standard extraction setup is easy with user interface, and the only requirement is data. Therefore, whenever possible, use the standard data extraction.

#### When to Use Advanced Data Extraction

##### Note

When it comes to more complex scenarios, the data needs to be extracted using custom code. Therefore, you must be familiar with SQL code and YAML to use the advanced data extraction.

Following are other possible use cases for choosing advanced data extraction:

- When you need two or more delta parameters to extract the table.
- When you want to partition data based on range.
- When you want to join two or more tables for the extraction.
- When the table does not have sufficient columns or data to run delta loads. For example, a missing date parameter that indicates the change or creation of a record or missing an ascending object number, etc.
- When you want to reduce the number of records in a table that is linked to your main table, even if it has a delta parameter. In this case, you can use another table to pull records of a certain type, such as a specified document type.
- When tables have key columns with null values and need to be handled separately. For example, table QAVA - CONCAT(MANDANT, PRUEFLOS, KZART, COALESCE(ZAEHLER, 'NULL')) AS c\_key.

To extract data, you need a connector that is linked to a source system. The connector forms a link between your source system and SAP Signavio Process Intelligence. All connectors support standard data extraction, whereas only the SAP ERP connector supports both standard and advanced extraction.

The SAP ERP connector is used for creating examples in the data extraction sections.

## 3.7.4.2 Managing Source Data

Find how to customize source data to define which data is extracted from a connected source system and loaded into SAP Signavio Process Intelligence.

A source data defines what data is extracted from a source system. The data extraction is configured in source data. You can set up different source data using the same connection and data set.

The criteria you set while creating source data is applied to the table data of the source system during extraction.

**Select the links below to learn more about each topic.**

### [Viewing Source Data \[page 176\]](#)

Learn how to get to the Source Data feature in SAP Signavio Process Intelligence and view the available options.

### [Creating a Source Data \[page 178\]](#)

Find out how to create a source data, which defines what is extracted from a process data pipeline.

### [Linking a Connection or Changing the Linked Connection \[page 179\]](#)

Find out how to link a connection while creating and editing a source data.

### [Editing, Renaming, and Deleting a Source Data \[page 179\]](#)

Learn how to rename, edit, and delete a source data.

## Related Information

### [Managing Tables for Data Extraction \[page 180\]](#)

### [Adding Tables \[page 183\]](#)

### [Standard Data Extraction \[page 185\]](#)

### [Advanced Data Extraction \[page 208\]](#)

### [Running the Initial Load Extraction \[page 220\]](#)

### [Scheduling the Data Extraction \[page 221\]](#)

## 3.7.4.2.1 Viewing Source Data

Learn how to get to the Source Data feature in SAP Signavio Process Intelligence and view the available options.

To view the source data, open  (Data Integration)  in the sidebar. (You also view source data in the Repository.)

The Source Data overview page appears with the following options:

Available Option	Description
Create	Create a new source data.
⬇️⬆️	Sort available source data by ascending or descending order. In addition, sort by name, connection type, created by, and created at.
🔍	Filter available source data based on name, connection type, created by, and created at.  To apply filter, select 🔎 . In the <i>View Settings</i> popup, select the filter option from the list and then <i>Ok</i> . To clear all active filters, select <i>Reset</i> .  The number next to the 🔎 option indicates the active filters.
☷	Shows available source data in a card view.  Each card shows the status of the source data. For example, Never executed, Error, Canceled, Completed.  Each card has an action menu ⚡ with <i>Rename</i> and <i>Delete</i> .
☷	<p><b> ⓘ Note</b></p> <p>Your assigned feature set determines which options appear in the action menu. For information on feature sets, see <a href="#">Access Requirements for Process Data Management [page 52]</a></p>
☷	Shows available source data in table form.  Sorts the available source data by ascending or descending order using the options ↑ or ↓ next to some column names in a table.
🔍	Type to search the source data.

## Viewing Connection Status in Source Data

Following status messages show up next to the name of the source data in the header:

- *No Connection* - No connection is linked to source data.
- *Invalid Connection* - A connection with invalid credentials and extra connection arguments.  
While creating a source data, if you choose *New Connection* option, a connection is created and linked to source data automatically. The *Invalid Connection* then shows in that source data header. To make it a valid connection, add connection credentials.

## 3.7.4.2.2 Creating a Source Data

Find out how to create a source data, which defines what is extracted from a process data pipeline.

### ⓘ Note

To create a source data, you need the feature set SAP Signavio Process Intelligence - Data Integration and editor or manager permission on the folder in which you want to create the source data. Your administrator can enable these for you.

After establishing a connection with your source system, you must create a source data using that connection type. While creating a source data, you're prompted to choose a connection, and you need to choose the one you've created earlier.

A source data can be used in the following areas:

- You create a new source data and link it to a process data pipeline.
- While creating a process data pipeline, if you choose the [New Source Data](#) option, then a source data is automatically created and linked to the process data pipeline. The following applies:
  - If you've set up your process data pipeline with a transformation template, the source data is preconfigured. You can customize the source data if necessary.
  - If you didn't use a template, you need to configure the source data.

Read more in the section [Create a process data pipeline \[page 251\]](#).

To create a new source data, follow these steps:

1. Open [\(Repository\)](#) or [\(Data Integration\)](#) in the sidebar.
2. Select [Create](#) or [Create](#) (in the Repository). The page for creating a connection opens.
3. Enter a name for the source data.
4. In the [Repository](#) field, if a folder is not already selected, select one.  
When you create a source data from the Repository, the [Repository](#) field is preselected with the folder from which you selected [Create](#) . When you create a source data under , Repository is preselected if you have editor or manager permission on the root folder. If you don't have editor or manager permission on the root folder, no folder is preselected and you have to select a folder.
5. Select a connection type from the available list.
6. Under [Connection Linked to Source Data](#), you can select an existing connection or create a new connection. You can change the connection later if necessary.
7. Select [Create](#). The source data is created and the [Edit source data](#) page opens.

### ⚡ Example

To customize the source data, you can perform the following tasks:

- [Managing Tables for Data Extraction \[page 180\]](#)
- [Standard Data Extraction \[page 185\]](#)
- [Advanced Data Extraction \[page 208\]](#)
- [Running the Initial Load Extraction \[page 220\]](#)
- [Scheduling the Data Extraction \[page 221\]](#)

## Related Information

[Managing Tables for Data Extraction \[page 180\]](#)

[Standard Data Extraction \[page 185\]](#)

[Advanced Data Extraction \[page 208\]](#)

### 3.7.4.2.3 Linking a Connection or Changing the Linked Connection

Find out how to link a connection while creating and editing a source data.

#### Context

While creating a source data, you're prompted to choose a connection. If you've already linked a connection, you can still change to a new connection. Before you do that, make sure that the source data is not linked to any process data pipeline that's running or scheduled to run. If the source data is part of any pipeline run, then that pipeline execution fails.

Follow these steps:

1. Open  [\(Repository\)](#) or  [\(Data Integration\)](#)  in the sidebar.
2. Open your source data for editing.
3. To view, add, or change connection, select *Connection* from your *Source Data* header.  
The dialog for linking opens.
4. You have the following options:
  - If no connection is linked, select *Link a connection*.
  - If you want to choose another connection, select *Link a new connection*.The dialog for selecting a connection opens.
5. Choose a connection and select *Link a new connection*.  
The connection is linked to the source data.

### 3.7.4.2.4 Editing, Renaming, and Deleting a Source Data

Learn how to rename, edit, and delete a source data.

#### Note

Before you edit or delete a source data, make sure that the source data is not linked to any process data pipeline that's running or scheduled to run. If the source data is part of any pipeline run, then it fails.

## Editing a Source Data

1. Open  [\(Repository\)](#) or  [\(Data Integration\)](#)  in the sidebar.
2. Click on the source data that you want to edit.  
The details page for the source data opens.

## Renaming and Deleting a Source Data

1. Open  [\(Repository\)](#) or  [\(Data Integration\)](#)  in the sidebar.
  2. To rename or delete the source data, select 
    - To change the name of your source data, select [Rename](#), add a name, and confirm with [Save](#).
    - To delete, select [Delete](#), confirm in the dialog that opens, and select [Delete](#).
- You can also rename and delete a source data from the overview page for that source data.

### Note

- Deleting source data can't be undone.
- The following status messages appear beside the name of the source data:
  - [No Connection](#) - If no connection is linked to source data
  - [Invalid Connection](#) - For invalid connection

### 3.7.4.3 Managing Tables for Data Extraction

You can customize the data extraction by adding or removing tables and columns to or from source data. You can also add column descriptions.

After creating a source data with linked connection, you need to add tables, columns from which you want to extract. While creating a source data, you can add tables and columns. If you chose not to do that during source data creation, you can still add tables and columns while editing the source data.

After adding tables and columns, you need to do the following:

- Make certain columns as key columns.
- Pseudonymize the confidential data or personally identifiable data.
- Add descriptions to columns.
- Configure a partition strategy to extract data based on your criteria. You can use SQL filters to further refine the data extraction.
- Configure the delta load if you want to periodically extract data from your source system.

After customizing tables and columns, and defining initial load and delta load criteria, you need to run the extraction. The status of the extraction can be monitored from [Logs](#) tab in the source data.

For different extraction types and options, see [Extraction Options \[page 170\]](#).

## View Available Options

The options available on the *Source Data* header menu, *Tables* tab, and the table detail view screen are as follows.

This image is interactive. Hover over each area for a description. Click or tap highlighted areas to show more information below the image.

The screenshot shows the SAP Signavio Process Intelligence interface. On the left, the 'Tables' tab is selected in the 'Source Data / [LD] Jira Test' sidebar. Below it, a list of tables shows 'All (4)' and 'ApplicationRoles "applicationroles"' is selected. On the right, a detailed view of the 'ApplicationRoles' table is shown. The table has columns: Key column, Column name, Type, Pseudonymize, and Description. Rows include 'Groups "groups"', 'Name "name"', 'Key "key"', 'NumberOfSeats "numberofseats"', and 'Platform "platform"'. Buttons for 'Save', 'Add column', 'Delete', and 'Cancel' are at the top right of the detail view.

- [#unique\\_115/unique\\_115\\_Connect\\_42\\_subsection-im0 \[page 181\]](#)
- [#unique\\_115/unique\\_115\\_Connect\\_42\\_subsection-im1 \[page 181\]](#)
- [#unique\\_115/unique\\_115\\_Connect\\_42\\_subsection-im2 \[page 182\]](#)
- [#unique\\_115/unique\\_115\\_Connect\\_42\\_subsection-im3 \[page 182\]](#)

### Source Data Header Menu Options

Option	Description
Connection	Links a new connection or changes the existing connection.
Schedule	Automatically extracts data from the tables based on the defined criteria.
... > Rename	Changes the name of your source data.
... > Delete	Deletes source data.

### Options in the Tables tab

Option	Description
Add	Adds tables to the source data.
<input type="checkbox"/>	Selection box for tables. This enables the options, Extract and Delete data/ table.
Extract	Performs delta load extraction for the selected table.
Delete data / table	Shows options to delete extracted data while retaining table, or delete the entire table from your source data.

## Table Details View Header Menu Options

Option	Description
Extract	Performs delta load for all the tables.
Rename Alias	Changes table alias.
Delete data / table	Shows options to delete extracted data while retaining table, or delete the entire table from your source data.
	Enter full screen.
	Exit Full screen. It is accessible from <b>...</b> option in table details view header menu.

## Options to Manage Columns

Option	Description
Add column	Adds column to the selected table.
<input type="checkbox"/>	Selection box for columns and key columns.
	Represents key columns in a table.
	Represents pseudonymized columns in a table.
Delete	Deletes selected columns from a table.
Cancel	Cancels all the changes made to columns.
	Undo changes made to a specific column.

Select the links below to learn more about each topic.

### [Adding Tables \[page 183\]](#)

Learn how to add tables and columns to the source data for data extraction.

### [Renaming the Table Alias \[page 184\]](#)

Find out how to rename the table alias, which is used as a table reference during data transformation.

### [Standard Data Extraction \[page 185\]](#)

Learn how to extract data from your source systems using the standard data extraction feature.

### [Advanced Data Extraction \[page 208\]](#)

Learn how to extract a large volume of data from your source systems using the advanced data extraction feature.

### [Running the Initial Load Extraction \[page 220\]](#)

Learn how to run the initial extraction of your process data.

### [Scheduling the Data Extraction \[page 221\]](#)

Learn how to schedule the data extraction for delta load.

### 3.7.4.3.1 Adding Tables

Learn how to add tables and columns to the source data for data extraction.

#### Context

After creating a source data with linked connection, you need to add tables, columns from which you want to extract data. While creating a source data, you can add tables and columns. If you chose not to do that during source data creation, you can still add tables and columns while editing the source data.

When adding a table, you're required to add at least one column. Editing a table lets you add and edit columns.

#### ⓘ Note

NULL values aren't supported in key columns for SAP source data. To use NULL values in key columns for SAP source data, use the advanced extraction mode.

To add tables and columns, follow these steps:

1. Open your source data and select *Add*.  
The table selection dialog opens.
2. Choose the table to add and select *Next*.  
The column selection dialog opens.

#### ⓘ Note

If your linked connection is SAP RFC, the extract configuration type dialog opens.

To extract a huge amount of data, select *Advanced*, then *Next*.

The table is added to the source data. Using SQL and YAML script, you need to define the initial load and delta load extraction.

3. Select *Standard*, then *Next*.
4. In the *Select columns* dialog, choose the columns that you want to add to the table, and select *Next*.  
The key column selection dialog opens.
5. Select the columns you want to define as key columns. Key columns are used to identify unique rows in a table and to remove duplicate rows.
6. Select *Next*.  
The table is added to the source data and displayed in the *Tables* tab.

## Watch How to Add a Table to the Source Data

The screenshot shows the SAP Signavio Process Intelligence User Guide interface. The left sidebar has a tree structure with 'Process Data Management' expanded, showing 'Source Data' as the selected item. The main content area is titled 'Source Data' and lists a single entry for 'Jira Software'. The entry details are as follows:

- Status: Completed
- Last extraction: 2024-01-25 12:30:18 (UTC)
- Schedule: Not scheduled
- Created at: 2023-11-07 12:47:31 (UTC)
- Created by: Luiz Davim

At the top right of the main area, there are buttons for 'Create', 'Clear all filters', and sorting options for 'Connection type', 'Name', 'Created by', and 'Created at'.

## Related Information

[Managing Columns \[page 187\]](#)

[Standard Data Extraction \[page 185\]](#)

[Advanced Data Extraction \[page 208\]](#)

### 3.7.4.3.2 Renaming the Table Alias

Find out how to rename the table alias, which is used as a table reference during data transformation.

#### Context

The table alias is used as a reference in the transformation scripts of business objects. Alias isn't included in the data extraction.

#### Note

- When you add a new table to the source data, the table alias is created automatically with the table name.
- If you want to link multiple source data to your process data pipeline, table names must be unique across all source data. For this reason, you need to create aliases for tables with the same name.
- When creating, changing, or removing aliases for table names, you must update the table names accordingly in the transformation scripts of business objects.

To rename an alias for a table, follow these steps:

## Procedure

1. Open your source data.
2. On the [Tables](#) tab, select the table whose alias you want to rename.  
The side panel opens and displays the columns added to the table.
3. From the table header menu, select and then [Rename alias](#).
4. In the [Rename alias](#) popup, enter a name, and confirm with [Save](#).

### 3.7.4.3.3 Standard Data Extraction

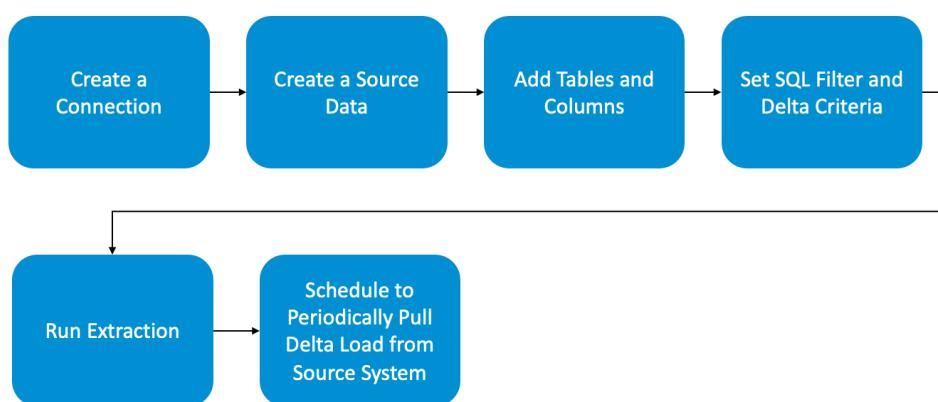
Learn how to extract data from your source systems using the standard data extraction feature.

#### Standard Data Extraction Flow for SAP ERP (RFC) Connector

The following image shows the standard data extraction workflow for SAP ERP (RFC) connector.

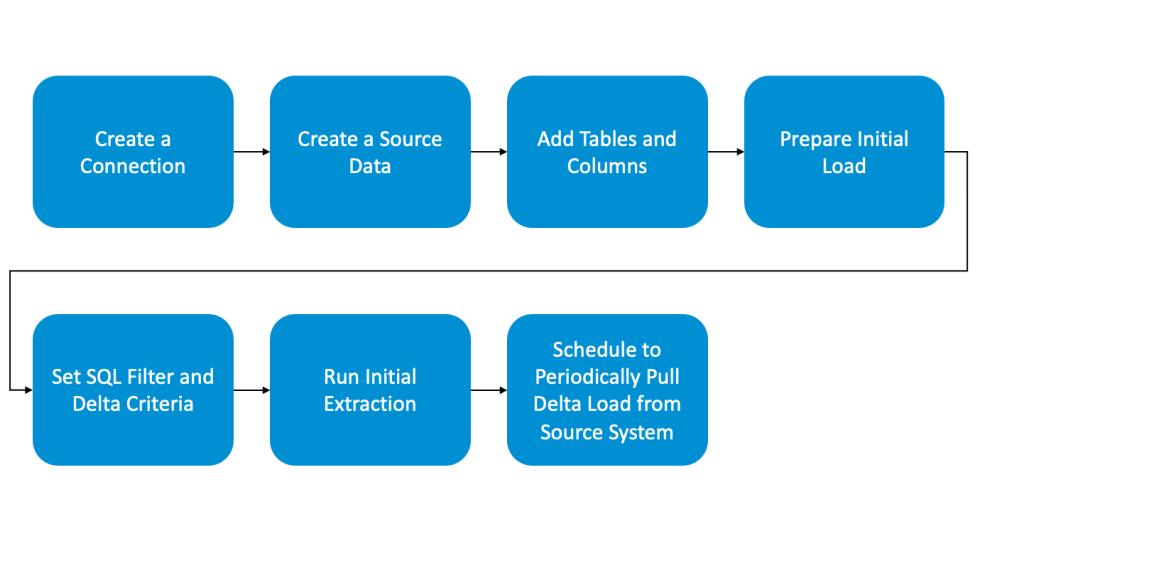
##### Note

For SAP ERP (RFC) source data, you don't need to prepare an initial load for source data tables where you choose Automatic Pagination as your partition strategy. The Automatic Pagination feature enables automatic data partitioning when you run the extraction. For more information, see [Automatic Pagination \[page 197\]](#).



## Standard Data Extraction Workflow

The following image shows the standard data extraction workflow:



## Watch How to Extract Data and Monitor Logs

### 1. Managing Columns [page 187]

Learn how to add columns to your source data, how to define key columns, and add descriptions to columns.

### 2. Adding Column to an Existing Table and Deleting a Column [page 189]

Learn how to add columns to an existing table in your source data.

### 3. Adding a Key Column and Description [page 191]

Learn how to set key columns for the tables that you want to extract, and how to add descriptions to the columns.

### 4. Pseudonymize Data [page 192]

Learn how to replace personally identifiable data with artificial pseudonyms. This is to pseudonymize extracted data.

5. [Partition Strategies \[page 193\]](#)  
Learn about the available partition strategies.
6. [Setting Delta Filters \[page 199\]](#)  
Learn how to set the delta filters for data extraction.
7. [Refining Extraction with SQL Filters \[page 202\]](#)  
Find out how to apply an SQL filter to define what data to extract with a data pipeline.
8. [Deleting Data or Table in Standard Extraction \[page 206\]](#)  
Learn how to delete the extracted data while either keeping the table's configuration or deleting the table entirely in your source data.

## Related Information

[Data Extraction Options \[page 169\]](#)

[Automatic Pagination \[page 197\]](#)

### 3.7.4.3.3.1 Managing Columns

Learn how to add columns to your source data, how to define key columns, and add descriptions to columns.

While creating a source data, you can add tables and columns to it. If you chose not to add the tables and columns during source data creation, you can still do it while editing the source data. For more information on adding tables, see the [Adding Tables \[page 183\]](#) section.

If you've added a table but not all the required columns, you can then add columns to an existing table. In addition, you can set key columns, and pseudonymize column values.

You can also extract selected table data and run initial extraction from the table details view screen.

### Options to Manage Columns

Following are the options available in the table details header menu and columns table.

**This image is interactive. Hover over each area for a description. Click or tap highlighted areas to show options and their details below the image.**

- #unique\_182/unique\_182\_Connect\_42\_subsection-im0 [page 188]
- #unique\_182/unique\_182\_Connect\_42\_subsection-im1 [page 188]

## Options in the Table Details View

Option	Description
Extract	Performs delta load for all the tables.
Rename alias	Changes table alias.
Delete data / table	Shows options to delete extracted data while retaining table, or delete the entire table from your source data.
Fullscreen icon	Enter full screen.
Exit Fullscreen icon	Exit Full screen. It's accessible from <b>...</b> option in table details view header menu.
Close icon	Closes the side panel

## Options to Manage Columns

Option	Description
Add column	Adds column to the selected table.
<input type="checkbox"/>	Selection box for columns and key columns.
	Represents key columns in a table.
	Represents pseudonymized columns in a table.
Delete	Deletes selected columns from a table.
Cancel	Cancels all the changes made to columns.
	Undo changes made to a specific column.

## Watch How to Manage Columns

**Parent topic:** Standard Data Extraction [page 185]

**Next:** Adding Column to an Existing Table and Deleting a Column [page 189]

## Related Information

[Standard Data Extraction \[page 185\]](#)

[Managing Tables for Data Extraction \[page 180\]](#)

[Running the Initial Load Extraction \[page 220\]](#)

[Troubleshooting Transformation Errors \[page 303\]](#)

### 3.7.4.3.3.2 Adding Column to an Existing Table and Deleting a Column

Learn how to add columns to an existing table in your source data.

While creating a source data, if you haven't already added all the required columns to a table, you can still add columns to an existing table. You can also delete columns from a table in source data.

Using the *Edit columns* option in the table details view, you can add columns to an existing table, edit, and delete columns.

1. Open your source data.
2. Select the table for which you need to add columns.  
The side panel opens and displays the existing columns in the table along with other options.

3. On the [Columns](#) tab, select [Edit columns](#).  
All the existing columns are editable.
4. Select [Add column](#). A popup for column selection appears.
5. Choose the columns and select [Add](#), then [Save](#).

Data pipelines fail if any name or alias contains other characters. Read more in the Troubleshooting Transformation Errors section.

## Supported Characters in Names and Aliases

Column names and aliases can contain only alpha-numeric and the following special characters:

- a-z
- A-Z
- 0-9
- §±!@#\$%^\*(\*)\_+=[]{}'`~\|./>? äöüÄÖÜß

## Deleting a Column

Select the columns that you want to delete. Then, select [Delete](#) and confirm with [Save](#).

**Parent topic:** [Standard Data Extraction \[page 185\]](#)

**Previous:** [Managing Columns \[page 187\]](#)

**Next task:** [Adding a Key Column and Description \[page 191\]](#)

## Related Information

[Pseudonymize Data \[page 192\]](#)

[Manual \[page 195\]](#)

[Advanced Data Extraction \[page 208\]](#)

[Running the Initial Load Extraction \[page 220\]](#)

### 3.7.4.3.3 Adding a Key Column and Description

Learn how to set key columns for the tables that you want to extract, and how to add descriptions to the columns.

#### Context

After creating a source data and adding tables and columns to it, you must set key columns in each table.

Key columns are used to identify unique rows in a table and to find duplicate rows. So, it's important that the key columns are correctly defined in each table. For that, do the following:

#### Procedure

1. On the *Columns* tab, select *Edit columns*. All the existing columns are editable.
2. Choose the column and enter text in the *Description* field.

→ Tip

To undo your change, select .

3. Select the *Key column* checkbox for a column that you want to define as a row identifier.

→ Remember

You can select up to 63 columns as the primary key in a table. Selecting more primary keys is invalid and causes an error.

4. Confirm with *Save*.

**Task overview:** [Standard Data Extraction \[page 185\]](#)

**Previous:** [Adding Column to an Existing Table and Deleting a Column \[page 189\]](#)

**Next:** [Pseudonymize Data \[page 192\]](#)

#### Related Information

[Pseudonymize Data \[page 192\]](#)

### 3.7.4.3.3.4 Pseudonymize Data

Learn how to replace personally identifiable data with artificial pseudonyms. This is to pseudonymize extracted data.

After adding tables and columns to your source data, you must enable the pseudonymize option for the columns with personally identifiable data.

Personally identifiable data can be replaced with artificial pseudonyms. Pseudonymization happens during data extraction, before the data reach SAP Signavio Process Intelligence.

When you select a column for pseudonymization, the values will be encoded using the SHA3-256 algorithm.

To learn about the pseudonymization in SaaS applications, see [How the Data is Extracted from SaaS Applications \[page 173\]](#) section and for applications hosted on-premise, see [How the On-Premises Extractor Works \[page 139\]](#) section.

#### ⓘ Note

- You can pseudonymize data of the type *Text* and the number types, *BigInt*, *Double*, and *Numeric* (but not *Integer*).
- While previewing the table data, you can see the artificial pseudonyms assigned to values. To preview, open the table and in the side panel, select *Table preview*.
- Pseudonymization is applied in the next extraction run.

To apply pseudonymization, follow these steps:

1. Open your source data and expand the table.
2. On the *Columns* tab, select *Edit columns*.  
All the existing columns are editable.
3. Select the *Pseudonymize* checkbox for a column to replace personally identifiable data with artificial pseudonyms.
4. Confirm with *Save*.

To undo the change, select .

**Parent topic:** [Standard Data Extraction \[page 185\]](#)

**Previous task:** [Adding a Key Column and Description \[page 191\]](#)

**Next:** [Partition Strategies \[page 193\]](#)

## Related Information

[Adding Tables \[page 183\]](#)

[Adding Column to an Existing Table and Deleting a Column \[page 189\]](#)

### 3.7.4.3.3.5 Partition Strategies

Learn about the available partition strategies.

The largest amount of data is pulled during the first extraction. To avoid overloading the system, you can configure a partition strategy. With the partition strategy, you define to extract the data in chunks.

#### Note

The optimal partition size depends on the total number of data rows and how the data is distributed over a certain period of time. For example, you select a different strategy for data that is uniformly distributed over a period of time than for data that isn't equally distributed.

In addition, consider the following:

For each partition, an extraction is performed. One the one hand, the more partitions you specify to reduce the partition size, the more extractions are run. This can reduce system performance. On the other hand, if partitions are too large, connection timeouts to source systems can prevent the extraction.

Therefore, we recommend that you analyze the amount of extraction data and its distribution. Also, check with the preview function whether the selected partition strategy is reasonable.

By default, no partition strategy is configured.

When you set a partition strategy, it's also applied to the delta extraction. Find more information on this, see [Setting Delta Filters \[page 199\]](#).

## Available Strategies

Strategy	Description	Parameters
<a href="#">None</a>	No partitions	-

Strategy	Description	Parameters
▶ <a href="#">Manual</a> ▶ <a href="#">Date (Time)</a>	Load data based on its date and time information	<p><i>Format for dates</i>: Specify the format in which you want to enter the dates.</p> <p><i>Start date</i>: Specify the start date from which partitions are created.</p> <p><i>End date</i>: Specify the end date by which partitions are created.</p> <p><i>Partition size</i>: Define how many partition units go into one partition. For example, if the partition unit is set to Month and the partition size to 2, each partition contains data of 2 months, from the start date until the end date.</p> <p><i>Partition unit</i>: Define the units for partitions, for example, year, month, week, day, and hour.</p> <p><i>Column</i>: Select the date column to which the start and the end date apply.</p>
▶ <a href="#">Manual</a> ▶ <a href="#">Static Value</a>	Load data based on selected attributes, for example industries or countries	Choose a column, then add the values that are used to create partitions.
<a href="#">Automatic (Pagination)</a>	Partition extracted data in chunks of rows	<p>You can change the custom page size of 25,000 rows.</p> <p>For more information, see <a href="#">Automatic Pagination [page 197]</a>.</p>

#### ⓘ Note

This option is only available for SAP ERP (RFC) connections.

## Error Handling

If the partition-based extraction fails, you have the following options:

- Reduce the partition size by changing the partition parameters and try again.
- Increase the value for the connection timeout via the connection parameters in the connection and try again.

**Parent topic:** [Standard Data Extraction \[page 185\]](#)

**Previous:** [Pseudonymize Data \[page 192\]](#)

**Next:** [Setting Delta Filters \[page 199\]](#)

## Related Information

[Setting Delta Filters \[page 199\]](#)

[Manual \[page 195\]](#)

[Partition Strategies \[page 193\]](#)

### 3.7.4.3.3.5.1 Manual

For manual partition, you need to prepare the initial load and then extract the initial load.

#### Preparing the Initial Load

After adding tables and columns to your source data, and customizing columns, you need to configure tables to extract data.

During initial extraction, a large amount of data is pulled. To avoid overloading the system, you need to configure a partition strategy. With the partition strategy, you define to extract the data in chunks.

Before you run the initial extraction, we highly recommend applying data partitioning to all the tables in your source data. This ensures that the initial load is executed successfully. Configuring partitions is most important for large tables such as EKKO.

For information on different use cases and the way data is extracted based on the criteria in table configuration, see [Delta Load and Partition Strategy \[page 201\]](#).

#### Note

For partitioning and extracting data from your SAP ERP (RFC) source system, you don't need to perform manual partition for source data tables where you choose Automatic Pagination as your partition strategy. The Automatic Pagination feature enables automatic data partitioning when you run the extraction. For more information, see [Automatic Pagination \[page 197\]](#).

For other connectors and for SAP ERP (RFC) source data tables where you have not selected Automatic Pagination as the partition strategy, you still need to prepare the initial load.

## Partition the Data Manually

Follow these steps:

1. Open your source data and expand the table.  
The side panel opens and displays the existing columns in the table, along with other options.
2. On the *Configuration* tab, in the *Partition Strategy* section, select the criteria for partitions.
3. You can configure partitions based on three strategies:
  - If you don't want to partition the data, choose **None**.
  - To use a partition strategy based on dates, choose  **Manual > Date (Time)** and specify the start and end dates. Then, define a partition unit and select the column that you want to use as the basis for the partition. For information on how including this column in the delta filter affects the behavior, see [Delta Load and Partition Strategy \[page 201\]](#).
  - To create a partition strategy based on static values, select  **Manual > Static Value**, choose one or more columns, and add values for each.
4. Enter the required information and confirm with **Save**.
5. Choose [\*\*Extract \(Initial Load\)\*\*](#).

For information on how to partition SAP ERP (RFC) source data tables, see [Automatic \[page 197\]](#).

## Change the Strategy

Once the initial extraction is done, you can no longer change the partition strategy to keep the data consistent.

To choose a different partition strategy, delete the extracted data and reset the partition strategy.

## Related Information

[Partition Strategies \[page 193\]](#)

### 3.7.4.3.3.5.2 Automatic

#### Context

When you are partitioning data for SAP ERP (RFC) connections, you have the option of Automatic Pagination as well as the manual options available for the other connectors. To set a partition strategy for an SAP ERP (RFC) source data, follow these steps:

#### Procedure

1. Open your source data.
2. In the source data details page, choose the table for which you want to set pagination. The side panel opens.
3. Select the *Configuration* tab. Under *Partition Strategy*, choose your strategy type from the following options:
  - None  
If you don't want to partition the data, choose None.
  - Manual
    - To use a partition strategy based on dates, choose  *Manual*  and specify the start and end dates. Then, define a partition unit and select the column that you want to use as the basis for the partition.
    - To create a partition strategy based on static values, select  *Manual* , choose one or more columns, and add values for each.
  - Automatic (Pagination)  
Partition extracted data in chunks of rows. The default is set at 25,000 rows but you can change it. For more information on this option, see [Automatic Pagination \[page 197\]](#).
4. Save your changes.

### 3.7.4.3.3.5.2.1 Automatic Pagination

Learn more about automatic pagination.

#### Note

This feature applies only to SAP ERP (RFC) connections where you have selected *Automatic (Pagination)* as the partition strategy. For other connectors or for SAP ERP (RFC) connections where you haven't enabled Automatic Pagination, you still need to prepare the initial load. For more information, see [Manual \[page 195\]](#).

Pagination, in the world of data extraction, involves breaking down the large set of data into smaller, more manageable chunks. This simplifies the data retrieval process and enhances efficiency when working with large datasets.

By default, when you select Automatic Pagination as the partition strategy for an SAP ERP (RFC) source data table, data is extracted in chunks of 25,000 rows. You can change this page size to meet your own requirements. This means that you no longer need to use advanced data extraction if your sole purpose was data partitioning. The maximum page size using this data extraction pagination feature is 50,000 rows and the minimum page size is 10,000 rows. You can change the page size in intervals of 5,000 rows. We recommend using the default page size of 25,000 rows unless you have a specific need to change it.

#### ⚠ Caution

The SAP ERP (SAP RFC) connector page size should be greater than or equal to the page size set here. The default connector page size is 50,000.

#### ⓘ Note

Make sure that each extracted table contains the key columns correctly defined.

When you view the extraction log for a table, you will see just one entry, which is updated as the data is extracted. This is different from previous behavior, where you see several entries for each partition.

When the data extraction fails, the retry begins from the end of the last page that was successfully extracted. For example, if the error occurs at row 50,786, and the default page size of 25,000 has been used, the retry starts with row 50,001.

For information about changing the default pagination for an SAP ERP (RFC) source data table, see [Changing the Page Size for Automatic Pagination \[page 199\]](#).

### 3.7.4.3.3.5.2.2 Minimum Requirements for Automatic Pagination

The minimum requirements to successfully use the Automatic Pagination feature.

Before you activate Automatic Pagination, ensure that you meet the following minimum requirements:

- You must meet the prerequisites of your SAP ERP (RFC) source system, including having the required SAP Notes installed. For more information on the required SAP Notes, see [Required and Use Case Specific SAP Notes \[page 66\]](#).
- If you are using the on-premises extractor, you must be using version v1.944.0 or later for the Automatic Pagination feature to work.
- Validate that all the key columns are correctly configured.

### 3.7.4.3.3.5.2.3 Changing the Page Size for Automatic Pagination

#### Context

To change the default pagination for an SAP ERP (RFC) source data table, follow these steps:

#### Procedure

1. Open your source data.
2. In the source data details page, choose the table for which you want to set pagination. The side panel opens.
3. Select the *Configuration* tab. Under *Partition Strategy*, select *Automatic (Pagination)* if not already selected.
4. Choose *Change Page Size*.  
The *Change Page Pagination* dialog opens.
5. Select the *Custom Page Size* option.
6. Change the page size as required.

##### Note

The maximum page size using this data extraction pagination feature is 50,000 rows and the minimum page size is 10,000 rows. You can change the page size in intervals of 5,000 rows. We recommend using the default page size of 25,000 rows unless you have a specific need to change it. For more information, see [Automatic Pagination \[page 197\]](#).

7. Choose *Change*.
8. Save your changes.

### 3.7.4.3.3.6 Setting Delta Filters

Learn how to set the delta filters for data extraction.

#### Overview

After adding tables and columns to your source data, and configuring the partition strategy, you can set delta filters if you want to periodically extract data from your source system.

Delta load is the process of extracting only the new data added to a table since the last successful load. You can define a delta filter of a certain date for each field in a table. Based on the set filters, the delta load is extracted from a table.

Make sure that each extracted table contains a primary key definition, PK.

#### ⓘ Note

The delta parameter in the advanced extraction usually pulls data up to the current day minus one (current day - 1), while the standard extraction always pulls data up to the current date.

#### ⓘ Note

You can only use columns with the types Date and Timestamp as delta filters. Where Timestamp is used as a delta filter, only the date part of the timestamp is considered. The time part of the timestamp is not considered.

If you've set up your process data pipeline using a process-based template, check for each table whether the default initial values of the delta filter are meaningful for your use case.

## How Delta Load Mechanism Works

If the delta load was configured properly:

- Newly added rows are extracted based on the timestamp or insertion sequence.
- Updated rows are extracted as new parquet files with the extraction timestamp, c\_fetchdate.

For each extracted table, at least two parquet files are generated, one with the raw data extracted during the initial run and the other with the deduplicated data, which includes the existing and newly extracted data. Data deduplication happens by grouping all the rows based on the primary key, then choosing the most recent entry extracted from all parquet files. All this happens internally, therefore, you can only access the optimized table with unique data.

Let's assume you want to extract the delta load. For that, consider you have initially extracted data from the following table named "Sales" extracted on 2022-11-05.

Customer ID	Product ID	Quantity	Price (Euros)	Timestamp
001	000N20	10	100	2022-11-05 04:02:35
002	000W20	20	400	2022-11-05 04:02:35
003	000N21	21	440	2022-11-05 04:02:35

After initial extraction, you have updated the existing customer data (Customer ID 003) and added new data, as follows:

Customer ID	Product ID	Quantity	Price (Euros)	Timestamp
001	000N20	10	100	2022-11-05 04:02:35
002	000W20	20	400	2022-11-05 04:02:35
003	000N21	25	500	2022-11-10 04:02:35
1010	000XZ20	15	150	2022-06-05 04:02:35

Customer ID	Product ID	Quantity	Price (Euros)	Timestamp
1011	000XN20	20	400	2022-06-05 04:02:35
1012	000NW21	21	440	2022-10-05 04:02:35

As the existing data is updated and new data is added, a parquet file called "Sales-20221105.parquet" is generated. This parquet file contains duplicate rows for the record, 003. The data in these two tables is then grouped by primary key and c\_fetchdate, so that only the most recent records are available in the optimized table.

The parquet files are maintained by SAP Signavio on the AWS platform and are currently not accessible.

1. Open your source data and expand the table.
2. On the *Configuration* tab, in the *Delta Filter* section, select *Add*.
3. From the *Choose a field* dropdown list, select a field.
4. Enter a date format, for example, **MM/DD/YY** or **DD.MM.YY**.
5. Enter the initial date. Then, click anywhere on the screen and select *Add*.
6. Confirm with *Save*.

The date filter is applied when running the initial extraction.

To undo your change, select .

To delete a delta filter, select .

## Delta Load and Partition Strategy

The data extraction happens based on the table configuration in source data.

The following table shows the behavior of delta load based on different configurations.

Table Configuration Criteria	Data Extraction
<ul style="list-style-type: none"> <li>• Partition strategy:   <i>Date (Time)</i> </li> <li>• Delta filter: Configured</li> <li>• The column in the delta filter is the same as the column in the partition strategy.</li> </ul>	Data is extracted and partitioned with the columns used in the <i>Partition Strategy</i> and <i>Delta Filter</i> . Dates defined in the <i>Delta Filter</i> are considered.
<ul style="list-style-type: none"> <li>• Partition strategy:   <i>Date (Time)</i> </li> <li>• Delta filter: Configured</li> <li>• The column in the delta filter is not the same as the column in the partition strategy.</li> </ul>	Extracts data without partitioning. Dates defined in the <i>Delta Filter</i> are considered.
<ul style="list-style-type: none"> <li>• Partition strategy:   <i>Date (Time)</i>  or    <i>Static Value</i> </li> <li>• Delta filter: Not configured</li> </ul>	Extracts data without partitioning. <i>Delta Filter</i> won't be considered.

Table Configuration Criteria	Data Extraction
<ul style="list-style-type: none"> <li>Partition strategy: <i>Automatic</i></li> <li>Delta filter: Configured</li> </ul>	Extracts data with partitioning. <i>Delta Filter</i> is considered.
<ul style="list-style-type: none"> <li>Partition strategy: <i>Automatic</i></li> <li>Delta filter: Not configured</li> </ul>	Extracts data with partitioning. <i>Delta Filter</i> won't be considered.

**Parent topic:** Standard Data Extraction [page 185]

**Previous:** Partition Strategies [page 193]

**Next:** Refining Extraction with SQL Filters [page 202]

### 3.7.4.3.3.7 Refining Extraction with SQL Filters

Find out how to apply an SQL filter to define what data to extract with a data pipeline.

On table level, you can limit the extraction data with an SQL filter. Then, only data sets with attributes matching the SQL query are extracted.

To apply an SQL filter, follow these steps:

1. Open your source data and expand the table.  
The side panel opens and displays the existing columns in the table, along with other options.
2. On the *Configuration* tab, in the *SQL Filter* section, add your SQL query.

#### ⓘ Note

You cannot start the filter with a WHERE clause because the WHERE clause is automatically applied by the system. In addition, the filter cannot contain a semicolon (:).

3. To preview the result of your SQL query, select *Preview*.
4. Confirm with *Save*.  
The SQL filter is applied in the next extraction.

To edit an SQL filter, select the code, edit, and confirm *Save*.

To undo your change, select ↲.

#### ⓘ Note

For SAP ERP (SAP RFC) connectors, if you are using a static date in the filter, ensure that each element separated by a hyphen. For example '2024-07-24'.

You can add comments to your SQL query to help explain different parts of the query or if you want to temporarily exclude part of the query. Comments can be placed anywhere within the query, including at the beginning and end of the filter.

You can use both single-line and multi-line comments. Single-line comments begin with two dashes (--). Everything following -- on the line is considered as a comment.

```
--This is a test single-line comment.  
CustomerID = 13  
AND Country = 'France'
```

Multi-line comments begin with a forward-slash (/) followed by an asterisk (\*) on the first of the lines that you want to use as a comment and end with an asterisk (\*) followed by a forward slash (/) on the last line of the comment. These comments span multiple lines, allowing for more detailed descriptions or temporary exclusions of larger sections of the query.

```
/*  
This is a test  
multi-line comment.  
*/  
CustomerID = 13  
AND Country = 'France'
```

You can save your filter with the comments included and then preview the actual query that will be executed by the system with all the comments removed. Comments are not sent to the source system and have no impact on the logic or execution of the query.

**Parent topic:** [Standard Data Extraction \[page 185\]](#)

**Previous:** [Setting Delta Filters \[page 199\]](#)

**Next:** [Deleting Data or Table in Standard Extraction \[page 206\]](#)

## Related Information

[Running the Initial Load Extraction \[page 220\]](#)

[Manual \[page 195\]](#)

### 3.7.4.3.3.7.1 Subqueries

A subquery is a query that is nested inside another SQL statement. You can add a subquery in the SQL Filter. This subquery corresponds to the WHERE clause of the main query.

#### ⓘ Note

The following limitations apply to SAP ERP (RFC) connectors:

- We only support the following aggregate functions (AVG, COUNT, MIN, MAX, SUM)
- EXISTS statements are not supported

You can use single subqueries with all connectors.

```
InvoiceNumber in (
    SELECT Number FROM Invoices WHERE Value > 10
)
```

Nested queries such as the following are supported for all connectors except for SAP ERP (RFC) tables where you have enabled Automatic Pagination. This is because subqueries would be paginated for these SAP ERP (RFC) tables.

```
InvoiceNumber = (
    SELECT Number FROM Invoices
    WHERE AmountOfItems = (
        SELECT MAX(AmountOfItems) FROM Purchase
    )
)
```

Similarly, multiple subqueries such as the following are supported for all connectors except for SAP ERP except for SAP ERP (RFC) tables where you have enabled Automatic Pagination. Again this is because subqueries would be paginated for these SAP ERP (RFC) tables.

```
InvoiceNumber in (
    SELECT Number FROM Invoices WHERE Value > 10
)
AND
AmountOfItems = (
    SELECT MAX(AmountOfItems) FROM Purchase
)
```

### 3.7.4.3.3.7.2 Variables

Define time variables at table level.

#### ⓘ Note

This variables feature is only available for SAP ERP (RFC) connectors.

You can use dynamic time variables in the SQL Filter in order to specify delta criteria in subqueries or for delta logic that cannot be handled by the delta filter.

To add a dynamic time variable, follow these steps:

1. Open your source data and expand the table.  
The side panel opens and displays the existing columns in the table, along with other options.
  2. On the *Configuration* tab, in the *Dynamic time variables* section, select *Add*.
  3. In the *Name* field, add the name of the variable.  
The *Reference* field is automatically completed.
  4. Select your date format and then select an initial value.
  5. Save your changes.
- You can now use this variable in the SQL Filter. The *Current value* field is automatically filled after the table is next extracted.
- You can edit the description of the variable but not anything else. You can delete variables.

The following is an example of variable use in the SQL Filter.

```

CDPOS.TABNAME IN ('VBAP', 'VBAK', 'LIPS', 'LIKP', 'VBRP', 'VBRK', 'BSEG',
'BKPF', 'VBUK')
AND CDPOS.OBJECTCLAS IN ('BELEG', 'VERKBELEG', 'FAKTBELEG', 'LIEFERUNG')
AND CHANGENR >=
    SELECT MIN(CHANGENR) AS MINCHANGENR
    FROM CDHDR
    WHERE UDATE >= '$cdhrd_udate' AND OBJECTCLAS IN ('BELEG', 'VERKBELEG',
'FAKTBELEG', 'LIEFERUNG')
)

```

#### Dynamic time variables

[Edit Variables](#)

Use dynamic time variables in the SQL filter for specifying delta criteria in sub-queries or for delta logics that cannot be handled by the delta filter.

Name	Reference	Initial value	Current value	Description
cdhrd_udate	'\$cdhrd_udate'	2024-01-01	2024-07-23	CDHDR - UDATE

The following example shows a case where a variable is required as the delta logic cannot be handled by the delta filter.

```

KOART = 'K'
AND (
    ( AUGCP >= '$delta' )
    OR
    (
        BELNR IN (
            SELECT
            DISTINCT BELNR
            FROM BKPF
            WHERE
                ( CPUDT >= '$delta'
                OR AEDAT >= '$delta'
                OR UPDDT >= '$delta' )
        )
    )
)

```

#### Dynamic time variables

[Edit Variables](#)

Use dynamic time variables in the SQL filter for specifying delta criteria in sub-queries or for delta logics that cannot be handled by the delta filter.

Name	Reference	Initial value	Current value	Description
delta	'\$delta'	2024-01-01	2024-07-23	Delta

### 3.7.4.3.3.8 Deleting Data or Table in Standard Extraction

Learn how to delete the extracted data while either keeping the table's configuration or deleting the table entirely in your source data.

You can delete the extracted data while retaining the configured table, or delete the entire table from your source data in SAP Signavio Process Intelligence. To do this, use the [Delete data / table](#) option, which is accessible in SAP Signavio Process Intelligence at the following places:

- Source Data > table details screen header menu
- Table configuration screen

#### ⚠ Caution

- Deleting the extracted data or the entire table that is linked to a process data pipeline will affect the data transformation within that pipeline.
- Data is deleted permanently from SAP Signavio Process Intelligence and this can't be undone.

Follow these steps:

1. Open your source data.
2. Choose the tables that you want to delete and select [Delete data / table](#)

#### → Tip

You can also delete from the table details view. Expand the table and from the header menu, select **⋮**, then [Delete data/table](#).

A popup window appears with the following options for you to choose.

- [Delete only extracted data and keep the table](#): Deletes only the extracted data while keeping the table's configuration for later use. Selecting this option allows you to re-extract the data using the existing table configuration.

The following table configuration-related options are also displayed:

Configuration Options	Description
Keep partition strategy	It's selected by default if partitions are set for your table, else disabled. Deselect to delete the defined strategy.

Configuration Options	Description
Keep delta filter	<p>It's selected by default if the delta filter is configured for your table. The following delta options are displayed.</p> <ul style="list-style-type: none"> <li>• Keep the initial value</li> <li>• Make current value as initial value</li> </ul> <p>For example,</p> <p>Initial Value = 01-01-2020</p> <p>Current Value = 01-07-2023</p> <p>Selecting <i>Keep initial value</i> results in:</p> <ul style="list-style-type: none"> <li>• Initial Value = 01-01-2020</li> <li>• Current Value = 01-01-2020</li> </ul> <p>Selecting <i>Make current value as initial value</i> results in:</p> <p>Initial Value = 01-07-2023</p> <p>Current Value = 01-07-2023</p>
Keep SQL filter	<p>It's selected by default if SQL filters are defined for your table, else disabled.</p> <p>Deselect to delete the filter.</p>
Keep SQL filter and variables	<p>It's selected by default if SQL filters and variables are defined for your table, else disabled.</p> <p>Deselect to delete the filter and variables.</p>

- *Delete the table completely*: Table and extracted data is deleted permanently.
3. Confirm with *Delete*.

## Watch How to Delete Data or Table

Parent topic: [Standard Data Extraction \[page 185\]](#)

Previous: [Refining Extraction with SQL Filters \[page 202\]](#)

### 3.7.4.3.4 Advanced Data Extraction

Learn how to extract a large volume of data from your source systems using the advanced data extraction feature.

#### ⓘ Note

- To extract data, you need a connector that is linked to a source system. All connectors support standard data extraction, whereas only the SAP ERP connector supports both standard and advanced extraction.
- When it comes to more complex scenarios, the data needs to be extracted using custom code. Therefore, you must be familiar with SQL code and YAML to use the advanced data extraction.

### Use Cases

Following are other possible use cases for choosing advanced data extraction:

- When you need two or more delta parameters to extract the table.
- When you want to partition data based on range.
- When you want to join two or more tables for the extraction.

- When the table does not have sufficient columns or data to run delta loads. For example, a missing date parameter that indicates the change or creation of a record or missing an ascending object number, etc.
- When you want to reduce the number of records in a table that is linked to your main table, even if it has a delta parameter. In this case, you can use another table to pull records of a certain type, such as a specified document type.
- When tables have key columns with null values and need to be handled separately. For example, table QAVA - CONCAT(MANDANT, PRUEFLOS, KZART, COALESCE(ZAEHLER, 'NULL')) AS c\_key.

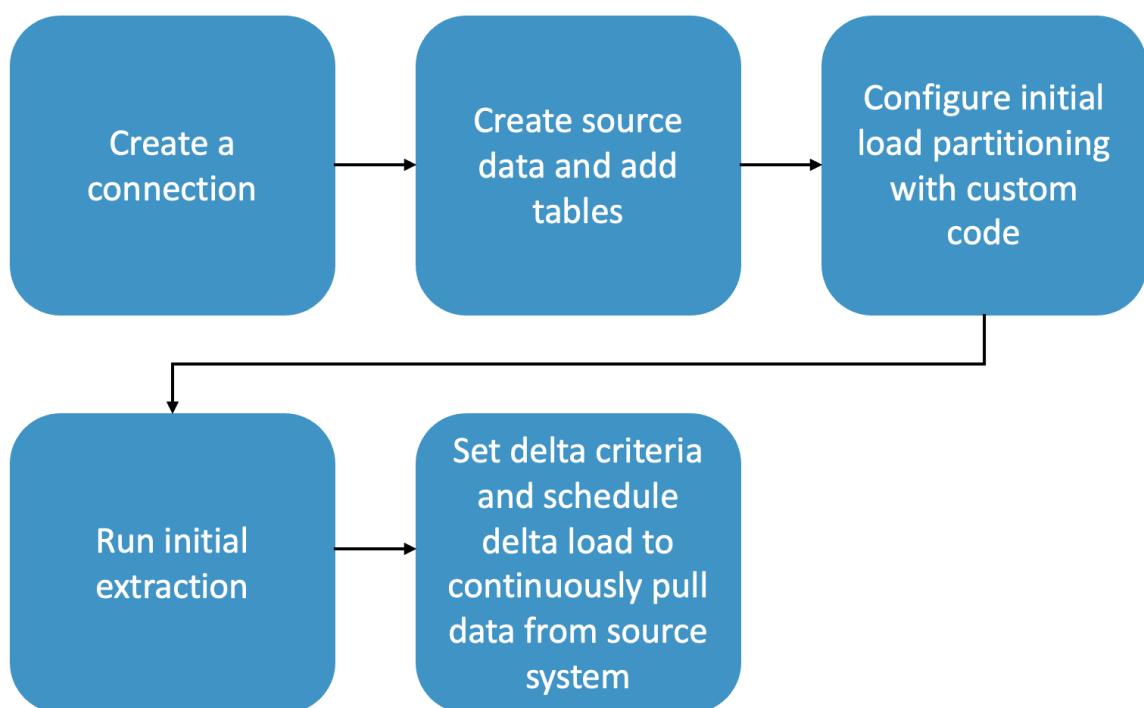
In a table's advanced extraction mode, you use a script to specify what data to extract from a table.

In an extraction script, you can specify extraction options such as a partition strategy and filters, as well as custom extraction options.

You can decide for each table whether it is configured by script.

## Advanced Data Extraction Workflow

The following image shows the advanced data extraction workflow:



## Error Linting for Extraction Code

The script editor provides a linter that parses the script and detects errors related to extraction code. Rows with errors are highlighted and indicated by a red dot. If available, additional information is displayed when you hover over the error.

1. [Configuring Initial Load \[page 210\]](#)  
Learn the different ways of partitioning your data, and why it's necessary.
2. [Setting the Delta Load Criteria \[page 215\]](#)  
Learn how to define the delta load for advanced data extraction.
3. [Deleting Data or Table in Advanced Extraction \[page 219\]](#)  
Learn how to delete the extracted data while either saving the script or deleting the table entirely in your source data.

### 3.7.4.3.4.1 Configuring Initial Load

Learn the different ways of partitioning your data, and why it's necessary.

Before you run the initial extraction, we highly recommend applying data partitioning to the table. Due to the high amount of data being extracted from the source systems, you need to split the data into smaller chunks. This improves the processing time.

To configure the initial load partitions and delta criteria, open your source data and expand the table. The script editor opens in the side panel for you to add your code.

Following are the different ways to partition the data:

- [Partitioning based on static values \[page 210\]](#)
- [Partitioning based on date \[page 211\]](#)
- [Partitioning based on subquery results \[page 212\]](#)
- [Partitioning based on Change Number Range \[page 213\]](#)

**Parent topic:** [Advanced Data Extraction \[page 208\]](#)

**Next:** [Setting the Delta Load Criteria \[page 215\]](#)

#### 3.7.4.3.4.1.1 Partitioning Based on Static Values

Learn how to use static values to partition your data. Example code is included to help you get started.

Example code:

```
tableSyncConfigurations:  
  alias: bkpf  
  sql: |  
    SELECT  
      CONCAT(MANDT, BUKRS, BELNR, GJAHR) AS c_key,  
      CURRENT_TIMESTAMP() AS c_fetchdate,  
      MANDT,  
      BUKRS,  
      BELNR,  
      GJAHR,  
      CPUDT,  
      CPUTM,
```

```

        AWTYP,
        AWKEY
FROM BKPF
WHERE GJAHR = :gjahr
    AND BUKRS = :bukrs
keyColumn: c_key
mostRecentRowColumn: c_fetchdate
partitions:
  - name: gjahr
    values:
      - 2022
      - 2023
  - name: bukrs
    values
      - '001'
      - '002'

```

In the above code, `partitions` is the place where you define the values to filter data. When using partitions, the extraction code needs to be adjusted at two places. Depending on the defined number of partitions, the individual extractions start.

In the above code, WHERE condition is to filter the table.

For example, `GJAHR= :gjahr`.

In the example, `GJAHR` is the column in the table that you want to partition.

`:gjahr` is the link to the number of partitions defined under `partitions` in the query.

### 3.7.4.3.4.1.2 Partitioning Based on Date

Learn how to partition your data based on its date values. Example code is included to help you get started.

Example code:

```

tableSyncConfigurations:
  alias: cdhdr
  sql: |
    SELECT
      CONCAT(MANDANT, OBJECTCLAS, OBJECTID, CHANGENR) AS c_key,
      CURRENT_TIMESTAMP() AS c_fetchdate,
      MANDANT,
      OBJECTCLAS,
      OBJECTID,
      CHANGENR,
      UDATE,
      UTIME,
      TOSTRING(HASHBYTES('MD5', CDHDR.USERNAME)) AS USERNAME
    FROM CDHDR
    WHERE UDATE >= :partition_date
      AND UDATE <= DATEADD('MM', 1, :partition_date)
keyColumn: c_key
mostRecentRowColumn: c_fetchdate
partitions:
  - name: partition_date
    values:
      - '2022-01-01'
      - '2022-02-01'
      - '2022-03-01'
      - '2022-04-01'
      - ...

```

In the partitions, you define values to filter the data. When using partitions, the extraction code needs to be adjusted at two places. Depending on the defined number of partitions, the individual extractions start.

In the above code, WHERE condition is to filter the table.

```
WHERE UDATE >= :partition_date  
      AND UDATE <= DATEADD('MM', 1, :partition_date)
```

UDATE is the column in the table that you want to partition.

DATEADD('MM', 1, :partition\_date) 'MM' represents monthly. You can set daily as DD, weekly as WW, monthly as MM.

### 3.7.4.3.4.1.3 Partitioning Based on Subquery Results

Learn how to partition your data based on subquery results. Example code is included to help you get started.

Use this partition strategy when the table does not have a delta parameter.

Example code:

```
tableSyncConfigurations:  
  alias: cdhdr  
  sql: |  
    SELECT  
      CONCAT(MANDANT, OBJECTCLAS, OBJECTID, CHANGENR) as c_key,  
      CURRENT_TIMESTAMP() AS c_fetchdate,  
      CHANGENR,  
      MANDANT,  
      OBJECTCLAS,  
      OBJECTID,  
      UDATE,  
      TOSTRING(HASHBYTES('SHA3_256', CDHDR.USERNAME)) AS USERNAME,  
      UTIME  
    FROM CDHDR  
    WHERE OBJECTID IN (  
      SELECT DISTINCT CONCAT(AUFK.MANDT, AUFK.AUTYP, AUFK.AUFNR) AS aufk_keys  
      FROM AUFK  
      WHERE ERDAT >= :partition_date  
            AND ERDAT <= DATEADD('WW', 1, :partition_date))  
  keyColumn: c_key  
  mostRecentRowColumn: c_fetchdate  
  partitions:  
    - name: partition_date  
      values:  
        - '2020-01-01'  
        - '2020-01-08'  
        - '2020-01-15'  
        - '2020-01-22'  
        - '2020-01-29'
```

The following table explains the code for partitioning data based on subquery results.

Code	Description
<pre>WHERE OBJECTID IN (     SELECT DISTINCT         CONCAT(AUFK.MANDT, AUFK.AUTYP,         AUFK.AUFNR) AS aufk_keys     FROM AUFK     WHERE ERDAT         &gt;= :partition_date         AND ERDAT &lt;= DATEADD('WW',         1, :partition_date))</pre>	<p>Using the partitions with ":" shows the connection to defined partitions. This can be daily, weekly, and monthly.</p> <p>The subquery is executed before the main query and then applied as filter to make sure that the desired data is extracted.</p>
<pre>partitions: - name: partition_date   values:     - '2020-01-01'     - '2020-01-08'     - '2020-01-15'     - '2020-01-22'     - '2020-01-29'</pre>	<p>After initial load, make sure you set the delta load based on the defined partitions here. While creating delta load using the date information, add parameters section with initial date for the very first delta load. This is to ensure the data extraction happens based on correct date values. For information about delta load, see <a href="#">Delta load using date information. [page 215]</a></p>

### 3.7.4.3.4.1.4 Partitioning Based on Change Number Range

Learn how to partition your data based on the change number range.

Use the following script to extract data from the CDPOS table based on the change number range:

```
tableSyncConfigurations:
  alias: cdpos
  sql: |
    SELECT
      CONCAT(MANDANT, OBJECTCLAS, OBJECTID, CHANGENR, TABNAME, TABKEY, FNAME,
      CHNGIND) AS c_key,
      CURRENT_TIMESTAMP() AS c_fetchdate,
      MANDANT,
      OBJECTCLAS,
      OBJECTID,
      CHANGENR,
      TABNAME,
      TABKEY,
      FNAME,
      CHNGIND,
      VALUE_NEW
    FROM CDPOS
    WHERE CHANGENR >= :changenr AND CHANGENR <= :max_changenr
  keyColumn: c_key
  mostRecentRowColumn: c_fetchdate
  parameters:
    - name: changenr
      initial: '0000000001'
      idformat: '%010d'
      pagesize: 100000
      type: id
```

In the preceding script, the WHERE condition in the SQL query uses the values defined in the Parameters code block. This implies the table is extracted using parameters, which dynamically partition the data based on the initial and pagesize values.

For initial data extraction using ascending numbers, the values entered in the `parameters` block are the starting point. The value for the `initial` parameter is the minimum change number obtained from the CDHDR table. CDHDR is a header table of the CDPOS table.

For initial data extraction from the CDPOS table, you first need to extract data from the CDHDR table based on the `udate`, the required date range. For example, extract the data that is added or updated on or after 01.01.2023, `udate >= 01-01-2023`. For information on extracting data based on date, see [Partition based on date \[page 211\]](#).

## ⌚ Example

### Example Query

```
tableSyncConfigurations:  
  alias: cdhdr  
  sql: |  
    SELECT  
      CONCAT(MANDANT, OBJECTCLAS, OBJECTID, CHANGENR) AS c_key,  
      CURRENT_TIMESTAMP() AS c_fetchdate,  
      MANDANT,  
      OBJECTCLAS,  
      OBJECTID,  
      CHANGENR,  
      UDATE,  
      UTIME,  
      TOSTRING(HASHBYTES('MD5', CDHDR.USERNAME)) AS USERNAME  
    FROM CDHDR  
    WHERE UDATE = :partition_date  
      AND UDATE = DATEADD('MM', 1, :partition_date)  
keyColumn: c_key  
mostRecentRowColumn: c_fetchdate  
partitions:  
  - name: partition_date  
    values:  
    - '2023-01-01'  
    - '2023-02-01'  
    - '2023-03-01'  
    - '2023-04-01'  
    - ...
```

Next, you need to get the minimum change number from the CDHDR table that was extracted in your process data pipeline. For that, use the following query:

```
SELECT min(changenr)  
FROM CDHDR
```

Let's assume the minimum change number you get is 000000000. Pass this number as an input to the `initial` parameter.

The `Pagesize` parameter defines the number of rows in a partition. This parameter dynamically splits the table into partitions based on the minimum change number. You'll define only the initial value for the Page size parameter, and the system then iterates and creates partitions until no new results. When a partition doesn't return results, the last value used for the extraction is saved and used as the new initial value for the next data extraction. This saved value is passed as an input to the `initial` parameter in the next extraction.

## Dynamic Partitioning Explained with an Example

Let's assume:

```
initial: 00000000,  
pagesize: 100000
```

then the dynamic partitioning happens internally in the CDPOS table, as follows:

```
WHERE changenr >= initial and changenr < result of initial+pagesize
```

The first partition:

WHERE changenr >= 00000000 and changenr < 01000000. The result of initial + pagesize, 00000000 + 100000 becomes 01000000.

The second partition:

CDPOS WHERE changenr >= 01000000 and changenr < 02000000) . The result of initial + pagesize+Pagesize, 01000000 + 100000 + 100000 becomes 02000000.

If the second partition doesn't return results, the last extracted value in the first partition 01000000 is saved in the background for the next extraction. The 01000000 value is passed as an input to the `initial` parameter in the next extraction.

### ⚠ Caution

The extraction process will stop when a partition does not return any result. Similarly, if a specified `pagesize` does not return any result due to other applied filters, the extraction will stop, regardless of the presence of records with a higher changeNR. In such cases, it's recommended to adjust the `pagesize` parameter value accordingly.

After configuring initial load, confirm with [Save](#).

## Related Information

[Partition based on date \[page 211\]](#)

### 3.7.4.3.4.2 Setting the Delta Load Criteria

Learn how to define the delta load for advanced data extraction.

Delta load is the process of extracting only the new data added to a table since the last successful load. You can define delta criteria such as certain date and time for each field in a table. Based on the set criteria, the delta load of the table is extracted. Each table extracted as a parquet file has an extraction timestamp, `c_fetchdate`.

Make sure that each extracted table contains a primary key definition, PK.

### ❖ Example

[How the Delta mechanism Works](#)

If the delta load was configured properly:

- Newly added rows are extracted based on the timestamp or insertion sequence.
- Updated rows are extracted as new parquet files with the extraction timestamp, c\_fetchdate.

For each extracted table, at least two parquet files are generated, one with the raw data extracted during the initial run and the other with the deduplicated data, which includes the existing and newly extracted data. Data deduplication happens by grouping all the rows based on the primary key, then choosing the most recent entry extracted from all parquet files. All this happens internally, therefore, you can only access the optimized table with unique data.

Let's assume you want to extract the delta load. For that, consider you have initially extracted data from the following table named "Sales" extracted on 2022-11-05.

Customer ID	Product ID	Quantity	Price (Euros)	Timestamp
001	000N20	10	100	2022-11-05 04:02:35
002	000W20	20	400	2022-11-05 04:02:35
003	000N21	21	440	2022-11-05 04:02:35

After initial extraction, you have updated the existing customer data (Customer ID 003) and added new data, as follows:

Customer ID	Product ID	Quantity	Price (Euros)	Timestamp
001	000N20	10	100	2022-11-05 04:02:35
002	000W20	20	400	2022-11-05 04:02:35
003	000N21	25	500	2022-11-10 04:02:35
1010	000XZ20	15	150	2022-06-05 04:02:35
1011	000XN20	20	400	2022-06-05 04:02:35
1012	000NW21	21	440	2022-10-05 04:02:35

As the existing data is updated and new data is added, a parquet file called "Sales-20221105.parquet" is generated. This parquet file contains duplicate rows for the record, 003. The data in these two tables is then grouped by primary key and c\_fetchdate, so that only the most recent records are available in the optimized table.

The parquet files are maintained by SAP Signavio on the AWS platform and are currently not accessible.

For advanced data extraction, you can configure delta load in the following ways:

- [Delta Load Using Dates \[page 217\]](#)
- [Delta Load Using Ascending Numbers \[page 218\]](#)
- [Delta Load Using Subqueries \[page 218\]](#)

### **ⓘ Note**

The delta parameter in the advanced extraction usually pulls data up to the current day minus one (current day - 1), while the standard extraction always pulls data up to the current date.

When you run extraction, based on the defined delta criteria, the data is extracted.

**Parent topic:** Advanced Data Extraction [page 208]

**Previous:** Configuring Initial Load [page 210]

**Next task:** Deleting Data or Table in Advanced Extraction [page 219]

## Related Information

[Running the Initial Load Extraction \[page 220\]](#)

### 3.7.4.3.4.2.1 Delta Load Using Dates

View the example for delta load using data information.

Following is the example code for delta load using date information:

```
tableSyncConfigurations:
  alias: cdhdr
  sql: |
    SELECT
      CONCAT(MANDANT, OBJECTCLAS, OBJECTID, CHANGENR) AS c_key,
      CURRENT_TIMESTAMP() AS c_fetchdate,
      MANDANT,
      OBJECTCLAS,
      OBJECTID,
      CHANGENR,
      UDATE,
      UTIME,
      TOSTRING(HASHBYTES('MD5', CDHDR.USERNAME)) AS USERNAME
    FROM CDHDR
    WHERE UDATE >= :left_erdat
keyColumn: c_key
mostRecentRowColumn: c_fetchdate
parameters:
  - name: erdat
    initial: 2023-01-01
    format: yyyy-MM-dd
    type: date
```

In the above code snippet, the `:left_` and the parameter name entered in `parameters` section, is a delta variable.

In `parameters` section of code, you are free to choose a name for your parameter. The initial date which you entered is used for the very first delta load. After this load, the value of that parameter is automatically adjusted in the background and set to the date of the last extraction.

After configuring delta load, confirm with [Save](#).

After configuring the delta load, run the extraction to pull the new data continuously into SAP Signavio Process Intelligence. You can then create a process data pipeline and perform data transformations. You can also monitor the pipeline.

### 3.7.4.3.4.2.2 Delta Load Using Ascending Numbers

View the example of delta load using ascending numbers.

Following is the example code for delta load using ascending numbers. The following query can be used for the initial extraction as well. For example, changenr of the CDPOS Table.

```
tableSyncConfigurations:
  alias: cdpos
  sql: |
    SELECT
      CONCAT(MANDANT, OBJECTCLAS, OBJECTID, CHANGENR, TABNAME, TABKEY, FNAME,
CHNGIND) AS c_key,
      CURRENT_TIMESTAMP() AS c_fetchdate,
      MANDANT,
      OBJECTCLAS,
      OBJECTID,
      CHANGENR,
      TABNAME,
      TABKEY,
      FNAME,
      CHNGIND,
      VALUE_NEW
    FROM CDPOS
    WHERE CHANGENR >= :changenr AND CHANGENR <= :max_changenr
keyColumn: c_key
mostRecentRowColumn: c_fetchdate
parameters:
  - name: changenr
    initial: '0000000001'
    idformat: '%010d'
    pagesize: 1000000
    type: id
```

In the above sample code, the partitions with ":" shows the connection with defined parameters for a potential load.

For the initial delta load, the value entered in the `parameters`, is the starting point. The logic in the `parameters`, loads the number of rows defined in the `pagesize` parameter, and often return the results. We recommend that you increase the page size when you add additional parameters.

After configuring delta load, confirm with [Save](#).

After configuring the delta load, run the extraction to pull the new data continuously into SAP Signavio Process Intelligence. You can then create a process data pipeline and perform data transformations. You can also monitor the pipeline.

### 3.7.4.3.4.2.3 Delta Load Using Subqueries

Learn how to configure delta load using sub queries for advanced data extraction.

Following is the example code for delta load using a subquery:

```
tableSyncConfigurations:
  alias: cdhdr
  sql: |
    SELECT
      CONCAT(MANDANT, OBJECTCLAS, OBJECTID, CHANGENR) as c_key,
```

```

CURRENT_TIMESTAMP() AS c_fetchdate,
CHANGENR,
MANDANT,
OBJECTCLAS,
OBJECTID,
UPDATE,
TOSTRING(HASHBYTES('SHA3_256', CDHDR.USERNAME)) AS USERNAME,
UTIME
FROM CDHDR
WHERE OBJECTID IN (
    SELECT DISTINCT CONCAT(AUFK.MANDT, AUFK.AUTYP, AUFK.AUFNR) AS aufk_keys
    FROM AUFK
    WHERE ERDAT >= :left_erdat)
keyColumn: c_key
mostRecentRowColumn: c_fetchdate
parameters:
- name: erdat
  initial: 2023-01-01
  format: yyyy-MM-dd
  type: date

```

In the above sample code, the `:left_` and the parameter name entered in `parameters` section, is a delta variable.

In the `parameters`, you can assign a name for your parameter. And, the initial date, which you entered is used for the first delta load. After this load, the value of that parameter is automatically adjusted in the background and set to the date of the last extraction.

#### Note

Sub-queries have a query limit of 10,000 entries.

After configuring delta load, confirm with [Save](#).

After configuring the delta load, run the extraction to pull the new data continuously into SAP Signavio Process Intelligence. You can then create a process data pipeline and perform data transformations. You can also monitor the pipeline.

### 3.7.4.3.4.3 Deleting Data or Table in Advanced Extraction

Learn how to delete the extracted data while either saving the script or deleting the table entirely in your source data.

#### Context

You can delete the extracted data while saving the advanced extraction's script, or delete the entire table from your source data in SAP Signavio Process Intelligence. To do this, use the [Delete data / table](#) option, which is accessible in SAP Signavio Process Intelligence at the following places:

- Action menu of a selected table on the source data tables list screen
- Table configuration screen

### ⚠ Caution

- Deleting the extracted data or the entire table that is linked to a process data pipeline will affect the data transformation within that pipeline.
- Data is deleted permanently from SAP Signavio Process Intelligence and this can't be undone.

Follow these steps:

## Procedure

1. Open your source data.
2. Choose a table and select *Delete data/table*. A pop-up window appears with the following options:
  - *Delete only extracted data and keep the table*: This deletes the extracted data and saves the current script for later use. For new data with current configuration, you need to re-extract data from your source system.
  - *Delete the table completely*: This deletes the table and extracted data permanently.

**Task overview:** [Advanced Data Extraction \[page 208\]](#)

**Previous:** [Setting the Delta Load Criteria \[page 215\]](#)

### 3.7.4.3.5 Running the Initial Load Extraction

Learn how to run the initial extraction of your process data.

The data extraction happens based on the table configuration in source data. After adding required tables and columns, and configuring initial load and delta load, as needed, you can then trigger the data extraction.

### ⓘ Note

Only the *Extract(Initial load)* button on the table configuration screen in source data can trigger the initial load extraction process.

For delta load extraction options, see [Data Extraction Options \[page 169\]](#) and for defining delta load filters, see [Setting Delta Filters \[page 199\]](#).

After saving your partition strategy, follow these steps:

1. Open your source data and expand the table whose initial data load you want to extract.
2. On the *Configuration* tab, select *Extract (initial load)*.
3. Select **X** to close the table details view.
4. Select the *Logs* tab to monitor the extraction and to view the extraction details of all the tables .
5. Select **>** for the log entry that you want to monitor.  
The side panel opens with details of the selected log entry.

6. To cancel the extraction process, select .

You can preview the extracted data per table. To do so, switch to the *Tables* tab. Expand the table and select the *Table preview* tab.

After running your initial extraction, configure and schedule the delta load to automatically pull new data from your source system.

For each new process data pipeline, you need to run the initial data extraction manually.

## Related Information

[Data Extraction Options \[page 169\]](#)

[Setting Delta Filters \[page 199\]](#)

[Scheduling the Data Extraction \[page 221\]](#)

### 3.7.4.3.6 Scheduling the Data Extraction

Learn how to schedule the data extraction for delta load.

While creating or editing the source data, you can set a schedule for the data extraction. Based on the set criteria, it extracts the new data since last extraction from the source system.

1. Open your *Source Data*.
2. From the header menu, select *Schedule*.  
The schedule configuration dialog opens.
3. Select the schedule toggle *Activate* on the upper right of the screen.
4. Set the criteria and confirm with *Save*.

The data extraction is scheduled as per the defined criteria.

After configuring the delta load, the new data that is added to your source system is continuously pulled into SAP Signavio Process Intelligence. Then, you can create a process data pipeline and run data transformations. You can also monitor the pipeline during data transformation.

## Related Information

[Run Data Pipelines \[page 291\]](#)

## 3.7.5 Upload Data Using the Ingestion API

Learn how to configure an Ingestion API connection and source data, then upload data to SAP Signavio Process Intelligence.

Uploading data to SAP Signavio Process Intelligence with the Ingestion API is different to the standard way of uploading and transforming data. There is no extraction step after uploading data to SAP Signavio Process Intelligence, only transformation and load.

You can set up data ingestion by either creating a source data or a process data pipeline.

### Prerequisites

Before uploading, make the following checks and preparations in your data to avoid encountering errors.

#### Verify dates and times:

- Ensure dates and times use supported data types. These include:
  - Date
  - Timestamp (millisecond precision)
  - Time (millisecond precision)
- Convert date and timestamp formats in files to milliseconds before upload. For example:  
**Fri Jun 24 2022 10:58:41 GMT+0200** becomes **1656061121670** milliseconds

#### Ensure the data includes no invalid characters:

- Replace NULL values with an empty string in files. Not all NULL value types are detected.
- Column names must not contain special characters. Only characters from the character class [A-Za-z\_] are valid for column names. For example, column names must not contain spaces.
- Avoid spaces in the names of uploaded files.
- Avoid spaces in the specified table name in the schema.

#### Pseudonymize the data on your source system before uploading.

- SAP Signavio Process Intelligence doesn't support pseudonymizing the uploaded data.

## Uploading Data

Once you're ready to upload, follow these steps:

1. Set up data ingestion by creating an ingestion connection, source data, or process data pipeline in SAP Signavio Process Intelligence. Read more in section [Setting Up Source Data \[page 223\]](#).

#### ⓘ Note

- Connections to the Ingestion API are authenticated by an access token. This token can't be refreshed once you have created an Ingestion API connection. To get a new token, delete the existing connection and create a new connection. See [Ingestion API Authentication](#) for more information.

- Only one connection can be linked to one source data for data ingestion.
2. Call the API using the API credentials and upload the data. Read more in the sections [Ingestion Request](#) and [Ingestion Status Request](#).

#### ⓘ Note

- The duration between API calls that upload data to the same source must be at least 30 seconds. Otherwise, you get a timeout error.
- If the size of the CSV or TSV file exceeds 150 MB, we recommend you split it into multiple files of maximum 150 MB each. You can then make multiple upload requests using the same schema.
- API calls mustn't contain more than five files per call.

3. Run the initial transformation and load. Pipeline logs are generated to provide transformation and load information. Read more in section [Running the Transformation and Load \[page 297\]](#).

Once uploaded, the data is ready for investigation. Read how to define and grant access to process data in section [Prepare a process \[page 20\]](#) and how to analyze data in section [Process Mining \[page 309\]](#).

## Uploading to an Existing Dataset

If you upload to an existing dataset, consider the following:

- Your data must conform to the existing data ingestion schema. The Ingestion API can't be used to modify the schema.
- The primary key of your new data must be the same as that of the existing data. The primary key of an existing ingestion table cannot be modified.
- If you upload data for existing records which were added in earlier requests, it is assumed you're performing an update. Pushing data to the same table with the same primary keys overwrites existing data. Note that this doesn't apply to duplicate records uploaded in the same request. It is expected that all records in a single upload request are unique.

### 3.7.5.1 Setting Up Source Data

Read about how to set up data ingestion with the Ingestion API in SAP Signavio Process Intelligence.

You can set up data ingestion by either creating an ingestion source data or a process data pipeline.

## Create Source Data for Data Ingestion

#### ⓘ Note

- You can delete only the ingested data, or delete the entire table. To delete, select the table, then [Delete data / table](#). Choose one of the options and select [Delete](#).

- You can copy your table's schema to your clipboard and use it while working with the Ingestion API. For this, select the table, and the table details view opens in the side panel. Then select *Copy schema*.

Follow these steps:

1. Open  (*Repository*) or  (*Data Integration*)  in the sidebar.
2. Enter a name for the source data.
3. On the *Other* tab, select *Ingestion API*.
4. Select *Create*.

The source data page opens.

#### Note

The source data and linked connection are created at the same time. They both share the same name.

5. Select *Add Table*  
The selection dialog opens.
6. Choose the table to add and select **Next**.  
The column selection dialog opens.
7. In the **Select columns** dialog, choose the columns that you want to add to the table, and select **Next**.  
The key column selection dialog opens.
8. Select the columns you want to define as key columns. Key columns are used to identify unique rows in a table and to remove duplicate rows.
9. Select **Next**.  
The table is added to the source data and displayed in the **Tables** tab.
10. Expand the table whose schema you want to copy and select *Copy schema* in the header menu.

## Create an Ingestion Process Data Pipeline

Follow these steps:

1. Open  (*Repository*) or  (*Data Modeling*)  in the sidebar.
2. Enter a name for the process data pipeline.
3. On the *Other* tab, click *Ingestion API*.
4. Click **Next**.
5. On the **Select a template** section, select **Blank template** and click **Next**.
6. On the **Select the source data** section, select an existing source data or click **New source data**.
7. Click *Create*.

The process data pipeline page opens. Read more in section [Manage process data pipelines \[page 235\]](#).

### 3.7.5.2 Manage the Ingestion API Access Token

Read about how to manage the ingestion API access token in SAP Signavio Process Intelligence.

An access token is used to authenticate calls to the Ingestion API. The token is created when you set up an ingestion connection, as described in [Setting Up Source Data \[page 223\]](#).

## Getting a New Access Token

After creating an ingestion connection, the generated access token can't be refreshed or changed. If an access token for a specific connection is compromised, you must get a new access token.

To get a new access token, delete the existing connection and create a new connection. Use the new access token to authenticate the Ingestion API calls to SAP Signavio Process Intelligence.

### ⓘ Note

Deleting an ingestion connection breaks the linked source data.

## 3.7.5.3 Ingestion API Related Errors

Read about the reference information for the Ingestion API available in SAP Signavio Process Intelligence.

The following table describes possible solutions to problems you might encounter when using the Ingestion API.

Problem	Possible Solutions
Access is denied. The access token for your connection might be invalid.	Obtain a new access token. For more information on obtaining a new token, see <a href="#">Ingestion API Authentication</a> .
The schema is invalid. The format of the JSON code might be invalid, or the JSON code might not conform to the Apache Avro standard.	<p>Check that the schema code is valid JSON.</p> <p>Verify that your schema aligns with the Apache Avro standard.</p>
Your data files are rejected as an unsupported type.	The supported file extensions are CSV and TSV. Check your file extensions.
An invalid character exists between the encapsulated token and the delimiter.	The relevant line number is provided in the error trace. Find that line in your data and amend the invalid character.
A name in the header is missing or duplicated.	Check that the header line of the CSV or TSV is present, complete and has no repeated names.
A field is rejected as not accepting NULL values.	In the schema, set the relevant field as nullable.
An error is encountered for a specific input string when converting the CSV/TSV file.	Ensure that the type in the schema matches the corresponding data in the files.
You receive the message: The initial request for table <Table Name> is still in progress. Please wait for it to finish before starting a new request.	Wait for the first table ingestion request to be concluded before starting a second one. After this, other requests can be started, but there should be at least 30 seconds between them. Otherwise, you may get a timeout error.

## 3.7.6 Manually Upload Data

How to create a connection that connects SAP Signavio Process Intelligence with a source system.

In SAP Signavio Process Intelligence, you can find the following source data systems to upload data manually:

- [Manual upload \[page 226\]](#)
- [Legacy manual upload \[page 233\]](#)

The following table summarizes the key differences between the two types of uploads:

Manual upload	Legacy manual upload
Configuring and uploading zipped CSV files is centralized. No connection type is needed to create a source data. This simplifies and speeds up the setup.	Configuring and uploading CSV file requires a connection setup and involves multiple screens navigation.
Table customization is simplified with the improved user interface.	Table customization is complex and requires additional steps.
Supports delimiters such as comma (,), semi-colon (;), and tab control.	Supports only comma (,).
Supports uploading zipped CSV files.	Supports uploading zipped CSV files.

Select the links below to learn more about each topic.

- [Prerequisites \[page 226\]](#)
- [Supported Data Types \[page 228\]](#)
- [Uploading Data Manually \[page 229\]](#)
- [Configuring a Data Table \[page 230\]](#)
- [Editing a File Name \[page 232\]](#)
- [Deleting a File, Data Table, and Column \[page 232\]](#)

### 3.7.6.1 Manual Upload

Using the manual upload source data system, you can upload any data as zipped CSV files into SAP Signavio Process Intelligence. Before uploading data, get familiar with the guidelines on preparing the data.

#### Prerequisites

Before uploading, make the following checks and preparations in your data to avoid errors.

**Ensure the data includes no invalid characters:**

- **Column names must not contain special characters. Only characters from the character class [A-Za-z\_] are valid for column names. For example, column names must not contain spaces.**
- Replace NULL values with an empty string in files. Not all NULL value types are detected.
- Avoid spaces in the names of uploaded files.

- Avoid spaces in the specified table name in the schema.

#### **Supported and unsupported file formats:**

- Zipped CSV files.
- Zipped file must only contain only the CSV files, not folders.
- ABAPTE file upload isn't supported.

#### **Verify data in the CSV files:**

- Each row must have its own unique identifier in the process data.
- Supports delimiters such as comma (,), semi-colon (;), and tab control.  
Data with the separator “\t” is not supported.
- CSV files must contain headers

#### **Pseudonymize the data on your source system before uploading:**

SAP Signavio Process Intelligence doesn't support Pseudonymizing the uploaded data.

#### **Verify date and timestamp:**

- Data in UNIX timestamp format is supported. For example, while configuring a table, for timestamp value, 1656061121670, you can choose date, timestamp, or time data type.
- To use a string as date or timestamp, convert the string into UNIX timestamp format before uploading. For example,  
convert the string, **1999-05-05T05:05:05** into UNIX timestamp, **318304922000**.
- If your file has a column with timestamp data, for example, **Fri Jun 24 2022 10:58:41 GMT+0200**, use STRING data type for the column while configuring a table.

## **Recommendations for Uploading Data**

- The duration between each file upload to the same source must be at least 30 seconds. Otherwise, you get a timeout error.
- New data can't be added to an existing table.
- CSV file for upload mustn't exceed one million rows.

## **Related Information**

[Uploading Data Manually \[page 229\]](#)

[Configuring a Data Table \[page 230\]](#)

[Deleting a File, Data Table, and Column \[page 232\]](#)

### **3.7.6.1.1      Supported Data Types**

Supported data types in manual upload.

Manual upload supports the following data types:

- boolean: a binary value
- int: 32-bit signed integer
- long: 64-bit signed integer
- double: double precision (64-bit) IEEE 754 floating-point number
- string: unicode character sequence

For detailed data requirements, see the [Prerequisites \[page 226\]](#) section.

## **Supported Date and Time Data Types**

The manual upload uses the Avro Apache library to serialize input data into supported Avro data types. While configuring the table, the data types you choose for the date, date-time, and time formats are automatically changed into the appropriate Avro data types.

This section describes the date and time data types that are supported and must be used when configuring tables.

### **Date**

A date logical type annotates an Avro `int`, where the `int` stores the number of days from the unix epoch, 1 January 1970 (ISO calendar).

### **Time**

A `time-millis` logical type annotates an Avro `int`, where the `int` stores the number of milliseconds after midnight, 00:00:00.000.

### **Timestamp**

A `timestamp-millis` logical type annotates an Avro `long`, where the `long` stores the number of milliseconds from the unix epoch, 1 January 1970 00:00:00.000 UTC.

## Nullability

Unions are used to represent nullable fields, for example, [ "null", "string" ] declares a field which may be either a null or string.

### 3.7.6.1.2 Uploading Data Manually

How to create, edit, and delete source data. A source data defines what is extracted from a data pipeline.

You can upload data manually as zipped CSV files. A zip file can contain data with the same schema or different schemas.

You'll find the *Manual upload* option while creating a source data.

Before you get started, make sure you check the [Prerequisites \[page 226\]](#) and [Supported Data Types \[page 228\]](#).

To upload data manually, follow these steps:

1. Open  [\(Repository\)](#) or  [\(Data Integration\)](#)  in the sidebar.

2. Enter a name for the source data.

3. In the *Repository* field, if a folder is not already selected, select one.

When you create a source data from the Repository, the *Repository* field is preselected with the folder from which you selected   . When you create a source data under  , Repository is preselected if you have editor or manager permission on the root folder. If you don't have editor or manager permission on the root folder, no folder is preselected and you have to select a folder.

4. Select *Manual Upload* as the connection type from the available list.

5. Select *Create*.

The source data is created and the upload dialog opens.

6. Drag your file to the import area or select a zipped file to upload from your local machine.

The uploaded file is shown in the *Unprocessed files* section.

After uploading, configure the table with the correct data types and key columns. See [Configuring a Data Table \[page 230\]](#).

[Configuring a Data Table \[page 230\]](#)

## Related Information

[Editing a File Name \[page 232\]](#)

[Deleting a File, Data Table, and Column \[page 232\]](#)

### 3.7.6.1.3 Configuring a Data Table

How to create, edit, and delete source data. A source data defines what is extracted from a data pipeline.

After uploading the data into SAP Signavio Process Intelligence, you can configure the data table with the correct data types and key columns. For list of supported data types, see [Supported Data Types \[page 228\]](#) section.

#### Note

A data table can be configured for multiple files with the same header only.

1. Open your source data.
2. In the *Unprocessed files* section, you can do either of the following:
  1. Choose the CSV file that was uploaded as a single file.
  2. Choose the zip file, open ▾ the menu, and select one or more CSV files.
3. To configure a data table for multiple files with same header, choose the files and select *Configure table*.
4. In the *Configure table* popup window, enter a name for the data table.
5. Choose either single or double quotes and a field separator from the list and select *Next*.

#### Example

##### *Using single and double quotation marks*

Each value in a row is checked against the selected quotation mark and parsed by the separator. If the selected quotation mark matches the quotation marks around the value, then these values are formatted automatically. Otherwise, value format remains unchanged. The parsed values are then available for the table configuration.

The following table demonstrates how quotation marks work with comma (,) as a separator:

Chosen Quotation Marks in Application	Row of Values in the Up- loaded File	Split Values by Separator (First, second, and third value)	Description
Single quotation mark (') or double quotation mark ("")	001,Process,TRUE	001 Process TRUE	Values are parsed.
Double quotation marks ("")	001," Process ",TRUE	001 Process TRUE	Values are parsed and auto-formatted.  For example, the space and double quotation marks ("") around the value <b>Process</b> are removed because the selected quotation mark matches the quotation marks around the value.

Chosen Quotation Marks in Application	Row of Values in the Up- loaded File	Split Values by Separator (First, second, and third value)	Description
Single quotation mark ('')	001," Process ",FALSE	001 " Process " FALSE	<p>Values are parsed, but the value format remains unchanged.</p> <p>For example, the space and double quotation marks (" ") around the <code>Process</code> value remain the same because the selected quotation mark doesn't match the quotation marks around the value.</p>
Double quotation marks ("")	001," Process,Data ",FALSE	001 Process, Data FALSE	<p>Values are auto-formatted.</p> <p>If your selected quotation mark is double, the comma-separated values enclosed in double quotation marks (" ") are considered as a single value while parsing.</p> <p>For example, the values <code>Process,Data</code> are considered to be one value, as the chosen quotation mark is double.</p>
Single quotation mark ('')	001," Process,Data ",FALSE	001 " Process Data " FALSE	<p>The values format remains unchanged.</p> <p>If your selected quotation mark is single, the comma-separated values enclosed in double quotation marks (" ") are considered as two separate values while parsing.</p> <p>For example, the values <code>" Process,Data "</code> are considered to be two separate values, as the chosen quotation mark is single.</p>

6. Preview lines in the chosen CSV files and select *Next*.

7. Assign a data type to each column. To do so, select the data type from the drop-down list in each column header and select *Next*.

 **Note**

Make sure the timestamp data type is set to string. Otherwise, the file upload fails.

8. Choose one or more columns as key columns by ticking the checkboxes and select *Create table*.

 **→ Remember**

You can select up to 63 columns as the primary key in a table. Selecting more primary keys is invalid and causes an error.

The table is created and displayed in the *Data tables* section.

9. To view all the columns in a data table, choose the data table and open  the menu.

## Related Information

[Editing a File Name \[page 232\]](#)

[Deleting a File, Data Table, and Column \[page 232\]](#)

### 3.7.6.1.4 Editing a File Name

How to create, edit, and delete source data. A source data defines what is extracted from a data pipeline.

You can edit the unprocessed CSV file names and zipped file names. You can also edit the configured data table names.

1. Open your source data.
2. Choose the CSV file and enter a new name. The latest name is saved automatically.

### 3.7.6.1.5 Deleting a File, Data Table, and Column

How to create, edit, and delete source data. A source data defines what is extracted from a data pipeline.

You can delete manually uploaded files, configured data tables, and columns.

### Deleting an Unprocessed File

Open your source data, choose the file, and select  *Action menu > Delete*.

## Deleting a Data Table

Open your source data, choose the data table, and select  *Action menu > Delete.*

## Deleting a Column from Data Table

1. Open your source data, choose the data table and open  the menu.
2. Choose the column and select .

### 3.7.6.2 Legacy Manual Upload

How to create a connection that connects SAP Signavio Process Intelligence with a source system.

#### Note

The legacy manual upload feature will no longer be available after September 9, 2023.

As an alternative, you can use the improved manual upload feature. Using the improved manual upload, you can configure and upload files from one place. You don't need a connection type for creating a source data. This simplifies and speeds up the set up process. For information about the improved manual upload, see the [Manual upload \[page 226\]](#) section.

Using legacy manual upload, you can upload process data as zipped CSV files.

## Requirements and Considerations

The following requirements and considerations apply:

- A ZIP file can contain one or more CSV files.
- Uploaded files are organized in directories. You can upload one or more ZIP files to a directory. The data from all files in a directory is converted into one table.
- Column names mustn't contain special characters. Only characters from the character class [A-Za-z] are valid for column names.
- If your spreadsheet file has more than one sheet, create a CSV file for each sheet.
- To separate data values, use the comma. Any other delimiter doesn't work.
- In the process data, don't add an uneven number of quotation marks, for example `"okay string",12421,"not ok"ay string",456.`
- In the process data, each row must have its own unique identifier. Otherwise when you extract the data, duplicate rows will occur.

- Timestamps have to be imported as `varchar` fields and then be converted to timestamps in the transformation script.
- Ensure that data doesn't contain control characters. These characters aren't printable and won't display during screen sharing sessions.
- Ensure columns don't contain trailing backslashes.

## Related Information

[Work with Legacy Manual Upload \[page 234\]](#)

### 3.7.6.2.1 Work with Legacy Manual Upload

How to create a connection that connects SAP Signavio Process Intelligence with a source system.

Setting up and working with the legacy manual upload feature involves the following procedures:

1. [Create a connection \[page 135\]](#)
2. [Create source data \[page 178\]](#)
3. [Customize tables and columns \[page 180\]](#)

#### → Remember

You can select up to 63 columns as the primary key in a table. Selecting more primary keys is invalid and causes an error.

## 3.8 Transform and Load Data

Get an overview of transforming the extracted data and loading it into a process.

After extracting data from source systems, transform and load data into a process for further investigations.

Using process data pipelines, the data is transformed and an event log is generated as a result. The event log is then loaded into a process linked within a process data pipeline. You can use this process to perform further investigations and generate insights.

#### To transform and load data into a process, you need the following:

- A valid connection with your source system whose data you want to transform.
- Data Extracted into SAP Signavio Process Intelligence using Source Data.  
If data hasn't extracted already, you can still extract the data using [Run ETL](#) option in Process Data Pipelines.
- A process data pipeline. While creating a process data pipeline creation, you're asked to choose the appropriate template and then source data. The connection associated with the selected source data is linked automatically.

- Data transformation rules defined in business objects, event collectors, and a case attribute.
- A process linked to your process data pipeline. This is to upload the event log with transformed data into a process for further analysis and mining.
- Access to *Run ETL* or *Run T&L* options.

Select the links below to learn more about each topic.

#### [Process Data Pipelines \[page 235\]](#)

Learn about the requirements for data pipelines and data type requirements. Also, how to create and manage process data pipelines, and view the health status of your process data pipeline. You can also find information about defining transformation rules in business objects, event collectors, and a case attribute.

#### [Run Data Pipelines \[page 291\]](#)

Learn how to run your process data pipeline, and schedule pipeline runs. You can run it manually or schedule an automatic execution at any given point of time. You can execute the transformation and load at any time.

#### [Monitor Data Pipelines and Download Event Logs \[page 299\]](#)

Get an overview of monitoring data pipelines and downloading event logs.

#### [Troubleshooting Transformation Errors \[page 303\]](#)

Find solutions to common errors with data pipelines.

#### [SQL Style Guide for Transformations \[page 306\]](#)

Follow these best practices when writing SQL queries for transformations.

## 3.8.1 Process Data Pipelines

Learn about the requirements for data pipelines and data type requirements. Also, how to create and manage process data pipelines, and view the health status of your process data pipeline. You can also find information about defining transformation rules in business objects, event collectors, and a case attribute.

In a process data pipeline, you define how the data pipeline extracts and transforms data, and where to load the data.

A process data pipeline contains all settings necessary to run a data pipeline:

- a connection that enables a link to the source system
- a process into which the extracted and transformed data is loaded
- a source data defining which data to be extracted
- a transformation configuration with a business process and transformation rules for extracted data

### ⓘ Note

We recommend setting up and testing data pipelines in a test environment. After a successful test, you can transfer the process data pipeline to your production system by using the import and export functions. Read more in section [Export and import a process data pipeline \[page 260\]](#).

## Concepts

- **Business process:** The process that you want to analyze in your organization. When you set up a process data management pipeline, you model the business process in the process data pipeline.
- **Business object:** An artifact in a process data pipeline. A business object, for example, a lead, consists of events and attributes.
- **Events:** Activities for a specific business object, for example the creation and qualification of a lead.
- **Event collectors:** The scripts for events are called event collectors.
- **Attributes:** A characteristic of an event on event-level or case-level. For example, the name of the person that created a lead is an attribute on event-level. The ID of that person is an attribute on case-level.

Select the links below to learn more about each topic.

### [About Data Transformation Templates \[page 236\]](#)

Data transformation templates, which are part of our accelerators for SAP Signavio Process Intelligence, speed up the creation of process data pipelines. They're based on business processes in specific source systems, like the Incident-to-Resolution process in ServiceNow. Find here an overview of all templates that you can use to create data models for process data pipelines.

### [Requirements for Data Pipelines \[page 247\]](#)

Overview of ETL requirements considering feature sets, connectors, transformation templates, and source systems.

### [Data Type Requirements for Process Data Pipelines \[page 248\]](#)

Find the supported data types, and the mandatory columns for case attribute and event collectors.

### [Set Up and Run a Data Pipeline \[page 249\]](#)

High-level description on how to set up and run a data pipeline in SAP Signavio Process Intelligence.

### [Managing Process Data Pipelines \[page 250\]](#)

Learn how to manage process data pipelines.

### [Business Objects \[page 262\]](#)

How to map extracted source system data to business objects in SAP Signavio Process Intelligence using SQL transformation scripts, which collect case-level attributes and events.

### [Data Views \[page 274\]](#)

An overview of data views in process data pipeline.

### [Process Data Model \[page 282\]](#)

Learn how the process data model integrates contextual information with process data. Data is arranged to allow a simpler and easier way to create data analysis.

### [Query Editor \[page 284\]](#)

The script editor provides features for text editing and quick navigation within the editor.

## 3.8.1.1 About Data Transformation Templates

Data transformation templates, which are part of our accelerators for SAP Signavio Process Intelligence, speed up the creation of process data pipelines. They're based on business processes in specific source systems, like the Incident-to-Resolution process in ServiceNow. Find here an overview of all templates that you can use to create data models for process data pipelines.

For some source systems, we provide transformation templates in which the business process, the extraction, and the transformation are preconfigured.

The templates are based on common business processes like Lead-to-Opportunity, Lead-to-Quote, or Incident-to-Resolution.

For a detailed description of each template, see section [Data transformation templates](#).

The templates include the following:

- A common business process with activities and business objects
- A definition of which data to extract
- Scripts to transform the extracted data

## Prerequisites

- You need the feature set SAP Signavio Process Intelligence – Data Modelling to use the templates. Your workspace administrator can enable it for you.
- The template documentation is available only for SAP Signavio users with a license for SAP Process Intelligence.

## Use Cases

You can use a process-specific template as a starting point and customize it based on your needs.

Blank templates are empty. Use a blank template if no template is available for your business process.

## Overview of Process-Specific Templates

Here, you can find all templates that are developed and maintained by us or by our partners.

Value Accelerator	System	End-to-End Process	Line of Business	Value Driver	Industry	Availability	Provider
Process-agnostic analysis	All	All	All	All	All	Available	SAP Signavio
Acquire to Onboard (SAP S/4HANA)	SAP S/4HANA	Acquire to Decommission	Asset Management	Reduce Asset Maintenance Cost	All	Available	SAP Signavio
Acquire to Onboard (SAP ECC)	SAP ECC	Acquire to Decommission	Asset Management	Reduce Asset Maintenance Cost	All	Available	SAP Signavio

Value Accelerator	System	End-to-End Process	Line of Business	Value Driver	Industry	Availability	Provider
Aligning Demand, Supply, and Financial Plans (SAP Integrated Business Planning for Supply Chain)	SAP IBP	Plan to Fulfill	Supply Chain	Reduce Days in Inventory	All	Available	SAP Signavio
Attract to Acquire Talent (SAP SuccessFactors)	SAP SuccessFactors	Recruit to Retire	Human Resources	Reduce HR Manual Transaction Effort; Reduce Time to Fill	All	Available	SAP Signavio
Incident to Resolution (ServiceNow)	ServiceNow	Lead to Cash	Sales	Reduce Service and Support Cost	All	Available	SAP Signavio
Inspect to Quality (SAP S/4HANA)	SAP S/4HANA	Plan to Fulfill	Manufacturing	Reduce Waste Generation Cost; Reduce Total Manufacturing Cost; Improve On-Time Delivery Performance	All	Available	SAP Signavio
Inspect to Quality (SAP ECC)	SAP ECC	Plan to Fulfill	Manufacturing	Reduce Waste Generation Cost; Reduce Total Manufacturing Cost; Improve On-Time Delivery Performance	All	Available	SAP Signavio
Invoice Excellence for Invoice to Pay Supported by OpenText in SAP S/4HANA	SAP S/4HANA	Finance	Finance	Improve Days Payable Outstanding; Reduce Finance Cost; Improve Accounts Payable FTE Productivity	All	Available	SAP Signavio

Value Accelerator	System	End-to-End Process	Line of Business	Value Driver	Industry	Availability	Provider
Invoice Excellence for Invoice to Pay Supported by OpenText in SAP ECC	SAP ECC	Finance	Finance	Improve Days Payable Outstanding; Reduce Finance Cost; Improve Accounts Payable FTE Productivity	All	Available	SAP Signavio
Invoice to Cash (SAP ECC)	SAP ECC	Finance	Finance	Reduce Days Sales Outstanding; Reduce Compliance and Risk Management Cost	All	Available	SAP Signavio
Invoice to Cash (SAP S/4HANA)	SAP S/4HANA	Finance	Finance	Reduce Days Sales Outstanding; Reduce Compliance and Risk Management Cost	All	Available	SAP Signavio
Invoice to Cash (SAP S/4HANA Cloud Public Edition)	SAP S/4HANA Cloud Public Edition	Finance	Finance	Reduce Days Sales Outstanding; Reduce Compliance and Risk Management Cost	All	Available	SAP Signavio
Invoice to Pay (SAP ECC)	SAP ECC	Finance	Finance	Improve Days Payable Outstanding; Reduce Compliance and Risk Management Cost	All	Available	SAP Signavio
Invoice to Pay (SAP S/4HANA)	SAP S/4HANA	Finance	Finance	Improve Days Payable Outstanding; Reduce Compliance and Risk Management Cost	All	Available	SAP Signavio
Issue to Resolution (Jira Service Management for Cloud)	Jira Service Management for Cloud	Issue to Resolution	Service	Reduce Customer Churn; Reduce Service and Support Cost	All	Available	SAP Signavio

Value Accelerator	System	End-to-End Process	Line of Business	Value Driver	Industry	Availability	Provider
Issue to Resolution (Jira Service Management for Data Center and Server)	Jira Service Management for Data Center and Server	Issue to Resolution	Service	Reduce Customer Churn; Reduce Service and Support Cost	All	Available	SAP Signavio
Lead to Close (Salesforce Sales Cloud) by PwC Switzerland	Salesforce Sales Cloud	Lead to Close	Sales	Reduce Sales Cost	All	Available	Partner offering by PwC Switzerland
Lead to Opportunity (Salesforce Sales Cloud)	Salesforce Sales Cloud	Lead to Cash	Sales	Reduce Sales Cost	All	Available only for existing customers	SAP Signavio
Lead to Opportunity (SAP Sales Cloud)	SAP Sales Cloud	Lead to Cash	Sales	Reduce Sales Cost	All	Available	SAP Signavio
Lead to Quote (Salesforce Sales Cloud)	Salesforce Sales Cloud	Lead to Cash	Sales	Reduce Sales Cost	All	Available only for existing customers	SAP Signavio
Make to Stock (SAP ECC)	SAP ECC	Plan-to-Fulfill	Manufacturing	Reduce Days Sales Outstanding; Reduce Compliance and Risk Management Cost	Process industry	Available	SAP Signavio
Make to Stock (SAP S/4HANA)	SAP S/4HANA	Plan to Fulfill	Manufacturing	Reduce Days Sales Outstanding; Reduce Compliance and Risk Management Cost	Process industry	Available	SAP Signavio
Manage Personal Employee Information (SAP SuccessFactors)	SAP SuccessFactors	Recruit to Retire	Human Resources	Reduce HR Manual Transaction Effort	All	Available	SAP Signavio

Value Accelerator	System	End-to-End Process	Line of Business	Value Driver	Industry	Availability	Provider
Manage Transportation Execution (SAP Transportation Management)	SAP Transportation Management	Plan to Fulfill	Supply Chain	Reduce Total Logistics Cost; Reduce Transportation Spend	All	Available	SAP Signavio
Manage Warehouse and Inventory, Out-bound Processing (SAP EWM)	SAP EWM	Plan to Fulfill	Supply Chain	Reduce Total Logistics Cost	All	Available	SAP Signavio
Meter to Cash (SAP for Utilities (IS-U))	SAP for Utilities (IS-U)	Lead to Cash	Finance	Reduce Customer Churn; Reduce Sales Cost	Utilities	Available	SAP Signavio
Meter to Cash (SAP S/4HANA Utilities)	SAP S/4HANA Utilities	Lead to Cash	Finance	Reduce Customer Churn; Reduce Sales Cost	Utilities	Available	SAP Signavio
Operate Manufacturing (SAP Digital Manufacturing)	SAP Digital Manufacturing	Plan to Fulfill	Manufacturing	Reduce Total Manufacturing Cost; Reduce Manufacturing Cycle Time	All	Available	SAP Signavio
Operate to Maintain (SAP ECC)	SAP ECC	Acquire to Decommission	Asset Management	Reduce Asset Maintenance Cost	All	Available	SAP Signavio
Operate to Maintain (SAP S/4HANA)	SAP S/4HANA	Acquire to Decommission	Asset Management	Reduce Asset Maintenance Cost	All	Available	SAP Signavio
Optimizing Payments for Premium Collections (SAP Collections and Disbursements for Insurance) by BearingPoint	SAP S/4HANA SAP ECC	Invoice to Cash	Finance	Increase Adherence to Standardized SAP Business Processes; Reduce Days Sales Outstanding	Insurance	Available	Partner offering by BearingPoint

Value Accelerator	System	End-to-End Process	Line of Business	Value Driver	Industry	Availability	Provider
Order to Cash (SAP ECC)	SAP ECC	Lead to Cash	Sales	Reduce Sales Cost; Reduce Customer Churn; Reduce Days Sales Outstanding; Improve Customer Satisfaction	All	Available	SAP Signavio
Order to Cash (SAP S/4HANA)	SAP S/4HANA	Lead to Cash	Sales	Reduce Sales Cost; Reduce Customer Churn; Reduce Days Sales Outstanding; Improve Customer Satisfaction	All	Available	SAP Signavio
Procure to Pay (SAP Ariba)	SAP Ariba	Source to Pay	Sourcing & Procurement	Improve User Compliance; Increase Adherence to Standardized SAP Business Processes; Reduce Compliance and Risk Management Cost	All	Available	SAP Signavio
Procure to Pay (SAP Ariba and SAP S/4HANA or SAP Ariba and SAP ECC) – Cross-System Accelerator	SAP Ariba and SAP S/4HANA	Source to Pay	Sourcing & Procurement	Improve User Compliance; Increase Adherence to Standardized SAP Business Processes; Reduce Compliance and Risk Management Cost	All	Available	SAP Signavio

Value Accelerator	System	End-to-End Process	Line of Business	Value Driver	Industry	Availability	Provider
Procure to Pay (Oracle JD Edwards) by Globant	Oracle JD Edwards	Source to Pay	Sourcing & Procurement	Reduce Compliance and Risk Management Cost; Improve On-Time Delivery Performance; Increase Adherence to Standardized SAP Business Processes	All	Available	Partner offering by Globalbant
Procure to Pay (SAP S/4HANA)	SAP S/4HANA	Source to Pay	Sourcing & Procurement	Reduce Compliance and Risk Management Cost; Reduce Finance Cost; Improve On-Time Delivery Performance; Increase Adherence to Standardized SAP Business Processes	All	Available	SAP Signavio
Procure to Pay (SAP ECC)	SAP ECC	Source to Pay	Sourcing & Procurement	Reduce Compliance and Risk Management Cost; Reduce Finance Cost; Improve On-Time Delivery Performance; Increase Adherence to Standardized SAP Business Processes	All	Available	SAP Signavio
Project to Cash (SAP S/4HANA Cloud Public Edition)	SAP S/4HANA Cloud Public Edition	Lead to Cash	Service	Reduce Days Sales Outstanding	Professional Services	Available	SAP Signavio

Value Accelerator	System	End-to-End Process	Line of Business	Value Driver	Industry	Availability	Provider
Reduce Duplicate Invoices for Invoice to Pay (SAP S/4HANA)	SAP S/4HANA	Finance	Finance	Reduce Finance Cost; Reduce Compliance and Risk Management Cost	All	Available	SAP Signavio
Reduce Duplicate Invoices for Invoice to Pay (SAP ECC)	SAP ECC	Finance	Finance	Reduce Finance Cost; Reduce Compliance and Risk Management Cost	All	Available	SAP Signavio
Request to Service (SAP Service Cloud)	SAP Service Cloud	Lead to Cash	Service	Reduce Customer Churn; Reduce Finance Cost	All	Available	SAP Signavio
Source Products and Services (SAP Ariba)	SAP Ariba	Source to Pay	Sourcing & Procurement	Reduce Compliance and Risk Management Cost; Reduce Overall Supply Chain Planning Cost; Reduce Sourcing Cycle Time; Improve Procurement FTE Productivity	Procurement	Available	SAP Signavio
Vendor Invoice Management (OpenText in SAP S/4HANA or SAP ECC or SAP S/4HANA)	OpenText in SAP S/4HANA or SAP ECC	Finance	Finance	Improve Days Payable Outstanding; Reduce Finance Cost; Improve Accounts Payable FTE Productivity	All	Available	SAP Signavio

## Access to the Template Documentation

For a detailed description of the process-specific templates, see [SAP Signavio Value Accelerators for SAP Signavio Process Intelligence](#).

You can access the template documentation when these prerequisites are met:

- You have a license for SAP Signavio Process Intelligence.
- Your workspace administrator has activated the feature sets for process data management for you. Read more in section [Access Requirements for Process Data Management \[page 52\]](#).

Then, you have the following options:

- Directly open the documentation by clicking the following link, based on the region in which your workspace is hosted:
  - Australia (AU): [Template documentation](#)
  - Canada (CA): [Template documentation](#)
  - Europe (EU): [Template documentation](#)
  - Japan (JP): [Template documentation](#)
  - Singapore (SGP): [Template documentation](#)
  - South Korea (KR): [Template documentation](#)
  - USA (US): [Template documentation](#)
- Log in to SAP Signavio Process Intelligence, and in the side panel, select any object under *Data Modeling* or *Data Integration*. Then, select  > *Template documentation*.
- When creating a process data pipeline and you're about to select a template, you can use the *More info* link on the template tile to open the template documentation.

❖ Example

## Create new process data pipeline

Process data pipeline name  
New process data pipeline

Select a template

Filter templates  
search

 Invoice-to-Cash (SAP ECC) <a href="#">More info</a>	 Invoice-to-Pay (SAP ECC) <a href="#">More info</a>
 Order-to-Cash (SAP ECC) <a href="#">More info</a>	 Operate-to-Maintain (SAP ECC) <a href="#">More info</a>
 Procure-to-Pay (SAP ECC) <a href="#">More info</a>	 Make-to-Stock (SAP ECC) <a href="#">More info</a>

Back [Next](#)

Read more about process data pipelines in section [Process Data Pipelines \[page 235\]](#).

## Related Information

[Creating a Process Data Pipeline \[page 251\]](#)

### 3.8.1.2 Requirements for Data Pipelines

Overview of ETL requirements considering feature sets, connectors, transformation templates, and source systems.

This section explains the following data pipeline configuration requirements:

- [Set up and work with data pipelines \[page 247\]](#)
- [Connectors and data transformation templates \[page 247\]](#)
- [Source systems \[page 247\]](#)

#### Set up and work with data pipelines

You can manage data pipelines only if the following requirements are met:

- You have a license for SAP Signavio Process Intelligence.
- Your workspace administrator has activated the feature sets for process data management for you, read more in section [Access Requirements for Process Data Management \[page 52\]](#).
- You have the manager role for the process into which you want to load extracted data, read more in the sections [Prepare a process \[page 20\]](#) and [Roles and user management \[page 31\]](#).
- You have SQL knowledge to customize the transformation scripts.

#### Connectors and data transformation templates

All connectors for source systems are available by default for users with the feature sets SAP Signavio Process Intelligence - Data Integration. All data transformation templates are available by default for users with the feature set SAP Signavio Process Intelligence - Data Modeling. For more information about managing feature sets, see section [Activate feature sets](#).

#### Source systems

Source systems must meet the following requirements:

- The source system data is modeled as data tables.
- The source system can run SQL queries with the JDBC driver.

In addition, requirements that are specific to source systems and data transformation templates can apply. Find connector requirements in section [Connection Types and Available Connectors \[page 62\]](#), and template-specific requirements in section [About Data Transformation Templates \[page 236\]](#).

### 3.8.1.3 Data Type Requirements for Process Data Pipelines

Find the supported data types, and the mandatory columns for case attribute and event collectors.

#### Supported Data Types

The execution of data transformation scripts uses AWS Athena, which is based on open-source Trino and Presto projects.

For a list of supported data types, see the Data Definition Language (DDL) column in the table [Data types in Amazon Athena - Amazon Athena](#).

For a general reference guide covering SQL query operators and functions, refer to the [Trino](#) documentation.

#### Mandatory Columns for Business Objects

Each business object has one case attribute and multiple event collectors where you specify the transformation rules in the form of SQL queries. These queries require certain mandatory columns to generate an event log.

**Mandatory columns for an event collector:**

Mandatory Column	Data Type	Notes
c_caseid	String	Converts numeric value into a string.
c_eventname	String	Converts numeric value into a string.

Mandatory Column	Data Type	Notes
c_time	Timestamp	<p>Timestamp without time zone.</p> <p>For example,</p> <ul style="list-style-type: none"> <li>• YYYY-MM-DD HH:mm:ss '2024-03-25 11:12:13'</li> <li>• YYYY-MM-DD HH:mm:ss SSS '2024-03-25 11:12:13.456'</li> </ul> <p>Format characters indicate:</p> <ul style="list-style-type: none"> <li>• YYYY: year (0000-9999), MM: month, DD: day of the Month</li> <li>• HH: Hour, 24 h clock, mm: minutes, ss: seconds, sss: fractional seconds with millisecond precision</li> </ul>

#### Mandatory columns for a case attribute:

Mandatory Column	Data Type	Notes
c_caseid	String	Converts numeric value into a string.

## Related Information

[Creating a Process Data Pipeline \[page 251\]](#)

[Business Objects \[page 262\]](#)

### 3.8.1.4 Set Up and Run a Data Pipeline

High-level description on how to set up and run a data pipeline in SAP Signavio Process Intelligence.

To set up a data pipeline, follow these steps:

1. Ensure that the requirements are met, read more in section [Requirements for data pipelines \[page 247\]](#).
2. Create a connection. If you want to select a connection that exists, you can skip this step.  
Read more in section [Manage connections \[page 134\]](#).
3. Create a process data pipeline and set it up.

Read more in section [Create a process data pipeline \[page 251\]](#).

You can use a template to accelerate process data pipeline creation, read more in section [Use data transformation templates \[page 236\]](#).

When setting up the process data pipeline, you perform the following tasks:

- Define what data to extract in a source data, read more in the sections [Manage process data pipelines \[page 176\]](#) and [Link source data \[page 253\]](#).

- Define how to transform the data and map it to business objects, read more in section [Business Objects \[page 262\]](#).
  - Link a process into which to load transformed data, read more in section [Link a process \[page 256\]](#).
4. When the process data pipeline is set up, you can run the pipeline. Read more in section [Run the data pipeline \[page 292\]](#).  
Data is extracted, transformed, and loaded into the process which is linked in the process data pipeline.
5. You can monitor the pipeline execution, read more in section [Monitor pipeline execution \[page 299\]](#).

### 3.8.1.5 Managing Process Data Pipelines

Learn how to manage process data pipelines.

You can create, edit, and delete a process data pipeline. A process data pipeline can have different source data systems. For a transformed data to be loaded into process for further investigations, you must link a process within a process data pipeline.

Select the links below to learn more about each topic.

#### [Viewing Process Data Pipelines \[page 250\]](#)

Learn how to get to the Process Data Pipelines feature in SAP Signavio Process Intelligence and view the available options.

#### [Creating a Process Data Pipeline \[page 251\]](#)

How to create and set up a data model for data pipeline.

#### [Linking a Source Data \[page 253\]](#)

How to link source data to a process data pipeline. The source data defines what data to extract.

#### [Linking a Process \[page 256\]](#)

How to link a process to a data pipeline to specify where to extract the transformed data. How to create, edit, and delete data models

#### [Configure Event Sorting \[page 257\]](#)

Learn how to configure the order of event sorting.

#### [Viewing Pipeline Health Status \[page 258\]](#)

Gain insights into the health of modeling entities by running the validation checks at the pipeline level.

#### [Exporting and Importing a Process Data Pipeline \[page 260\]](#)

For users with the superuser role: Share data models for data pipelines between SAP Signavio workspaces using the export and import functions.

#### [Editing and Deleting a Process Data Pipeline \[page 261\]](#)

How to change the settings of a data model that is used to run data pipeline.

### 3.8.1.5.1 Viewing Process Data Pipelines

Learn how to get to the Process Data Pipelines feature in SAP Signavio Process Intelligence and view the available options.

To view all the process data pipelines, open  ([Data Modeling](#)) in the sidebar and select [Process Data Pipelines](#).

The Process Data Pipelines overview page appears with the following options:

Available Option	Description
Create	Create a new process data pipeline.
Import	Import a process data pipeline, which is in .etl file.
↓↑	Sort process data pipelines by ascending or descending order. In addition, sort by name, created by, and created date.
▼	Filter process data pipelines based on name, created by, and created date.  To apply filter, select ▼. In the <i>View Settings</i> popup, select the filter option from the list and then <i>Ok</i> . To clear all active filters, select <i>Reset</i> .  The number next to the ▼ option indicates the active filters.
grid	Shows process data pipelines in a card view.  Each card shows the status of the process data pipeline run. For example, Never executed, Error, Canceled, Completed.  Each card has an action menu ••• with <i>Rename</i> , <i>Export</i> , and <i>Delete</i> .
<div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"><p><b>ⓘ Note</b></p><p>Your assigned feature set determines which options appear in the action menu. For information on feature sets, see <a href="#">Access Requirements for Process Data Management [page 52]</a></p></div>	
grid	Shows process data pipelines in table form.  Sorts the process data pipelines by ascending or descending order using the options ↑ or ↓ next to some column names in a table.
🔍	Type to search the process data pipelines.

### 3.8.1.5.2 Creating a Process Data Pipeline

How to create and set up a data model for data pipeline.

#### ⓘ Note

To create a process data pipeline, you need the feature set SAP Signavio Process Intelligence – Data Modeling and editor or manager permission on the folder in which you want to create the process data pipeline. Your administrator can enable these for you.

You always create a process data pipeline with a template. The following types of templates are available:

- Process-based template

The process data pipeline is pre-configured. For example, a process-based template is the template for the Incident-to-Resolution in ServiceNow. You can customize the template.

- Blank template

The template is empty. You need to set up the business process, the extraction, and the transformation rules on your own.

Read more on templates in section [Use data transformation templates \[page 236\]](#).

To create a process data pipeline, follow these steps:

1. Open  (*Repository*) or  (*Data Modeling*)  in the sidebar.

2. Select  *Create*  (in the Repository). The page for creating a process data pipeline opens.

3. Enter a name for the process data pipeline.

4. In the *Repository* field, if a folder is not already selected, select one.

When you create a process data pipeline from the Repository, the *Repository* field is preselected with the folder from which you selected  *Create*  . When you create a process data pipeline under  *Data Integration*  , Repository is preselected if you have editor or manager permission on the root folder. If you don't have editor or manager permission on the root folder, no folder is preselected and you have to select a folder.

5. Select a connection type from the available list.

6. Select a template.

Some connection types have process-specific templates available. You can select one of these templates or choose a blank template.

7. Select a source data.

You can either select an existing source data or choose to create a new source data. If you select an existing source data that is already linked to another connection, you see information about that connection. You can navigate to the source data page and change the linked connection.

If you selected *New source data*, enter a name for the source data and then under *Connection Linked to Source Data* select an existing connection or create a new connection.

8. Click *Create*.

The process data pipeline is created and opens.

9. If necessary, customize the source data and the transformation.

10. To complete the process data pipeline, link a process. Then, you can run the data pipeline.

## Process Data Pipeline Grid Options

You have the following options:



Zoom in



Zoom out



Enable full screen view



Disable full screen view



Fit the process data pipeline to grid width

## Related Information

[Linking a Process \[page 256\]](#)

[Run Data Pipelines \[page 291\]](#)

### 3.8.1.5.3 Linking a Source Data

How to link source data to a process data pipeline. The source data defines what data to extract.

In source data, you define which data is extracted from a source system.

#### Link Source Data

Follow these steps:

1. Open □ (*Repository*) or ■▶ (*Data Modeling*) ➤ *Process Data Pipelines* ▶ in the sidebar.
2. Select your process data pipeline.
3. On the *Overview* tab, select *Connection and source data*.  
The dialog for selecting a connection type opens.
4. Select a connector from the following connection types:
  - SAP Signavio
  - Enterprise Systems
  - Cloud Storage / Warehouse
  - Database
  - Other
5. Select *Next*.
6. Choose an existing source data which is related to the connection and select *Link*.  
The source data is linked to the process data pipeline.  
Changes to the process data pipeline are applied immediately.

## Link Multiple Source Data Systems

To run transformations for complex processes, you can extract data from different source systems. To do this, you can link multiple source data systems to your data pipeline.

### ⓘ Note

The table names must be unique across all source data systems that are linked to one process data pipeline.

In case of redundant table names, you need to create aliases before you can link source data to a process data pipeline. Read more in section [Create a table name alias \[page 180\]](#).

### ⓘ Note

A complete data pipeline executes for each source data that is linked to a process data pipeline and a separate event log is generated for each pipeline execution.

Follow these steps:

1. Open  (*Repository*) or  (*Data Modeling*)  in the sidebar.
2. Select your process data pipeline.
3. On the *Overview* tab, select *Connection and source data*.  
The dialog for selecting a source data opens.
4. Select a connector from the following connection types:
  - SAP Signavio
  - Enterprise Systems
  - Cloud Storage / Warehouse
  - Database
  - Other
5. Select *Next*.
6. Choose an existing source data and select *Link*.  
The source data is linked to the process data pipeline.  
Changes to the process data pipeline are applied immediately.

## Remove the Link to Source Data

You can remove a linked source data in three places, on the *Overview*, *Connections*, and *Source data* tabs.

## Remove Source Data on the Overview Tab

Follow these steps:

1. Open  (*Repository*) or  (*Data Modeling*)  in the sidebar.

2. Select [Process Data Pipelines](#). The *Process Data Pipelines* overview opens.
  3. Open your process data pipeline.
4. On the *Overview* tab, select  on the connection card then [Remove](#).
  5. To confirm removal, confirm in the dialog and select [Remove](#).  
The connection and source data is removed from the process data pipeline. The source data and the extracted data remains unchanged.

## Remove Source Data on the Connections Tab

Follow these steps:

1. Open  (*Repository*) or  (*Data Modeling*)  [Process Data Pipelines](#)  in the sidebar.
  2. Select [Process Data Pipelines](#). The *Process Data Pipelines* overview opens.
  3. Select the [Connections](#) tab.
4. Locate the required connection and click , then [Remove](#).
  5. To confirm removal, confirm in the dialog and select [Remove](#).  
The connection and source data is removed from the process data pipeline. The source data and the extracted data remains unchanged.

## Remove Source Data on the Source Data Tab

Follow these steps:

1. Open  (*Repository*) or  (*Data Modeling*)  [Process Data Pipelines](#)  in the sidebar.
  2. Select [Process Data Pipelines](#). The *Process Data Pipelines* overview opens.
  3. Open your process data pipeline.
  4. Select the [Source Data](#) tab.
5. Locate the required source data and select , then [Remove](#).
  6. To confirm removal, confirm in the dialog and select [Remove](#).  
The source data and connection is removed from the process data pipeline. The source data and the extracted data remains unchanged.

## Related Information

[Managing Source Data \[page 176\]](#)

[Run Data Pipelines \[page 291\]](#)

## 3.8.1.5.4 Linking a Process

How to link a process to a data pipeline to specify where to extract the transformed data. How to create, edit, and delete data models

By linking the data pipeline to a process, you define where to load transformed data.

### ⓘ Note

The user linking a process needs the Manager role assigned for the process. Read more in section [Roles and user management \[page 31\]](#).

### Link a process

Follow these steps:

1. Open  (*Repository*) or  (*Data Modeling*)  in the sidebar.
2. Select your process data pipeline.
3. On the *Overview* tab, click the *Process* block.  
The Update link to process configuration dialog opens.
4. Select a process from the dropdown list.  
If the process doesn't exist yet, you can create a new one with [New Process](#).
5. To confirm, select [Update](#).  
The process is linked to the process data pipeline.  
Changes to the process data pipeline are applied immediately.
6. You can open the linked process by selecting the process card in the *Overview* tab.  
The process opens in a new tab.

### Edit the link to a process

Follow these steps:

1. Open  (*Repository*) or  (*Data Modeling*)  in the sidebar.
2. Select your process data pipeline.
3. On the *Overview* tab, select  on the linked process, then [Edit](#).  
The configuration dialog opens.
4. Select an existing process from the dropdown list or create a new process by selecting [New Process](#).
5. Select [Update](#).  
The linked process is updated.

## Remove the link to a process

Follow these steps:

1. On the *Overview* tab of your process data pipeline, click  on the linked process, then *Remove*.  
The configuration dialog opens.
2. To confirm removal, confirm in the dialog and select *Remove Link*.  
The link to the process is removed from the process data pipeline. Changes to the process data pipeline are applied immediately.

## Related Information

[Run Data Pipelines \[page 291\]](#)

### 3.8.1.5.5 Configure Event Sorting

Learn how to configure the order of event sorting.

#### Context

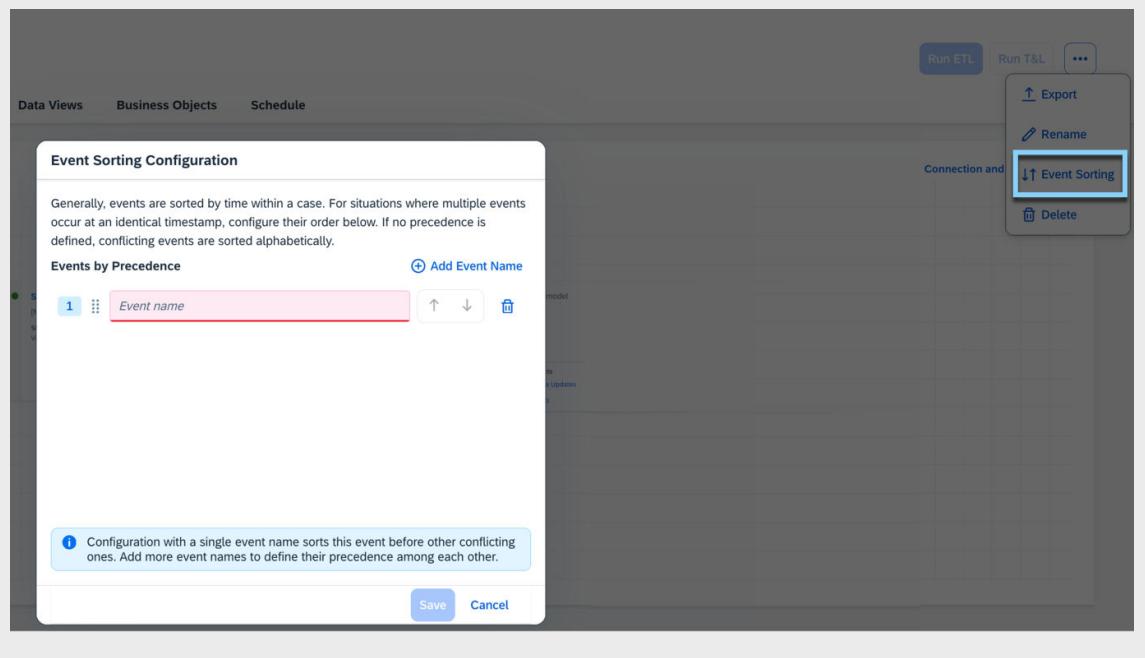
Generally, events within a case are sorted by timestamp. For multiple events that occur at an identical timestamp, you can configure the order of events. If no specific order is configured, the conflicting events are sorted in alphabetical order.

During the next pipeline run, the events within a case are sorted based on the defined configuration.

#### Procedure

1. Open your process data pipeline.
2. To configure the order of events, select  (Event Sorting) in the header menu.  
A popup opens to configure the event sorting.
3. Select *Add Event Name*.
4. Under the *Events by Precedence* section, enter the event name.

## Example



5. To add more event names, select (Add Event Name) and enter the text.
6. To change the order of events, use options , beside the field.
7. To delete the event name, select its option.
8. Confirm with **Save**.

Your changes are applied in the next pipeline run.

### 3.8.1.5.6 Viewing Pipeline Health Status

Gain insights into the health of modeling entities by running the validation checks at the pipeline level.

The pipeline health option actively identifies potential issues in the data transformation logic in a process data pipeline. It runs the validation checks while defining the transformation rules, helping data experts or analysts ensure the success of subsequent process data pipeline runs. This reduces the time needed to generate consistent data for process analysis.

You can find the *Pipeline Health Check* option in the process data pipeline's header menu.

#### Validation Checks at the Pipeline Level

A series of validation checks are performed based on the query definitions of data views, event collectors, and case attributes.

The pipeline health check option categorizes issues in the data transformation logic according to their severity. The types of issues, their causes, and the color code corresponding to each issue type are as follows:

Issue Type	Description	Possible Reasons for the Issue	Color Code of the Pipeline Health Check option
Errors	Issues that need to be resolved before running a process data pipeline. Otherwise, the pipeline fails.	<ul style="list-style-type: none"> <li>References to missing tables, views, and columns.</li> <li>Duplicate output columns. Column <code>column</code> name is defined multiple times as the output column.</li> <li>Syntax errors in query definitions.</li> <li>Presence of ambiguous columns or references to tables or views.</li> <li>Missing mandatory columns.</li> <li>Empty query definitions.</li> </ul>	Red
Warnings	Exceptions, if left unresolved can lead to issues.	<ul style="list-style-type: none"> <li>Non-deterministic query functions, like the <code>NOW()</code> function.</li> <li>Columns that aren't extracted from the source data table.</li> </ul>	Orange
Information	Feedback about significant change or issue in the application.	<ul style="list-style-type: none"> <li>Disabled business objects.</li> <li>Unused data views.</li> <li>Data view or business object name conflicts with a source data table name.</li> </ul>	Blue

If there are no errors or warnings, the pipeline health check option is displayed in green.

## Accessing Errors, Warnings, and Information

Follow these steps:

- To view the query issues in event collectors, case attributes, and data views, select the [Pipeline Health Check](#) option in the process data pipeline's header menu.
- From the pipeline health check popup, you can select the error, warning, or information to quickly navigate to the query and resolve it.

### 3.8.1.5.7 Exporting and Importing a Process Data Pipeline

For users with the superuser role: Share data models for data pipelines between SAP Signavio workspaces using the export and import functions.

With the export and import functions, you can use process data pipelines in different workspaces.

#### Export a Process Data Pipeline

Follow these steps:

1. Open  [\(Data Modeling\)](#)  [Process Data Pipelines](#) in the sidebar.
  2. For the process data pipeline you want to export, select  [\(More\)](#)  [Export](#).
- The process data pipeline is exported as a process data file. The file is saved to your browser's download folder.

#### Import a Process Data Pipeline

Follow these steps:

1. Open  [\(Data Modeling\)](#)  [Process Data Pipelines](#) in the sidebar.
2. On the [Process data pipelines](#) overview, select [Import](#).  
The import wizard opens.
3. Select the downloaded process data file you want to import confirm with [Upload](#).  
The process data pipeline is imported.

If the import fails, check the import data or re-export the process data pipeline and run the import again.

#### Related Information

[Run Data Pipelines \[page 291\]](#)

[Monitor Data Pipelines and Download Event Logs \[page 299\]](#)

### 3.8.1.5.8 Editing and Deleting a Process Data Pipeline

How to change the settings of a data model that is used to run data pipeline.

#### Editing a Process Data Pipeline

To edit a process data pipeline, follow these steps:

1. Open  (*Repository*) or  (*Data Modeling*)  in the sidebar.
2. Click the process data pipeline that you want to edit.  
The process data pipeline opens.
3. Apply your changes to the data pipeline. The changes are applied immediately.
4. If you want to execute the data pipeline, select *Run ETL*.

#### Deleting a Process Data Pipeline

##### Note

Deleting a process data pipeline can't be undone.

A process data pipeline deletion breaks the scheduled pipeline run, preventing the related source data from extracting the most recent data. As a result, the linked process is unable to access the latest data for further analysis and mining.

Therefore, it's important to check for dependencies before deleting.

##### Note

To delete a process data pipeline, you need manager permission on the process data pipeline.

1. Open  (*Repository*) or  (*Data Modeling*)  in the sidebar.
2. Choose the process data pipeline you want to delete, select  then *Delete*.  
A popup opens with a confirmation message.
3. Confirm by ticking the checkbox and select *Delete*.

#### Related Information

[Business Objects \[page 262\]](#)

[Data Views \[page 274\]](#)

[Run Data Pipelines \[page 291\]](#)

### 3.8.1.6 Business Objects

How to map extracted source system data to business objects in SAP Signavio Process Intelligence using SQL transformation scripts, which collect case-level attributes and events.

You can model your business process and define transformation rules in a process data pipeline. For that, you need to do the following:

- Model your business process with activities and objects on a canvas in your process data pipeline.
- Define transformation rules in business objects for extracted data.

Each business object consists of one case attribute and multiple event collectors where you specify the transformation rules in separate scripts.

The transformation rules consist of two aspects:

- Adding the case attributes and events from extracted data.
- Mapping them to the business objects.

The result of the transformation is event logs. The logs are loaded to the process, which is linked in the process data pipeline, providing the data for investigations.

The transformation rules must contain certain columns as mandatory to generate an event log. For list of supported and unsupported data types, as well as mandatory columns, see [Data Type Requirements for Process Data Pipelines \[page 248\]](#).

If the data hasn't changed since it was last cached, the data pipeline run utilizes the cached information. To view if your data pipeline run utilized a cached result, select the log entry from your process data pipeline. Details are displayed in the [Message](#) column on the respective tab in the [Transformation & Load](#) or [Full ETL](#) screen.

#### ⓘ Note

It's important to have a good understanding of SQL to add or customize transformation rules or scripts. This knowledge helps you to fine-tune the transformation rules and tailor them to your specific business requirement.

## Accessing and Managing Business Objects

You can view, create, edit, delete, enable, or disable business objects from the following places in a process data pipeline:

- [Business Objects](#) tab
- Query editor screen

## Concepts

- **Business process:** The process that you want to analyze in your organization. When you set up a process data management pipeline, you model the business process in the process data pipeline.

- **Business object:** An artifact in a process data pipeline. A business object, for example, a lead, consists of events and attributes.
- **Events:** Activities for a specific business object, for example the creation and qualification of a lead.
- **Event collectors:** The scripts for events are called event collectors.
- **Attributes:** A characteristic of an event on event-level or case-level. For example, the name of the person that created a lead is an attribute on event-level. The ID of that person is an attribute on case-level.

Select the links below to learn more about each topic.

#### [Creating a Business Object \[page 263\]](#)

Learn how to create a business object in a process data pipeline.

#### [Renaming and Deleting a Business Object \[page 265\]](#)

Learn how to rename and delete a business object

#### [Creating an Event Collector and Defining Transformation Rules \[page 266\]](#)

Learn how to create an event collector and add transformation rules to it.

#### [Editing and Deleting an Event Collector \[page 268\]](#)

Learn how to edit and delete an event collector of a business object.

#### [Creating a Case Attribute and Defining Transformation Rules \[page 270\]](#)

Learn how to add transformation rules in a case attribute.

#### [Editing and Deleting a Case Attribute \[page 272\]](#)

Learn how to edit and delete a case attribute of a business object.

#### [Enabling or Disabling Business Objects, Event Collectors, and Case Attributes \[page 272\]](#)

Learn how to model the business process and its objects on a canvas in a process data pipeline.

## Related Information

[Query Editor \[page 284\]](#)

[Creating a Data View \[page 275\]](#)

[Run Data Pipelines \[page 291\]](#)

## 3.8.1.6.1 Creating a Business Object

Learn how to create a business object in a process data pipeline.

A business object is an artifact in the business process. Each business object consists of a case attribute and event collectors. The transformation rules are defined as SQL queries written within event collectors and case attributes.

You can view, create, edit, rename, and delete a business object from the following places in a process data pipeline:

- **Business Objects** tab: You can directly open the *Business Objects* tab, or from the *Overview* tab, choose the *Process Data Model* card. This opens the *Business Objects* tab.

### ⓘ Note

Your first business object can only be created in the *Business Objects* tab.

- Query editor: When you select an existing event collector or case attribute to edit, you get to the query editor interface.

## Creating a Business Object from the Business Objects Tab

Follow these steps:

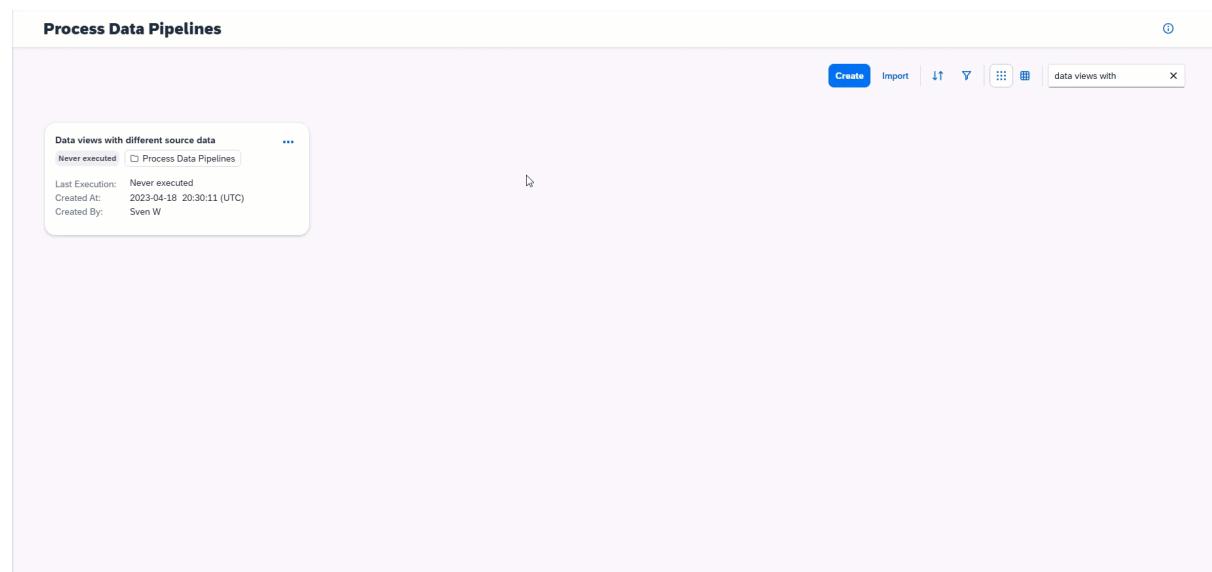
1. Open (*Repository*) or (*Data Modeling*) (*Process Data Pipelines*) in the sidebar.
2. Select *Process Data Pipelines*. The *Process Data Pipelines* overview opens.
3. Select the *Business Objects* tab.
4. Select *Create*. The popup for creating a business object opens.

### → Tip

If you already have an existing business object, select its event collector or case attribute. The query editor opens with *Business Objects* and *Data Views* tabs in a side panel along with all the options.

5. Enter name and select *Create*.
- The business object is by default disabled. To enable, see the Enabling or Disabling a Business Object section.

## Watch How to Create a Business Object from Query Editor



## Related Information

[Creating an Event Collector and Defining Transformation Rules \[page 266\]](#)

[Creating a Case Attribute and Defining Transformation Rules \[page 270\]](#)

[Query Editor \[page 284\]](#)

[Enabling or Disabling Business Objects, Event Collectors, and Case Attributes \[page 272\]](#)

### 3.8.1.6.2 Renaming and Deleting a Business Object

Learn how to rename and delete a business object

#### Context

You can rename and delete a business object from the following places in a process data pipeline:

- **Business Objects** tab: You can directly open the **Business Objects** tab, or from the **Overview** tab, select **Process data model** card > **Edit**. The **Business Objects** tab opens.  
Your first business object can only be created in the **Business Objects** tab.
- Query editor: When you select an existing event collector or case attribute to edit, you get to the query editor interface.

#### ⓘ Note

To rename or delete a business object from the query editor, select the event collector or case attribute. The query editor opens with **Business Objects** and **Data Views** tabs in a side panel along with all the options.

Select **...** for a business object and choose **Rename** or **Delete** accordingly.

## Renaming a Business Object

#### Procedure

1. Open your process data pipeline and select the **Business Objects** tab.
2. Select **...** for a business object, then **Rename**.
3. Enter the text and select **Rename**.

## Deleting a Business Object

### Procedure

1. Open your process data pipeline and select the *Business Objects* tab.
2. Select **...** for a business object, then *Delete*.
3. Confirm the message by ticking the check box, and select *Delete*.

### 3.8.1.6.3 Creating an Event Collector and Defining Transformation Rules

Learn how to create an event collector and add transformation rules to it.

The scripts for events are called event collectors. Events are the activities for a specific business object. For example, the creation and qualification of a lead.

Each business object contains only one case attribute and multiple event collectors in which the transformation rules can be defined. The transformation rules are written as SQL queries. These queries require certain columns as mandatory. Read more in [Data Type Requirements for Process Data Pipelines \[page 248\]](#)

During a pipeline run, the defined rules are applied to transform the data, which generates an event log (process data). The event log is then loaded into a process within a process data pipeline.

#### ⓘ Note

An event collector can be enabled or disabled. To apply the defined transformation rules during the pipeline run, you need to enable the event collector. For more information, see the Enabling or Disabling Business Objects, Event Collectors, and Case Attributes section.

You can create, edit, rename, and delete an event collector from two places in a process data pipeline:

- *Business Objects* tab.
- Query editor. When you select an existing event collector or case attribute to edit, you get to the query editor interface.

### Creating an Event Collector

1. Open your process data pipeline and select the *Business Objects* tab.
2. Choose a business object and expand to view its case attributes and event collectors.
3. Select *Create* for the event collector. A popup opens to create an event collector.

#### → Tip

You can also create an event collector in the query editor. Select any entity of a business object, and the query editor opens with *Business Objects* and *Data Views* tabs in a side panel along with all the options.

4. Enter a name and select *Create*.

## Defining Transformation Rules

1. On the *Business Objects* tab, select the event collector to add transformation rules. The query editor opens.
2. Write your query in the script editor.

→ Tip

To add a new part to the existing query, move the cursor to the right place and add the extension.

Under *Available Columns*, search for available data views, source data tables and their columns in the tree structure, or enter text in the search field. To add a column, source data table, or data view choose the data element and select its . The data element is then added to the script at the cursor position.

3. Issues within queries are categorized and represented as errors, warnings, and informational messages. To view and resolve the list of errors, go to the editor's header menu and select *Issues*. For information on issue types and reasons for the issue, see Viewing Pipeline Health Status section.

→ Tip

In the query editor, you can identify and view the errors, warnings, and informational messages using the icons in the *Data Views*, *Business Objects*, and *Available Columns* tabs in the side panel.



Viewing Issues in the Query Editor

4. Confirm with *Save*. It saves the changes made to that specific event collector.

Your changes are applied in the next pipeline run.

ⓘ Note

- You can save an event collector with invalid queries. However, it's important to ensure that all event collectors have valid and functioning queries before running a pipeline. If a pipeline run includes an enabled event collector with invalid queries, the pipeline execution fails, therefore, no transformations are applied.  
For information on how to monitor the pipeline run, see the Monitoring Data Pipelines section.
- When more than one user modifies the same event collector at once and tries to save it, the last user who edited that event collector is prompted to overwrite the changes. In the popup window, using the

[More](#) option, the incoming changes can be accepted or rejected. If you choose to reject, your changes are saved as a new event collector.

- The execution of data transformation scripts uses AWS Athena, which is based on the open-source Trino and Presto projects. For a general reference guide covering SQL query operators and functions, refer to the [Trino](#) documentation.
- If the data hasn't changed since it was last cached, the data pipeline run utilizes the cached information. To view if your data pipeline run utilized a cached result, select the log entry from your process data pipeline. Details are displayed in the [Message](#) column on the respective tab in the [Transformation & Load](#) or [Full ETL](#) screen.

## Related Information

[Query Editor \[page 284\]](#)

[Run Data Pipelines \[page 291\]](#)

[Monitoring Data Pipelines \[page 299\]](#)

[Enabling or Disabling Business Objects, Event Collectors, and Case Attributes \[page 272\]](#)

[Viewing Pipeline Health Status \[page 258\]](#)

### 3.8.1.6.4 Editing and Deleting an Event Collector

Learn how to edit and delete an event collector of a business object.

#### Context

You can edit an event collector using the query editor.

You can delete an event from the following places in a process data pipeline:

- **Business Objects** tab
- Query editor: When you select an existing event collector or case attribute to edit, you get to the query editor interface.

## Editing an Event Collector

#### Context

If the data hasn't changed since it was last cached, the data pipeline run utilizes the cached information. To view if your data pipeline run utilized a cached result, select the log entry from your process data pipeline.

Details are displayed in the *Message* column on the respective tab in the *Transformation & Load* or *Full ETL* screen.

## Procedure

1. On the **Business Objects** tab, expand a business object and select the event collector.  
The query editor opens.
2. Apply your changes and confirm with *Save*.

# Deleting an Event Collector from the Business Objects Tab

## Context

Deleting an event collector can't be undone. Deleting an event collector that is included in a process data pipeline can fail the execution of pipeline run. Therefore, check for any dependencies before deleting.

## Procedure

1. On the *Business Objects* tab, select *⋮* for the event collector you want to delete, then *Delete*.
2. Confirm by ticking the checkbox, and select *Delete*.

# Deleting an Event Collector from the Query Editor

## Context

Deleting an event collector can't be undone. Deleting an event collector that is included in a process data pipeline can fail the execution of pipeline run. Therefore, check for any dependencies before deleting.

## Procedure

1. Select the event collector from the *Business Objects* tab.  
The query editor opens.
2. From the *Business Objects* tab in the side panel, choose the data view, select *⋮*, then *Delete*.
3. Confirm by ticking the checkbox, and select *Delete*.

### 3.8.1.6.5 Creating a Case Attribute and Defining Transformation Rules

Learn how to add transformation rules in a case attribute.

#### Context

The case attribute is a characteristic of an event on case-level. For example, the name of the person that created a lead is an attribute on event-level. The ID of that person is an attribute on case-level.

Each business object contains only one case attribute and multiple event collectors in which the transformation rules can be defined. The transformation rules are written as SQL queries. These queries require certain columns as mandatory. Read more in [Data Type Requirements for Process Data Pipelines \[page 248\]](#)

During a pipeline run, the defined rules are applied to transform the data, which generates event logs. These event logs are then loaded into a process within a process data pipeline.

If the data hasn't changed since it was last cached, the data pipeline run utilizes the cached information. To view if your data pipeline run utilized a cached result, select the log entry from your process data pipeline. Details are displayed in the *Message* column on the respective tab in the *Transformation & Load* or *Full ETL* screen.

#### ⓘ Note

- By default, a case attribute is created when you create a business object.
- A case attribute can be enabled or disabled. To apply the defined transformation rules during the pipeline run, you need to enable the event collector. For more information, see the Enabling or Disabling Business Objects, Event Collectors, and Case Attributes section.

#### Procedure

1. Open your process data pipeline and select the *Business Objects* tab.
2. Select *Create* to add a business object.

#### → Tip

You can also create a business object using the query editor. Select any entity of a business object, and the query editor opens with *Business Objects* and *Data Views* tabs in a side panel along with all the options.

3. Enter a name and select *Create*. The business object and case attribute are created.
4. Select the case attribute to add transformation rules. The query editor opens.
5. Write your query in the editor.

## → Tip

To add a new part to the existing script, move the cursor to the right place and add the extension.

Under *Available columns*, search for available data views, source data tables and their columns using the tree structure, or enter text in the search field. To add a column or data view or source data table, choose the entity and select . The entity is then added to the script at the cursor position.

6. Confirm with **Save**. It saves the changes made to that specific case attribute.

Your changes are applied in the next pipeline run.

Issues within queries are categorized and represented as errors, warnings, and informational messages. To view and resolve the list of errors, go to the editor's header menu and select *Issues*. For information on issue types and reasons for the issue, see Viewing Pipeline Health Status section.

## → Tip

In the query editor, you can identify and view the errors, warnings, and informational messages using the icons in the *Data Views*, *Business Objects*, and *Available Columns* tabs in the side panel.



Viewing Issues in the Query Editor

## Related Information

[Query Editor \[page 284\]](#)

[Run Data Pipelines \[page 291\]](#)

[Monitoring Data Pipelines \[page 299\]](#)

[Viewing Pipeline Health Status \[page 258\]](#)

### 3.8.1.6.6 Editing and Deleting a Case Attribute

Learn how to edit and delete a case attribute of a business object.

#### Editing a Case Attribute

##### Procedure

1. On the **Business Objects** tab, expand a business object and select the case attribute.  
The query editor opens.
2. Apply your changes and confirm with [Save](#).

#### Deleting a Case Attribute

##### Context

By default, a case attribute is created when you create a business object.

###### Note

Deleting a case attribute can't be undone. Deleting a case attribute that's included in a process data pipeline can fail the execution of the pipeline run. Therefore, check for any dependencies before deleting.

To delete a case attribute, you need to delete the associated business object.

##### Related Information

[Renaming and Deleting a Business Object \[page 265\]](#)

### 3.8.1.6.7 Enabling or Disabling Business Objects, Event Collectors, and Case Attributes

Learn how to model the business process and its objects on a canvas in a process data pipeline.

The enable and disable options help you design the business process model. You can enable or disable business objects, case attributes, and event collectors.

By default all the business objects are enabled.

## ⓘ Note

You can enable or disable a business object, event collector, and case attribute from two places in a process data pipeline:

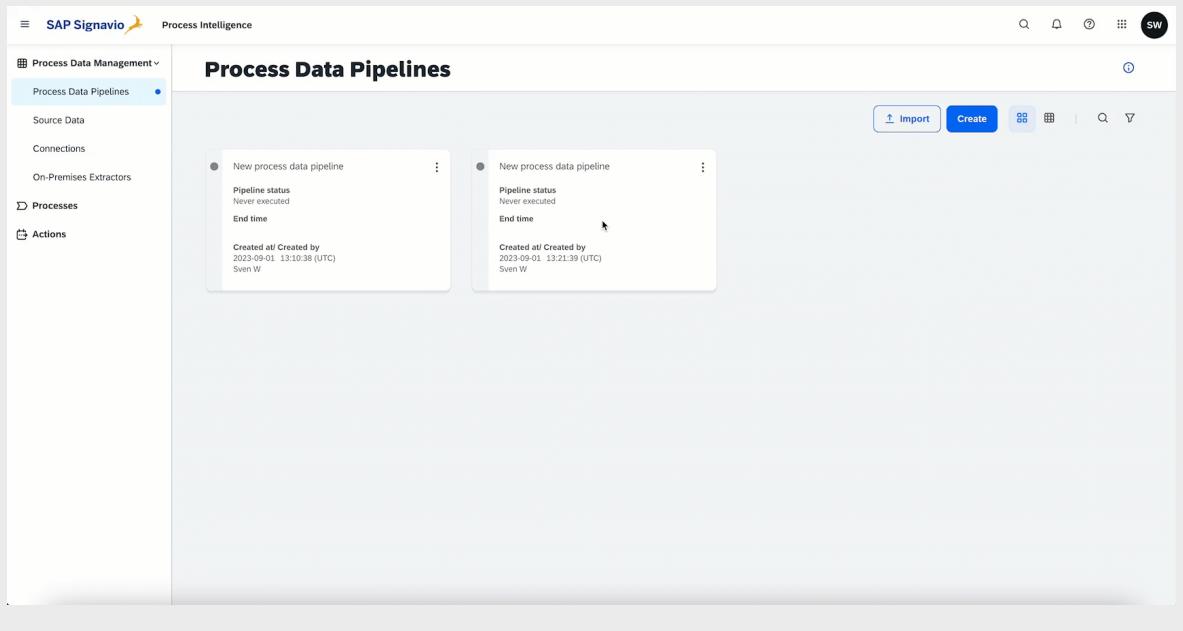
- *Business Objects* tab.
- Query editor. When you select an existing event collector or case attribute to edit, you get to the query editor interface.

The following implies when enabling and disabling business objects:

- When you enable or disable a business object, its corresponding event collectors and case attributes are automatically enabled or disabled. However, you have the option to disable specific event collectors and case attributes in the active business object.
- Only the enabled business objects are part of the data transformation pipeline.
- For the pipeline to run, at least one business object with an event collector must be enabled.
- While the pipeline is running, any changes made to the process data pipeline are not reflected.

## ⚡ Example

*Watch how to enable and disable*



## Enabling or Disabling Business Objects

Follow these steps:

1. Open (*Repository*) or (*Data Modeling*) *Process Data Pipelines* in the sidebar.
2. Select *Process Data Pipelines*. The *Process Data Pipelines* overview opens.
3. Select the *Business Objects* tab.
4. Choose the business object that you want to enable or disable, select , then *Enable* or *Disable*.

### → Tip

You can also open the event collector or case attribute of a business object. The query editor opens with *Business Objects* and *Data Views* tabs in a side panel along with all the options. Then, follow step 2.

## Enabling or Disabling Event Collectors and Case Attributes

1. Open □ (*Repository*) or ■ (Data Modeling) ➤ *Process Data Pipelines* in the sidebar.  
Open your process data pipeline and select *Business Objects* tab.
2. Select *Process Data Pipelines*. The *Process Data Pipelines* overview opens.
3. On the *Business Objects* tab, select a business object.
4. Enable or disable entities from either of the following places:
  1. Choose specific event collectors or case attributes that you want to enable or disable and select ..., then *Enable* or *Disable* accordingly.
  2. Open the event collector or case attribute. The query editor opens with *Business Objects* and *Data Views* tabs in a side panel along with all the options. Then, follow step a.

### 3.8.1.7 Data Views

An overview of data views in process data pipeline.

Data views are virtual tables that can retrieve and join data from tables and other data views through queries that you define. You can create data views in a process data pipeline and reuse them across business objects or other data views within the same process data pipeline.

Data views are similar to SQL queries used in event collectors and case attributes of business objects.

During the initial pipeline run, the data view's query result is cached and retrieved in subsequent runs. This speeds up the data transformation. Whenever the pipeline runs, it checks for new data in the underlying tables, any changes to the table, or a data view definition that requires an update. In such cases, the query results will be cached again.

You can break down complex queries into multiple chunks and save each chunk as a data view. This reduces the complexity of a large single query, as a significant chunk of business logic is collected in the data view. For instance, one data view prepares the header of a specific business object, which is then combined with data from the item table in the actual business case.

With data views, you can do the following:

- Reuse data views: In a data view query, add references to other data views and tables.
- Structure the query however you want.

### ⓘ Note

- The execution of data transformation scripts in data views uses AWS Athena, which is based on open-source Trino and Presto projects. For a general reference guide covering SQL query operators and functions, refer to the [Trino](#) documentation.

- Data views with invalid queries can be saved. However, it's important to ensure that all the data views have valid and functioning queries before running a pipeline. If a pipeline run includes a data view with an invalid query, the pipeline execution fails, therefore, no transformations are applied.
- If the data hasn't changed since it was last cached, the data pipeline run utilizes the cached information. To view if your data pipeline run utilized a cached result, select the log entry from your process data pipeline. Details are displayed in the *Message* column on the respective tab in the *Transformation & Load* or *Full ETL* screen.

Select the links below to learn more about each topic.

#### [Creating a Data View \[page 275\]](#)

Learn how to create a data view in a process data pipeline.

#### [Creating a Nested Data View \[page 277\]](#)

How to create nested data views in a process data pipeline.

#### [Editing and Deleting a Data View \[page 281\]](#)

How to edit and delete data views in a process data pipeline.

## Related Information

[Business Objects \[page 262\]](#)

[Query Editor \[page 284\]](#)

[Run Data Pipelines \[page 291\]](#)

### 3.8.1.7.1 Creating a Data View

Learn how to create a data view in a process data pipeline.

You can create a data view with columns from source data tables and other existing data views available in a process data pipeline. The data views created for a process data pipeline are visible only within that pipeline.

You can create, rename, edit, and delete a data view from the following places:

- *Data Views* tab
- Query editor. When you select a data view for editing, you get to the query editor interface.

To create a data view, follow these steps:

1. Open □ (*Repository*) or ⌘▶ (*Data Modeling*) ➤ *Process Data Pipelines* ▶ in the sidebar.
2. Select *Process Data Pipelines*. The *Process Data Pipelines* overview opens.
3. Select the *Data Views* tab.  
Your data views and any pre-configured data views available for your chosen process data pipeline template are displayed.
4. Select *Create*. A data view creation popup opens.
5. Enter a name following the naming conventions, and select *Create*. See the [Naming Conventions for a Data View \[page 277\]](#) section.

The query editor opens with the *Data Views* and *Business Objects* tabs in the side panel. In addition, all the available source data tables and data views that are already created for your process data pipeline also appear in the side panel.

6. Write your query in the script editor.

→ Tip

To add a new part to the existing query, move the cursor to the right place and add the extension.

Under *Available Columns*, search for available data views, source data tables and their columns in the tree structure, or enter text in the search field. To add a column, source data table, or data view choose the data element and select its . The data element is then added to the script at the cursor position.

7. Issues within queries are categorized and represented as errors, warnings, and informational messages. To view and resolve the list of errors, go to the editor's header menu and select *Issues*. For information on issue types and reasons for the issue, see Viewing Pipeline Health Status section.

→ Tip

In the query editor, you can identify and view the errors, warnings, and informational messages using the icons in the *Data Views*, *Business Objects*, and *Available Columns* tabs in the side panel.



Viewing Issues in the Query Editor

8. Confirm with *Save*.

The validation checks are performed in the background for the syntactical and semantical correctness of the data.

Your changes are applied in the next process data pipeline run. You can then use the data views while creating queries in business objects.

ⓘ Note

- You can save a data view with invalid query. However, it's important to ensure that all data views have valid and functioning queries before running a pipeline. If a pipeline run includes a data view with an invalid query, the pipeline execution fails, therefore, no transformations are applied.  
For information on how to monitor the pipeline run, see the Monitoring Data Pipelines section.
- All the data views in your process data pipeline are accessible from the *Data views* tab and *Available Columns* section in the SQL editor's sidebar.
- Data views that are empty can be saved but can't be used in other data views or business objects.
- The execution of data transformation scripts in data views uses AWS Athena, which is based on open-source Trino and Presto projects. For a general reference guide covering SQL query operators and functions, refer to the [Trino](#) documentation.

- If the data hasn't changed since it was last cached, the data pipeline run utilizes the cached information. To view if your data pipeline run utilized a cached result, select the log entry from your process data pipeline. Details are displayed in the *Message* column on the respective tab in the *Transformation & Load* or *Full ETL* screen.

## Naming Conventions for a Data View

While creating a data view, make sure that the following rules are met:

- The data view name must be unique.
- The data view name must start with 'a-z' 'A-Z' '\_' and followed by 'a-z' 'A-Z' '0-9' '\_'.
- Don't use spaces and special characters in the data view name.

## Related Information

[Query Editor \[page 284\]](#)

[Business Objects \[page 262\]](#)

[Viewing Pipeline Health Status \[page 258\]](#)

[Monitoring Data Pipelines \[page 299\]](#)

### 3.8.1.7.2 Creating a Nested Data View

How to create nested data views in a process data pipeline.

A nested data view is created when a data view query has references to other data views. You can only nest the data views that are created within a process data pipeline.

For information about creating data views and rules, see [Create a data view \[page 275\]](#) section.

## Example

The following example describes how to create a nested data view within a process data pipeline.

### Creating the First Data View

Let's consider that you have a process data pipeline with Recruit to Hire data.

In your process data pipeline, create a data view named job\_requisition\_uk with the following query:

```
SELECT jobreqid, country, closeddatetime, custhoursperweek  
FROM jobrequisition  
WHERE jobrequisition.country in ('United Kingdom')  
AND jobrequisition.custhoursperweek = '40'
```

The query retrieves the job requisition IDs that require a 40 hour workweek in the United Kingdom. It also returns the requisition closed date and time.

o check how the data is displayed for your defined query, use the *Preview data* option in the script editor.

#### • Example

*Query result:*

jobreqid	country	custhoursperweek	closeddatetime
61	United Kingdom	40	1496182932000
581	United Kingdom	40	-62135769600000
602	United Kingdom	40	1507747109000
42	United Kingdom	40	1496851532000
41	United Kingdom	40	-62135769600000
1220	United Kingdom	40	-62135769600000
601	United Kingdom	40	1507691863000

Row limit: 100 ▾ (7 rows retrieved)

Execution time: 780ms

## Creating a Data View Based on Other Data View

In the same process data pipeline, create a data view named job\_requisition\_candidates\_uk and have reference to the first data view. Following is the query for nested data view:

```
SELECT job_requisition_uk.jobreqid, jobapplication.candidateid,  
job_requisition_uk.closeddatetime  
FROM job_requisition_uk  
INNER JOIN jobapplication ON jobapplication.jobreqid =  
job_requisition_uk.jobreqid
```

The query retrieves the job requisition IDs, hired candidate IDs, and other specified columns data in the SELECT statement. It joins the data from the job\_requisition\_uk data view and the job application table, based on the job requisition ID.

### ❖ Example

*Query result:*

jobreqid	candidateld	hiredOn	closeddatetime
61	61	<null>	1496182932000
61	21	<null>	1496182932000
581	1681	<null>	-62135769600000
602	622	1508216456000	1507747109000
42	81	<null>	1496851532000
42	21	<null>	1496851532000
1220	1840	<null>	-62135769600000
1220	698	<null>	-62135769600000
1220	1859	<null>	-62135769600000
601	623	1508216449000	1507691863000
601	622	<null>	1507691863000

Row limit:  (11 rows retrieved) Execution time: 1s 352ms

### ⓘ Note

- All the nested data views in a process data pipeline are accessible from the *Available Columns* in the SQL editor's side panel. You can also access them from the *Available Columns* in the Business Object editor's side panel.
- When you modify a data view, make sure all its referenced data views are modified accordingly. Otherwise, the data transformation fails when you run the pipeline. For example, before deleting a column from a data view, you must first delete the referenced columns. The same applies to changing a column or data type in the data view.

## Related Information

[Edit and delete a data view \[page 281\]](#)

### 3.8.1.7.3 Editing and Deleting a Data View

How to edit and delete data views in a process data pipeline.

#### Editing a Data View

1. Open [\(Repository\)](#) or [\(Data Modeling\)](#) [Process Data Pipelines](#) in the sidebar.
2. Select [Process Data Pipelines](#). The [Process Data Pipelines](#) overview opens.
3. On the [Data Views](#) tab, select a data view. The query editor opens.
4. Apply your changes and confirm with [Save](#).

#### Deleting a Data View

##### Note

Deleting a data view can't be undone.

You can delete a data view from the following places:

- [Data Views](#) tab
- Query editor

##### Data Views Tab

1. On the [Data Views](#) tab, select for the data view you want to delete, then [Delete](#).
2. Confirm by ticking the checkbox, and select [Delete](#).

##### Query Editor

1. Select the data view from the [Data Views](#) tab.  
The query editor opens.
2. From the [Data Views](#) tab in the side panel, choose the data view, select , then [Delete](#).
3. Confirm by ticking the checkbox, and select [Delete](#).

##### Note

- The execution of data transformation scripts in data views uses AWS Athena, which is based on open-source Trino and Presto projects. For a general reference guide covering SQL query operators and functions, refer to the [Trino](#) documentation.
- You can modify the data view name using the option > [Rename](#) in the header menu. Changes are applied immediately.
- When more than one person modifies the same data view at once and tries to save it, the last person who edited that data view will be prompted to overwrite the changes. On the popup window, using the [More](#) option, the incoming changes can be accepted or rejected. If you choose to reject, your changes are saved as a new data view.

### 3.8.1.8 Process Data Model

Learn how the process data model integrates contextual information with process data. Data is arranged to allow a simpler and easier way to create data analysis.

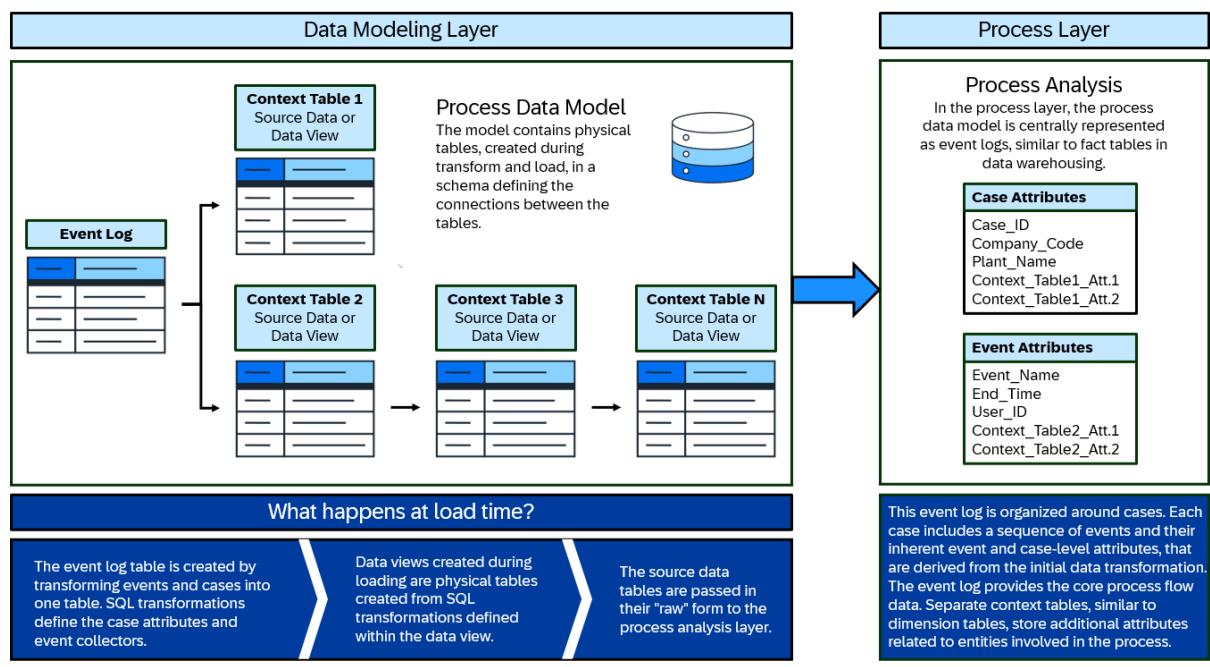
Contextual information is data that exists within the event log but isn't part of core event log data used to create a business process. For example, it can be customer master data, inventory records, or financial transactions. Outside the process data model, this data could be accessed using complex queries that take a long time to run.

The process data model allows you to connect contextual data to process data by creating a context relation between the data. You define the source and target data to create the context relation. When a context relation is defined in the process data model, the information is stored in a star or snowflake database schema. This schema allows quick access to data that can be easily queried. Because the information is stored in the model, full transformation and load can be avoided for minor changes.

Context relations can be created based on source data tables or data views without any additional SQL queries. Once created, attributes of the context information can be accessed and their definitions can be viewed.

Data analysis can be done using SIGNAL and widgets in the same way that these tools are used on other data sets. The relational model can be treated as if it were a single table. When queries span several tables, SIGNAL joins the tables for you.

The following graphic provides an overview of the process data model:



#### ① Note

- The model supports both one-to-one and many-to-one join cardinalities, with the many side always on the left side of the join. The event log table acts as the left table in the join tree. A left join connects all other tables back to the event log.
- Context relation join conditions can include attributes from case-level fields, event-level fields, or a combination of both.

- Case and event attributes automatically extend to include attributes from context tables.

## Related Information

[Processes \[page 19\]](#)

[Process Data Management \[page 48\]](#)

[Data Views \[page 274\]](#)

### 3.8.1.8.1 Creating, Editing, and Deleting a Context Relation

Learn how to create, edit, and delete a context relation in the process data model.

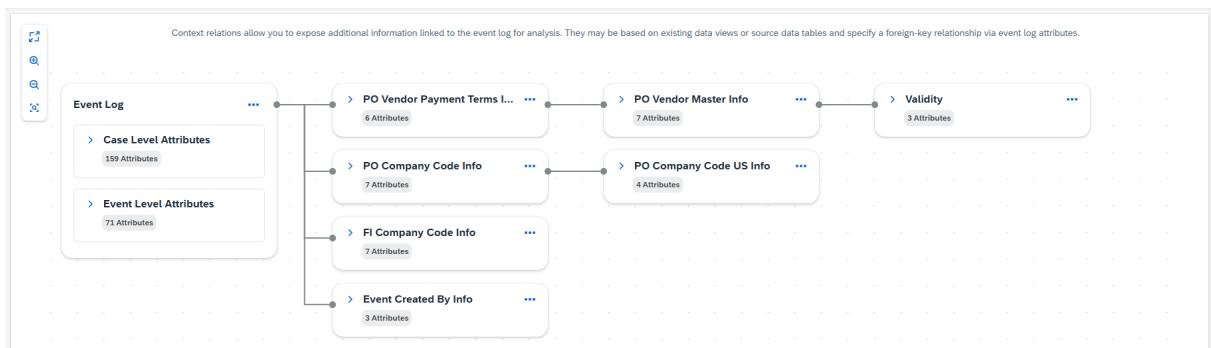
## Context

Context relations allow you to expose additional information linked to the event log for analysis. They can be based on existing data views or source data tables and specify a foreign-key relationship via event log attributes.

### Creating a Context Relation

Follow these steps:

- Open  (*Repository*) or  (*Data Modeling*)  in the sidebar.
- Choose your process data pipeline.
- Select the *Process Data Model* tab.
- To create your first context relation, select *Create*. The create context relation dialog box opens.
- Define your context relation.
  - In the *Name* field, enter a unique name for your context relation.
  - In the *Source* field, choose from the options available in the dropdown menu, such as the event log or a previously created context relation.
  - In the *Target* field, choose a data view or source data table from the list provided.
  - In the *Source Column* field, choose from the list of columns available in the dropdown menu.
  - In the *Target Column* field, choose from the list of columns available in the dropdown menu.
  - To create additional source and target column connections, within your context relation, select *+ Key Field*.
- Create additional context relations to build up your process data model.
  - To create additional context relations, on your event log or previously created context relation, select *... (More)*.
  - Select *+ Create Context Relation*. The context relation dialog box opens.
  - To create new context relations, repeat step 6.



Process Data Model Canvas

### **ⓘ Note**

- Performance decreases as the size of the data used in the context relation increases.
- An analytical query runs more slowly as you increase the number of context relations that it spans.
- The attributes sourced from context tables are identifiable in the process layer by the prefix of the context relation name automatically added to each attribute.
- The model currently supports up to 5 tables joined in series.

### **Editing a Context Relation**

Follow these steps:

1. Select **... (More)** on your context relation.
2. Select **Edit**. The context relation dialog box opens.
3. Make your changes and select **Save**.

### **Deleting a Context Relation**

Follow these steps:

1. Select **... (More)** on your context relation.
2. Select **Delete**.
3. Confirm with **Delete**.

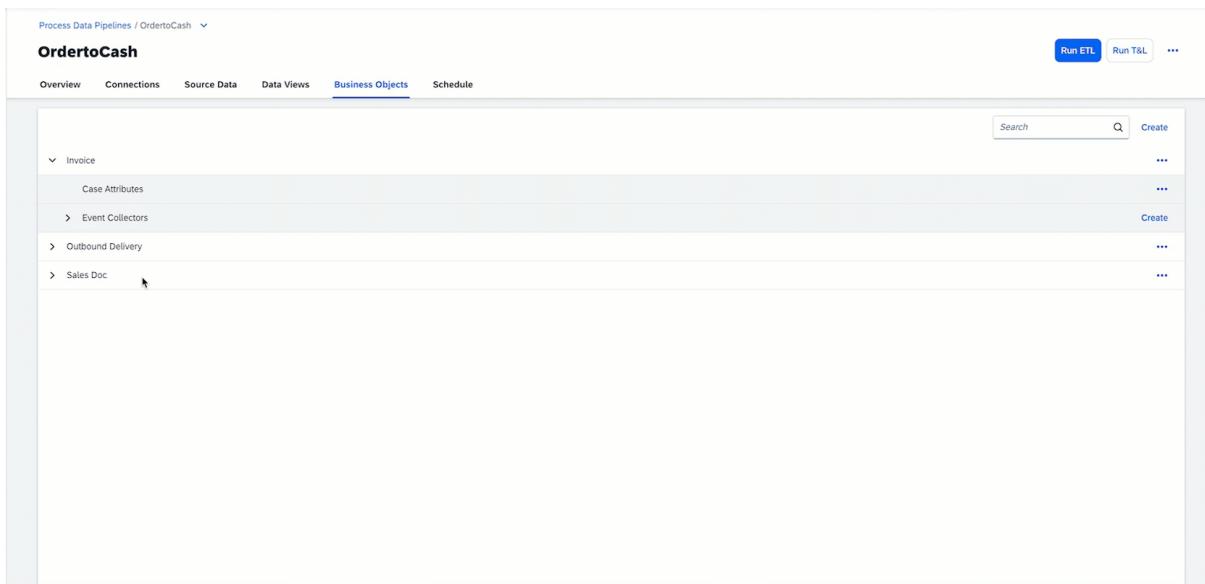
## **3.8.1.9    Query Editor**

The script editor provides features for text editing and quick navigation within the editor.

While working with the script, you can do the following:

- Preview your SQL query result along with the query execution time.
- Find and replace script elements.
- Change font size of your script.
- View shortcuts for editing the script.
- Compare changes that you make in the script to the last saved version.

### **Watch an Overview of the Query Editor**



Select the links below to learn more about each topic.

#### [Adding, Editing, and Deleting the Script \[page 286\]](#)

Learn how to add, edit, and delete a script in the query editor.

#### [Changing the Font Size of a Script \[page 287\]](#)

Learn how to change the font size of a script.

#### [Editing with Multiple Cursors \[page 287\]](#)

The script editor supports multi-cursor editing to quickly edit multiple rows of code and multiple occurrences of an element in the code at once. Each cursor functions independently, adapting to its specific context. You can efficiently change your event collectors, case attributes, and data views in a process data pipeline.

#### [Finding and Replacing Script Elements \[page 289\]](#)

Learn how to find and replace script elements in the editor.

#### [Previewing the Script Result \[page 289\]](#)

Get familiar with the options in the script editor while previewing your query result.

#### [Viewing Shortcuts for Script Editing \[page 290\]](#)

A list of keyboard shortcuts is provided for you to quickly navigate while working with your script. Shortcuts are categorized based on their function. Available categories are [Actions](#), [Selection](#), [Navigation](#), and [Application](#).

#### [Mandatory Script Items \[page 290\]](#)

How to define the transformation rules for case attributes and events with SQL scripts. You can also add your own event collectors.

#### [Comparing Script Changes Before Saving \[page 291\]](#)

Compare changes that you make in the script to the last saved version or to a previously saved version.

## Related Information

### [Business Objects \[page 262\]](#)

[Data Views \[page 274\]](#)

[Run Data Pipelines \[page 291\]](#)

### 3.8.1.9.1 Adding, Editing, and Deleting the Script

Learn how to add, edit, and delete a script in the query editor.

#### Context

From query editor, you can add and edit scripts in case attributes and event collectors. In addition, you can add SQL queries in data views.

##### ⓘ Note

The execution of data transformation scripts uses AWS Athena, which is based on open-source Trino and Presto projects. For a general reference guide covering SQL query operators and functions, refer to the [Trino](#) documentation.

#### Actions

Action	Description
Add script in case attributes and event collectors.	Select the case attribute or event collector from the <a href="#">Business Objects</a> tab in the side panel. Then write or paste your script.
Add a script for case attributes.	Select the <a href="#">Case Attributes</a> tab, and write or paste your script.
Add a script for events.	Select <a href="#">Add event collector</a> , and write or paste your script.
Add queries in the data view.	Select the data view from the <a href="#">Data Views</a> tab in the side panel. Add your query.
Add a new part to the existing script.	Select at the correct place in the script and add the extension.
Search for available data views.	Under <a href="#">Available columns</a> , you can search for available data views, source data tables and their columns. Either search in the tree structure or enter a search string in the search field. To add an available column, choose the column and select  . The column is then added to the script at the cursor position. Similarly, you can also add source data tables to the script editor from the <a href="#">Available columns</a> .
Delete the script of an event collector.	Either select the script and clear it using the delete key on the keyboard or delete the event collector. To delete the event collector, select its  , then <a href="#">Delete</a> .
Delete the script of a case attribute.	Select the script and clear it using the Delete key on the keyboard. To delete the case attribute entity, you need to delete the business object.

### 3.8.1.9.2 Changing the Font Size of a Script

Learn how to change the font size of a script.

#### Procedure

1. Open the query editor.
2. In the header menu, select , then *Font Size*.
3. In the *Font size configuration* popup window, drag the slider to the required font size.
4. Select *Close* to view the editor.

### 3.8.1.9.3 Editing with Multiple Cursors

The script editor supports multi-cursor editing to quickly edit multiple rows of code and multiple occurrences of an element in the code at once. Each cursor functions independently, adapting to its specific context. You can efficiently change your event collectors, case attributes, and data views in a process data pipeline.

Using keyboard shortcuts, you can add additional cursors to the subsequent lines of code and also select multiple occurrences of an element.

#### Keyboard Shortcuts for Multi-Cursor Editing

- To view keyboard shortcuts for multi-cursor editing, in the query editor header menu, select , then *Keyboard Shortcuts*. A popup opens with a list of keyboard shortcuts.  
Under the *Selection* category, you find the following:

Keys Function	Windows	Mac
Add more cursors above the selected cursor position	<i>Ctrl + Alt + ↑</i>	+  +
Add more cursors below the selected cursor position	<i>Ctrl + Alt + ↓</i>	+  +
Find and select the next occurrence	<i>Ctrl+D</i>	+
Add the cursor to the position and multi-select the code	<i>Alt + Click</i>	+

- To remove multiple cursors, either click somewhere in the script editor area or select *Esc* on your keyboard.

#### → Tip

Each cursor comes with its own clipboard that allows you to copy and paste common patterns.

## Examples: How to Use Multi-Cursors for Bulk Editing

### Multi-select Rows of Code and Edit

For example, here's a code snippet that shows you how to edit the table name `timesheet_record`.

1. Position your cursor at the end of the `timesheet_record` table name and press  +  +  to add an additional cursor in the next line of code.
2. Add your code and save your changes.

To remove the multi-cursor, select `Esc` on your keyboard.

```
11 --pre_timesheet_record.TimesheetRecord AS PredecessorTimesheetRecord,
12 --pre_timesheet_record.TimesheetStatus AS PredecessorTimesheetStatus,
13 timesheet_record.CreatedByUser,
14 timesheet_record.RecordedHours,
15 timesheet_record.UnitOfMeasure,
16 timesheet_record.SenderCostCenter,
17 timesheet_record.ActivityType,
18 timesheet_record.ControllingArea,
19 -- Requester's information, person #, full name
20 timesheet_record.Person,
21 --timesheet_record.PersonFullName, --pseudonymized column by default
22 -- Business partner #, partner role
23 timesheet_record.BusinessPartner,
24 -- WBS Element information
25 timesheet_record.WBSElement,
26 timesheet_record.ProjectInternalID,
27 FROM_UNIXTIME(timesheet_record.TimesheetApprovedDate / 1000) AS TimesheetApprovedDate
```

### Bulk Edit Specific Lines of Code and Copy / Paste the Code

Here's another code snippet that shows how to bulk edit specific elements in rows of code simultaneously.

1. Select the code to bulk edit and press the keyboard shortcut `Command+D`. Then, add your code.
2. To edit specific text in rows of code as shown in the example, position the cursor at the starting of text and press the keyboard shortcut  + `Click` (for Mac) or `Alt + Click` (for windows).
3. Select and copy the code.
4. Position the cursor where you want to add the code and paste it as shown in the example.

```
6 END AS c_eventname,
7 timesheet_record.c_time as c_time,
8 -- previous workaround below
9 -- FROM_UNIXTIME(timesheet_record.TimesheetApprovedDate / 1000 + timesheet_record.TimesheetLastCh
10 timesheet_record.TimesheetRecord,
11 --pre_timesheet_record.TimesheetRecord AS PredecessorTimesheetRecord,
12 --pre_timesheet_record.TimesheetStatus AS PredecessorTimesheetStatus,
13 timesheet_record.CreatedByUser,
14 timesheet_record.RecordedHours,
15 timesheet_record.UnitOfMeasure,
16 timesheet_record.SenderCostCenter,
17 timesheet_record.ActivityType,
18 timesheet_record.ControllingArea,
```

### 3.8.1.9.4 Finding and Replacing Script Elements

Learn how to find and replace script elements in the editor.

Follow these steps:

1. In the script editor, select  .
2. Enter your search term to locate.

Findings are highlighted in the script. You can navigate the findings with the arrow buttons next to the search field.

3. If you want to replace a finding, select  and enter the new term in the *Replace with* field.
4. Choose whether to consider capitalization by selecting the *Consider capitalization* option.
5. Select *Replace* or press *Enter*. To update all findings at once, select *Replace All*.

The script is updated accordingly.

### 3.8.1.9.5 Previewing the Script Result

Get familiar with the options in the script editor while previewing your query result.

The following options are available while previewing the query result:

Option	Description
Preview	Displays the preview panel with the query result and its execution time. The query result shows any NULL and empty values retrieved.
Row Limit	The preview panel's default setting for returned rows is 100. You can change this limit using the <i>Row Limit</i> field at the bottom of the panel. The pre-defined row limits are 100, 250, 500, and 999.
	Closes the preview panel.
 (Refresh)	Reloads the preview of the query result.
 (Download)	Saves your query result in CSV format.
	Resizes your preview area.
	Enters full screen.

Generating a preview can take some time. While a script preview is loading, you can switch to another script.

### 3.8.1.9.6 Viewing Shortcuts for Script Editing

A list of keyboard shortcuts is provided for you to quickly navigate while working with your script. Shortcuts are categorized based on their function. Available categories are *Actions*, *Selection*, *Navigation*, and *Application*.

#### Procedure

1. In the script editor header, select , then *Keyboard Shortcuts*.

A popup window appears with a list of shortcuts grouped based on their function.

2. Select a category tab to view a list of available shortcuts.
3. Select *Close* to view the editor.

### 3.8.1.9.7 Mandatory Script Items

How to define the transformation rules for case attributes and events with SQL scripts. You can also add your own event collectors.

Make sure that the scripts contain all the mandatory script items:

- The case attribute script must include the case ID
- The event scripts must include the case ID, the event name, and the timestamp of the event

Mandatory script items are indicated by a status indicator placed above the script:

Status indicator	Description
	Mandatory script item is missing
	Mandatory script item is added

#### Error linting for event collectors and case attributes

The script editor provides a linter that parses the script to detect errors related to event collectors and case attributes. Rows with errors are highlighted and indicated by a red dot. Each error in a row is indicated by a wavy underscore. If available, additional information is displayed when you hover the error.

##### Note

Resolve all indicated errors. In case that one of the mandatory script items is missing, the pipeline will break.

### Example

[View error linting](#)

```
23 • meter_reading_order_attr AZ (
24 •     SELECT * FROM (
25         SELECT *
26             *
27                 row_number() over(PARTITION BY c_caseid
```

extraneous input 'AZ' expecting {', AS}

## Related Information

[Query Editor \[page 284\]](#)

### 3.8.1.9.8 Comparing Script Changes Before Saving

Compare changes that you make in the script to the last saved version or to a previously saved version.

Choosing the [Compare Changes](#) button opens the code comparison view, where you can compare the working version to the latest saved version or to any previously saved version. Choose [Latest Saved Version](#) to see the list of previously saved versions. You can then choose the previous version that you want to compare the current working version with.

If the working version looks as expected, click [Cancel](#) to get back to the SQL editor, where you can save your changes. If you are not happy with your changes, you can revert some or all of them to the latest saved version or to the previously saved version that you have opened. Then choose [Apply Changes](#).

If another user has saved changes to the script since you opened it, you receive a warning message in the SQL editor that the script has been updated by another user. In the message, click [More](#) to proceed. You can either choose [Get new version](#), which discards any unsaved changes that you have made to the script or [Review changes](#), which opens the code comparison view. In the code comparison view, you can compare your working version to the new latest saved version. In the 3-way comparison view, you see your working version of the script side-by-side with your starting version and the latest saved version.

### 3.8.2 Run Data Pipelines

Learn how to run your process data pipeline, and schedule pipeline runs. You can run it manually or schedule an automatic execution at any given point of time. You can execute the transformation and load at any time.

After setting up your process data pipeline, you can do the following:

- run and cancel the data pipeline manually at any time

- schedule an automatic run of the data pipeline
- run and cancel the transformation and load manually at any time
- view the log files of the last 10 executed data pipelines
- download the pipeline event log for each data pipeline execution with the finished Load step

### Note

If the data hasn't changed since it was last cached, the data pipeline run utilizes the cached information. To view if your data pipeline run utilized a cached result, select the log entry from your process data pipeline. Details are displayed in the *Message* column on the respective tab in the *Transformation & Load* or *Full ETL* screen.

Select the links below to learn more about each topic.

#### [Running the Complete Data Pipeline \[page 292\]](#)

How to start the execution of the data pipeline. You can run it manually or schedule an automatic execution at any given point of time.

#### [Scheduling the Pipeline Run \[page 293\]](#)

How to activate the scheduler for data pipeline. The pipeline will then automatically pull your data from the source system into SAP Signavio Process Intelligence.

#### [Running the Transformation and Load \[page 297\]](#)

Learn how to start the execution of the data pipeline. You can run it manually or schedule an automatic execution at any given point of time.

#### [Canceling an Extraction and a Transformation \[page 298\]](#)

How to view the execution history of data pipeline. There is a history for each process data pipeline.

How to create, edit, and delete data models

## 3.8.2.1 Running the Complete Data Pipeline

How to start the execution of the data pipeline. You can run it manually or schedule an automatic execution at any given point of time.

### Manually run the pipeline

When the Process data pipeline is set up, you can run the complete pipeline manually at any time.

- To run the pipeline, open your Process data pipeline and select *Run ETL*. If the *Run ETL* button is deactivated, check on the *Overview* tab if there is a process linked to your data pipeline. The data is extracted, transformed, and uploaded to the process that is linked in the Process data pipeline.
- To navigate to the process with the uploaded data, open your Process data pipeline and on the *Overview* tab click the linked process card.
- The process opens in a new tab. You can view the uploaded data in the process settings, read more in the Process setting section.

## Scheduled pipeline running

You can schedule the automatic execution of the data pipeline. The pipeline then extracts the data that has changed since the last extraction. You can enable and configure a schedule on source data and Process data pipeline level. Read more in the Scheduled Pipeline Running section.

### Related Information

[Monitoring Data Pipelines \[page 299\]](#)

[Process Settings \[page 21\]](#)

[Scheduling the Pipeline Run \[page 293\]](#)

### 3.8.2.2 Scheduling the Pipeline Run

How to activate the scheduler for data pipeline. The pipeline will then automatically pull your data from the source system into SAP Signavio Process Intelligence.

You can schedule the automatic execution of the data pipeline. The pipeline then extracts the data that has changed since the last extraction. You can enable and configure the scheduler in a source data and in a process data pipeline.

#### ⓘ Note

- As long as an extraction is running, no further extraction can be started, even though it's scheduled. For example, if an extraction takes 2 hours and it's scheduled to run every hour, one extraction is always skipped.
- Users with the analyst role can't edit or configure schedules in process data pipelines and source data.

### Time Zone

For any date and time set with the scheduler, the Coordinated Universal Time (UTC) standard is used.

### Enable the Scheduler

You can enable the scheduler in two places, in source data and in a process data pipeline.

## Enable the Scheduler in Source Data

### ⓘ Note

Enabling the scheduler in source data only schedules the extraction step of data pipelines.

Follow these steps to enable the scheduler in source data:

1. Open the source data and select *Schedule* in the header.
2. Select the schedule toggle or *Activate* on the upper right of the page.  
The schedule is activated for the source data.
3. Select *Save*.  
The extraction is scheduled by default to run daily at midnight.

## Enable the Scheduler in a Process Data Pipeline

### ⓘ Note

Enabling the scheduler in a process data pipeline schedules the full ETL or T&L (Transform & Load) pipelines. Read more in section [Pipeline scheduling overview \[page 296\]](#).

Follow these steps:

1. Open your process data pipeline and select the *Schedule* tab.
2. Select the schedule toggle or *Activate* on the upper right corner of the page.  
The schedule is activated for the process data pipeline.
3. Confirm with *Save*.  
The execution of the full ETL or T&L data pipeline is scheduled by default to run daily at midnight.

## Customize the scheduler

You can customize the scheduler in two places, in source data and in a process data pipeline.

## Customize the scheduler in source data

Follow these steps:

1. Open your source data and select *Schedule* in the header.
2. Select the schedule toggle or *Activate* on the upper right corner of the page.
3. Customize the scheduler. The following options are available:

4. Schedule option	Description
Hourly	Customize the scheduler to execute after set amount of hours or at a specific time.
Daily	Customize the scheduler to execute after set amount of days, every week day, or at a specific time on the set amount of days or at a specific time every week day.
Weekly	Customize the scheduler to execute on specific days at a certain time weekly. The following options are available: <ul style="list-style-type: none"> <li>• Saturday</li> <li>• Sunday</li> <li>• Monday</li> <li>• Tuesday</li> <li>• Wednesday</li> <li>• Thursday</li> <li>• Friday</li> </ul>
Monthly	Customize the schedule to execute at a specific time with the following options: <ul style="list-style-type: none"> <li>• A specific day of every month, for example, day 1 of every month.</li> <li>• Last day of every month.</li> <li>• On the last weekend of every month.</li> <li>• A specific day before the end of the month, for example, 10 days before the end of the month.</li> </ul>

5. Confirm with [Save](#).

The schedule is configured and captured in the schedule summary section.

## Customize the scheduler in a process data pipeline

Follow these steps:

1. Open your process data pipeline and select the [Schedule](#) tab.
2. Select the schedule toggle or [Activate](#) on the upper right corner of the page.
3. Customize the scheduler. The following options are available:

4. Schedule option	Description
Hourly	Customize the scheduler to execute after set amount of hours or at a specific time.
Daily	Customize the scheduler to execute after set amount of days, every week day, or at a specific time on the set amount of days or at a specific time every week day.

Schedule option	Description
Weekly	<p>Customize the scheduler to execute on specific days at a certain time weekly. The following options are available:</p> <ul style="list-style-type: none"> <li>• Saturday</li> <li>• Sunday</li> <li>• Monday</li> <li>• Tuesday</li> <li>• Wednesday</li> <li>• Thursday</li> <li>• Friday</li> </ul>
Monthly	<p>Customize the schedule to execute at a specific time with the following options:</p> <ul style="list-style-type: none"> <li>• A specific day of every month, for example, day 1 of every month.</li> <li>• Last day of every month.</li> <li>• On the last weekend of every month.</li> <li>• A specific day before the end of the month, for example, 10 days before the end of the month.</li> </ul>

5. Confirm with [Save](#).

The schedule is configured and captured in the schedule summary section located on the right side of the schedule page.

## Specify source data in the scheduler

This section provides an overview of the data pipeline. You can specify which source data are included and executed in the scheduled pipeline.

### Note

If no source data is included in the schedule, only Transformation and Load (T&L) will execute once the schedule is triggered.

Follow these steps:

1. Open your process data pipeline and select the [Schedule](#) tab.
2. Select the schedule toggle or [Activate](#) on the upper right corner of the page.
3. Customize the scheduler.
4. To include or exclude specific source data from the schedule, Select the toggle on the related source data.
5. Confirm with [Save](#).

## Disable the scheduler

You can disable the scheduler in two places, in a source data and in a process data pipeline.

### Disable the scheduler in source data

Follow these steps:

1. Open the source data and select the *Schedule* in the header.
2. Select the schedule toggle on the upper right corner of the page.  
The scheduler is automatically saved and disabled.

### Disable the scheduler in a process data pipeline

Follow these steps:

1. Open the process data pipeline and select the *Schedule* tab.
2. Select the scheduler toggle on the upper right corner of the page.  
The scheduler is automatically saved and disabled.

## Related Information

[Monitoring Data Pipelines \[page 299\]](#)

### 3.8.2.3 Running the Transformation and Load

Learn how to start the execution of the data pipeline. You can run it manually or schedule an automatic execution at any given point of time.

You can transform the data extracted from your source system and then load that data into the linked process at any time.

- To run the data transformation and load the transformed data to the linked process, open your Process data pipeline and select *Run T&L*. Read more in the Scheduled Pipeline Running section.

#### ⓘ Note

The *Run T&L* button is disabled in one of the following cases:

- No business objects are configured for the Process data pipeline.
- No process is linked to the Process data pipeline.

- If the data hasn't changed since it was last cached, the data pipeline run utilizes the cached information. To view if your data pipeline run utilized a cached result, select the log entry from your process data pipeline. Details are displayed in the [Message](#) column on the respective tab in the [Transformation & Load](#) or [Full ETL](#) screen.

The data is transformed and loaded to the process that is linked in the Process data pipeline.

## Related Information

[Monitoring Data Pipelines \[page 299\]](#)

[Scheduling the Pipeline Run \[page 293\]](#)

### 3.8.2.4 Canceling an Extraction and a Transformation

How to view the execution history of data pipeline. There is a history for each process data pipeline. How to create, edit, and delete data models

You can cancel the extraction and the transformation independently for a running pipeline. You can do this in two places, in source data and in a Process data pipeline.

#### Canceling an Extraction in Source Data

Follow these steps:

1. While the pipeline is running, view the [Pipeline logs](#) section on the [Overview](#) tab.  
The logs are displayed.
2. To cancel the extraction for the running pipeline, select [Cancel](#).  
A confirmation dialog opens.
3. Select [Confirm](#).  
The execution of the running pipeline is canceled immediately. You can now execute other pipelines without waiting for the previous pipeline cancellation to complete. Already extracted data isn't deleted.

#### Canceling an Extraction, Transformation, and Load in a Process Data Pipeline

Follow these steps:

1. While the pipeline is running, open the [Overview](#) tab and select [Pipeline logs](#).  
The logs are displayed at the bottom of the page.
2. To cancel the extraction, transformation, and load for the running pipeline, select [Cancel](#).  
A confirmation dialog opens.
3. Select [Confirm](#).

The execution of the running pipeline is canceled immediately. You can now execute other pipelines without waiting for the previous pipeline cancellation to complete. Already extracted data won't be deleted.

### 3.8.3 Monitor Data Pipelines and Download Event Logs

Get an overview of monitoring data pipelines and downloading event logs.

You can monitor the pipeline run from the [Overview](#) tab in a process data pipeline. Upon successful pipeline run, you can download the event log as a file in XES format.

Select the links below to learn more about each topic.

#### [Monitoring Data Pipelines \[page 299\]](#)

Learn how to access the data pipeline logs, view log details, and rerun the extraction from the logs. The section also describes how to sort and filter log entries, show or hide IDs, and copy error messages.

#### [Downloading the Pipeline Event Log in XES Format \[page 301\]](#)

Learn how to view the execution history of data pipeline. There is a history for each process data pipeline. How to create, edit, and delete data models

#### [Accessing the Business Objects and Data Views from Pipeline Logs \[page 302\]](#)

From the pipeline logs in your process data pipeline, you can access data views, business objects, case attributes, and event collectors.

#### 3.8.3.1 Monitoring Data Pipelines

Learn how to access the data pipeline logs, view log details, and rerun the extraction from the logs. The section also describes how to sort and filter log entries, show or hide IDs, and copy error messages.

The execution of each data extraction and each process data pipeline run is logged for you to view the history. You can view the last 100 extractions.

You can view the status of data upload calls in the logs section of an Ingestion API source data. Read more in the section [Use the ingestion status API](#).

#### Accessing the Logs

Follow these steps:

1. Open your process data pipeline.
2. On the [Overview](#) tab, if the logs aren't displayed at the bottom of the page, select *Pipeline logs* on the canvas.

Logs are distributed on different tabs as follows:

Pipeline Log Tabs	What Do They Show
<i>Current</i>	Shows the current executions of your process data pipeline.
<i>Related</i>	A source data can be included in multiple process data pipelines. This tab shows the process data pipeline executions of shared source data and data extraction runs of any source data.
<i>All</i>	Shows all the pipeline executions and data extraction runs of any source data.

3. To view more details on a log entry, select it.

### Example

*Watch how to monitor a pipeline*

The screenshot shows the SAP Signavio Process Intelligence interface. On the left, there's a sidebar with navigation links like 'Process Data Management', 'Source Data', 'Connections', 'On-Premises Extractors', 'Processes', and 'Actions'. The main area is titled 'Process Data Pipelines' and displays a single log entry for a 'data pipeline' with an 'Error' status. The entry details are as follows:

- End time: 2023-10-05 16:53:36 (UTC)
- Created at: 2022-09-22 11:51:12 (UTC)
- Created by: Sven W

At the top right of the main area, there are buttons for 'Import', 'Create', and various filters. Below the table, there are sorting and search options for 'Name', 'Created by', and 'Created at'.

## Log Details

Log details are distributed on the following tabs:

Tab	Description
<i>Extractions</i>	View the extracted tables and how long their extraction took. If no extraction was run, this tab isn't displayed.
<i>Data view transformation</i>	View the used data views and how long their processing took. If no data views are used, this tab isn't displayed.
<i>Case attribute transformations</i>	View transformed case attributes per business object.
<i>Event collector transformations</i>	View transformed event collectors per business object.

Tab	Description
<a href="#">Event log load</a>	View the number of events and cases and how long event log generation took. If errors happen, corresponding messages are listed here.

If the data hasn't changed since it was last cached, the data pipeline run utilizes the cached information. To view if your data pipeline run utilized a cached result, select the log entry from your process data pipeline. Details are displayed in the [Message](#) column on the respective tab in the [Transformation & Load](#) or [Full ETL](#) screen.

## Rerunning Failed Extractions

To rerun a failed extraction, go to the [Extractions](#) tab and select  [Retry](#).

If you want to rerun all failed extractions at once, select  [Retry All](#) in the header of the [Status](#) column.

## Sorting and Filtering, Showing IDs, or Copying Error Messages

In the logs, you have the following options:

- To sort and filter the log, use the functions in the table header.
- To show or hide the IDs in the log, select [Show IDs](#) or [Hide IDs](#).
- To copy a condition or error message to the clipboard, choose a condition or message and select .

## Related Information

[Managing Connections \[page 134\]](#)

[Managing Source Data \[page 176\]](#)

### 3.8.3.2 Downloading the Pipeline Event Log in XES Format

Learn how to view the execution history of data pipeline. There is a history for each process data pipeline. How to create, edit, and delete data models

#### Note

You need the feature set SAP Signavio Process Intelligence - Data Modeling and at least viewer permission on the specific process data pipeline in order to download the pipeline event log. Your workspace administrator can enable these for you.

For each executed pipeline with a finished Load step, you can download the pipeline event log as a file in XES format.

Follow these steps:

1. Open your process data pipeline.
2. On the [Overview](#) tab, select [Pipeline logs](#).  
The logs display at the bottom of the page.
3. To view more details of a log entry, select it.  
The details open.
4. Click .  
The file is saved to your browser's download folder.

## Related Information

[Access Requirements for Process Data Management \[page 52\]](#)

[Exporting and Importing a Process Data Pipeline \[page 260\]](#)

### 3.8.3.3 Accessing the Business Objects and Data Views from Pipeline Logs

From the pipeline logs in your process data pipeline, you can access data views, business objects, case attributes, and event collectors.

## Procedure

1. Open your Process data pipeline.
2. On the [Overview](#) tab, select [Pipeline logs](#).  
The logs display at the bottom of the page.
3. To view details of a log entry, select it.  
The details open.
4. Choose the following tabs to access the respective entity:
  - [Access data views](#)  
On the [Data view transformations](#) tab, choose the data view and select it. The selected data view opens with its script editor.
  - [Access case attributes](#)  
On the [Case attribute transformations](#) tab, choose the case attribute, and select the respective business object. The selected business object opens with its case attribute.
  - [Access event collectors](#)

On the [Event collector transformations](#) tab, choose the event collector, and select the respective business object. The selected business object opens with its event collectors.

### 3.8.4 Troubleshooting Transformation Errors

Find solutions to common errors with data pipelines.

Find solutions to errors that can occur during the transformation and load steps of a data pipeline.

If a problem continues, please contact our SAP Signavio service experts from the [SAP for Me portal](#).

#### Ambiguous names or aliases for columns

The pipeline fails with a message like this:

```
Error executing TransformationProcessor CASE - (Error [[Simba][AthenaJDBC]](...)  
An error has been thrown from the AWS Athena client. SYNTAX_ERROR: line 1:1:  
Column name 'SalesDocId' specified more than once. You may need to manually  
clean the data at location 's3://...'
```

Solution:

All columns must have unique names or aliases. To fix the error, assign unique names or aliases to all columns exposed by the case collector query.

#### Incorrect timestamp format

Column names can be interpreted as time values or date-time values with time zone information. If queries in a case attribute script contain such column names, the pipeline fails with a message like this:

```
Error creating BusinessObject: Error [[Simba][AthenaJDBC]](...) An error has been  
thrown from the AWS Athena client.  
Invalid column type for column Test Time: current_time: Unsupported Hive type:  
time with time zone [Execution ID: ...] while running query  
[CREATE OR REPLACE VIEW view_bo_case_522894a9d93b4181b6b0c70d99c26073 AS WITH...
```

If queries in event collectors scripts contain such column names, the pipeline fails with a message like this:

```
Error executing TransformationProcessor EVENT - (Error [[Simba][AthenaJDBC]](...)  
An error has been thrown from the AWS Athena client.  
NOT_SUPPORTED: Unsupported Hive type: time with time zone [Execution ID: ...]  
while running query [UNLOAD...
```

Solution:

To fix the error, change your query to avoid creating any column with a name that be interpreted as time zone information.

If you are using an Athena function, read in the [Trino documentation](#) which function doesn't include timezone information on its output.

## Special characters in column or alias names

When column or alias names contain characters that aren't supported, the pipeline fails. For example, a column with the name "SalesDoc:Number" results in a failing pipeline with a message like this:

```
Some characters are not allowed on column names. Please avoid [':', '&', '<'] on
column names.
Whenever possible, stick to alphanumeric based column names (uppercase letters,
lowercase letters, whitespaces and numbers).
Column '"sales: report"' needs to be renamed to avoid the use of problematic
characters
```

Solution:

Column names and aliases can only contain alpha-numeric and supported special characters. To fix these errors, check the column names and aliases for columns from the queries in the failing script. Read more on supported characters in section [Supported characters in names and aliases \[page 180\]](#).

## Query exhausted resources

Running the pipeline or previewing the result of a transformation script fails with any of the following error messages:

```
Query exhausted resources of this scale factor.
```

```
Error executing TransformationProcessor EVENT - (java.sql.SQLException: [Simba]
[AthenaJDBC](...) An error has been thrown from the AWS Athena client. Query
timeout [Execution ID: ...])
```

This error occurs when the AWS Athena memory limit is reached. For example, this can happen when transformation scripts with memory expensive operations are run on large data sets.

Solution:

To solve this error, re-organize and optimize any resource-heavy query in transformation scripts. For example, you can optimize grouping, ordering, and joining operations as described in this [AWS blogpost with performance tuning tips](#).

## Unknown column type

The pipeline fails with an error related to an unknown column type.

Example:

```
"Error executing TransformationProcessor EVENT - (Error [[Simba][AthenaJDBC]
(...) An error has been thrown from the AWS Athena client. SYNTAX_ERROR: line
1:1: Column type is unknown: EventCreatedByUserType.
```

This error occurs when the column value is null:

```
SELECT
```

```
...  
, null EventCreatedByUserType  
...
```

Solution:

To fix the error, modify the query as follows:

```
SELECT  
...  
, cast(null as varchar) EventCreatedByUserType  
...
```

### 3.8.5 SQL Style Guide for Transformations

Follow these best practices when writing SQL queries for transformations.

#### SQL Example

```
/*
  3a
Change Log
  -2023/01/15 ER: Converted null times to zero
  -2023/01/20 DH: Remove events without a timestamp
*/
SELECT  5a          5b
        CONCAT(vbap.mandt, vbap.vbeln, vbap.posnr) AS "c_caseid"  1a
1b    -- 2023/01/15 ER: converting null times to zero
      ,FROM_UNIXTIME(vbap.erdat / 1000 + COALESCE(vbap.erzet, 0)) AS "c_time"
      -- 2023/01/15 ER
1c    , 'Create Sales Order Item' AS "c_eventname"  1d
      ,vbap.ernam AS "Event Created by User ID"
      ,CASE
        WHEN vusr02_header.ustyp = 'A' THEN 'Dialog'
        WHEN vusr02_header.ustyp = 'B' THEN 'System'
        WHEN vusr02_header.ustyp = 'C' THEN 'Communications Data'
        WHEN vusr02_header.ustyp = 'L' THEN 'Reference'
        WHEN vusr02_header.ustyp = 'S' THEN 'Service'
        ELSE NULL
      END AS "Event Created By User Type"
FROM vbak
INNER JOIN vbap ON 1=1  2a
2b    AND vbak.mandt = vbap.mandt
      AND vbak.vbeln = vbap.vbeln
LEFT JOIN vusr02_header ON 1=
      AND vusr02_header.mandt = vbap.mandt
      AND vusr02_header.bname = vbap.ernam
WHERE 1=1
4a    --2023/01/20 DH: Remove events without a timestamp
      AND vbap.erdat IS NOT NULL
      --2023/01/20 DH
4b    AND vbak.vbtyp = 'C'  3c
```

- #unique\_215/unique\_215\_Connect\_42\_subsection-im1 [page 307]
- #unique\_215/unique\_215\_Connect\_42\_subsection-im2 [page 307]
- #unique\_215/unique\_215\_Connect\_42\_subsection-im3 [page 307]
- #unique\_215/unique\_215\_Connect\_42\_subsection-im4 [page 307]
- #unique\_215/unique\_215\_Connect\_42\_subsection-im5 [page 307]
- #unique\_215/unique\_215\_Connect\_42\_subsection-im6 [page 307]
- #unique\_215/unique\_215\_Connect\_42\_subsection-im7 [page 307]

- [#unique\\_215/unique\\_215\\_Connect\\_42\\_subsection-im8 \[page 307\]](#)
- [#unique\\_215/unique\\_215\\_Connect\\_42\\_subsection-im9 \[page 307\]](#)
- [#unique\\_215/unique\\_215\\_Connect\\_42\\_subsection-im10 \[page 307\]](#)
- [#unique\\_215/unique\\_215\\_Connect\\_42\\_subsection-im11 \[page 307\]](#)
- [#unique\\_215/unique\\_215\\_Connect\\_42\\_subsection-im12 \[page 307\]](#)
- [#unique\\_215/unique\\_215\\_Connect\\_42\\_subsection-im13 \[page 308\]](#)

Click each circle for more information.

## Required columns

List the required columns first (`c_caseid`, `c_time`, `c_eventname`).

## Indented columns

Use a new, indented line for each column.

## Comma positioning

Start each new column with a comma, allowing users to comment out lines of code without producing errors.

## Aliases

Alias multi-word column names with double quotes and spaces capitalizing every word ("My Column Name").

## Use 1=1 in joins

Start all table joins with "ON 1=1" to increase readability of subsequent (uniformly indented) conditions.

## Indented join conditions

Use a new, indented line for each join condition.

## Changelogs

At the start of a script, include a change log covering any alterations to the code.

## Inline comment format

Start inline comments with a change date and the editor's initials.

## Comments ending custom code

End custom code with an inline comment including the change date and initials.

## Use 1=1 in conditions

Start where clauses with "WHERE 1=1" to increase readability of subsequent (uniformly indented) conditions.

## Indented WHERE conditions

Use a new, indented line for each WHERE condition.

## Keyword casing

Capitalize SQL keywords (SELECT, FROM, JOIN, etc.).

## **Column casing**

Use lower case letters for source column and table names.

1. Column Selection
  1. List the required columns first (`c_caseid`, `c_time`, `c_eventname`).
  2. Use a new, indented line for each column.
  3. Start each new column with a comma, allowing users to comment out lines of code without producing errors.
  4. Alias multi-word column names with double quotes and spaces capitalizing every word ("My Column Name").
2. Table Joins
  1. Start all table joins with "ON `1=1`" to increase readability of subsequent (uniformly indented) conditions.
  2. Use a new, indented line for each join condition.
3. Comments
  1. At the start of a script, include a change log covering any alterations to the code.
  2. Start inline comments with a change date and the editor's initials.
  3. End custom code with an inline comment including the same change date and initials.
4. Where Conditions
  1. Start where clauses with "WHERE `1=1`" to increase readability of subsequent (uniformly indented) conditions.
  2. Use a new, indented line for each WHERE condition.
5. General Formatting
  1. Capitalize SQL keywords (SELECT, FROM, JOIN, etc.).
  2. Use lower case letters for source column and table names.

# 4 Process Mining

Introduction to the analysis of process data in SAP Signavio Process Intelligence

To analyze the process data that has been uploaded to your process, you can create investigations and dashboards.

## Investigation

With an investigation, you can perform in-depth process mining analysis.

You can create many investigations for each business process. This allows you to focus on data related to a different aspect in each investigation.

On an investigation, you can do the following:

- visualize data in widgets, grouping related data in chapters
- review process performance against metrics
- narrow down data with filters
- manually capture insights or have insights generated
- share Live Insights from the widgets to BPMN diagrams

## Dashboard

With a dashboard, you can do in-depth process mining analysis and tell your story using data visualizations. It also lets you monitor key performance indicators that are relevant to a specific goal.

You can create many dashboards for each business process, for example, one dashboard for each audience.

On a dashboard, you can also do the following:

- visualize data in widgets, grouping different aspects of complex processes on separate pages
- narrow down data with filters

The layout of a dashboard is flexible. You can resize and rearrange widgets based on your preference.

Multiple users can work simultaneously on a dashboard without overriding each other's work. So, you can make changes that don't need to be saved, for example, when you change filters for exploration purposes. Only after you save your changes, they become available to other users. If you close the workspace without saving your work, your changes are not preserved.

Users with consumer role can also explore the dashboards shared with them, for example, they can apply individual filters. However, they cannot save their changes.

You can shorten the time to insight by using our pre-configured dashboards, which are tailored to specific use cases and mining needs. These dashboards are available in the value accelerator library for SAP Signavio

solutions. To get them, please contact your workspace administrator. For more information, see [Value Accelerator Library for SAP Signavio Solutions](#).

## Investigation vs Dashboard

The following table compares investigations and dashboards.

	<i>Investigation</i>	<i>Dashboard</i>
<b>Goal</b>	In-depth process mining analysis	In-depth process mining analysis, present highlights of your data story, and track KPIs
<b>Process view</b>	One per investigation, applied to all widgets	One per dashboard, applied to all widgets
<b>Access rights</b>	Private, anyone can view, anyone can edit  Read more in section <a href="#">Share an investigation with other SAP Signavio Process Intelligence users [page 317]</a> .	Private, anyone can view, anyone can edit  View access still allows users to edit a dashboard for exploration purposes, but the changes can't be saved.  Read more in section <a href="#">Share a dashboard with other SAP Signavio Process Intelligence users [page 335]</a> .
<b>Available widgets</b>	All widgets  Find the list of available widgets in section <a href="#">Add widgets to an investigation [page 345]</a> .	All widgets  Find the list of available widgets in section <a href="#">Add widgets to a dashboard [page 345]</a> .
<b>Widget creation</b>	<ul style="list-style-type: none"> <li>• Inline creation</li> <li>• Copy widgets from and to investigations and dashboards</li> <li>• Duplicate widgets on an investigation</li> </ul>	<ul style="list-style-type: none"> <li>• Inline creation</li> <li>• Copy widgets from and to investigations and dashboards</li> <li>• Duplicate widgets on a dashboard</li> </ul>
<b>Display widgets in other SAP Signavio applications</b>	Embed a widget using the widget ID, read more in section <a href="#">Display widgets in other SAP Signavio applications [page 349]</a> .	Currently, embedding widgets that are on a dashboard is not supported.
<b>Changes persisted</b>	Changes, for example, adding filters and widgets are always persisted without further ado.	By default, changes to filters and widgets are only saved locally for the user and are not persisted automatically. User needs to manually click <a href="#">Save</a> to store changes.

<b>Layout</b>	Fixed layout, from top to bottom: <ul style="list-style-type: none"><li>• Always add widgets at the end of a chapter or investigation</li><li>• Fixed widget size</li><li>• Widgets are always placed next to or below each other</li><li>• Widgets can only be moved up and down</li><li>• Infinite length, document approach</li></ul>	Flexible layout: <ul style="list-style-type: none"><li>• Place widgets anywhere</li><li>• Free resizing of widgets</li><li>• Arrange widgets on top of each other</li><li>• Adding or deleting a widget doesn't change the positions of other widgets in the dashboard</li><li>• Infinite length</li><li>• Choose between free and grid-based layout</li></ul>
		Read more in <a href="#">Drag, drop, and resize widgets on a dashboard [page 340]</a> and <a href="#">Layout Options for Dashboards [page 333]</a> .
<b>Content structure</b>	Group widgets in chapters, from top to bottom, read more in section <a href="#">Add, edit, and delete chapters [page 314]</a> .	Group widgets on pages, each page is on a different tab, read more in section <a href="#">Add, edit, and delete pages [page 334]</a> .
<b>Link to a specific location</b>	Sharing links to single chapters of investigations is not supported.	Share links to single pages of a dashboard
<b>Insights</b>	Available for investigations and widgets, read more in section <a href="#">Insights [page 461]</a>	Available for dashboards and widgets, read more in section <a href="#">Insights [page 461]</a>
<b>Process model</b>	Can be linked. Learn more in <a href="#">Link a BPMN Diagram to an Investigation [page 319]</a> .	Can be linked. Learn more in <a href="#">Link a BPMN Diagram to a Dashboard [page 336]</a> .
<b>Export and import</b>	Single investigations, as JSON, see <a href="#">Export and import an investigation [page 325]</a>	These are the options: <ul style="list-style-type: none"><li>• Single dashboards, as JSON, see <a href="#">Export and import dashboards [page 341]</a></li><li>• Bundled dashboards using the central repository for value accelerators, see <a href="#">Value Accelerator Library for SAP Signavio Solutions</a></li></ul>

## Related Information

- [Investigations \[page 312\]](#)
- [Dashboards \[page 329\]](#)
- [Dashboards \[page 329\]](#)
- [Filters \[page 443\]](#)
- [Insights \[page 461\]](#)
- [Work with Metrics \[page 480\]](#)

## 4.1 Investigations

Learn about investigations, one of the data analysis options in SAP Signavio Process Intelligence.

With an investigation, you can perform in-depth process mining analysis.

You can create many investigations for each business process. This allows you to focus on data related to a different aspect in each investigation.

On an investigation, you can do the following:

- visualize data in widgets, grouping related data in chapters
- review process performance against metrics
- narrow down data with filters
- manually capture insights or have insights generated
- share Live Insights from the widgets to BPMN diagrams

### Where to Find Investigations?

#### ⓘ Note

You need access to the process to view investigations.

To access investigations, open your process and choose the *Investigations* tab. Here, you can find existing investigations and create new ones.

### Related Information

[Add and duplicate an investigation \[page 313\]](#)

[Add, edit, and delete chapters \[page 314\]](#)

[Edit, rename, and delete an investigation \[page 316\]](#)

[Share an investigation with other SAP Signavio Process Intelligence users \[page 317\]](#)

[Share an investigation in SAP Signavio Process Collaboration Hub \[page 318\]](#)

[Add metrics to an investigation \[page 324\]](#)

[Export and Import Investigations \[page 325\]](#)

## 4.1.1 Add and duplicate an investigation

Learn how to add a new investigation or copy an existing one.

### Create an investigation

Follow these steps:

1. Open your process and select [New Investigation](#).  
The investigation settings open.
2. Enter a name and select a process view.
3. To compare the actual process data with the process model, you can link a BPMN model.  
Read more in section [Link a BPMN Diagram to an Investigation \[page 319\]](#).  
This is needed, for example, for the widgets [Activity List \[page 353\]](#) and [Process Conformance \[page 355\]](#).
4. Confirm with [Go to Investigation](#).  
The investigation opens. By default, the [Process Discovery](#) widget is displayed.

### Duplicate an investigation

#### ⓘ Note

Users with the manager role for a process can change all process views of a duplicated investigation.

Analysts can only change the process views to which they have access.

To duplicate an investigation, follow these steps:

1. Open your process and select [Investigations](#).
2. Select  > [Duplicate](#) for the investigation you want to duplicate.  
The investigation is duplicated and displayed with (Copy) added to the investigation name.

### Related Information

[Share an investigation with other SAP Signavio Process Intelligence users \[page 317\]](#)

[Add widgets to an investigation \[page 345\]](#)

## 4.1.2 Add, edit, and delete chapters

A chapter is a section in an investigation where you can group or organize widgets based on your preferences. Learn how to add, edit, and delete chapters, or how to change their descriptions.

You can add many chapters to an investigation based on your requirement.

Each chapter is added as a section at the bottom of your investigation.

You have the following options to manage your chapters:

- Create a chapter
- Rename a chapter
- Change the chapter description
- Copy a chapter
- Change the chapter order
- Delete a chapter

### ⓘ Note

You need the manager or analyst role for a process to use these functions.

### Create a chapter

Follow these steps:

1. Open your investigation.
2. In the sidebar, select *New chapter*.
3. Type a name and press Enter.  
The chapter is added.

### Rename a chapter

Follow these steps:

1. In your investigation, select the chapter name.  
The name becomes editable.
2. Type a new name and press *Enter*.  
The name of the chapter is updated.

## Change the chapter description

Follow these steps:

1. In the sidebar of your investigation, select the chapter to edit.
2. Select  in the chapter title.
3. In the dropdown, select [Edit](#).  
The chapter settings open.
4. Apply your change and confirm with [Save](#).  
The description is changed.

## Copy a chapter

You can copy a chapter within an investigation or to any other of your investigations. In either case, the chapter is copied at the end of the investigation. Follow these steps:

1. In the sidebar of your investigation, select the chapter to copy.
2. select  in the chapter title and select [Copy to](#).
3. Select the investigation into which you want to copy the chapter.
4. Confirm with [Paste here](#).  
The chapter is copied to the selected investigation. If you have applied filters to the chapter, these filters are copied as well.

## Change the chapter order

Follow these steps:

1. In the sidebar of your investigation, select the chapter to move.
2. select  in the chapter title and select [Move up](#) or [Move down](#).  
The chapter is moved.

## Delete a chapter

### Note

Deleting a chapter can't be undone.

Follow these steps:

1. In the sidebar of your investigation, select the chapter to delete.
2. Select  in the chapter title and select *Delete*.  
The chapter and contained widgets are deleted.

## Related Information

[Add widgets to an investigation \[page 345\]](#)

[Edit, move, and delete widgets \[page 347\]](#)

### 4.1.3 Edit, rename, and delete an investigation

Learn how to edit, rename, or delete an investigation.

#### Note

You need the manager or analyst role for a process to use these functions.

## Edit an investigation

Follow these steps:

1. Open your process and under *Investigations*, select  for your investigation, then *Settings*.  
The investigation settings open.
2. You can change the following:
  - Select another process view
  - Link a BPMN diagram
  - Configure a metrics bar
3. Confirm with *Done*.  
Your changes are applied to the investigation.

## Rename an investigation

Follow these steps:

1. Open your process and under *Investigations*, select  for your investigation, then *Rename*.

2. Type a new name and select *Save*.  
The name of the investigation is updated.

## Delete an investigation

### ⓘ Note

Deleting an investigation can't be undone.

Follow these steps:

1. Open your process and under *Investigations*, select  for your investigation, then *Delete*.
2. Confirm in the dialog with *Delete*.  
The investigation is deleted.

## Related Information

[Filters \[page 443\]](#)

[Add metrics to an investigation \[page 501\]](#)

[Add widgets to an investigation \[page 345\]](#)

## 4.1.4 Share an investigation with other SAP Signavio Process Intelligence users

Learn how to make investigations private, visible, or editable for other users of SAP Signavio Process Intelligence.

By default, you're the owner of the investigation that you create or duplicate. The owner can share the investigation with other users and the owner's name is displayed in the *Investigations* tab of your process. You can use process views, either to define which process data your users can view, or use them to grant access to investigations. For more information, see [Define Access with Process Views \[page 26\]](#).

You have the following options when sharing your investigation:

Access by User Role

Sharing Option	Consumer	Analyst	Manager
 <a href="#">Private</a>	Can't view or edit.	Can't view or edit.	Can view but can't edit.
 <a href="#">Anyone can view</a>	Can view but can't edit.	Can view and edit but can only save changes to a new dashboard.	Can view, edit, and save to your current, or a new, dashboard.

Sharing Option	Consumer	Analyst	Manager
Anyone can edit	Can view but can't edit.	Can view, edit, and save to your current, or a new, dashboard.	Can view, edit, and save to your current, or a new, dashboard.

To change share settings on an investigation, follow these steps:

1. Navigate to your investigation's sharing option:
  - In the *Investigations* tab of your process.
  - In the title bar of your Investigation.
2. Select the sharing option icon. The sharing option can be displayed as , , or depending on how it has been set.  
The sharing option dialog box opens.
3. Select your sharing option.  
The investigation is shared according to your setting.

#### Note

You can also share your investigations with users of SAP Signavio Process Collaboration Hub, even if they don't have access to SAP Signavio Process Intelligence. For more information, see [Share an investigation in SAP Signavio Process Collaboration Hub \[page 318\]](#)

## Related Information

[Export and Import Investigations \[page 325\]](#)

[Add and duplicate an investigation \[page 313\]](#)

[Define Access with Process Views \[page 26\]](#)

## 4.1.5 Share an investigation in SAP Signavio Process Collaboration Hub

Learn how to share your investigations in SAP Signavio Process Collaboration Hub. Then, users who don't have access to SAP Signavio Process Intelligence can also view your findings.

Only investigations that aren't private can be shared.

The following users can view investigations in other applications by default:

- Users with the manager or analyst role of a process
- Workspace administrators of SAP Signavio Process Manager

For other users, you need to grant access by assigning a role and a process view.

## Grant access to your investigation in SAP Signavio Process Collaboration Hub

Follow these steps in SAP Signavio Process Intelligence:

1. Select the process in the *Processes* overview.
2. The process opens. Select  (*Settings*).
3. Select *Users*, then *Add User*.  
The *Add User* settings panel opens.
4. Search for the user you'd like to grant access to, then select their role and the process view.  
The selected users can access the investigations linked to that process view from their launchpad in SAP Signavio Process Collaboration Hub. Read more in section [Your launchpad](#).

### Note

If a BPMN diagram is linked to the investigation, the diagram is visible in the selected user's Shared Documents in SAP Signavio Process Collaboration Hub.

When the diagram is opened, only one of its linked investigations is displayed - the one that is first in alphabetical order. If investigations are renamed, or new investigations are added, these changes are considered when determining which investigation is first in alphabetical order.

## Related Information

[Share an investigation with other SAP Signavio Process Intelligence users \[page 317\]](#)

[Define Access with Process Views \[page 26\]](#)

[Export and Import Investigations \[page 325\]](#)

[Roles and user management \[page 31\]](#)

## 4.1.6 Link a BPMN Diagram to an Investigation

Linking your BPMN diagram lets you compare your expected process with your actual process - for example, by using the *Activity List*, *Process Conformance*, or *Variant Explorer* widgets.

## Procedure

1. Open your process and select *Investigations*.
2. To open the *Settings* window of the investigation that you're linking to your BPMN model:
  - a. If you're creating a new investigation, select *New Investigation*.

- b. For an existing investigation, select  , then *Settings*.
3. In the *Link BPMN model to investigation (optional)* field, search for your BPMN process model by entering the process name or keywords.
4. To start the mapping of activities, select *Map activities*.
  - To map automatically, select *Auto-map* and follow the on-screen instructions. The auto-map function maps events and activities with identical names, but isn't case-sensitive. If multiple activities have the same name, the event is mapped to the first occurrence of the activity on the process model. You can edit this manually if needed.

#### Note

The auto-map function is only available if there are matches between event names in the event log and the activities in the BPMN diagram. If there are no matches, you need to manually map events and activities.

- To map manually, drag and drop each event from the event list into its corresponding activity on the diagram. Your manual mapping remains in place even if you use *Auto-map* later.
  - To unmap an event or activity, select it in the event list or diagram and choose  .
5. To add a metrics bar, select one or more metrics using the *Configure metrics bar* dropdown list.
  6. Confirm with *Go to Investigation* or *Done*.

The investigation opens. By default, the *Process Discovery* widget is displayed.

## Related Information

[Activity List \[page 353\]](#)

[Process Conformance \[page 355\]](#)

[Variant Explorer \[page 357\]](#)

## 4.1.7 Add widgets to an investigation

Widgets allow you to organize and visualize information about your process.

For information about how to add a widget to an investigation or dashboard, see [Building Widgets - New User Experience \[page 358\]](#).

## Related Information

[Copy or duplicate widgets \[page 346\]](#)

[Edit, move, and delete widgets \[page 347\]](#)

## 4.1.8 Copy or duplicate widgets

Learn how to copy and duplicate widgets. You can copy widgets from one investigation or dashboard into another. Duplicating widgets is only possible within the same investigation or dashboard.

You can create new widgets by copying or duplicating existing widgets:

- Copy – Specify where the new widget is added, for example, to another chapter, another investigation, or a dashboard.
- Duplicate – The duplicate is always automatically added next to or below the original widget.

### Copy a widget

You can copy widgets from an investigation to other investigations or dashboards, and from a dashboard to other dashboards or investigations.

Follow these steps:

1. Choose  in your widget and select *Copy to*.
2. Use  and  to navigate to another investigation or dashboard. If available, you can even specify the chapter for investigations or page for a dashboard.
3. Confirm with *Paste here*.

The widget and any filter applied to the widget are copied to the selected destination.

### Duplicate a widget

Follow these steps:

1. On your investigation or dashboard, find the widget you want to duplicate.
2. Choose  (*more options*) in the widget title and select *Duplicate*.

The widget is copied and added next to or below the original widget.

## Related Information

[Edit, move, and delete widgets \[page 347\]](#)

[Building Widgets - New User Experience \[page 358\]](#)

[Filters \[page 443\]](#)

## 4.1.9 Edit, move, and delete widgets

How to change the widget configuration, re-arrange widgets on the user interface, and delete widgets.

Which options are available depends on the following aspects:

- the widget type
- the role you have for the process

### Edit the widget configuration

Follow these steps:

1. Choose  (*more options*) in the widget and select *Edit*.  
The dialog for widget editing opens.
2. Apply your changes.
3. Confirm with *Save*.  
Your changes are applied to the widget.

### Move a widget

#### On an investigation

Choose  (*more options*) in the widget title and select *Move up* or *Move down*.

If you want to move a widget to a different chapter or to another investigation, use the copy function. Read more in section [Copy or duplicate widgets \[page 346\]](#).

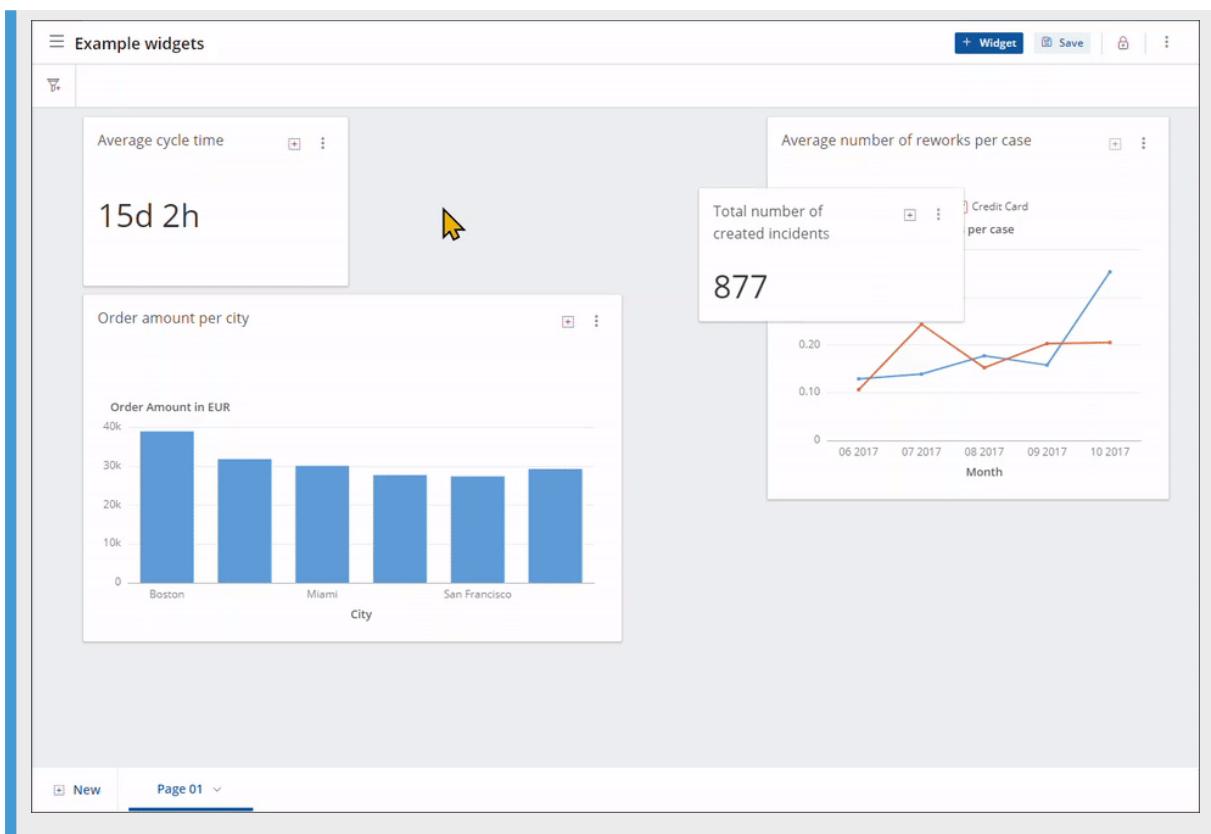
#### On a dashboard

You can drag and drop widgets to any desired location on a dashboard page. When the *Freeform* layout option is selected, you can overlap widgets or place them anywhere.

The following applies to all layout options: You can resize the widgets and rearrange them based on the available space on the dashboard.

#### Example

[Watch how to resize and rearrange widgets](#)



*Process Discovery* widgets have a minimum size to ensure that all elements for widget navigation, such as buttons, menus, and sliders, are always displayed.

## Delete a widget

### ⓘ Note

Deleting a widget can't be undone.

Follow these steps:

1. On your investigation or dashboard, find the widget you want to delete.
  2. Choose ⋮ in the widget and select *Delete*.
- The widget is deleted.

## Related Information

[Building Widgets - New User Experience \[page 358\]](#)

[Filters \[page 443\]](#)

## 4.1.10 Add metrics to an investigation

Learn how to configure widgets to display the output of metrics, or add a metrics bar to an investigation. Also, read how to delete metrics from the metrics bar.

### ⓘ Note

You need the manager or analyst role for a process to use these functions.

### Configure widgets to display the output of a metric

To configure widgets to display the output of one or more metrics, follow the instructions in section [Add widgets to an investigation \[page 345\]](#)

### Add a metrics bar

The metrics bar contains widgets that are preconfigured with metrics. You specify the widgets that are displayed in the bar.

### ⓘ Note

A user with the manager role needs to add metrics to the process before you can select metrics for the metrics bar. Read more in section [Add Metrics to a Process \[page 496\]](#).

The following applies to the metrics bar:

- The metrics bar is always located at the top of an investigation. You can't move it.
- You can change the order in which the metrics are displayed.
- The widget for each metric is preconfigured. You can't edit these widgets.

To add a metrics bar, follow these steps:

1. Open your process and select *Investigations*.
2. Select  for your investigation, then *Settings*.  
The investigation settings window opens.
3. Select one or more metrics using the *Configure metrics bar* drop-down list.
4. Confirm with *Done*.  
The metrics are displayed in your investigation.

## Remove a metric from the metrics bar

Follow these steps:

1. Open your process and select *Investigations*.
2. Select  (*more options*) for your investigation, then *Settings*.  
The investigation settings window opens.
3. Under *Configure metrics bar*, select  (*delete*) for the metric you want to remove.
4. Confirm with *Done*.  
The metric is no longer displayed in the investigation.

### 4.1.11 Export and Import Investigations

Learn how to export and import an investigation to share it across processes or workspaces.

You can use your investigations in different processes and workspaces. For that, you export your investigation and import it into another process. To speed up the creation of an investigation, you can even import it into the same process.

The export only includes references to process data, not the actual process data. Whether you need to configure an imported investigation depends on how much the data of the source and target process differ. Select the links below to learn more.

#### [Export an Investigation \[page 326\]](#)

Learn how to export an investigation to share it across processes or workspaces.

#### [Import an Investigation \[page 327\]](#)

Learn how to import an investigation to share it across processes or workspaces.

#### [Resolving Import Conflicts for Investigations \[page 327\]](#)

Learn how to resolve conflicts when importing investigations.

## Related Information

[Share an investigation with other SAP Signavio Process Intelligence users \[page 317\]](#)

[Work with Metrics \[page 480\]](#)

[Manage widgets \[page 345\]](#)

## 4.1.11.1 Export an Investigation

Learn how to export an investigation to share it across processes or workspaces.

### Context

The export only includes references to process data, not the actual process data. Whether you need to configure an imported investigation depends on how much the data of the source and target process differ.

The export includes the following:

- widgets
- chapters
- filters
- the metrics bar
- SIGNAL queries that are configured in widgets
- metrics that are added to the process, including their variables
- references to process data
- references to custom attributes

#### ⓘ Note

The export doesn't include the following:

- process data
- custom attributes
- the link to a BPMN process model

### Procedure

To export an investigation, follow these steps:

1. Open your process and select *Investigations*.
2. Select  >  *Export* for the investigation you want to export.

The investigation is exported as a JSON file. The file is saved to your browser's download folder.

## 4.1.11.2 Import an Investigation

Learn how to import an investigation to share it across processes or workspaces.

### Context

The following applies:

- You can import an investigation into any process.
- The more similar the data, the less configuration is required after an import.
- Data conflicts are detected and you can then resolve them.

### Procedure

To import an investigation, follow these steps:

1. Open your process, then select *Investigations* > *Import*.
2. Select the JSON file and the process view which you want to set for the investigation.
3. Confirm with *Next*.

The investigation to import is checked. If there aren't any conflicts, the investigation is imported and a confirmation message appears.

If there are conflicts, you can import the investigation as-is, but you then need to reconfigure the widgets that show an unexpected result. Alternatively, you can resolve the conflicts. For more information, see [Resolving Import Conflicts for Investigations \[page 327\]](#).

## 4.1.11.3 Resolving Import Conflicts for Investigations

Learn how to resolve conflicts when importing investigations.

The following issues can cause import conflicts:

- the same name is used for a metric in both the exported investigation and the target process, but the metrics have different SIGNAL code
- the same name is used for a metric variable in both the exported investigation and the target process, but the variables have different values
- widgets are configured with custom attributes

You resolve conflicting items as follows:

<b>Metric variables</b>	For each conflicting variable, a new name is suggested.  You have the following options: <ul style="list-style-type: none"><li>• Import a variable with a new name. You can use the suggested name or edit it. The variable is added to the process.</li><li>• Keep the variable name from the source investigation. The variable in the target process is overwritten. Widgets of the target process using this variable can show a false or no result.</li></ul>
<b>Metrics</b>	For each conflicting metric, a new name is suggested.  You have the following options: <ul style="list-style-type: none"><li>• Import a metric with a new name. You can use the suggested name or edit it. The metric is added to the process.</li><li>• Keep the metric name from the source investigation. The metric in the target process is overwritten. Widgets in existing investigations of the target process using this metric can show a false or no result.</li></ul>
<b>Custom attributes</b>	For each conflicting attribute, you can select an attribute to which you want to map it.  You have the following options: <ul style="list-style-type: none"><li>• Map an attribute. The attribute reference, used in widgets of the investigation to import, is updated.</li><li>• Don't map an attribute. The attribute reference is outdated. Widgets using this reference in the investigation to import can show a false or wrong result.</li></ul>

## Related Information

[Share an investigation with other SAP Signavio Process Intelligence users \[page 317\]](#)

[Work with Metrics \[page 480\]](#)

[Manage widgets \[page 345\]](#)

## 4.2 Dashboards

Learn about dashboards, one of the data analysis options in SAP Signavio Process Intelligence.

With a dashboard, you can do in-depth process mining analysis and tell your story using data visualizations. It also lets you monitor key performance indicators that are relevant to a specific goal.

You can create many dashboards for each business process, for example, one dashboard for each audience.

On a dashboard, you can also do the following:

- visualize data in widgets, grouping different aspects of complex processes on separate pages
- narrow down data with filters

The layout of a dashboard is flexible. You can resize and rearrange widgets based on your preference.

Multiple users can work simultaneously on a dashboard without overriding each other's work. So, you can make changes that don't need to be saved, for example, when you change filters for exploration purposes. Only after you save your changes, they become available to other users. If you close the workspace without saving your work, your changes are not preserved.

Users with consumer role can also explore the dashboards shared with them, for example, they can apply individual filters. However, they cannot save their changes.

You can shorten the time to insight by using our pre-configured dashboards, which are tailored to specific use cases and mining needs. These dashboards are available in the value accelerator library for SAP Signavio solutions. To get them, please contact your workspace administrator. For more information, see [Value Accelerator Library for SAP Signavio Solutions](#).

### Where to Find Dashboards?

#### ⓘ Note

You need access to the process to view dashboards.

To access dashboards, open your process and choose the [Dashboards](#) tab. Here, you can find existing dashboards and create new ones.

### Related Information

[Create, edit, and delete dashboards \[page 330\]](#)

[Share a Dashboard with Many Groups \[page 331\]](#)

[Layout Options for Dashboards \[page 333\]](#)

[Add, Edit, and Delete Pages \[page 334\]](#)

[Dragging, Dropping, and Resizing Widgets on Dashboards \[page 340\]](#)

[Export and Import Dashboards \[page 341\]](#)

## 4.2.1 Create, edit, and delete dashboards

Read how to create, edit, copy, and delete a dashboard.

### Create a dashboard

Follow these steps:

1. Open your process and select *Dashboards*.  
The dashboard overview opens.
2. Select *New Dashboard*.  
The dashboard settings open.
3. Enter a name and select a process view. Read about the different process view types in section [Define Access with Process Views \[page 26\]](#).
4. To compare the actual process data with the process model, you can link a BPMN model.  
Read more in section [Link a BPMN Diagram to a Dashboard \[page 336\]](#).  
This is needed, for example, for the [Process Conformance \[page 355\]](#) widget.
5. Confirm with *Save*.  
The dashboard opens.

### Edit a dashboard

Follow these steps:

1. Open your process and select *Dashboards*.  
The dashboard overview opens.
2. Select the dashboard you want to edit and apply your changes.
3. Confirm with *Save*.

### Copy a dashboard

Follow these steps:

1. Open your process and select *Dashboards*.  
The dashboard overview opens.
2. Select  for your dashboard, then *Save as*.
3. Enter a name and confirm with *Save*.  
The copy is added to the dashboard overview.

## Delete a dashboard

### Note

Deleting a dashboard can't be undone.

Follow these steps:

1. Open your process and select [Dashboards](#).  
The dashboard overview opens.
2. Select  for the dashboard you want to delete, then [Delete](#).
3. Confirm with [Delete](#).  
The dashboard is deleted.

## Related Information

[Filters \[page 443\]](#)

[Add widgets to a dashboard \[page 345\]](#)

### 4.2.2 Share a Dashboard with Many Groups

Read how to share a single dashboard with multiple stakeholder groups for which different parts of the process data are relevant.

Let's assume you want to make KPIs available to several departments, but each department is only allowed to view a certain portion of the data. To set up one dashboard, which can be shared with all departments, follow these steps:

1. Create a process view with the option [Use for access-control only](#) activated and specify all users of all departments. Read how to create the process view in section [For Dashboard Access \[page 28\]](#).
2. Create your dashboard and assign the process view by following the steps in section [Create a dashboard \[page 330\]](#).  
You can add widgets now or later.
3. Set the dashboard visibility to [Anyone can view](#) or [Anyone can edit](#), based on your preference. Read more in section [Define Access with Process Views \[page 26\]](#).
4. For each department, create a process view that controls data access. In each process view, specify the following:
  1. The data that the users of each department can view
  2. The users of the respective department

Access setup is complete. You can add the KPIs by creating widgets. Also, the specified users can access the dashboard.

## Process View Switcher

If users are assigned to multiple process views, they can switch between the process views on a dashboard. This changes the dashboard data only for the user. However, the assigned process view of the dashboard isn't changed.

Switching the process view is done using the drop-down menu in the upper right corner of a dashboard. The selection is saved to the user's browser storage. When users switch the browser or clear the browser storage, the dashboard opens again with the assigned process view.

Only process views that control data access are available for selection in the process view switcher.

### 4.2.3 Changing the Process View

Read how to assign a different process view to a dashboard, and how to switch between process views on a dashboard.

#### Changing the Assigned Process View

To change the assigned process view, follow these steps:

1. Open your process and choose *Dashboards*.  
The dashboard overview opens.
2. Choose  for your dashboard, then *Settings*.
3. Select another process view from the drop-down list.
4. Confirm with *Go to Dashboard*.

## Process View Switcher

If users are assigned to multiple process views, they can switch between the process views on a dashboard. This changes the dashboard data only for the user. However, the assigned process view of the dashboard isn't changed.

Switching the process view is done using the drop-down menu in the upper right corner of a dashboard. The selection is saved to the user's browser storage. When users switch the browser or clear the browser storage, the dashboard opens again with the assigned process view.

Only process views that control data access are available for selection in the process view switcher.

## Related Information

[Define Access with Process Views \[page 26\]](#)

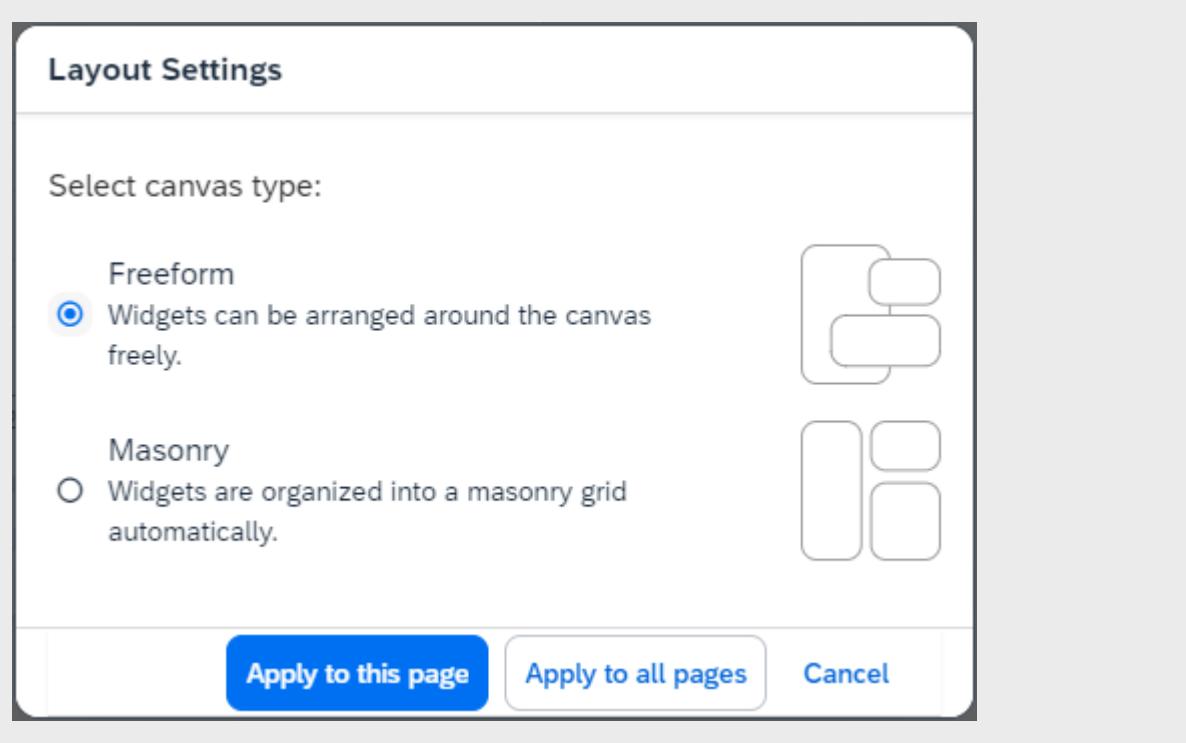
### 4.2.4 Layout Options for Dashboards

Learn how to set the layout for pages on dashboards in SAP Signavio Process Intelligence. You can choose to freely arrange widgets or have them automatically organized based on a grid.

#### Context

Choose the layout for your dashboard pages. By default, widgets can be arranged freely.

##### Example



#### Procedure

1. On your dashboard, open the menu at the bottom of a page and choose [Layout Settings](#).
2. In the dialog, choose one of these canvas types:

- *Freeform*: You can arrange widgets as needed on the canvas. Widgets can overlap.
  - *Masonry*: When you arrange widgets, they automatically snap to a grid.
3. Decide whether to apply the layout only to the current page or to all pages of the dashboard.
- The layout is applied immediately. If necessary, widgets are rearranged accordingly.
4. Save the dashboard.

## Related Information

[Dragging, Dropping, and Resizing Widgets on Dashboards \[page 340\]](#)

### 4.2.5 Add, Edit, and Delete Pages

With pages, you can organize widgets based on your preference. Read how to create, rename, duplicate, and delete pages.

A page is a section on a dashboard where you can organize widgets based on your preferences. You can add many pages to a dashboard based on your requirement.

Each page is added as a tab at the bottom of the dashboard.

#### Adding a Page

In the bottom-left corner of your dashboard, choose *New*. A new page tab is added.

#### Renaming a Page

Open the  menu of your page and choose *Rename*. Type a new name and confirm with *Enter*.

You can also double click a page tab to rename it.

#### Duplicating a Page

Open the  menu of your page and choose *Duplicate*.

## Reordering Pages

You can reorder pages by dragging and dropping them.

## Deleting a Page

Open the  menu of your page and choose [Delete](#).

### 4.2.6 Share a dashboard with other SAP Signavio Process Intelligence users

Read how to make dashboards private, visible, or editable for other users of SAP Signavio Process Intelligence.

By default, you're the owner of the dashboard that you create or duplicate. The owner of the dashboard can share the dashboard with other users and the owner's name is displayed in the [Dashboards](#) tab of your process. Use process views, either to define which process data your users can view, or use them to grant access to dashboards. For more information, see [Define Access with Process Views \[page 26\]](#).

You have the following options when sharing your dashboard:

Access by User Role

Sharing Option	Consumer	Analyst	Manager
 <a href="#">Private</a>	Can't view or edit.	Can't view or edit.	Can view but can't edit.
 <a href="#">Anyone can view</a>	Can view but can't edit.	Can view and edit but can only save changes to a new dashboard.	Can view, edit, and save to your current, or a new, dashboard.
 <a href="#">Anyone can edit</a>	Can view but can't edit.	Can view, edit, and save to your current, or a new, dashboard.	Can view, edit, and save to your current, or a new, dashboard.

To change share settings on a dashboard, follow these steps:

1. Navigate to your dashboard's sharing option:
  - In the [Dashboards](#) tab of your process.
  - In the title bar of your dashboard.
2. Select the sharing option icon. The sharing option can be displayed as , , or  depending on how it has been set.  
The sharing option dialog box opens.
3. Select your sharing option.  
The dashboard is shared according to your setting.

#### Note

A dashboard can be shared with many groups when different parts of the process data are relevant. For more information, see [Share a Dashboard with Many Groups \[page 331\]](#).

## Related Information

[Create, edit, and delete dashboards \[page 330\]](#)

[Export and Import Dashboards \[page 341\]](#)

[Define Access with Process Views \[page 26\]](#)

### 4.2.7 Link a BPMN Diagram to a Dashboard

Linking your BPMN diagram lets you compare your expected process with your actual process - for example, by using the *Process Conformance* or *Variant Explorer* widgets.

#### Procedure

1. Open your process and select *Dashboards*.
2. To open the *Settings* window of the dashboard that you're linking to your BPMN model:
  - a. If you're creating a new dashboard, select *New Dashboard*.
  - b. For an existing dashboard, select  , then *Settings*.
3. Under *Map activities to process model*, search for your BPMN process model by entering the process name or keywords.
4. To start the mapping of activities, select *Map activities*.
  - To map automatically, select *Auto-map* and follow the on-screen instructions. The auto-map function maps events and activities with identical names, but isn't case-sensitive. If multiple activities have the same name, the event is mapped to the first occurrence of the activity on the process model. You can edit this manually if needed.

#### Note

The auto-map function is only available if there are matches between event names in the event log and the activities in the BPMN diagram. If there are no matches, you need to manually map events and activities.

- To map manually, drag and drop each event from the event list into its corresponding activity on the diagram. Your manual mapping remains in place even if you use *Auto-map* later.
  - To unmap an event or activity, select it in the event list or diagram and choose  , then .
5. Confirm with *Go to Dashboard* or *Save*.

The dashboard opens.

## Related Information

[Process Conformance \[page 355\]](#)

[Variant Explorer \[page 357\]](#)

## 4.2.8 Add widgets to a dashboard

Widgets allow you to organize and visualize information about your process.

For information about how to add a widget to an investigation or dashboard, see [Building Widgets - New User Experience \[page 358\]](#).

## Related Information

[Copy or duplicate widgets \[page 346\]](#)

[Edit, move, and delete widgets \[page 347\]](#)

## 4.2.9 Copy or duplicate widgets

Learn how to copy and duplicate widgets. You can copy widgets from one investigation or dashboard into another. Duplicating widgets is only possible within the same investigation or dashboard.

You can create new widgets by copying or duplicating existing widgets:

- **Copy** – Specify where the new widget is added, for example, to another chapter, another investigation, or a dashboard.
- **Duplicate** – The duplicate is always automatically added next to or below the original widget.

### Copy a widget

You can copy widgets from an investigation to other investigations or dashboards, and from a dashboard to other dashboards or investigations.

Follow these steps:

1. Choose  in your widget and select *Copy to*.
  2. Use  and  to navigate to another investigation or dashboard. If available, you can even specify the chapter for investigations or page for a dashboard.
  3. Confirm with *Paste here*.
- The widget and any filter applied to the widget are copied to the selected destination.

## Duplicate a widget

Follow these steps:

1. On your investigation or dashboard, find the widget you want to duplicate.
2. Choose  (*more options*) in the widget title and select *Duplicate*.  
The widget is copied and added next to or below the original widget.

## Related Information

[Edit, move, and delete widgets \[page 347\]](#)

[Building Widgets - New User Experience \[page 358\]](#)

[Filters \[page 443\]](#)

## 4.2.10 Edit, move, and delete widgets

How to change the widget configuration, re-arrange widgets on the user interface, and delete widgets.

Which options are available depends on the following aspects:

- the widget type
- the role you have for the process

### Edit the widget configuration

Follow these steps:

1. Choose  (*more options*) in the widget and select *Edit*.  
The dialog for widget editing opens.
2. Apply your changes.
3. Confirm with *Save*.  
Your changes are applied to the widget.

### Move a widget

#### On an investigation

Choose  (*more options*) in the widget title and select *Move up* or *Move down*.

If you want to move a widget to a different chapter or to another investigation, use the copy function. Read more in section [Copy or duplicate widgets \[page 346\]](#).

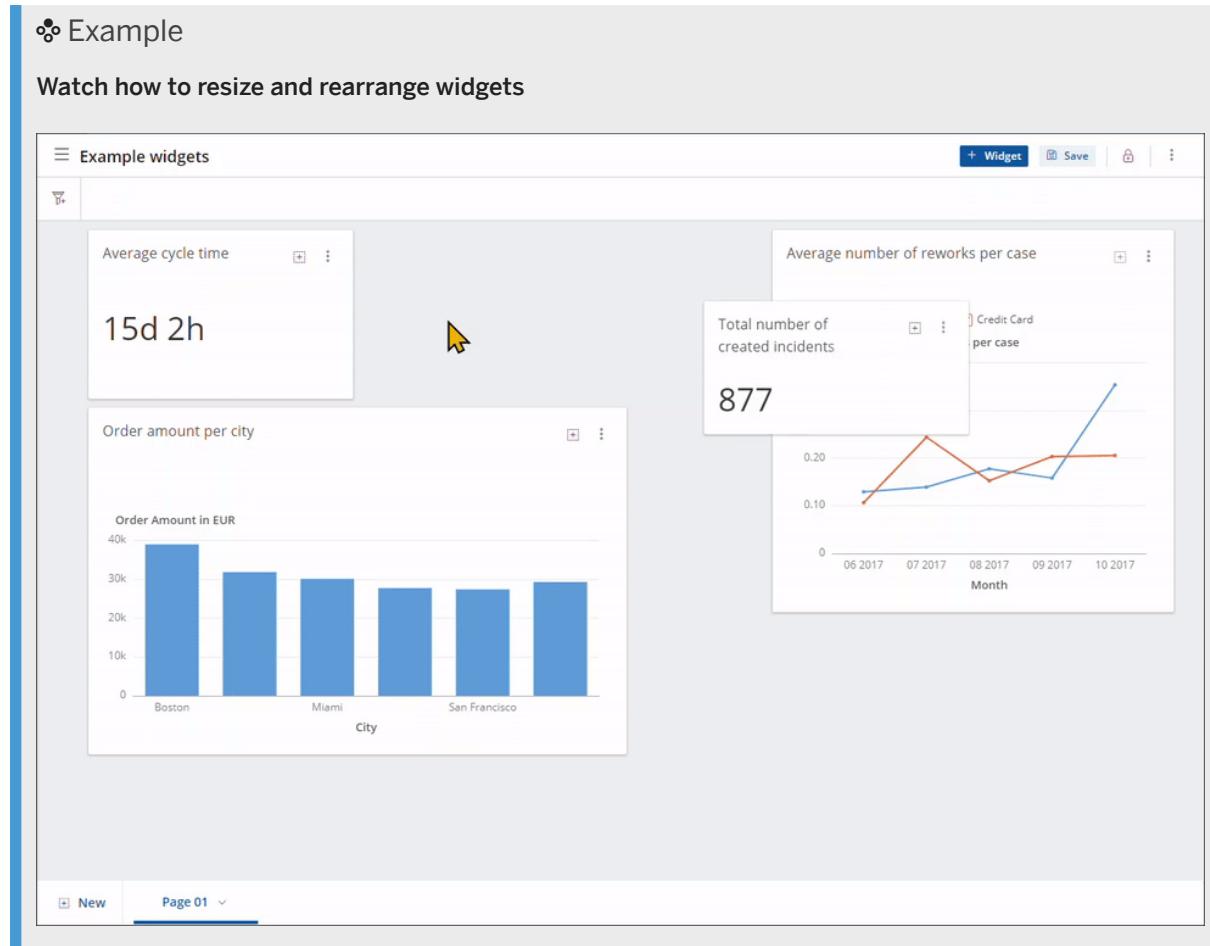
### On a dashboard

You can drag and drop widgets to any desired location on a dashboard page. When the *Freeform* layout option is selected, you can overlap widgets or place them anywhere.

The following applies to all layout options: You can resize the widgets and rearrange them based on the available space on the dashboard.

#### Example

##### Watch how to resize and rearrange widgets



*Process Discovery* widgets have a minimum size to ensure that all elements for widget navigation, such as buttons, menus, and sliders, are always displayed.

### Delete a widget

#### Note

Deleting a widget can't be undone.

Follow these steps:

1. On your investigation or dashboard, find the widget you want to delete.
2. Choose  in the widget and select *Delete*.  
The widget is deleted.

## Related Information

[Building Widgets - New User Experience \[page 358\]](#)

[Filters \[page 443\]](#)

### 4.2.11 Dragging, Dropping, and Resizing Widgets on Dashboards

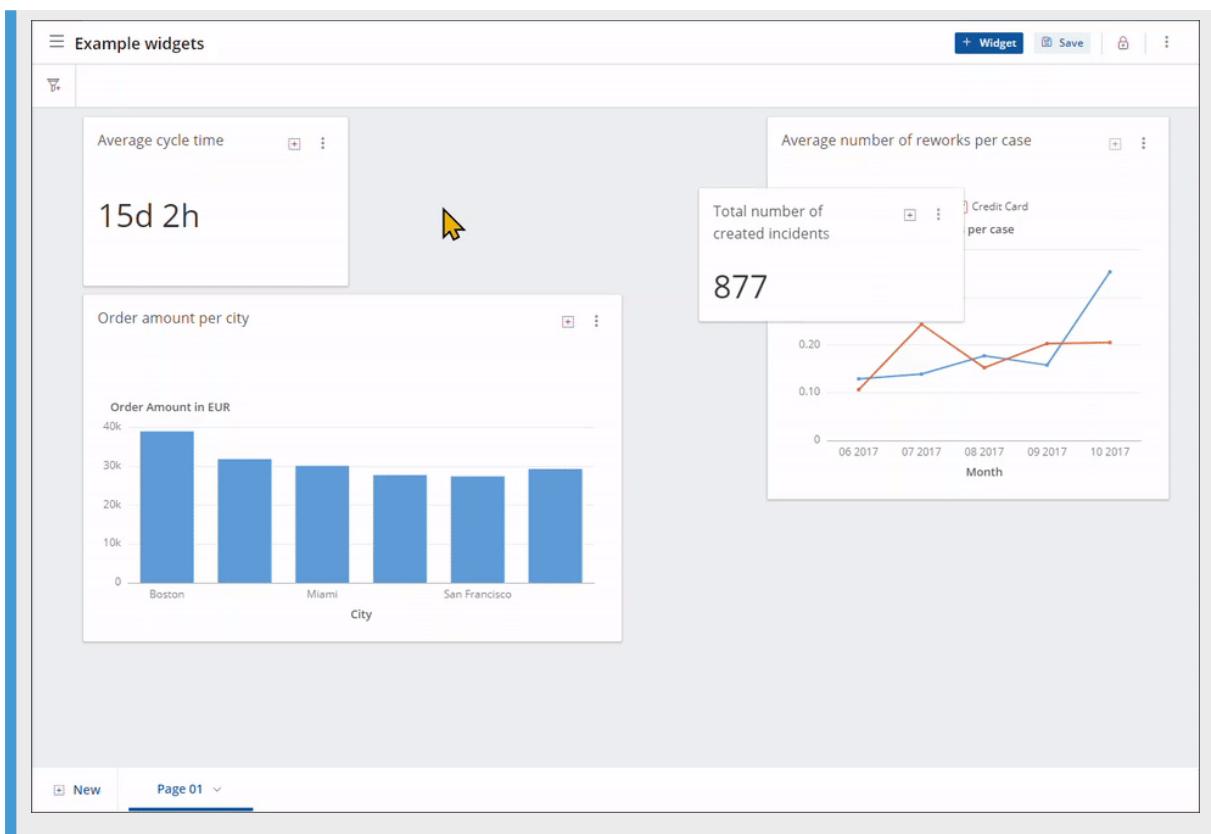
Learn how to drag, drop, and resize widgets on a dashboard in SAP Signavio Process Intelligence.

You can drag and drop widgets to any desired location on a dashboard page. When the *Freeform* layout option is selected, you can overlap widgets or place them anywhere.

The following applies to all layout options: You can resize the widgets and rearrange them based on the available space on the dashboard.

#### Example

[Watch how to resize and rearrange widgets](#)



*Process Discovery* widgets have a minimum size to ensure that all elements for widget navigation, such as buttons, menus, and sliders, are always displayed.

## Related Information

[Layout Options for Dashboards \[page 333\]](#)

### 4.2.12 Export and Import Dashboards

Share dashboards between SAP Signavio workspaces using the export and import functions.

You can use your dashboards in different processes and workspaces. For that, you export your dashboard and import it into another process. To speed up the creation of a dashboard, you can even import it into the same process.

The export only includes references to process data, not the actual process data. Whether you need to configure an imported dashboard depends on how much the data of the source and target process differ. Select the links below to learn more.

[Export a Dashboard \[page 342\]](#)

Learn how to export a dashboard to share it across processes or workspaces.

[Import a Dashboard \[page 343\]](#)

Learn how to import a dashboard to share it across processes or workspaces.

#### [Resolving Import Conflicts for Dashboards \[page 344\]](#)

Learn how to resolve conflicts when importing dashboards.

## Related Information

[Share a dashboard with other SAP Signavio Process Intelligence users \[page 335\]](#)

[Work with Metrics \[page 480\]](#)

[Manage widgets \[page 345\]](#)

### 4.2.12.1 Export a Dashboard

Learn how to export a dashboard to share it across processes or workspaces.

## Context

The export only includes references to process data, not the actual process data. Whether you need to configure an imported dashboard depends on how much the data of the source and target process differ.

The export includes the following:

- widgets
- pages
- filters
- the metrics bar
- SIGNAL queries that are configured in widgets
- metrics that are added to the process, including their variables
- references to process data
- references to custom attributes

#### Note

The export doesn't include the following:

- process data
- custom attributes

## Procedure

To export a dashboard, follow these steps:

1. Open your process and select *Dashboards*.
2. Select  >  *Export* for the dashboard you want to export.

The dashboard is exported as a JSON file. The file is saved to your browser's download folder.

## 4.2.12.2 Import a Dashboard

Learn how to import a dashboard to share it across processes or workspaces.

## Context

The following applies:

- You can import a dashboard into any process.
- The more similar the data, the less configuration is required after an import.
- Data conflicts are detected and you can then resolve them.

## Procedure

To import a dashboard, follow these steps:

1. Open your process, then select *Dashboards* >  *Import*.
2. Select the JSON file and the process view which you want to set for the dashboard.
3. Confirm with *Next*.

The dashboard to import is checked. If there aren't any conflicts, the dashboard is imported and a confirmation message appears.

If there are conflicts, you can import the dashboard as-is, but you then need to reconfigure the widgets that show an unexpected result. Alternatively, you can resolve the conflicts. For more information, see [Resolving Import Conflicts for Dashboards \[page 344\]](#).

### 4.2.12.3 Resolving Import Conflicts for Dashboards

Learn how to resolve conflicts when importing dashboards.

The following issues can cause import conflicts:

- the same name is used for a metric in both the exported dashboard and the target process, but the metrics have different SIGNAL code
- the same name is used for a metric variable in both the exported dashboard and the target process, but the variables have different values
- widgets are configured with custom attributes

You resolve conflicting items as follows:

---

#### Metric variables

For each conflicting variable, a new name is suggested.

You have the following options:

- Import a variable with a new name. You can use the suggested name or edit it. The variable is added to the process.
- Keep the variable name from the source dashboard. The variable in the target process is overwritten. Widgets of the target process using this variable can show a false or no result.

---

#### Metrics

For each conflicting metric, a new name is suggested.

You have the following options:

- Import a metric with a new name. You can use the suggested name or edit it. The metric is added to the process.
- Keep the metric name from the source dashboard. The metric in the target process is overwritten. Widgets in existing dashboards of the target process using this metric can show a false or no result.

---

#### Custom attributes

For each conflicting attribute, you can select an attribute to which you want to map it.

You have the following options:

- Map an attribute. The attribute reference, used in widgets of the dashboard to import, is updated.
- Don't map an attribute. The attribute reference is outdated. Widgets using this reference in the dashboard to import can show a false or wrong result.

## Related Information

[Share a dashboard with other SAP Signavio Process Intelligence users \[page 335\]](#)

[Work with Metrics \[page 480\]](#)

[Manage widgets \[page 345\]](#)

## 4.3 Manage widgets

Widgets are objects that allow you to organize and visualize information about your process. You can add them to your investigation or dashboard to organize and visualize information about your process.

As a result, you can evaluate and benchmark the performance of your business processes.

Read more about the different widgets in section [Widget types \[page 351\]](#).

### 4.3.1 Add widgets to an investigation

Widgets allow you to organize and visualize information about your process.

For information about how to add a widget to an investigation or dashboard, see [Building Widgets - New User Experience \[page 358\]](#).

## Related Information

[Copy or duplicate widgets \[page 346\]](#)

[Edit, move, and delete widgets \[page 347\]](#)

### 4.3.2 Add widgets to a dashboard

Widgets allow you to organize and visualize information about your process.

For information about how to add a widget to an investigation or dashboard, see [Building Widgets - New User Experience \[page 358\]](#).

## Related Information

[Copy or duplicate widgets \[page 346\]](#)

[Edit, move, and delete widgets \[page 347\]](#)

### 4.3.3 Copy or duplicate widgets

Learn how to copy and duplicate widgets. You can copy widgets from one investigation or dashboard into another. Duplicating widgets is only possible within the same investigation or dashboard.

You can create new widgets by copying or duplicating existing widgets:

- **Copy** – Specify where the new widget is added, for example, to another chapter, another investigation, or a dashboard.
- **Duplicate** – The duplicate is always automatically added next to or below the original widget.

#### Copy a widget

You can copy widgets from an investigation to other investigations or dashboards, and from a dashboard to other dashboards or investigations.

Follow these steps:

1. Choose  in your widget and select *Copy to*.
2. Use  and  to navigate to another investigation or dashboard. If available, you can even specify the chapter for investigations or page for a dashboard.
3. Confirm with *Paste here*.  
The widget and any filter applied to the widget are copied to the selected destination.

#### Duplicate a widget

Follow these steps:

1. On your investigation or dashboard, find the widget you want to duplicate.
2. Choose  (*more options*) in the widget title and select *Duplicate*.  
The widget is copied and added next to or below the original widget.

## Related Information

[Edit, move, and delete widgets \[page 347\]](#)

[Building Widgets - New User Experience \[page 358\]](#)

[Filters \[page 443\]](#)

## 4.3.4 Edit, move, and delete widgets

How to change the widget configuration, re-arrange widgets on the user interface, and delete widgets.

Which options are available depends on the following aspects:

- the widget type
- the role you have for the process

### Edit the widget configuration

Follow these steps:

1. Choose  (*more options*) in the widget and select *Edit*.  
The dialog for widget editing opens.
2. Apply your changes.
3. Confirm with *Save*.  
Your changes are applied to the widget.

### Move a widget

#### On an investigation

Choose  (*more options*) in the widget title and select *Move up* or *Move down*.

If you want to move a widget to a different chapter or to another investigation, use the copy function. Read more in section [Copy or duplicate widgets \[page 346\]](#).

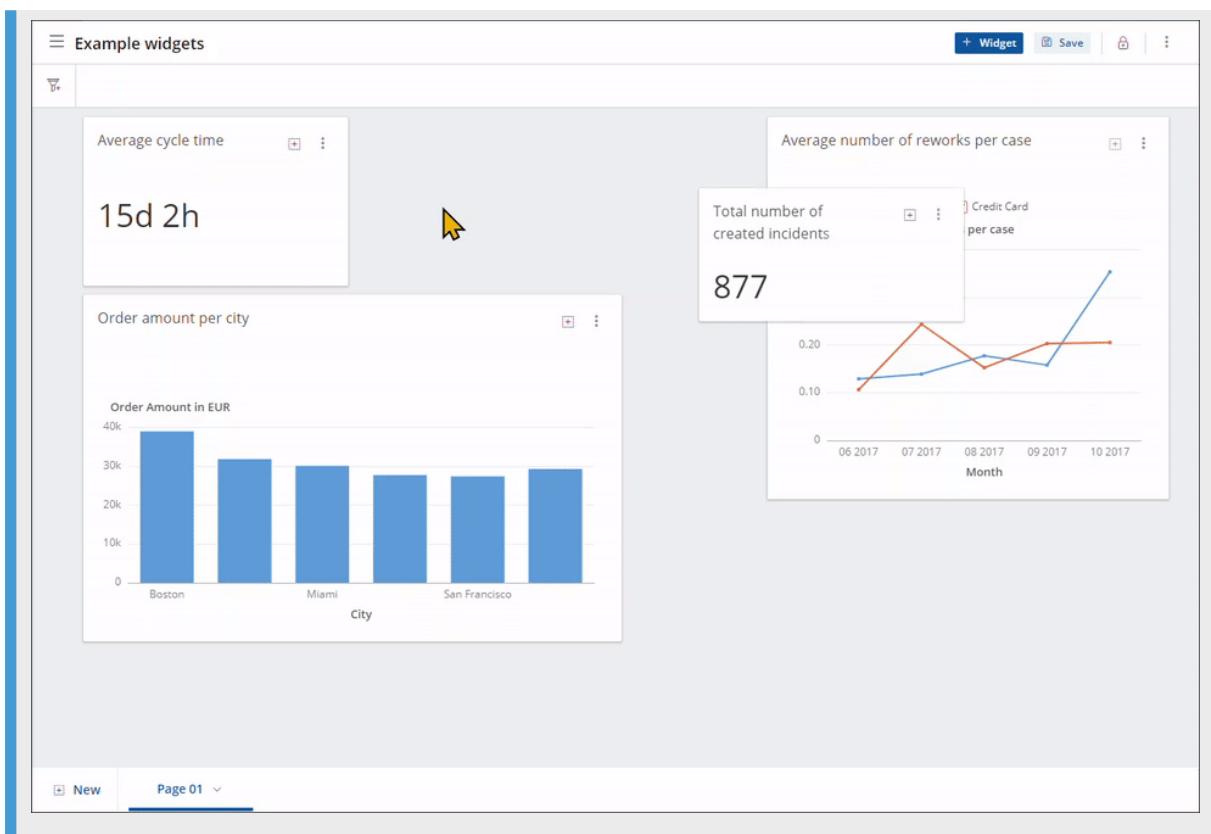
#### On a dashboard

You can drag and drop widgets to any desired location on a dashboard page. When the *Freeform* layout option is selected, you can overlap widgets or place them anywhere.

The following applies to all layout options: You can resize the widgets and rearrange them based on the available space on the dashboard.

#### Example

[Watch how to resize and rearrange widgets](#)



*Process Discovery* widgets have a minimum size to ensure that all elements for widget navigation, such as buttons, menus, and sliders, are always displayed.

## Delete a widget

### ⓘ Note

Deleting a widget can't be undone.

Follow these steps:

1. On your investigation or dashboard, find the widget you want to delete.
  2. Choose in the widget and select *Delete*.
- The widget is deleted.

## Related Information

[Building Widgets - New User Experience \[page 358\]](#)

[Filters \[page 443\]](#)

## 4.3.5 Exclude NULL Values

How to exclude data from widgets for which no value exists in the event log.

A NULL value is used in the event log when the value for an attribute is empty. Widgets always include NULL values unless they're explicitly excluded.

To exclude NULL values, you have the following options:

- Adjust the filters applied to an investigation, a dashboard, or a widget. It depends on the filter type whether NULL values can be excluded. For more information, see [Filter process data \[page 443\]](#).
- Adjust the SIGNAL query used to configure a widget. This option is only available on widgets displaying data as charts or as a value.
- Hide the NULL value group in the widget by deselecting it in the widget legend. This is only possible when NULL values exist and attributes are grouped. This option is only available on widgets displaying data as charts.

### Related Information

[Creating Charts and Tables Using Attributes and Metrics \(Interactive Mode\) \[page 364\]](#)

[Creating Charts and Tables Using SIGNAL Code \(SIGNAL Mode\) \[page 376\]](#)

## 4.3.6 Displaying Widgets in Other SAP Signavio Applications

Learn about the process and requirements for embedding widgets in other applications. For example, on the launchpad of SAP Signavio Process Collaboration Hub, in journey models, or as Live Insights shapes in process diagrams or value chains in SAP Signavio Process Manager.

To share analysis results and benchmarks with a wider audience, widgets can be embedded in other SAP Signavio applications as follows:

- As Live Insights shapes in SAP Signavio Process Manager
- On the launchpad in SAP Signavio Process Collaboration Hub
- In journey models created in SAP Signavio Journey Modeler

### Embedding Widgets

Follow these steps:

1. Grant view access to the data you want to share:
  1. Add the users as consumers to the process. For more information, see [Grant access to a process \[page 31\]](#).
  2. Add the users to the process view of the investigation or dashboard in which the widget is used. For more information, see [Define access to process data with process views \[page 26\]](#).

### Note

When view access isn't granted, embedded widgets don't display data, and Live Insights shapes stay gray.

2. If you want to link widgets to Live Insights shapes, you must configure thresholds for the widgets, see [Thresholds \[page 404\]](#).

3. Get the ID of the widget that you want to embed. To copy the ID to your clipboard, choose  in the widget and select [Copy widget ID](#).

### Note

The widget ID can't be copied when an investigation or dashboard is private. For information about how to change the status, see [Share an investigation with other users \[page 317\]](#) and [Share a dashboard with other SAP Signavio Process Intelligence users \[page 335\]](#).

4. Add the widget ID to your SAP Signavio application:

- For widgets linked to Live Insights shapes, see [Add Live Insights](#).
- For widgets on the launchpad, see [Page Properties](#).
- For widgets in journey models, see [SAP Signavio Process Intelligence widgets](#).

## Supported Widget and Chart Types

Only widgets displaying data as charts or as a value are supported. For data in charts, the following visualizations are supported:

- Bar chart
- Tree map
- Pie chart
- Dual axis chart
- Heat map
- Sankey chart
- Line chart
- Area chart
- Histogram

## Related Information

[Creating Charts and Tables Using Attributes and Metrics \(Interactive Mode\) \[page 364\]](#)

[Creating Charts and Tables Using SIGNAL Code \(SIGNAL Mode\) \[page 376\]](#)

## 4.3.7 Limitations on Widgets

Find out which limits apply to the widgets in SAP Signavio Process Intelligence.

### Configuration Types

Only the following widgets can be configured with attributes, SIGNAL queries, and metrics:

- [Breakdown \[page 353\]](#)
- [Over time \[page 355\]](#)
- [Value \[page 357\]](#)

### Over time Widget

When you configure the *Over time* widget with attributes, the following is not supported:

- count of started or ended cases
- groupings on event level

### Widgets Configured by a SIGNAL Query or Metrics

Widgets that are configured by a SIGNAL query or metrics don't support the following features:

- filtering on event-level
- user permissions

## 4.4 Building Widgets - Classic User Experience

Get to know the available widgets, learn how to create and configure them on dashboards and investigations, and find out what you can do in each widget.

#### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For detailed information, see [Building Widgets - New User Experience \[page 358\]](#).

#### [Activity List \[page 353\]](#)

This widget lists all activities that occur in the process. If a BPMN model is linked to the dashboard, the activities are grouped by conformance.

#### [Breakdown \[page 353\]](#)

Learn how to use the Breakdown widget to display your process data in charts.

#### [Case Table \[page 353\]](#)

Create a table with case information that you select. When you select a case on the widget, you can also view the events and event level attributes.

#### [Correlation \[page 354\]](#)

Learn how to use the Correlation widget to display process data as a scatter plot.

#### [Diagram \[page 354\]](#)

Display the latest revision of a process model from SAP Signavio Process Manager. From the widget, you can open the model in the editor of SAP Signavio Process Manager, or compare it with other revisions or models.

#### [Distribution \[page 354\]](#)

Learn how to use the Distribution widget to display how much time your cases take to complete.

#### [Over time \[page 355\]](#)

Learn how to use the *Over time* widget to display activities in a time series chart. For example, you can view the cycle time of activities over days and weeks, the number of cases during a certain duration, or the volume of help requests.

#### [Process Conformance \[page 355\]](#)

Check if the actual process flow, as recorded in the event log, matches the planned model and vice versa. Identify hotspot activities in variants and see how actual paths look like.

#### [Process Discovery \[page 355\]](#)

View a process model that is generated based on the event log data and understand how your process is performing, in terms of complexity and efficiency. Analyze conformance, cycle times, and occurrences of the individual activity sequences.

#### [Process Funnel \[page 356\]](#)

See for each variant which and how many cases follow a specific path. Find out where cases enter and leave the process and whether activities outside the process exist.

#### [SIGNAL table \[page 356\]](#)

Learn how to use the SIGNAL table widget to display the result of a SIGNAL query as a table.

#### [Spreadsheet \[page 356\]](#)

Learn how to add a spreadsheet to your process analysis. With a spreadsheet, you can include additional information on your data analysis, and perform quick calculations with functions and formulas.

#### [Text \[page 357\]](#)

Use the text box to include additional information about your process analysis. Common formatting options are available.

#### [Value \[page 357\]](#)

Learn how to use the Value widget to display case data that is aggregated to a single value.

#### [Variant Explorer \[page 357\]](#)

Deep dive into the variants of your process, explore their distribution, and compare them with each other. Analyze conformance, cycle times, and occurrences of the individual activity sequences.

## 4.4.1 Activity List

This widget lists all activities that occur in the process. If a BPMN model is linked to the dashboard, the activities are grouped by conformance.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Activity List \[page 415\]](#).

## 4.4.2 Breakdown

Learn how to use the Breakdown widget to display your process data in charts.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Charts and Tables \[page 361\]](#) and [Example: How to Create a Breakdown Widget \[page 370\]](#).

## 4.4.3 Case Table

Create a table with case information that you select. When you select a case on the widget, you can also view the events and event level attributes.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Charts and Tables \[page 361\]](#) and [Example: How to Create a Table Widget \[page 368\]](#).

#### 4.4.4 Correlation

Learn how to use the Correlation widget to display process data as a scatter plot.

→ Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Charts and Tables \[page 361\]](#) and [Example: How to Create a Correlation Widget Using a Scatter Plot Visualization \[page 374\]](#).

#### 4.4.5 Diagram

Display the latest revision of a process model from SAP Signavio Process Manager. From the widget, you can open the model in the editor of SAP Signavio Process Manager, or compare it with other revisions or models.

→ Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Process Diagram \[page 421\]](#).

#### 4.4.6 Distribution

Learn how to use the Distribution widget to display how much time your cases take to complete.

→ Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Charts and Tables \[page 361\]](#) and [Example: How to Create a Distribution Widget \[page 371\]](#).

## 4.4.7 Over time

Learn how to use the *Over time* widget to display activities in a time series chart. For example, you can view the cycle time of activities over days and weeks, the number of cases during a certain duration, or the volume of help requests.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Charts and Tables \[page 361\]](#) and [Example: How to Create an Over Time Widget \[page 373\]](#).

## 4.4.8 Process Conformance

Check if the actual process flow, as recorded in the event log, matches the planned model and vice versa. Identify hotspot activities in variants and see how actual paths look like.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Process Conformance \[page 416\]](#).

## 4.4.9 Process Discovery

View a process model that is generated based on the event log data and understand how your process is performing, in terms of complexity and efficiency. Analyze conformance, cycle times, and occurrences of the individual activity sequences.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Process Discovery \[page 423\]](#).

## 4.4.10 Process Funnel

See for each variant which and how many cases follow a specific path. Find out where cases enter and leave the process and whether activities outside the process exist.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Process Funnel \[page 429\]](#).

## 4.4.11 SIGNAL table

Learn how to use the SIGNAL table widget to display the result of a SIGNAL query as a table.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Charts and Tables \[page 361\]](#) and [Example: How to Create a Table Widget \[page 368\]](#).

## 4.4.12 Spreadsheet

Learn how to add a spreadsheet to your process analysis. With a spreadsheet, you can include additional information on your data analysis, and perform quick calculations with functions and formulas.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Spreadsheet \[page 438\]](#).

## 4.4.13 *Text*

Use the text box to include additional information about your process analysis. Common formatting options are available.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Text \[page 442\]](#).

## 4.4.14 *Value*

Learn how to use the Value widget to display case data that is aggregated to a single value.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Charts and Tables \[page 361\]](#) and [Example: How to Create a Value Widget \[page 369\]](#).

## 4.4.15 *Variant Explorer*

Deep dive into the variants of your process, explore their distribution, and compare them with each other. Analyze conformance, cycle times, and occurrences of the individual activity sequences.

### → Remember

The classic widget creation experience is no longer available. Instead, use the new user experience to build your widgets. All widgets you were able to create with the classic experience can still be built using the new interface.

For more information, see [Variant Explorer \[page 431\]](#).

## 4.5 Building Widgets - New User Experience

Learn about our new default widget creation experience on dashboards and investigations.

We provide the following widget types:

- [Charts and Tables \[page 361\]](#): Visualize your data based on your needs and preferences.
- [Process-Related Widgets \[page 414\]](#): Find out how your processes look like, whether they conform with the planned process, how many variants exist, and more.
- [Utility Widgets \[page 438\]](#): Add more information to your analysis, using spreadsheets or text fields.

### What Has Changed

#### → Remember

The classic experience for building widgets is no longer available.

The new widget creation and configuration experience brings a more visual and simplified way to work with your widgets. The goal of this change is to make things easier, faster, and more flexible.

Here are some highlights of what has changed:

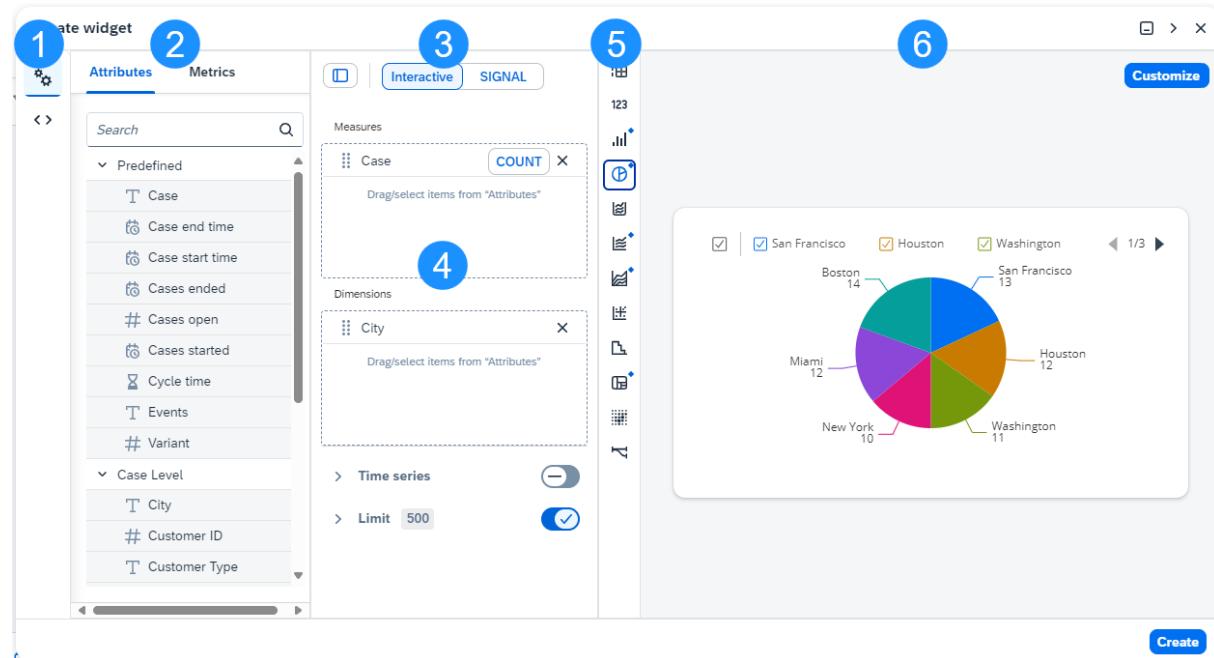
Area	Classic experience	New experience
Widget creation	Sometimes, widget creation starts with the question where to find the <a href="#">Create</a> button.	The <a href="#">Create Widget</a> button is always visible at the top of a dashboard.
Choosing a widget type	<ul style="list-style-type: none"><li>• You need to decide in which chart to display your analysis goal first. For example, when you want to view your data in a bar chart, the user interface only allows building a <a href="#">Breakdown</a> widget. For any other chart, you need to create a different widget and start over the data configuration again.</li><li>• Also, creating process-related widgets takes more clicks than actually needed.</li></ul>	<ul style="list-style-type: none"><li>• For any sort of chart or graph, select <a href="#">Charts &amp; Tables</a> and start configuring your data. As you go, you can try out different visualizations and pick the one that represents your analysis goal the best.</li><li>• Process-related and utility widgets are created with a single click.</li></ul>

Area	Classic experience	New experience
Usability	<ul style="list-style-type: none"> <li>The code editor is small so that SIGNAL queries are hard to read.</li> <li>You need to know which chart type to use.</li> <li>Some widget settings are hard to find as they're scattered throughout the user interface.</li> </ul>	<ul style="list-style-type: none"> <li>In the wide code editor, your SIGNAL code is easy to see and work with.</li> <li>While configuring and previewing your widget, visualizations that match the current structure of your data configuration are recommended.</li> <li>Widget settings like the number of results, intervals for time series, or chart sorting, are built into the user interface, making them easy to find and change.</li> </ul>

## 4.5.1 User Interface Overview

Get to know the user interface for creating widgets that visualize your data in charts or tables, and learn how to use it.

This image is interactive. Hover over each area for a description. Select highlighted areas to show more information below the image.



- #unique\_379/unique\_379\_Connect\_42\_subsection-im1 [page 360]

- [#unique\\_379/unique\\_379\\_Connect\\_42\\_subsection-im3 \[page 360\]](#)
- [#unique\\_379/unique\\_379\\_Connect\\_42\\_subsection-im4 \[page 361\]](#)
- [#unique\\_379/unique\\_379\\_Connect\\_42\\_subsection-im5 \[page 361\]](#)
- [#unique\\_379/unique\\_379\\_Connect\\_42\\_subsection-im6 \[page 361\]](#)
- [#unique\\_379/unique\\_379\\_Connect\\_42\\_subsection-im7 \[page 360\]](#)

## 1 - Side Navigation with Access to the Data Configuration and Code View

Option	Description
 <a href="#">(Configure the data that is shown in your widget)</a>	The configuration view is for setting up the data that you want to display in the widget. Here, you can choose between drag-and-drop configuration in <i>Interactive</i> mode and query-based configuration in <i>SIGNAL</i> mode.
 <a href="#">(Show the complete <i>SIGNAL</i> code for your widget)</a>	The code view shows both what you've set up and what a widget inherits from the dashboard, such as filters.

**→ Remember**

You can copy the *SIGNAL* code from the code view, but to make any changes, you've got to switch over to the configuration view and choose the *SIGNAL* mode.

## 2 - Attributes and Metrics

Attributes from the data log and metrics that were added to the metrics collection of the process are listed here. To configure the widget, drag items from here to the *Measures* and *Dimensions* fields in the configuration area.

- The *Attributes* list starts with predefined attributes, then you find the case-level attributes, and at the end event-level attributes.
- The *Metrics* list separates the valid metrics from the invalid ones, with the valid ones placed at the top of the list.

The search field above both lists helps you find the attributes or metrics you need.

## 3 - Modes for Data Configuration

- In *Interactive* mode, you combine attributes and metrics. How? Just drag and drop them from the list on the left into the respective areas here.
- If you choose the *SIGNAL* mode, this area turns into a code editor where you can type in your *SIGNAL* query. The attributes and metrics lists on the left then have a handy copy function to assist you. The copy icon appears when you hover over a list entry.

### ① Note

You can combine both modes. For example, you can start in *Interactive* mode and then switch to *SIGNAL* mode to enhance the query. However, if you are in *SIGNAL* mode and switch to *Interactive* mode, all changes made since the start of configuration will be lost.

Ready to create your first widgets? Follow the instructions in [How to Build Data Visualizations \[page 364\]](#).

## 4 - Configuration Area

Drop attributes and metrics here, specify whether to display activities over time, and define the number of results if necessary.

If your selected measures and dimensions aren't a valid combination, try out a different combination.

## 5 - Visualization Options

You've got a variety of charts to choose from, or you can pick the table or KPI (value) option to bring your selected data to life.

If the combination of measures and dimensions can't be visualized, change the data configuration or try another visualization.

## 6 - Preview Area

Here, you can look at the outcome of your data configuration. The moment you change the configuration, the preview refreshes on the fly.

This is also where you decide how to present the widget content. You can set things like the name and description, data labels, color palettes, a sorting order, how to round numbers, currency values, and much more. To view all options, select the [Customize](#) button in the top-right corner.

Ready to create your first widgets? Follow the instructions in [How to Build Data Visualizations \[page 364\]](#).

## Related Information

[How to Build Data Visualizations \[page 364\]](#)

## 4.5.2 Charts and Tables

As a data analyst, understand what is important for the creation of widgets that visualize data in any sort of graph, as a table, or as a KPI (value).

Before you start creating widgets, find out more about these topics:

- [About the Data Structure, Measures, and Dimensions \[page 362\]](#)
- [User Interface Overview \[page 359\]](#)

As soon as you're ready to create your first widgets, follow the instructions in [How to Build Data Visualizations \[page 364\]](#).

## 4.5.2.1 About the Data Structure, Measures, and Dimensions

Understand how your data is structured, learn what dimensions and measures are, and explore some example analyses.

### Data Structure

The data input for all chart visualizations is a table, with one or more fields, and one or more rows. So, the default view when creating a widget in SAP Signavio Process Intelligence is a table.

Based on your analysis and visualization goals, you need to configure this table of data using aggregated attribute values about your data (measures) and attributes by which you want to segment or group your data (dimensions).

Assume, for example, you want to determine how long it takes, on average, from order placement to goods delivery for different customer types, such as 'standard' and 'premium'. Then, the average of the aggregated cycle time is the measure and the customer type is the dimension.

By combining different measures with different dimensions, you can create views of your data that can be used to visualize the data according to your needs.

### Measures and Dimensions

#### In General

When looking at data, dimension and measure are assigned according to the type of attribute, and usually the following applies:

- Dimensions are qualitative, in other words, not numeric.
- Measures are quantitative, so you can perform aggregation calculations on them.

#### In SAP Signavio Process Intelligence

Here, **dimensions** are the qualitative data that make up your data set, called event log attributes. Examples for event log attributes are 'case\_id', 'customer\_id', 'customer\_type', 'city', and 'order\_category'. You can use dimensions to segment your data into categories, often referred to as grouping your data.

**Measures** are aggregated values derived from the quantitative attributes of your data, for example:

- The count of cases, calculated by COUNT(case\_id)
- The average order amount, calculated by AVG(order\_amount)

To determine a measure based on an attribute, you first select that attribute, and then choose the calculation to achieve the desired aggregated value.

Measures return one value if there are no grouping dimensions. If dimensions exist, then one value is returned for each distinct group within the dimension.

Metrics, which are a type of measure, are pre-defined for easy reuse.

## Examples

Imagine you've an event log with the five attributes 'case\_id', 'customer\_id', 'city', 'order\_date', and 'order\_amount'.

case_id	customer_id	city	order_date	order_amount
10001	C0003	Berlin	2023-03-01	355.00
10002	C0003	Berlin	2023-03-04	1104.00
10003	C0004	Sydney	2023-03-21	240.00
10004	C0004	Sydney	2023-03-22	187.00
10005	C0003	Berlin	2023-03-28	1399.00
10006	C0005	Tokyo	2023-03-31	606.00

### Average Order Amount for all Orders

To determine the average order amount for all orders, define one measure based on 'order\_amount', with the average (AVG) aggregation function.

The result is a table with one column, 'AVG(order\_amount)', with the value '648.5'.

AVG(order\_amount)

648.50

### Average Order Amount for Each City

To determine the average order amount for each city, you need to define the following:

- one measure based on 'order\_amount', with the average (AVG) aggregation function
- one dimension based on 'city', which segments the data and provides a measure value for each city

The result is a table with two columns, 'AVG(order\_amount)' and 'city'.

AVG(order_amount)	city
952.67	Berlin
213.50	Sydney
606.00	Tokyo

### All Attributes for all Cases

To create a table that includes attributes for all cases, define a dimension for each of the five attributes. Since you don't want to perform any aggregation calculations, don't define any measure.

The result is a five-column, six-row data table, just like the one at the beginning of this example section.

## 4.5.2.2 How to Build Data Visualizations

Learn about the two modes for data configuration and understand how to create widgets in SAP Signavio Process Intelligence.

### Modes for Data Configuration

There are two modes for data configuration:

- In *Interactive* mode, you build your data view by combining attributes or metrics, using a drag-and-drop user interface. In the background, your configuration is turned into a SIGNAL query automatically.
- In *SIGNAL* mode, you write the SIGNAL query in a code editor. A visual user interface eases the selection of a visualization.

#### Note

You can combine both modes. For example, you can start in *Interactive* mode and then switch to *SIGNAL* mode to enhance the query. However, if you are in *SIGNAL* mode and switch to *Interactive* mode, all changes made since the start of configuration will be lost.

### Related Information

[Creating Charts and Tables Using Attributes and Metrics \(Interactive Mode\) \[page 364\]](#)

[Creating Charts and Tables Using SIGNAL Code \(SIGNAL Mode\) \[page 376\]](#)

### 4.5.2.2.1 Creating Charts and Tables Using Attributes and Metrics (Interactive Mode)

Learn how to create charts and tables by combining attributes and metrics, using a drag-and-drop user interface, in SAP Signavio Process Intelligence. Also find out how to apply aggregate functions to measures, apply sorting, display data in a time series chart, and more.

### Prerequisites

- You're familiar with the concepts of measures and dimensions and understand how to work with time series and case-and event-level metrics. For more information, see [Best Practices for Data Configuration \[page 378\]](#).

## Context

Build your data view by combining attributes and metrics, using a drag-and-drop user interface. In the background, your configuration is turned into a SIGNAL query automatically.

The screenshot shows the 'Create widget' interface. On the left, there's a sidebar with a search bar and two tabs: 'Attributes' (selected) and 'Metrics'. Under 'Attributes', there are sections for 'Predefined' (Case, Case end time, Case start time, Cases ended, Cases open, Cases started, Cycle time, Events, Variant), 'Case Level' (City, Customer ID, Customer Type, Drop out rate, Invoice Cash Discount, Lead time, Order Amount in EUR, Order Status, Payment Type, Percent of cases after), and 'Time series' (Interval set to Month, Limit set to 500). On the right, there are tabs for 'Interactive' (selected) and 'SIGNAL'. Under 'Interactive', there are sections for 'Measures' (Case COUNT) and 'Dimensions' (City). A preview area shows a pie chart with data for San Francisco (13), Houston (12), Boston (14), Miami (12), New York (10), and Washington (11). The preview also includes a legend and a 'Customize' button. At the bottom right is a 'Create' button.

### ⓘ Note

You can combine both modes. For example, you can start in [Interactive](#) mode and then switch to [SIGNAL](#) mode to enhance the query. However, if you're in [SIGNAL](#) mode and switch to [Interactive](#) mode, all changes made since the start of configuration will be lost.

Watch how to build a widget using [Interactive](#) mode in this example.

## Example

## Procedure

1. On a dashboard or investigation, select *Create Widget* or *Add widget* respectively. Then, select *Charts & Tables*.

The widget configuration dialog opens in *Interactive* mode.

2. To build the data query, drag attributes or metrics into the *Measures* and *Dimensions* fields.

The data column on the left displays case or event attributes, custom attributes, and the events within the attributes. Icons help you identify the type of an attribute or event:

Option	Description
#	Numbers including currencies
⌚	Durations like days, weeks, months, years
🕒	Date and time information provided as timestamps
T	Text including choices provided as Boolean values

3. For measures, also choose an aggregation function.

Option	Description
COUNT	Counts the number of values in a specified column.
AVG	Calculates the average of a collection of numeric values.
MAX	Finds the maximum value in a collection of values.
MIN	Finds the minimum value in a collection of values.

Option	Description
SUM	Calculates the sum of all values in a collection of numeric values.

### → Remember

NULL values aren't considered in any aggregation function.

It depends on the measure which aggregation function is available. The default for numbers is AVG, while for text values the default is COUNT.

The result is previewed as a table.

4. Choose a visualization like chart, histogram, or map.

Recommended visualizations for the current data configuration are indicated by a blue dot on the chart

icon, for example .

Depending on the combination of measures and dimensions, the number of possible visualizations varies.

The preview updates dynamically.

5. To display activities in a time series chart, activate the *Time series* option in the configuration area and choose the length of periods — per day, week, month, quarter, or year — represented on the graph.
6. To customize the appearance of your result, select *Customize* in the preview area and use these options:
  - *General*: Change the widget name and description.
  - *Format*: Configure the format of data for durations, date and time data, and numeric values.
  - *Visual*: Customize sorting, orientation, data labels, data color, and more in charts.

The available options depend on the result of the data configuration and the selected visualization type. For example, you can change the orientation for bar charts on the *Visual* tab, but this option isn't available for pie charts.

7. To save your widget configuration, choose *Create*. On a dashboard, finish by selecting *Save*.  
The widget builder closes and your new widget is displayed.

## Related Information

[Best Practices for Data Configuration \[page 378\]](#)

[Editing Widgets With Charts and Tables \[page 384\]](#)

[Setting a Limit for Query Results \[page 382\]](#)

[Decimal Places, Rounding Procedure, and a Unit Type for KPIs \[page 385\]](#)

[Visualization Types: Charts, Table, and Value \[page 389\]](#)

[Customize the Visual Appearance of Charts \[page 397\]](#)

[What You Can Do in a Widget \[page 401\]](#)

[Data Formatting for Durations, Date and Time Data, and Numeric Values \[page 387\]](#)

### 4.5.2.2.1.1 Example: How to Create a Table Widget

Learn how to build a widget to display case data in a table using the widget builder.

#### Context

Assume, for example, you want to display how many orders are placed by different customer types, such as 'standard' and 'premium'. Classically, you would create a *Case Table* or a *SIGNAL table* widget to visualize your information.

In the widget builder, you can create a view of your data by combining measures with dimensions and visualize the data according to your needs. In the following example, we're creating a table showing the order amount for each customer type.

##### Example

Visualize order amount by customer type.

Order Amount by Customer Type	
Order Amount in EUR	Customer Type
65.444,94	Premium
119.600,7	Standard

#### Procedure

1. On a dashboard or investigation, select *Create Widget* or *Add widget* respectively. Then, select *Charts & Tables*.  
The widget builder opens.
2. From the *Attributes* list, drag an 'Order Amount' event into the *Measures* field.  
The aggregation function is set to *AVG* by default.
3. To calculate the total sales order, select *SUM* as the aggregation function.
4. From the *Attributes* list, drag a 'Customer Type' event into the *Dimensions* field.  
Use the *Limit* settings to make further adjustments to your configuration if needed.  
Your widget is displayed in the preview area. The default visualization is (*Table*).
5. To name your widget, use *Customize*.  
If you don't provide a name for the widget, the visualization option is used as the default name.
6. To save your widget configuration, choose *Create*. On a dashboard, finish by selecting *Save*.  
The widget builder closes and your new widget is displayed.

## Related Information

[About the Data Structure, Measures, and Dimensions \[page 362\]](#)

[How to Build Data Visualizations \[page 364\]](#)

### 4.5.2.2.1.2 Example: How to Create a Value Widget

Learn how to build a widget to display a single and significant value of your process using the widget builder.

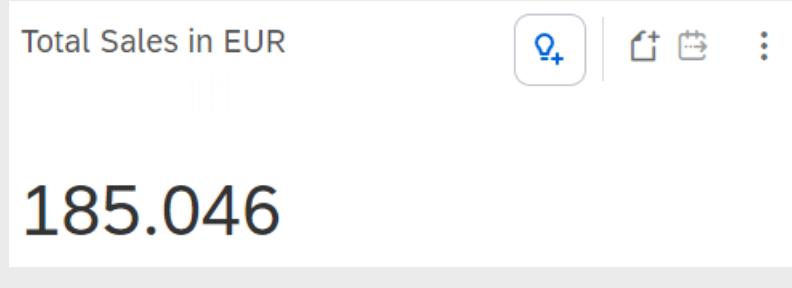
#### Context

Assume, for example, you want to display the total sales value of your process. Classically, you would create a [Value](#) widget to visualize your information.

In the widget builder, you can create a view of your data by using an 'Order Amount' measure and visualize the data as a 'Value'.

#### Example

Visualize the total sales value.



#### Procedure

1. On a dashboard or investigation, select [Create Widget](#) or [Add widget](#) respectively. Then, select [Charts & Tables](#).  
The widget builder opens.
2. From the [Attributes](#) list, drag an 'Order Amount' event into the [Measures](#) field.  
The aggregation function is set to [AVG](#) by default.
3. To calculate the total sales order, select [SUM](#) as the aggregation function.
4. From the visualization menu, select [123 \(Value\)](#).  
Your [Value](#) widget is displayed in the preview area.
5. To name your widget, use [Customize](#).

If you don't provide a name for the widget, the visualization option is used as the default name.

6. To save your widget configuration, choose *Create*. On a dashboard, finish by selecting *Save*.  
The widget builder closes and your new widget is displayed.

## Related Information

[About the Data Structure, Measures, and Dimensions \[page 362\]](#)

[How to Build Data Visualizations \[page 364\]](#)

### 4.5.2.2.1.3 Example: How to Create a Breakdown Widget

Learn how to create a widget to display the division or distribution of your process data in bar charts.

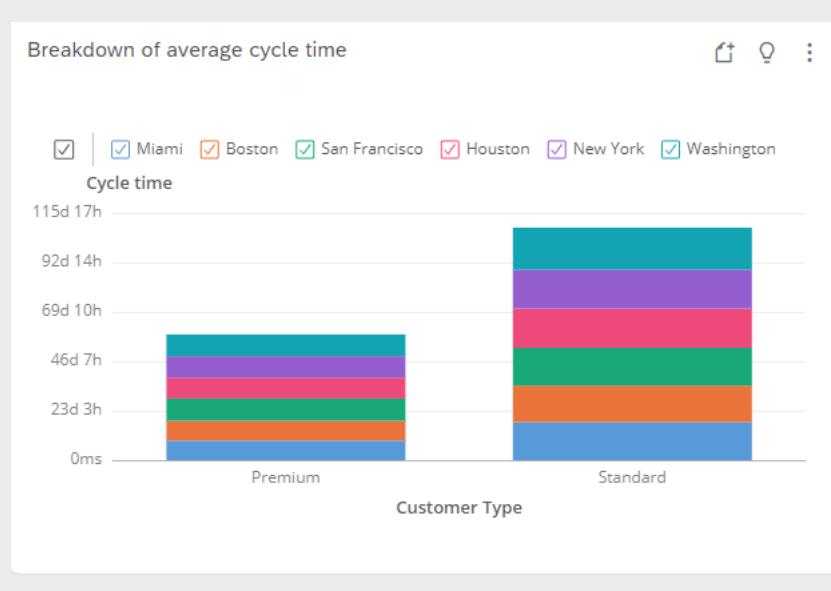
## Context

Assume, for example, you want to display the average cycle time, grouped by customer type and city. Classically, you would create a *Breakdown* widget to visualize your information.

In the widget builder, you can create a view of your data by combining a 'Cycle Time' measure with a 'Customer Type' and a 'City' dimension and visualize the data using a bar chart.

#### Example

Visualize the cycle time by customer type and city.



## Procedure

1. On a dashboard or investigation, select [Create Widget](#) or [Add widget](#) respectively. Then, select [Charts & Tables](#).  
The widget builder opens.
2. From the [Attributes](#) list, select a 'Cycle Time' event and drag it into the [Measures](#) field.  
The aggregation function is set to [AVG](#) by default.
3. From the [Attributes](#) list, select a 'Customer Type' measure and drag it into the [Dimensions](#) field, then select a 'City' measure and also drag it into the [Dimensions](#) field.  
Your widget is displayed in the preview area. The default visualization is  ([Table](#)).
4. From the visualization menu, select  ([Bar Chart](#)).
5. To further customize your visualization and to name your widget, use [Customize](#).  
For example, you can change the colors and orientation of the bars in a bar chart. You can also set a time range for the y-axis.  
If you don't provide a name for the widget, the visualization option is used as the default name.
6. To save your widget configuration, choose [Create](#). On a dashboard, finish by selecting [Save](#).  
The widget builder closes and your new widget is displayed.

## Related Information

[About the Data Structure, Measures, and Dimensions \[page 362\]](#)

[How to Build Data Visualizations \[page 364\]](#)

### 4.5.2.2.1.4 Example: How to Create a Distribution Widget

Learn how to create a widget to display how much time your cases take to complete using the widget builder.

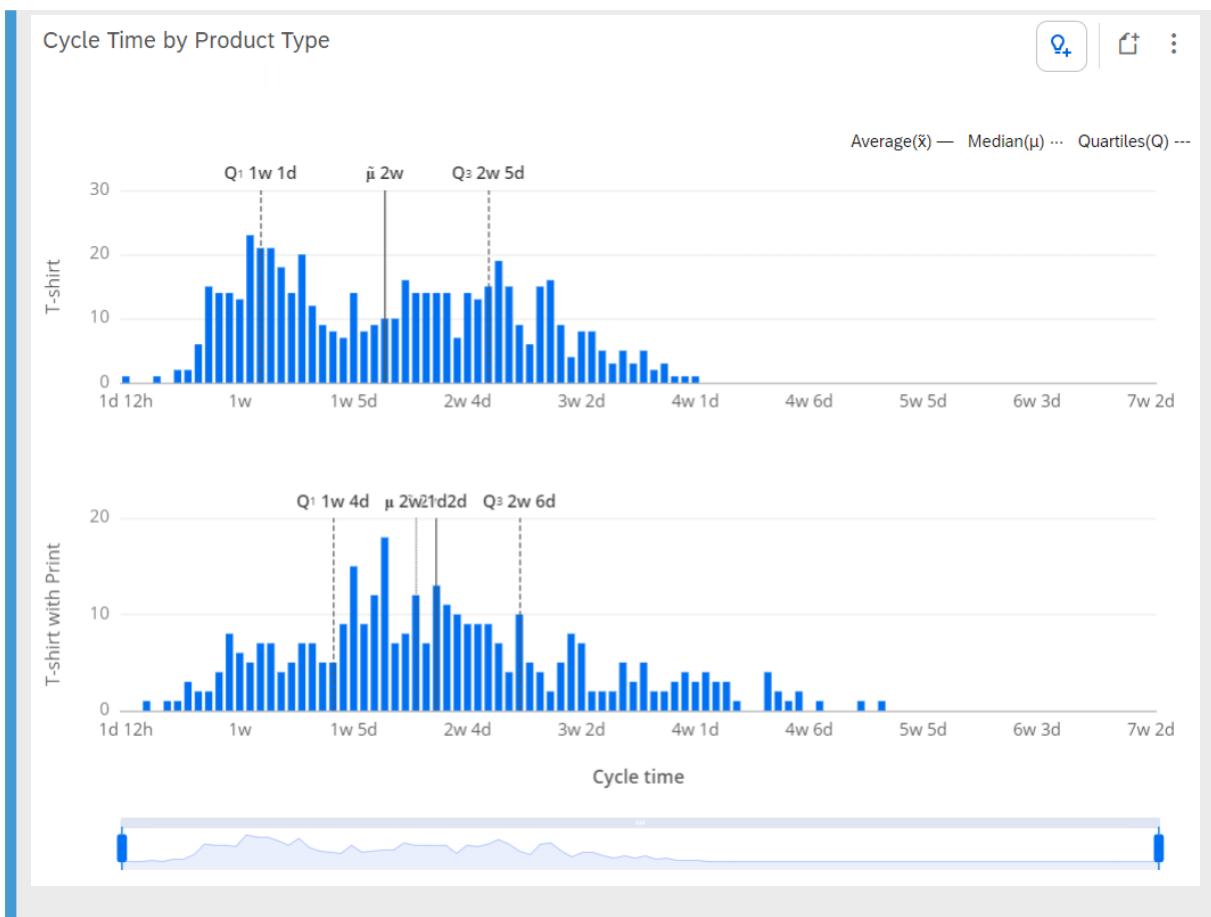
## Context

Assume, for example, you want to determine how much time sales orders for different product types take to be completed. Classically, you would create a [Distribution](#) widget to visualize your information.

In the widget builder, you can create a view of your data by combining a 'Cycle Time' measure with a 'Type of Goods' dimension and visualize the data according to your needs.

#### Example

Visualize the cycle time by product type.



## Procedure

1. On a dashboard or investigation, select [Create Widget](#) or [Add widget](#) respectively. Then, select [Charts & Tables](#).  
The widget builder opens.
2. From the [Attributes](#) list, select a 'Cycle Time' event and drag it into the [Measures](#) field.  
The aggregation function is set to **AVG** by default.
3. From the [Attributes](#) list, select a 'Type of Goods' measure and drag it into the [Dimensions](#) field.  
Your widget is displayed in the preview area. The default visualization is ([Table](#)).
4. From the visualization menu, select ([Histogram](#)).  
The average ( $\bar{x}$ ), median ( $\mu$ ), and quartile (Q) values are displayed by default.  
The first quartile (Q1) is the value under which 25% of data points are found when they are arranged in increasing order. The third quartile (Q3) is the value under which 75% of data points are found when arranged in increasing order.
5. To further customize your visualization and to name your widget, use [Customize](#).  
If you don't provide a name for the widget, the visualization option is used as the default name.
6. To save your widget configuration, choose [Create](#). On a dashboard, finish by selecting [Save](#).

The widget builder closes and your new widget is displayed.

## Related Information

[About the Data Structure, Measures, and Dimensions \[page 362\]](#)

[How to Build Data Visualizations \[page 364\]](#)

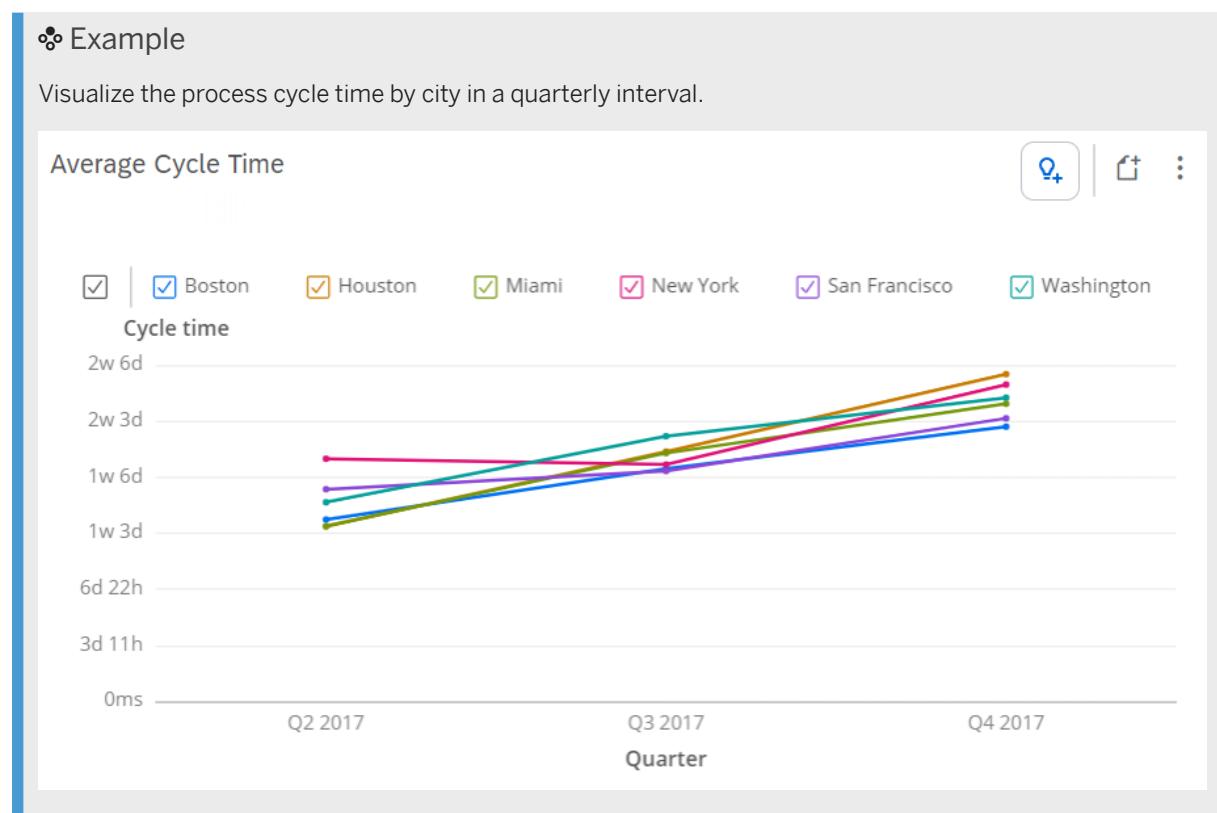
### 4.5.2.2.1.5 Example: How to Create an Over Time Widget

Learn how to build a widget to display activities in a time series chart using the widget builder.

## Context

Assume, for example, you want to determine the average duration of your process cases per city. Classically, you would create an *Over time* widget to visualize your information.

In the widget builder, you can create a view of your data by combining a 'Cycle Time' measure with a 'City' dimension and visualize the data according to your needs.



## Procedure

1. On a dashboard or investigation, select [Create Widget](#) or [Add widget](#) respectively. Then, select [Charts & Tables](#).  
The widget builder opens.
2. From the [Attributes](#) list, select a 'Cycle Time' event and drag it into the [Measures](#) field.  
The aggregation function is set to [AVG](#) by default.
3. From the [Attributes](#) list, select a 'City' measure and drag it into the [Dimensions](#) field.
4. Activate the [Time Series](#) setting, then select [Quarter](#) from the [Interval](#) drop-down list.  
Your widget is displayed in the preview area. The default chart is  ([Table](#)).
5. From the visualization menu, select your preferred visualization option, for example  ([Line Chart](#)).  
Your [Over time](#) widget is displayed in the preview area.
6. To further customize your visualization and to name your widget, use [Customize](#).  
If you don't provide a name for the widget, the visualization option is used as the default name.
7. To save your widget configuration, choose [Create](#). On a dashboard, finish by selecting [Save](#).  
The widget builder closes and your new widget is displayed.

## Related Information

[About the Data Structure, Measures, and Dimensions \[page 362\]](#)

[How to Build Data Visualizations \[page 364\]](#)

### 4.5.2.2.1.6 Example: How to Create a Correlation Widget Using a Scatter Plot Visualization

Learn how to create a widget to display process data as a scatter plot. A scatter plot is a graphical representation of numerical variables plotted along two axes.

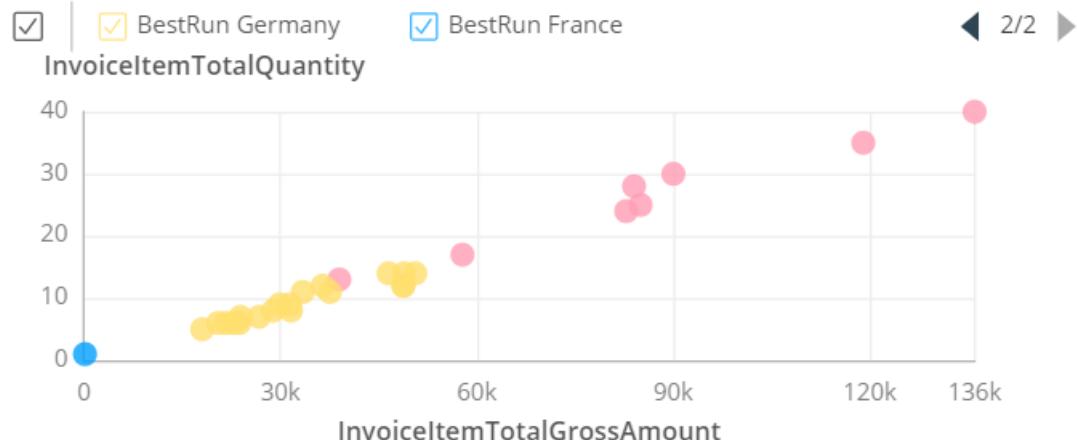
## Context

Assume, for example, you want to discover a relationship between two numerical values, such as the total quantity of orders and the total gross revenue. You also want to group them by company code. Classically, you would create a [Correlation](#) widget to visualize your information.

In the widget builder, you can combine numerical values (labeled "#") for the total quantity and the total gross amount and visualize the data as a scatter plot.

## Example

### Correlation: Quantity / Gross Amount



## Procedure

1. On a dashboard or investigation, select *Create Widget* or *Add widget* respectively. Then, select *Charts & Tables*.  
The widget builder opens.
2. From the *Attributes* list, select numerical values (labeled '#') for 'Total Quantity' and for 'Total Gross Amount' and drag them into the *Dimensions* field.  
Your widget is displayed in the preview area. The default visualization is: (*Table*).
3. From the visualization menu, select (*Scatterplot*).  
Your widget is visualized as a single-colored scatter plot.
4. From the *Attributes* list, select a 'Company Code' attribute and drag it into to the *Dimensions* field.  
Your scatter plot is now colored and grouped by company code.
5. To further customize your visualization, and to name your widget, use *Customize*.  
You can set data ranges for the coordinate axes and choose various color sets.  
If you don't provide a name for the widget, the visualization option is used as the default name.
6. To save your widget configuration, choose *Create*. On a dashboard, finish by selecting *Save*.  
The widget builder closes and your new widget is displayed.

## Related Information

[About the Data Structure, Measures, and Dimensions \[page 362\]](#)

[How to Build Data Visualizations \[page 364\]](#)

## 4.5.2.2.2 Creating Charts and Tables Using SIGNAL Code (SIGNAL Mode)

Learn how to create charts and tables using SIGNAL code in SAP Signavio Process Intelligence.

### Prerequisites

- You're familiar with the concepts of measures and dimensions and understand how to work with time series and case-and event-level metrics. For more information, see [Best Practices for Data Configuration \[page 378\]](#).

### Context

Build your data view by writing a SIGNAL query in a code editor. A visual user interface eases the selection of a visualization.

```
1 SELECT DATE_TRUNC('MONTH', (SELECT LAST(END_TIME)) AS "Month", COUNT(CASE_ID) AS "Cases", "City"
2 FROM "defaultview-1013"
3 ORDER BY 3, 1 ASC NULLS FIRST
4 FILL timeseries('MONTH'), NULL, GROUP
```

Month	Boston	Houston	Miami	New York	San Fran
06 2017	5	4	5	1	0
07 2017	2	7	2	2	3
08 2017	2	0	8	5	4
09 2017	3	3	0	1	0
10 2017	1	1	0	1	1

#### ① Note

You can combine both modes. For example, you can start in *Interactive* mode and then switch to *SIGNAL* mode to enhance the query. However, if you're in *SIGNAL* mode and switch to *Interactive* mode, all changes made since the start of configuration will be lost.

Watch how to build a widget using *SIGNAL* mode in this example.

## ⌚ Example

## Procedure

1. On a dashboard or investigation, select *Create Widget* or *Add widget* respectively. Then, select *Charts & Tables*.

The widget builder opens.

2. Switch the data configuration mode from *Interactive* to *SIGNAL*.
3. Enter your query.

The data column on the left displays case or event attributes, custom attributes, the events within the attributes, and the distinct values for each of them. These functions make writing queries easier and faster for you:

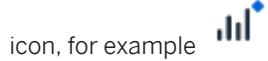
- Show concrete values for an attribute or event by selecting it. The number on the right indicates how many distinct values exist.
- Copy an attribute, event, or a value by hovering over it and selecting
- Icons help you identify the type of an attribute or event:

Option	Description
#	Numbers including currencies
⌚	Durations like days, weeks, months, years
⌚⌚	Date and time information provided as timestamps
T	Text including choices provided as Boolean values

The result is previewed as a table.

4. Choose the visualization like chart, histogram, or map.

Recommended visualizations for the current data configuration are indicated by a blue dot on the chart



icon, for example

Depending on the combination of measures and dimensions, the number of possible visualizations varies.  
The preview updates dynamically.

5. To customize the appearance of your result, select *Customize* in the preview area and use these options:

- *General*: Change the widget name and description.
- *Format*: Configure the format of data for durations, date and time data, and numeric values.
- *Visual*: Customize sorting, orientation, data labels, data color, and more in charts.

The available options depend on the result of the data configuration and the selected visualization type. For example, you can change the orientation for bar charts on the *Visual* tab, but this option isn't available for pie charts.

6. To save your widget configuration, choose *Create*. On a dashboard, finish by selecting *Save*.

The widget builder closes and your new widget is displayed.

## Related Information

[Best Practices for Data Configuration \[page 378\]](#)

[The SIGNAL Code Editor \[page 512\]](#)

[SAP Signavio Analytics Language](#)

[Editing Widgets With Charts and Tables \[page 384\]](#)

[Visualization Types: Charts, Table, and Value \[page 389\]](#)

[Customize the Visual Appearance of Charts \[page 397\]](#)

[What You Can Do in a Widget \[page 401\]](#)

### 4.5.2.2.3 Best Practices for Data Configuration

Find out how measures and dimensions can be combined and which predefined attributes exist. Understand how to work with time series and case- and event-level metrics to optimize data configuration and analysis in SAP Signavio Process Intelligence.

## Combinations of Measures and Dimensions

- These *Predefined* attributes are numerical values, which can't be used as a dimension together with a measure:
  - 'Case'

- 'Cases Ended'
- 'Cases Open'
- 'Cases Started'
- 'Cycle Time'
- 'Events'
- In *Interactive* mode, the attributes 'Cases Ended', 'Cases Open', 'Cases Started' can only be used together with the *Time series* option turned on.
- Grouping by event level attributes is only possible when the measure is also an event level attribute. This is because the event log is flattened and grouped at event level. An exception are variants. You can group variants by both event and case level measures. In this case, the event log doesn't get flattened and the grouping happens on case level.

## Working With Time Series

- For a time series, you need at least one measure.
- When you configure time series queries in *SIGNAL* mode, we strongly recommend using the FILL clause, which fills any gaps inside a time series column with missing timestamps. Otherwise, the query could return unexpected results such as incorrect data visualizations due to null values being removed. For more information about the clause, see [FILL Clause](#), and for a detailed example of analyzing time series data, see [Filtered Events With Gaps Filled](#) in the SAP Signavio Analytics Language guide.

## About 'Cases Started', 'Cases Ended', and 'Cases Open' in Time Series

In a time series chart, cases are counted for each period of time like day, week, month, and so on. Since a case potentially spans many periods of time, you have to define exactly what you're counting.

Attribute	Description																
'Cases Started'	<p>Count all cases where the first event happens in the specified period of time.</p> <p><b>Example</b></p> <p>Here, the cases are counted for each day. Each bar stands for a case, and the bar length represents the duration of a case.</p> <p>The red bars stand for cases that started on January 2, 2023.</p> <table border="1"> <thead> <tr> <th>Date</th> <th>Cases started</th> </tr> </thead> <tbody> <tr><td>01/01/2023</td><td>2</td></tr> <tr><td>02/01/2023</td><td>2</td></tr> <tr><td>03/01/2023</td><td>1</td></tr> <tr><td>04/01/2023</td><td>1</td></tr> <tr><td>05/01/2023</td><td>0</td></tr> <tr><td>06/01/2023</td><td>0</td></tr> <tr><td>07/01/2023</td><td>0</td></tr> </tbody> </table>	Date	Cases started	01/01/2023	2	02/01/2023	2	03/01/2023	1	04/01/2023	1	05/01/2023	0	06/01/2023	0	07/01/2023	0
Date	Cases started																
01/01/2023	2																
02/01/2023	2																
03/01/2023	1																
04/01/2023	1																
05/01/2023	0																
06/01/2023	0																
07/01/2023	0																

'Cases Ended'	<p>Count all cases where the last event happened in the specified period of time.</p> <p><b>Example</b></p> <p>Here, the cases are counted for each day. Each bar stands for a case, and the bar length represents the duration of a case.</p> <p>The red bars stand for the cases that ended on January 4, 2023.</p> <table border="1"> <thead> <tr> <th>Date</th> <th>Cases ended</th> </tr> </thead> <tbody> <tr><td>01/01/2023</td><td>0</td></tr> <tr><td>02/01/2023</td><td>1</td></tr> <tr><td>03/01/2023</td><td>0</td></tr> <tr><td>04/01/2023</td><td>2</td></tr> <tr><td>05/01/2023</td><td>1</td></tr> <tr><td>06/01/2023</td><td>1</td></tr> <tr><td>07/01/2023</td><td>1</td></tr> </tbody> </table>	Date	Cases ended	01/01/2023	0	02/01/2023	1	03/01/2023	0	04/01/2023	2	05/01/2023	1	06/01/2023	1	07/01/2023	1
Date	Cases ended																
01/01/2023	0																
02/01/2023	1																
03/01/2023	0																
04/01/2023	2																
05/01/2023	1																
06/01/2023	1																
07/01/2023	1																

Attribute	Description																
'Cases Open'	Count all cases that started before or in the specified period of time, but aren't yet finished.																
	<p><b>Example</b></p> <p>Here, the cases are counted for each day. Each bar stands for a case, and the bar length represents the duration of a case.</p> <p>The red bars stand for the cases that started before or on January 3, 2023, but are not yet finished on that day.</p> <table border="1"> <thead> <tr> <th>Date</th> <th>Cases open</th> </tr> </thead> <tbody> <tr><td>01/01/2023</td><td>2</td></tr> <tr><td>02/01/2023</td><td>4</td></tr> <tr><td>03/01/2023</td><td>4</td></tr> <tr><td>04/01/2023</td><td>5</td></tr> <tr><td>05/01/2023</td><td>3</td></tr> <tr><td>06/01/2023</td><td>2</td></tr> <tr><td>07/01/2023</td><td>1</td></tr> </tbody> </table>	Date	Cases open	01/01/2023	2	02/01/2023	4	03/01/2023	4	04/01/2023	5	05/01/2023	3	06/01/2023	2	07/01/2023	1
Date	Cases open																
01/01/2023	2																
02/01/2023	4																
03/01/2023	4																
04/01/2023	5																
05/01/2023	3																
06/01/2023	2																
07/01/2023	1																

## Case- and Event-Level Metrics

You can configure widgets using two types of metrics. One type aggregates data over cases, while the other aggregates data over events.

### ⚠ Restriction

- Case- and event-level metrics are only available for widgets on dashboards. On investigations, you can only configure widgets using case-level metrics.
- You can configure a widget using either case-level or event-level metrics, but you can't combine case- and event-level metrics.

## Related Information

[How to Build Data Visualizations \[page 364\]](#)

[Work with Metrics \[page 480\]](#)

## 4.5.2.2.4 Setting a Limit for Query Results

Learn how to specify the number of results to display in a widget, with options to show all results or set a specific limit. This feature allows for better control and organization of data presentation in a dashboard.

### Prerequisites

- You're familiar with the concepts of measures and dimensions and understand how to work with time series and case-and event-level metrics. For more information, see [Best Practices for Data Configuration \[page 378\]](#).
- You're using the *Interactive* mode to create or edit the widget, see [Creating Charts and Tables Using Attributes and Metrics \(Interactive Mode\) \[page 364\]](#).  
If you want to specify the number of rows to return in *SIGNAL* mode, see [LIMIT Clause](#) in the *SAP Signavio Analytics Language Guide*.

### Context

By default, a widget displays up to 500 rows of the query result. You can customize this limit when creating or editing a widget.

### Procedure

1. Create a new widget or open an existing widget for editing.  
The widget configuration dialog opens.
2. In the configuration area, you have these options:
  - To display all results, deactivate the *Limit* option.
  - To change the number of results, open the limit settings with  $\downarrow$ , and specify your own limit.  
The widget shows a warning message if your query results are higher than the limit. You can hide the warning.

#### ⓘ Note

If you choose to hide the warning about the results limit, your data could be more difficult for others to interpret correctly.

3. Continue configuring the widget as needed, and save it.

## Results

The new limit setting takes effect immediately.

## Related Information

[Creating Charts and Tables Using Attributes and Metrics \(Interactive Mode\) \[page 364\]](#)

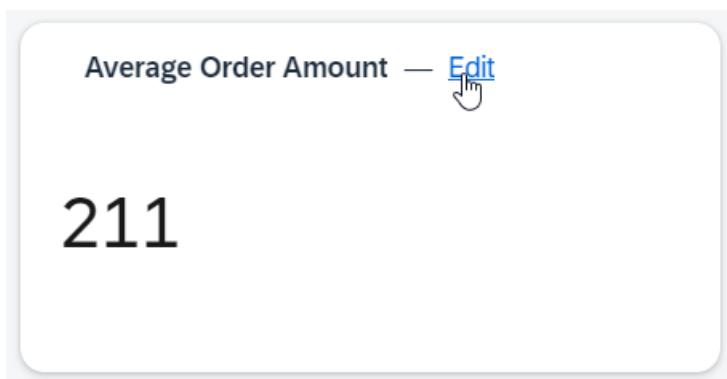
[Editing Widgets With Charts and Tables \[page 384\]](#)

### 4.5.2.3 Editing the Widget Name and Description

Learn how to edit the name and the description of a widget in the widget builder in SAP Signavio Process Intelligence.

#### Procedure

1. On your widget, choose  (more options), then select [Edit](#).  
The widget builder opens.
2. In the preview area, choose [Edit](#) next to the widget name.



The [Customize](#) area opens.

3. In the [Title](#) and [Description](#) fields, edit the widget name and description, then choose [Save](#).  
If you don't provide a name for the widget, the visualization option is used as the default name.  
A description adds context to the data. When a description exists, an info icon ⓘ is displayed on the widget. When users select the icon, the description is shown.
4. On a dashboard, choose [Save](#) to save the changes.

## 4.5.2.4 Editing Widgets With Charts and Tables

Learn how to customize widgets displaying charts and tables in SAP Signavio Process Intelligence.

### Prerequisites

You're the owner of the investigation or dashboard with the widget that you want to edit.

If you aren't the owner, you need editing rights to the investigation or dashboard. The  (*Anyone can edit*) icon in the header indicates that you can edit the investigation or dashboard.

For more details on access rights to investigations and dashboards, and corresponding editing options for widgets, see [Share an investigation with other SAP Signavio Process Intelligence users \[page 317\]](#) and [Share a dashboard with other SAP Signavio Process Intelligence users \[page 335\]](#).

### Context

Edit widgets when you want to reconfigure the data that is displayed in the widget, change the chart type or switch to table format, change the appearance of the visualization, and more.

### Procedure

1. Choose  (*more options*) in the widget and select *Edit*.

The configuration dialog opens in full size, by default.

 **Tip**

To view other widgets while editing yours, use the collapse options from the dialog header:

-  (*Dock right*) or  (*Maximize*) to pin a narrow version of the dialog to the right or switch back to full size
-  (*Minimize*) or  (*Maximize*) to minimize the dialog at the bottom or switch back to full size

2. Apply your changes and confirm with *Save*.

### Results

Changes are applied immediately. If the widget is displayed in other SAP Signavio solutions, changes are visible there as well.

## Related Information

[Displaying Widgets in Other SAP Signavio Applications \[page 349\]](#)

### 4.5.2.5 Decimal Places, Rounding Procedure, and a Unit Type for KPIs

Learn how to set decimal places or specify a rounding procedure for widgets that display a KPI (single aggregated value) in SAP Signavio Process Intelligence. Also, learn how to add the duration, a currency symbol, or a custom unit (suffix) to this value.

#### Prerequisites

- The widget builder for [Charts & Tables](#) is open.
- You've configured some data to be visualized as a chart, table, or value.

#### Procedure

1. In the preview area, select [Customize](#) and go to the [Format](#) tab.
2. You can activate or deactivate the options and customize the settings based on your needs. Find details about each option in these sections:
  - [Rounding Procedure \[page 385\]](#)
  - [Decimal Places \[page 386\]](#)
  - [Unit Type \(Suffix\) \[page 386\]](#)The preview updates dynamically.
3. Once you're satisfied with the result, save the widget.

#### Rounding Procedure

Choose a rounding procedure from the list:

- [\*Round up\*](#)  
Rounds the decimal place to the next higher value.
- [\*Round down\*](#)  
Rounds the decimal place to the next lower value.
- [\*Round to closest\*](#)  
Rounds values above or equal "5" to the next higher value.

View a list with results after rounding up or down in the following example:

### ❖ Example

Unrounded value = 878,568211364

Round up	Round down	Round to closest
878,568211364	878,568211364	878,568211364
878,56821137	878,56821136	878,56821136
878,5682114	878,5682113	878,5682114
878,568212	878,568211	878,568211
878,56822	878,56821	878,56821
878,5683	878,5682	878,5682
878,569	878,568	878,568
878,57	878,56	878,57
878,6	878,5	878,6
879	878	879

## Decimal Places

Activate rounding, then increase or decrease the decimal places with + and -.

By default, decimal places are set to zero.

## Unit Type (Suffix)

Activate the *Suffix* option, then select a unit type:

- *Duration*: Adds the duration to the widget.
- *Currency*: Choose a currency value from the dropdown list, for example EUR or USD.
- *Custom*: Enter your own unit. To include a space between the value and the unit, enter a space first and then your unit.

## Unit Setting in Widgets and Metrics

A unit can be set for values in widgets and in metrics, and these rules apply:

- If a unit isn't set in the metric or in the widget, no unit is displayed.
- If a unit is set in the metric, but not in the widget, the metric unit is displayed.
- If a unit is set in the widget, but not in the metric, the widget unit is displayed.
- If a unit is set in the metric and in the widget, the widget unit is displayed.

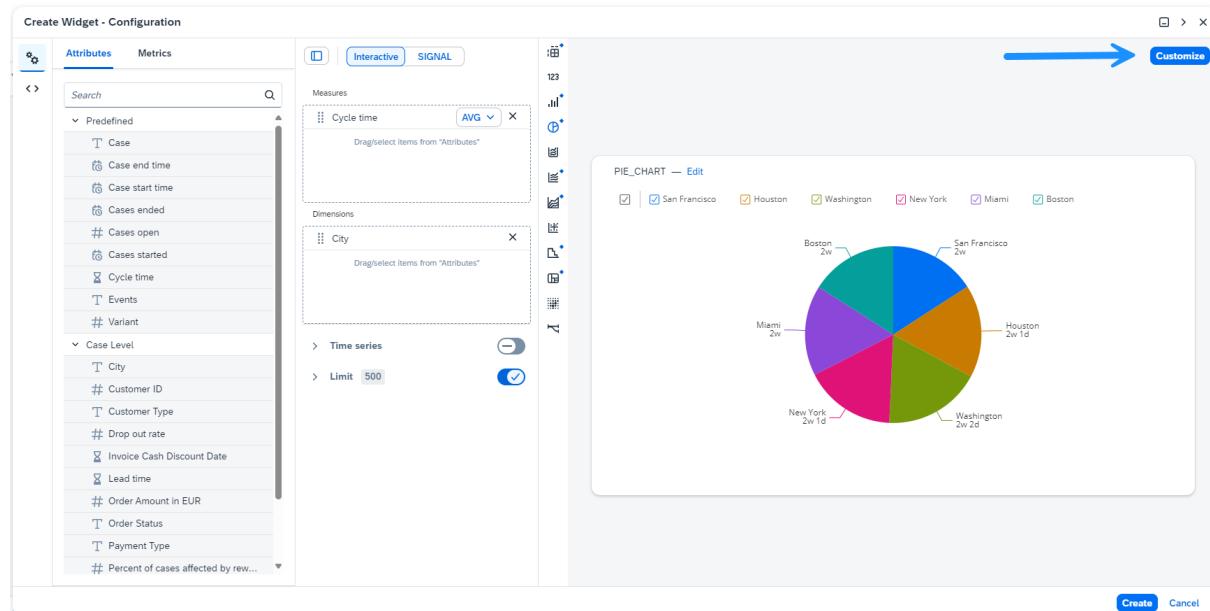
To learn how to configure units in metrics, see [Create a custom metric \[page 496\]](#).

## 4.5.2.6 Data Formatting for Durations, Date and Time Data, and Numeric Values

Learn how to configure the format of data that is displayed in widgets in SAP Signavio Process Intelligence. Use these options to adjust the optimal level of detail for represented KPIs.

Data formatting options are available under **Customize** in the preview area of the widget builder and must be set for each widget individually.

To change the format, open the *Customize* menu and, on the *Format* tab, choose your preferred format.



### → Tip

In *Table* widgets, you can set the format for each column.

## Durations

Durations can range from milliseconds to years. The format for calculated durations is determined automatically by default. For example, longer periods of time are represented in months or years, while shorter periods are more likely to be represented in hours or days. Manual changes can be reset to *Auto* to have the format determined automatically again.

By default, charts display only the first letter of the time units is displayed, for example '2w 3d' for '2 weeks 3 days'. Use the *Display units* option to switch to the full name of the time units or an abbreviation.

### ⌚ Example

A widget showing the lead time using the *Day, Hour, Minute* format:

Lead Time

3 days, 2 hours, 4 minutes

## Date and Time Data

Date and time data formatting is available for *Time series* options.

You can specify dates in any combination of days, months, and years. They can be displayed in short, medium, or long formats. For example, a medium-length date format can be DD/MMD/YYYY (day, month, year).

Time data can range from milliseconds to hours, and it can be displayed in the 12-hour format (AM/PM) or the 24-hour format. For example, a time format can be hh:mm (hour, minute) in the AM/PM format.

You can turn the date and time settings on or off individually.

### ⌚ Example

A widget showing the average cycle time over a quarterly interval using the *Day, Month, Year* format.

Quarter	Cycle time
01/04/2017	1w 5d
01/07/2017	2w 1d
01/10/2017	2w 4d

## Numeric Values

Abbreviations such as '10K' for '10,000', and thousand operators are activated by default for numbers. Deactivate them if needed.

You can set decimal places or specify a rounding procedure. You can also add the duration, a currency symbol, or a custom unit (suffix). For details, see [Decimal Places, Rounding Procedure, and a Unit Type for KPIs \[page 385\]](#).

### Example

A widget showing an order amount with thousand separators, decimal places, and currency prefix.

Order Amount  
USD 185,046.00

#### 4.5.2.7 Visualization Types: Charts, Table, and Value

Visualization Types in SAP Signavio Process Intelligence: Understand the different ways to represent data in widgets, such as bar charts, pie charts, scatterplots, and more to effectively communicate and analyze data in business processes.

### Table

The values are represented in a table.

### Example

Case table						
Case ID	Event count	Cycle time	Case start	Case end	City	
10100	4	13d 6h	08/08/2017, 22:52	22/08/2017, 05:18	Houston	
10101	4	24d 12h	12/07/2017, 13:30	06/08/2017, 01:47	San Francisco	
10102	5	19d 10h	26/06/2017, 17:33	16/07/2017, 04:29	Washington	
10103	4	21d 12h	23/09/2017, 05:51	14/10/2017, 17:59	New York	
10104	4	21d 7h	28/07/2017, 21:41	19/08/2017, 04:55	New York	
10105	4	18d 4h	01/06/2017, 11:49	19/06/2017, 16:09	Houston	
10106	4	27d 22h	29/07/2017, 21:02	26/08/2017, 19:08	Boston	
10107	4	16d 9h	06/07/2017, 14:14	22/07/2017, 23:28	New York	
10108	5	22d	29/07/2017, 12:40	20/08/2017, 12:48	New York	
10109	4	12d 23h	01/08/2017, 15:14	14/08/2017, 15:02	Houston	

You have the following options:

- To sort the data, select the column headers.
- To group the data, select  on the widget, and select  to ungroup.

For information on how to create a table, see [Example: How to Create a Table Widget \[page 368\]](#).

## Value

Display case data that's aggregated to a single value, for example, the average order value at a given location.

### Example

Average order amount      
Boston

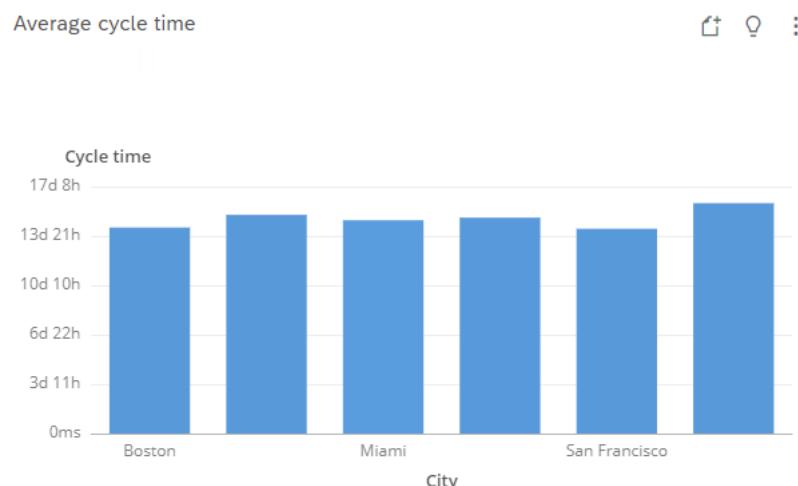
€216.25

For information on how to create a value, see [Example: How to Create a Value Widget \[page 369\]](#).

## Bar Chart

Values are represented as vertical or horizontal bars.

### Example

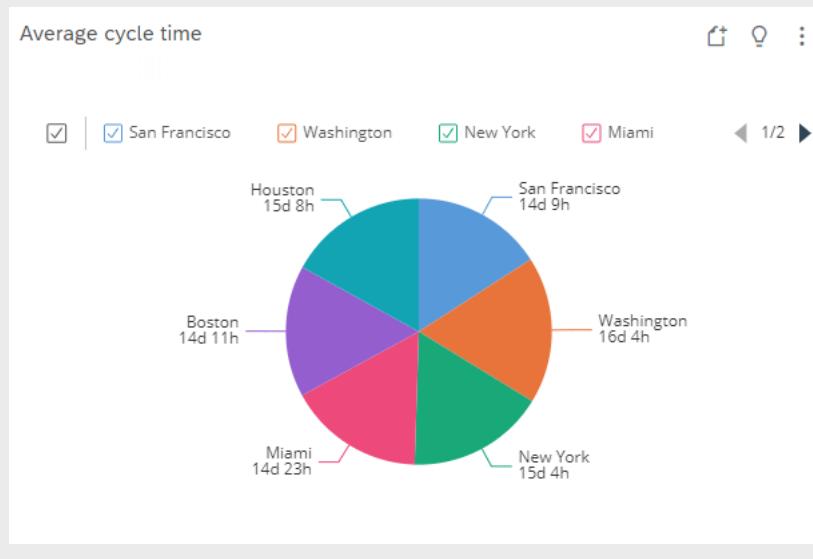


For information on how to create a bar chart, see [Example: How to Create a Breakdown Widget \[page 370\]](#).

## Pie Chart

Values are represented as pie slices to show the relative sizes of data.

## Example



For information on how to create a pie chart, see [Example: How to Create a Breakdown Widget \[page 370\]](#).

## Dual Axis Chart

The values of two measures are displayed on one chart to illustrate the relationships between the values.

To create a dual axis chart, specify two measures and one dimension. The measures can be two attributes, two metrics, or one attribute and one metric.

## Example

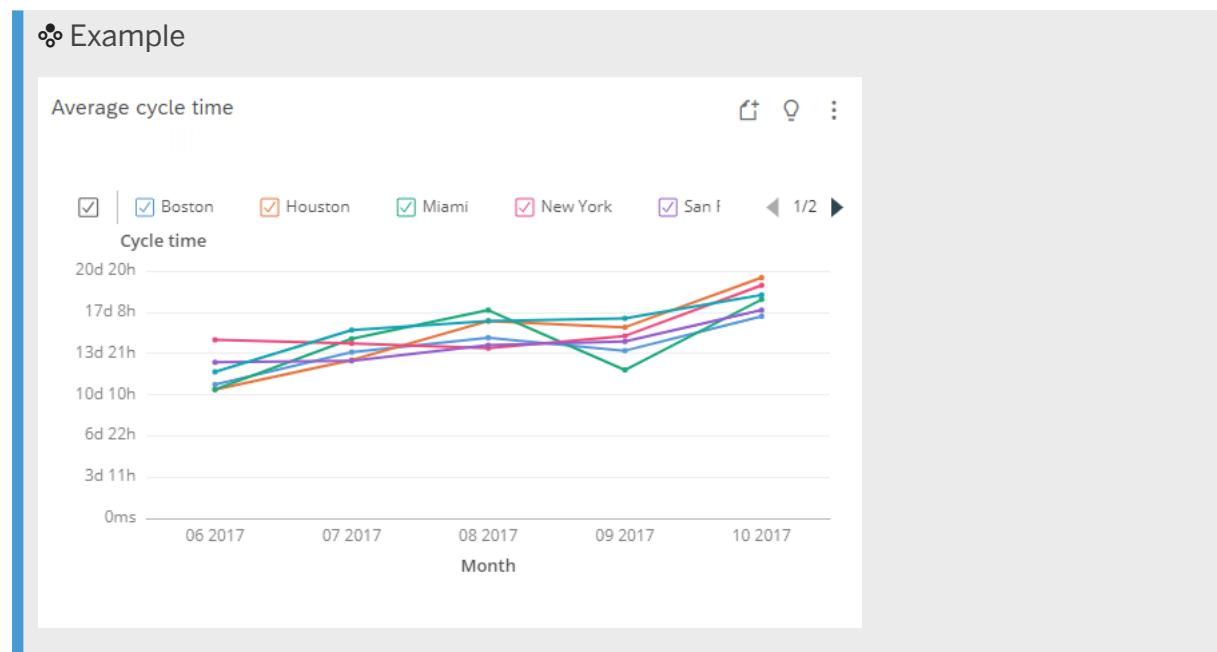


The bars represent the values of the first selected attribute or metric, the line graph represents the values of the second selected attribute or metric.

For information on how to create a dual axis chart, see [Example: How to Create a Breakdown Widget \[page 370\]](#).

## Line Chart

Values are displayed as a series of data points that are connected by straight-line segments.



For information on how to create a line chart, see [Example: How to Create an Over Time Widget \[page 373\]](#).

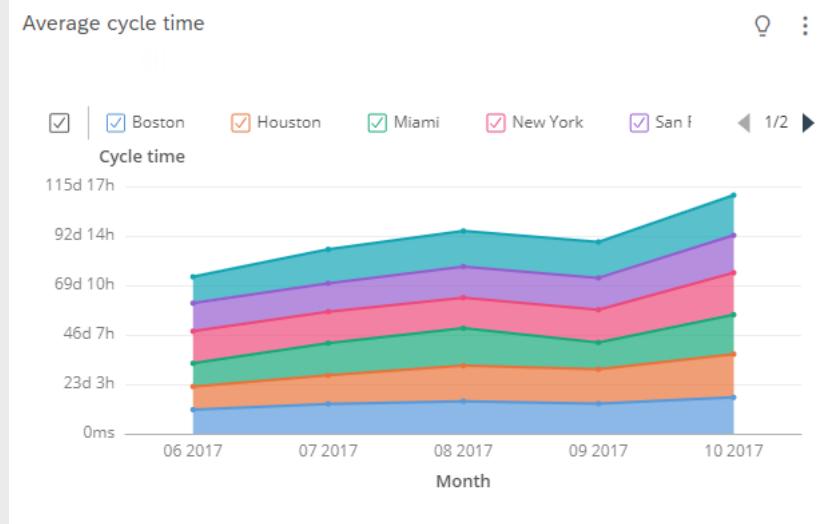
You can also create line charts with SIGNAL code that don't relate to time data. For example, you can render the number of sales cases in cities. See more in the [SAP Signavio Analytics Language user guide](#).

## Area Chart

An area chart is a line chart where the areas between each line and the following line are shaded with a color. When breaking down the values into groups, the groups are vertically arranged on top of each other. Each group has a different color.

The top line shows the sum of all groups. When hovering over the chart, tooltips show the specific data values for each group.

## Example

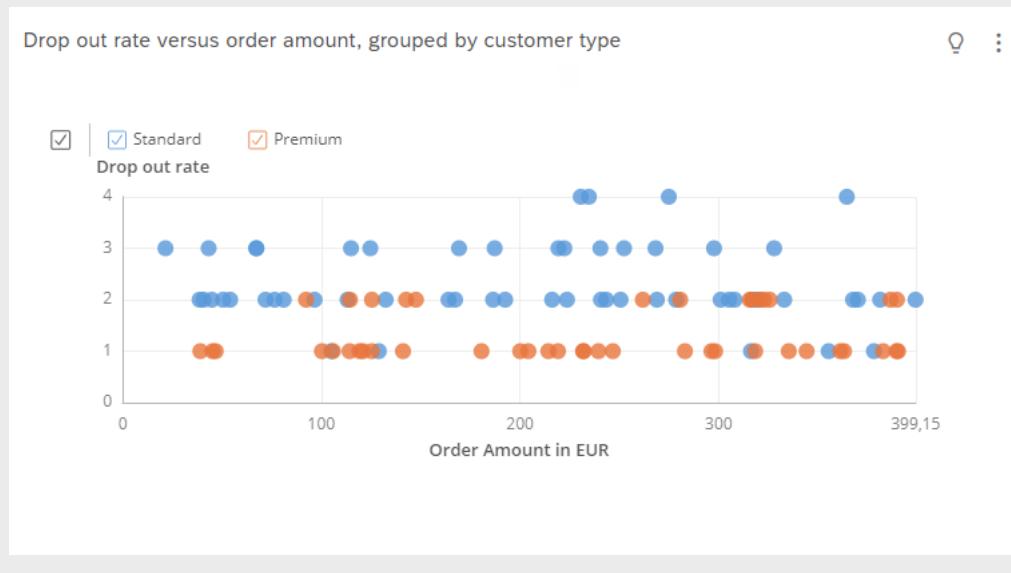


## Scatterplot

Display two numerical variables plotted along two axes. This graph can be good when you want to identify or show the relationship between two variables.

To create a scatterplot, specify two numeric or duration attributes as dimensions.

## Example



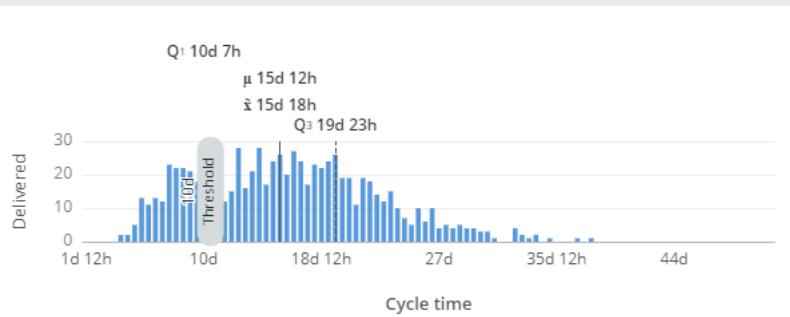
For information on how to create a scatterplot, see [Example: How to Create a Correlation Widget Using a Scatter Plot Visualization \[page 374\]](#).

## Histogram

Use histograms to display how the numeric or duration attributes of your cases are distributed. For example, you can see how the times for processing a sales order are distributed. You can group this data by order status, by adding 'order status' as a dimension.

The average ( $\bar{x}$ ), median ( $\mu$ ), and quartile (Q) values are displayed by default. The first quartile (Q1) is the value under which 25% of data points are found when they're arranged in increasing order. The third quartile (Q3) is the value under which 75% of data points are found when arranged in increasing order.

### Example



### Note

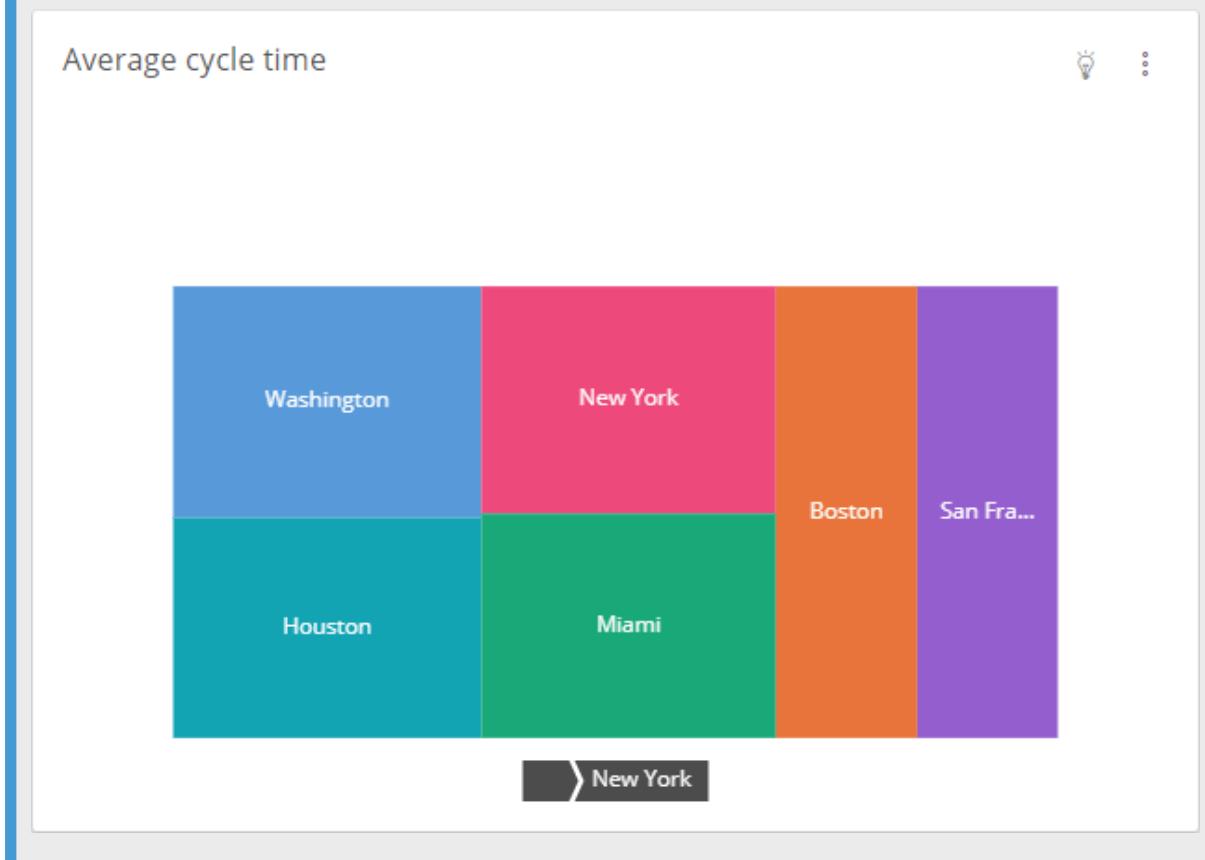
You can only create histograms in the *Interactive* mode of the widget builder. This visualization option isn't available in *SIGNAL* mode.

For information on how to create a histogram, see [Example: How to Create a Distribution Widget \[page 371\]](#).

## Tree Map

Hierarchical data is displayed as nested rectangles. Use it to compare quantities and patterns.

❖ Example



For information on how to create a tree map, see [Example: How to Create a Breakdown Widget \[page 370\]](#).

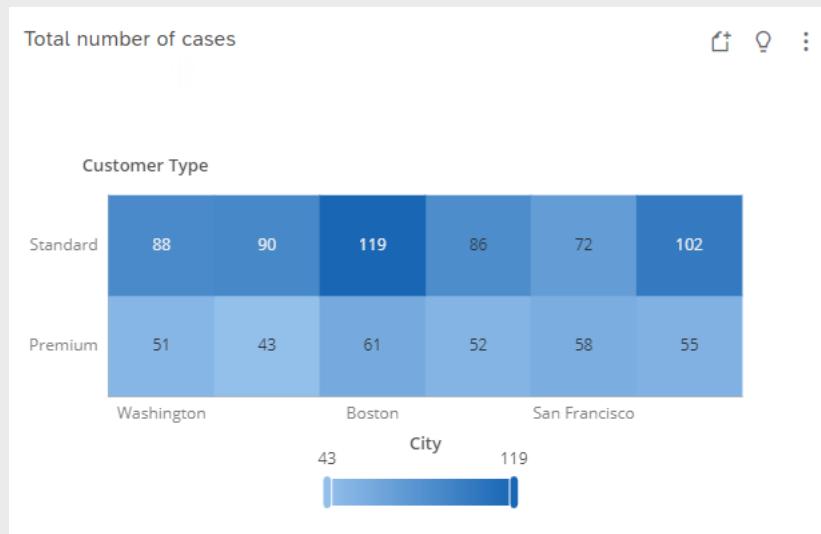
## Heat Map

Use this visualization type to identify patterns.

For a heat map to be created, the following applies:

- When you configure the widget with attributes, specify one measure and two dimensions.
- When you configure the widget with metrics, specify two measures.
- When you configure the widget with SIGNAL code, specify two dimensions.

### ❖ Example



The values of the two measures are represented by colored fields. The color scale represents the range between the minimum value and the maximum value. The value range can be reduced to any range of interest by moving the sliders.

For information on how to create a heat map, see [Example: How to Create a Breakdown Widget \[page 370\]](#).

## Sankey Chart

A Sankey chart depicts the flow from one set of values to another. The connections between attribute values are called links. The thickness of the links is proportional to the quantity or size of the flow.

To create a Sankey chart, select one metric or an aggregated case-level attribute that represents a quantity as the measure and two or more case-level attributes as dimensions.

### ❖ Example

This example shows the average cycle time per city, broken down by premium and standard customers. Links depicting the cycle time for standard customers are always thicker than for premium customers, indicating that standard customers generally have longer cycle times.

To view the cycle time per city and customer type, hover over the links.



## Related Information

[Best Practices for Data Configuration \[page 378\]](#)

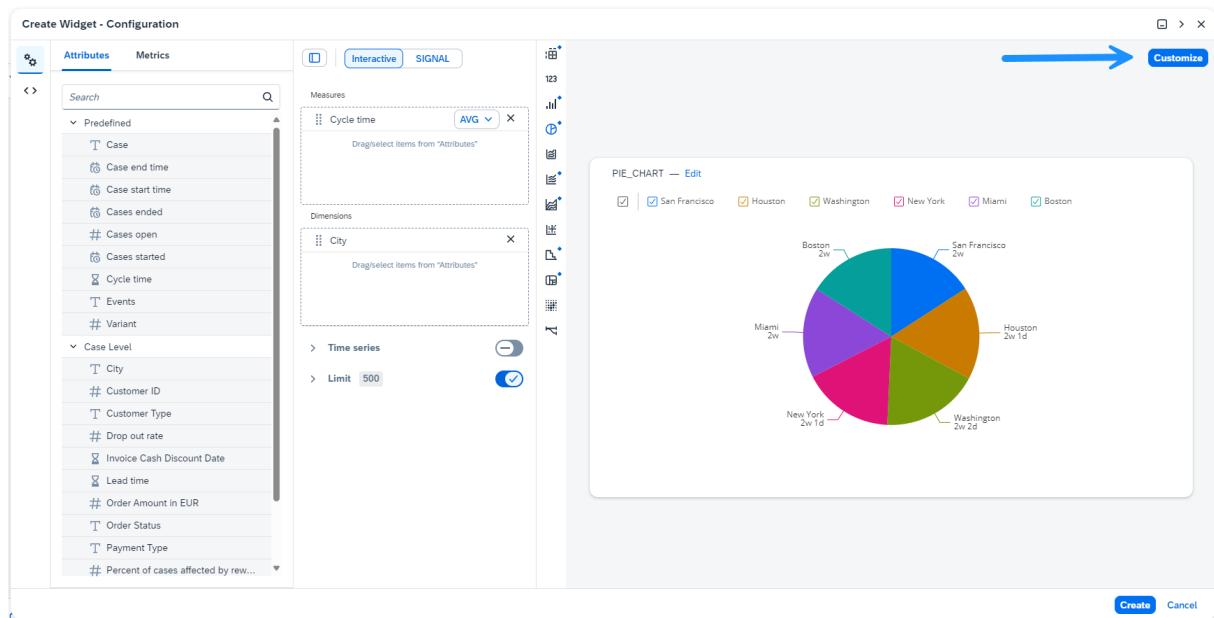
### 4.5.2.8 Customize the Visual Appearance of Charts

Learn how to customize sorting, orientation, stacking, and data colors in widgets displaying charts in SAP Signavio Process Intelligence. To better meet your needs, you can also add data labels and adjust the minimum and maximum scale values of the vertical axis (y-axis).

Visual appearance options are available under [Customize](#) in the preview area of the widget builder and must be set for each widget individually.

#### ⓘ Note

Which option is available depends on the visualization option that you've selected in the widget builder.



## Stacking and Orientation for Bar Charts

Bar charts display data in vertical clusters by default. You can change both, stacking, or orientation as follows:

- Stacking: (*Clustered*) or (*Stacked*)
- Orientation: (*Vertical*) or (*Horizontal*)

## Sorting for Bar Charts, Pie Charts, and Dual Axis Charts.

You can sort data in bar charts, pie charts, and dual axis charts. To sort data, activate sorting and select the value to sort and the sort order.

## Data Values for Histograms

The average ( $\bar{x}$ ), median ( $\mu$ ), and quartile (Q) values are displayed in histograms by default. You can show or hide individual data values or all at once.

## Data Color in Charts

Several predefined color palettes are available for all visualization types, except for tables and KPIs (single values).

We offer two types of color schemes:

#### Different Colors for Distinct Categories

These color palettes are available for most visualization types.



#### Color Sequences for Progressions

These color palettes are available for heatmaps and treemaps with two measures and one dimension.

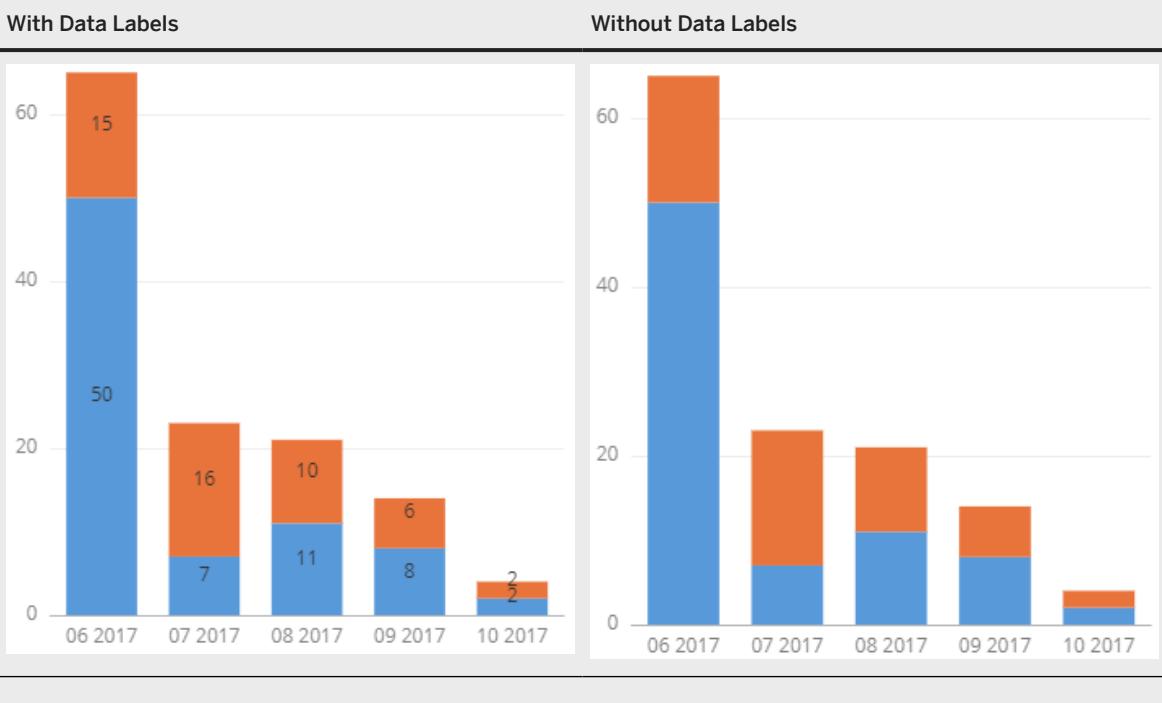


## Data Labels in Charts

You can show the values of a bar, area, or graph (line), directly on a chart. The option is deactivated by default. Once you've activated the *Data Label* option, you can specify the position, orientation, font size, and font style for the data labels.

View a chart with and without data labels in this example.

## Example



## Minimum and Maximum Limits for Numeric Axes

By default, the range of values shown in the axes is set to visualize all the data returned by the query. To provide a tailored context of the data values when designing a data analysis or to make multiple charts comparable, you can adjust the minimum and maximum scale values.

When applying limits, consider these aspects:

- Limits are available for dual axis charts, area charts, line charts, bar charts, and histograms.
- For dual axis charts, you can specify limits for both measures.
- You can specify minus values if needed.
- Whether a comma or a period works as a decimal separator depends on your browser. For example, it's a comma in Microsoft Edge and Google Chrome, and a point in Mozilla Firefox.
- For durations, specify the minimum and maximum values for the week (`--w`), day (`-d`), hour (`-h`), and minute (`-m`). For example, a threshold of eight days is specified with `01 w, 1 d, -- h, -- m`.

## Related Information

[Creating Charts and Tables Using Attributes and Metrics \(Interactive Mode\) \[page 364\]](#)

[Creating Charts and Tables Using SIGNAL Code \(SIGNAL Mode\) \[page 376\]](#)

[Editing Widgets With Charts and Tables \[page 384\]](#)

### 4.5.2.9 What You Can Do in a Widget

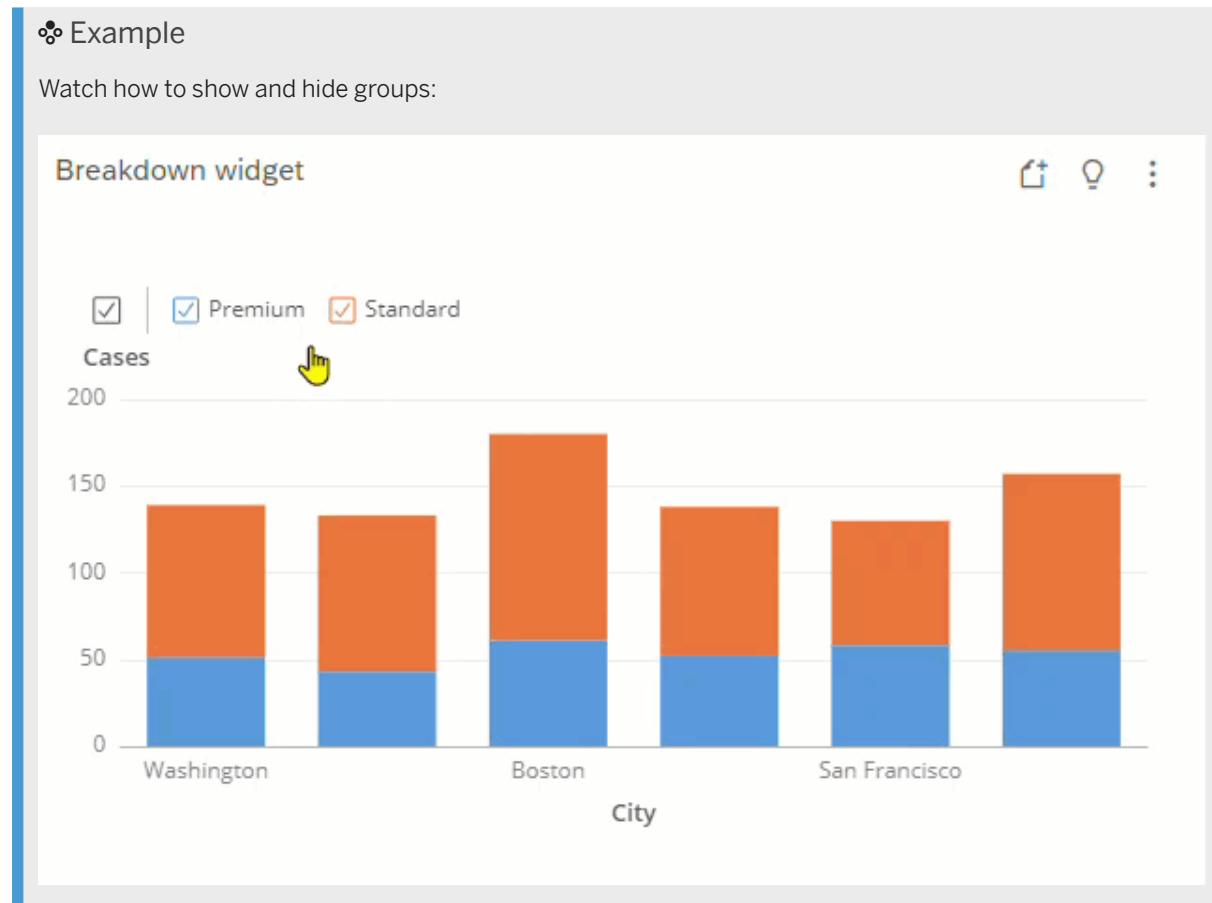
Widget functionality in SAP Signavio Process Intelligence: Show or hide data groups, drill down into data, add thresholds, filter based on selected data, and export data as CSV. Use the options to highlight important metrics in widgets displaying charts, tables, or KPIs (single aggregated values) and export data for further analysis.

#### Show or Hide Data Groups

For data that's displayed in charts and grouped several times, you can show or hide the groups in the widget. To do so, select or deselect the groups in the chart legend.

##### Example

Watch how to show and hide groups:



#### Drill Down Into Data

Explore multidimensional data by navigating from one level down to a more detailed one. You don't need to configure a new widget to do this, but instead you break down the data of an existing widget.

To drill down into your data, select (Add) in the widget and select an option. The result set is opened as a new widget.

The following options are available:

- Break down by another attribute that you select
- View over time
- View distribution

Which option is available depends on the data that you've selected in the widget.

### ❖ Example

Watch how to view a bar chart's data over time and its distribution:



## Add Thresholds

Thresholds help draw attention to metric values that are above or below a limit or outside a specific range. You can add visual thresholds to widgets that display charts, a single metric value, or tables.

## ❖ Example

Here's a chart with two thresholds and three regions:



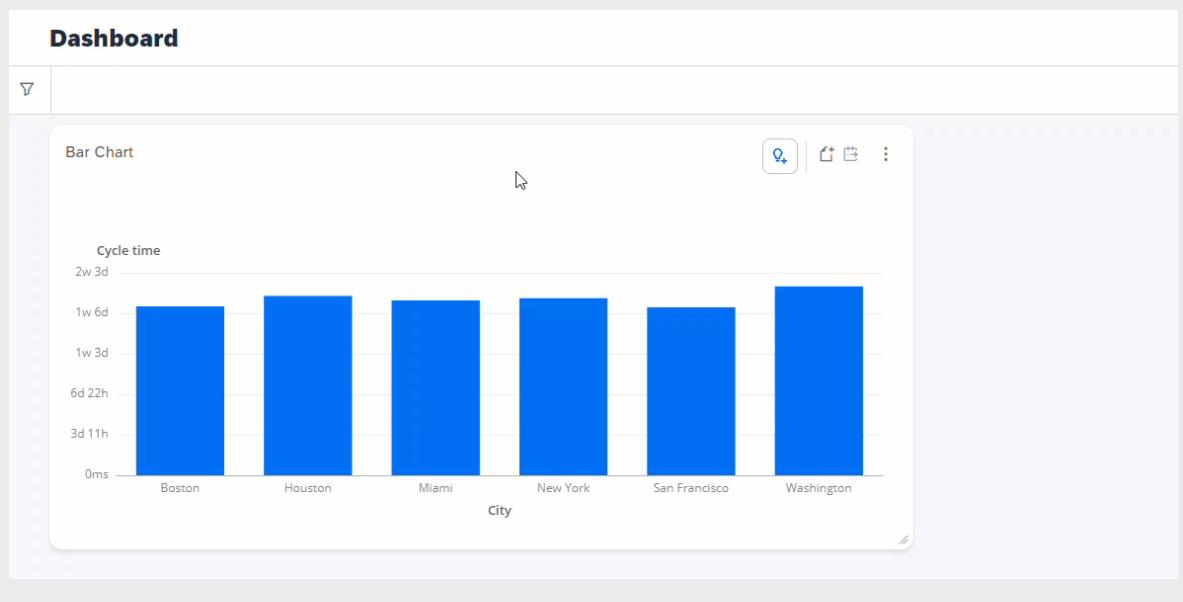
For more details, see [Thresholds \[page 404\]](#).

## Add a Filter Based on Selected Data

You can select one or more data points in a chart and use this selection to set a filter. To create the filter, select the data in the widget and choose ([Add](#)). Then, decide to which level to add the filter (widget or dashboard) and whether to include or exclude the selected data.

## ❖ Example

Watch how to select data in a bar chart and create a filter based on the selection:



More filter options are available in the widget menu. For more details, see [Filters \[page 443\]](#).

## Export Data as CSV

You can export chart or table data from a dashboard widget to a CSV file. For more details, see [Data Export \(CSV\) \[page 413\]](#).

## Related Information

[Thresholds \[page 404\]](#)

[Data Export \(CSV\) \[page 413\]](#)

[Decimal Places, Rounding Procedure, and a Unit Type for KPIs \[page 385\]](#)

[Customize the Visual Appearance of Charts \[page 397\]](#)

### 4.5.2.10 Thresholds

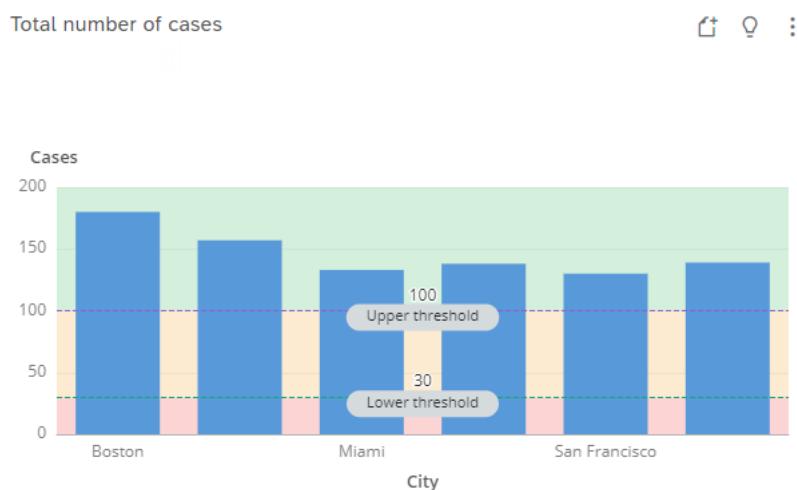
Learn about thresholds on widgets in SAP Signavio Process Intelligence.

Thresholds help draw attention to metric values that are above or below a limit or outside a specific range. You can add visual thresholds to widgets that display charts, a single metric value, or tables.

You can set a single threshold or an upper and lower threshold. Different highlight colors are available for areas inside or outside these thresholds.

## Examples

### Chart With Two Thresholds and Three Regions

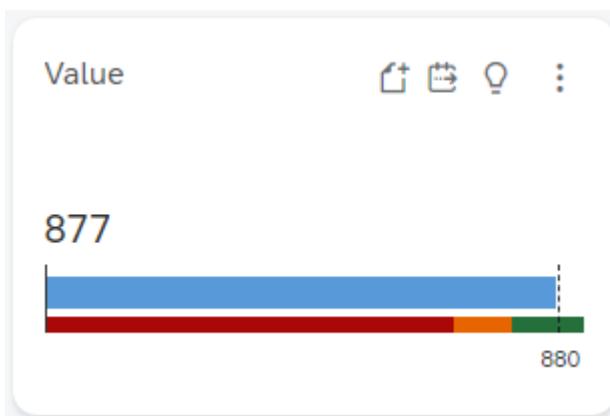


## Table With Three Regions

Table

Case ID	Event count	Cycle time	Case start	Case end	City
10100	4	13d 6h	08/08/2017, 22:52	08/22/2017, 05:18	Houston
10101	4	24d 12h	07/12/2017, 13:30	08/06/2017, 01:47	San Francisco
10102	5	19d 10h	06/26/2017, 17:33	07/16/2017, 04:29	Washington
10103	4	21d 12h	09/23/2017, 05:51	10/14/2017, 17:59	New York
10104	4	21d 7h	07/28/2017, 21:41	08/19/2017, 04:55	New York
10105	4	18d 4h	06/01/2017, 11:49	06/19/2017, 16:09	Houston
10106	4	27d 22h	07/29/2017, 21:02	08/26/2017, 19:08	Boston
10107	4	16d 9h	07/06/2017, 14:14	07/22/2017, 23:28	New York

## Value With Two Thresholds and a Goal



The metric (877) is displayed as a blue bar. A second bar displays the regions above, between, and below the threshold value according to the set colors. In addition, a goal (880) can be displayed by a dashed line.

## 4.5.2.10.1 Using Thresholds

### 4.5.2.10.1.1 Adding Thresholds to a Chart

Learn how to add thresholds to widgets displaying data in charts.

#### Prerequisites

The widget displays case data in a chart, using one of these visualization types:

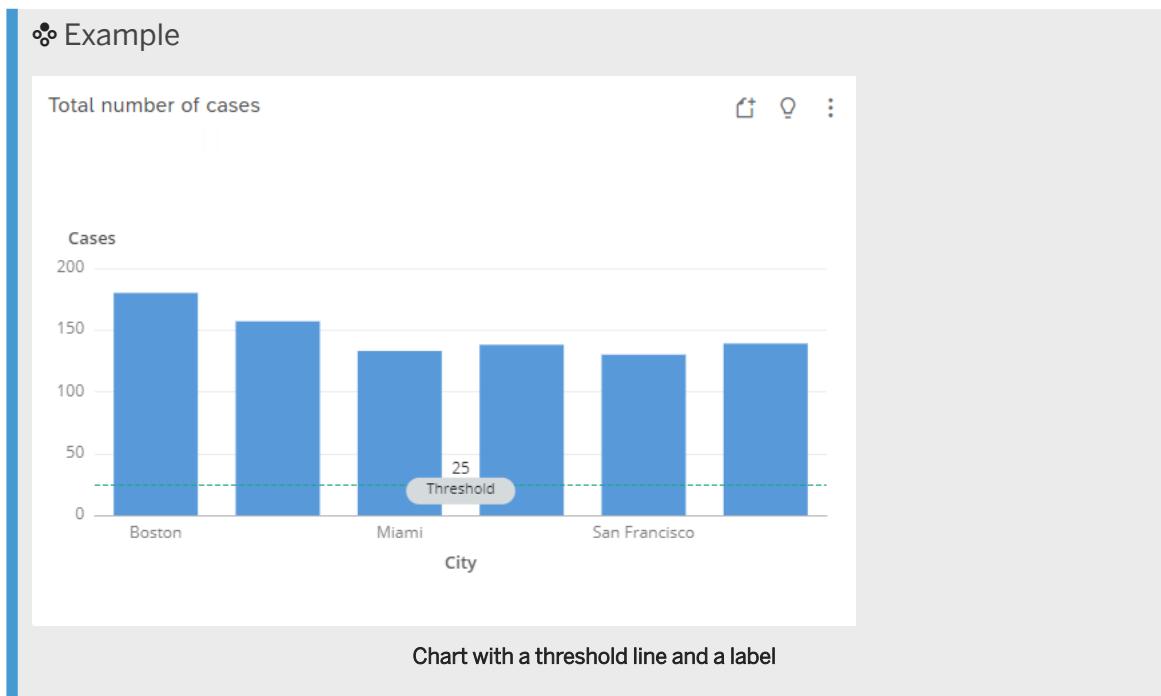
- *Area Chart*
- *Bar Chart*
- *Line Chart*

To create your widget, see the instructions in [How to Build Data Visualizations \[page 364\]](#).

#### Context

You have the following options to set and visualize thresholds:

- *Line*  
The threshold is displayed as a dashed line including the threshold value and label.



- *2 regions*  
Different background colors for the upper and lower regions are assigned.

## ❖ Example

Total number of cases

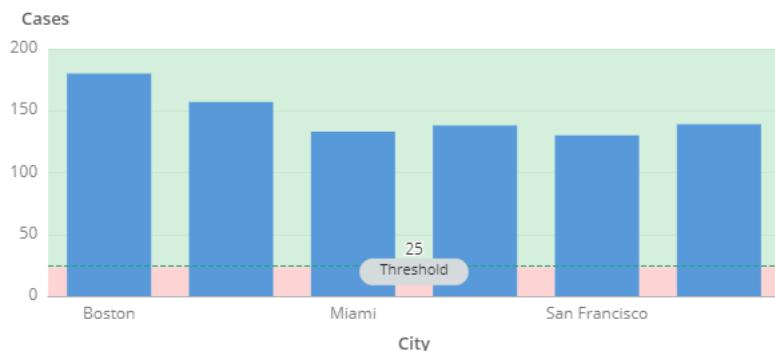


Chart with a threshold line, two regions, and a label

- **3 regions**

A second threshold can be set, resulting in three regions: Above the upper threshold, below the lower threshold, and between the thresholds.

## ❖ Example

Total number of cases

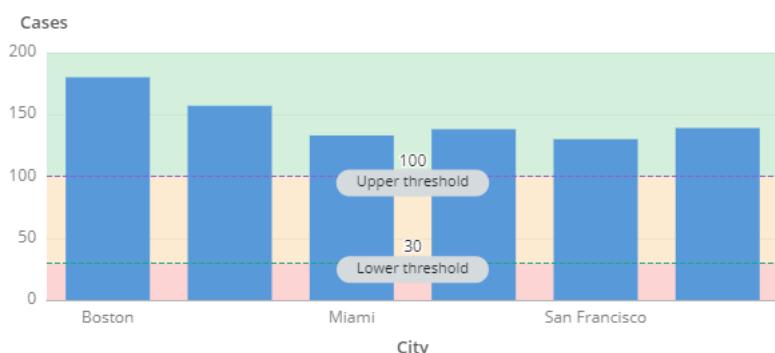


Chart with two thresholds with labels and three regions

## Procedure

1. Choose  (More Actions) on the widget, then *Threshold*.
2. In the configuration dialog, choose the threshold option.
3. Specify the value and a label for each threshold.  
For durations, specify the threshold value for the week (`--w`), day (`-d`), hour (`--h`), and minute (`--m`). For example, a threshold of eight days is specified with `01 w, 1 d, -- h, -- m`.
4. If you like, add a goal, for example to indicate a target value.
5. You can re-assign the background colors using the color bar. To swap the color assignment, choose *Swap color order*.
6. Confirm with *Save*.

## Results

The threshold is added according to your settings.

### 4.5.2.10.1.2 Adding Thresholds to a Table

Learn how to add thresholds for table data.

#### Prerequisites

- The widget displays data in a table, using the visualization type *Table*.
- You can add thresholds only to columns with numeric data.

To create your widget, see the instructions in [How to Build Data Visualizations \[page 364\]](#).

#### Context

You have the following options to set and visualize thresholds:

- **2 region**  
Different background colors for the upper and lower regions are assigned.
- **3 regions**  
A second threshold can be set, resulting in three regions: Above the upper threshold, below the lower threshold, and between the thresholds.

Table

Case ID	Event count	Cycle time	Case start	Case end	City
10100	4	13d 6h	08/08/2017, 22:52	08/22/2017, 05:18	Houston
10101	4	24d 12h	07/12/2017, 13:30	08/06/2017, 01:47	San Francisco
10102	5	19d 10h	06/26/2017, 17:33	07/16/2017, 04:29	Washington
10103	4	21d 12h	09/23/2017, 05:51	10/14/2017, 17:59	New York
10104	4	21d 7h	07/28/2017, 21:41	08/19/2017, 04:55	New York
10105	4	18d 4h	06/01/2017, 11:49	06/19/2017, 16:09	Houston
10106	4	27d 22h	07/29/2017, 21:02	08/26/2017, 19:08	Boston
10107	4	16d 9h	07/06/2017, 14:14	07/22/2017, 23:28	New York

A table with 3 regions for the cycle time

## Procedure

1. On the widget, choose (*Set threshold*) in the column header.
2. In the configuration dialog, choose the threshold option.
3. Specify the value and a label for each threshold.
4. You can re-assign the background colors using the color bar. To swap the color assignment, choose *Swap color order*.
5. Confirm with *Save*.

## Results

The threshold is added according to your settings.

### 4.5.2.10.1.3 Adding Thresholds to a Value

Learn how to add thresholds to a widget displaying a metric value.

## Prerequisites

The widget displays case data that's aggregated to a single value, using the visualization type *Value*.

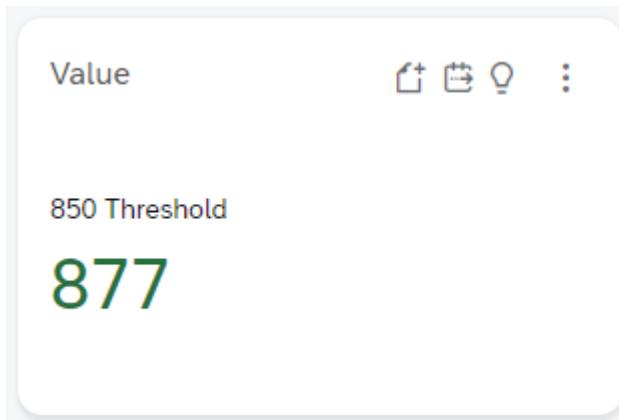
To create your widget, see the instructions in [How to Build Data Visualizations \[page 364\]](#).

## Context

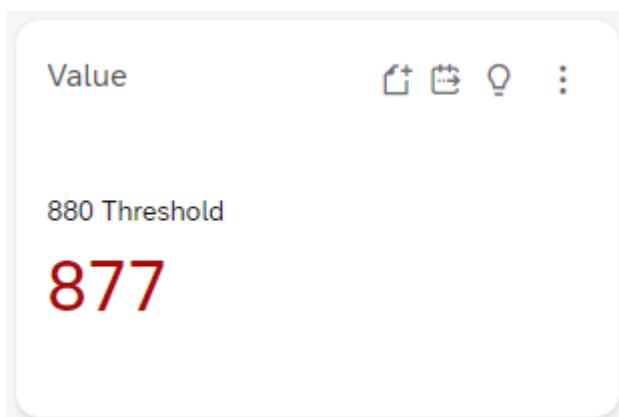
You have the following options to set and visualize thresholds:

- *2 regions*

The threshold value is displayed above the calculated metric. The color of the metric indicates whether the value is above or below the threshold. You can specify which color is used to indicate going below or above the threshold.



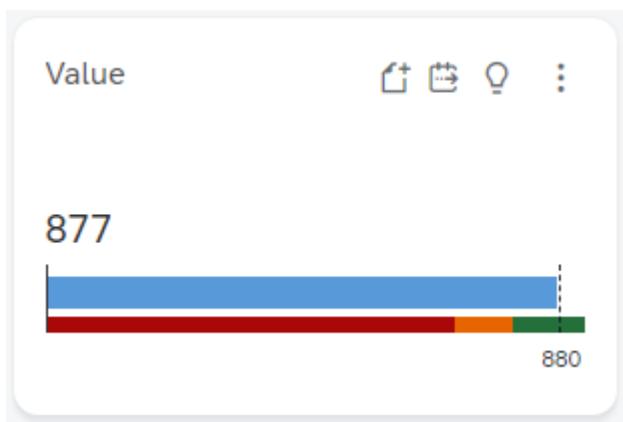
Widget with a metric (877) above the threshold (850)



Widget with a metric (877) below the threshold (880)

- *3 regions*

The metric (877) is displayed as a blue bar. A second bar below the metric bar displays the regions above, between, and below the threshold value according to the set colors. In addition, a goal (880) can be displayed by a dashed line.



Widget with two thresholds and a goal

## Procedure

1. Choose  (More Actions) on the widget, then *Threshold*.
2. In the configuration dialog, choose the threshold option.
3. Specify the value and a label for each threshold. If you like, add a goal, for example, to indicate a target value.
4. You can re-assign the background colors using the color bar. To swap the color assignment, choose *Swap color order*.
5. Confirm with *Save*.

## Results

The threshold is added according to your settings.

### 4.5.2.10.1.4 Removing Thresholds

Steps to remove thresholds from a widget in SAP Signavio Process Intelligence.

## Context

When a threshold is removed, live insight shapes based on the threshold may stop working.

## Procedure

1. Choose  (More Actions) on the widget, then *Threshold*.
2. In the configuration dialog, choose the threshold option *None*.
3. Confirm with *Save*.

## Results

All thresholds are removed from the widget.

## Related Information

[Live Insights Shapes in SAP Signavio Process Manager \[page 412\]](#)

### 4.5.2.10.2 Live Insights Shapes in SAP Signavio Process Manager

Live Insights shapes in SAP Signavio Process Manager require the threshold setting.

With the *Live Insights* shapes, you can add insights and KPIs you want to monitor to BPMN diagrams, value chains, and navigation maps.

For that, you add a *Live Insights* shape to your diagram and link it with a widget from SAP Signavio Process Intelligence. Users can then view the *Live Insights* in SAP Signavio Process Collaboration Hub.

In SAP Signavio Process Intelligence, thresholds need to be defined for the widgets that are linked to *Live Insights* shapes. In SAP Signavio Process Manager and SAP Signavio Process Modeler, the color of the shape indicates how the current result of the widget relates to the defined thresholds. The following example shows how the sentiment shape reflects the current widget result:



The color of a shape is only visible in SAP Signavio Process Collaboration Hub. In SAP Signavio Process Manager and SAP Signavio Process Modeler, the shapes stay grey.

## Related Information

[Add Live Insights](#)

## 4.5.2.11 Data Export (CSV)

Learn how you can export chart or table data from a dashboard or investigation widget in SAP Signavio Process Intelligence to a CSV file.

### ⓘ Note

- The CSV export is available for widgets showing a table, a KPI (value), or any type of chart, but not for widgets that show a histogram.
- This feature is only available if you're part of a user group which is assigned to the feature set [SAP Signavio Process Intelligence - Data export as CSV](#).

To export data shown in a widget on a dashboard or investigation, select  in the widget and choose [Export as CSV](#). The file is saved to your browser's download folder.

## Format

The delimiter used in the CSV file is a comma.

Date and time-related data are exported in ISO 8601 format.

### ⚡ Example

The exported data for a widget, which displays a chart with the order amount for each city, can appear in the CSV file as follows:

Order Amount,City
210.4030769230769, San Francisco
197.6191666666667, Houston
168.4736363636364, Washington
192.35599999999997, New York
250.01249999999996, Miami
235.17714285714285, Boston

## Values for Cycle Time

Values for cycle time are always exported as milliseconds. If you need a different time format, you need to convert the milliseconds outside of SAP Signavio Process Intelligence.

## Amount of Data Exported

By default, the widget displays and exports up to 500 rows of the data set.

You can change the default limit as follows:

- When you edit the widget in *Interactive* mode, activate the *Limit* option in the configuration area and define a new limit.
- When you edit the widget in *SIGNAL* mode, use the *LIMIT Clause* to define a limit.

If you then run the export again, the corresponding amount of data is exported.

## Related Information

[Creating Charts and Tables Using Attributes and Metrics \(Interactive Mode\) \[page 364\]](#)

[Creating Charts and Tables Using SIGNAL Code \(SIGNAL Mode\) \[page 376\]](#)

## 4.5.3 Process-Related Widgets

Use these SAP Signavio Process Intelligence widgets to discover which process steps are taken, whether your actual process conforms with the target process model, how many process variants exist, and much more.

These widgets are available:

### [Activity List \[page 415\]](#)

This widget lists all activities that occur in the process. If a BPMN model is linked to the dashboard or investigation, the activities are grouped by conformance.

### [Process Conformance \[page 416\]](#)

Check if the actual process flow, as recorded in the event log, matches the planned model and vice versa. Identify hotspot activities in variants and see how actual paths look like.

### [Process Diagram \[page 421\]](#)

Display the latest revision of a process model from SAP Signavio Process Manager. From the widget, you can open the model in the editor of SAP Signavio Process Manager, or compare it with other revisions or models.

### [Process Discovery \[page 423\]](#)

View a process model that is generated based on the event log data and understand how your process is performing, in terms of complexity and efficiency. Analyze conformance, cycle times, and occurrences of the individual activity sequences.

### [Process Funnel \[page 429\]](#)

See for each variant which and how many cases follow a specific path. Find out where cases enter and leave the process and whether activities outside the process exist.

### [Variant Explorer \[page 431\]](#)

Deep dive into the variants of your process, explore their distribution, and compare them with each other. Analyze conformance, cycle times, and occurrences of the individual activity sequences.

### 4.5.3.1 Activity List

This widget lists all activities that occur in the process. If a BPMN model is linked to the dashboard or investigation, the activities are grouped by conformance.

That way, you can compare the activities of the actual process with the activities in the linked process model, to see how conforming your actual process data is. If no BPMN model is linked, all activities are treated as non-conforming.

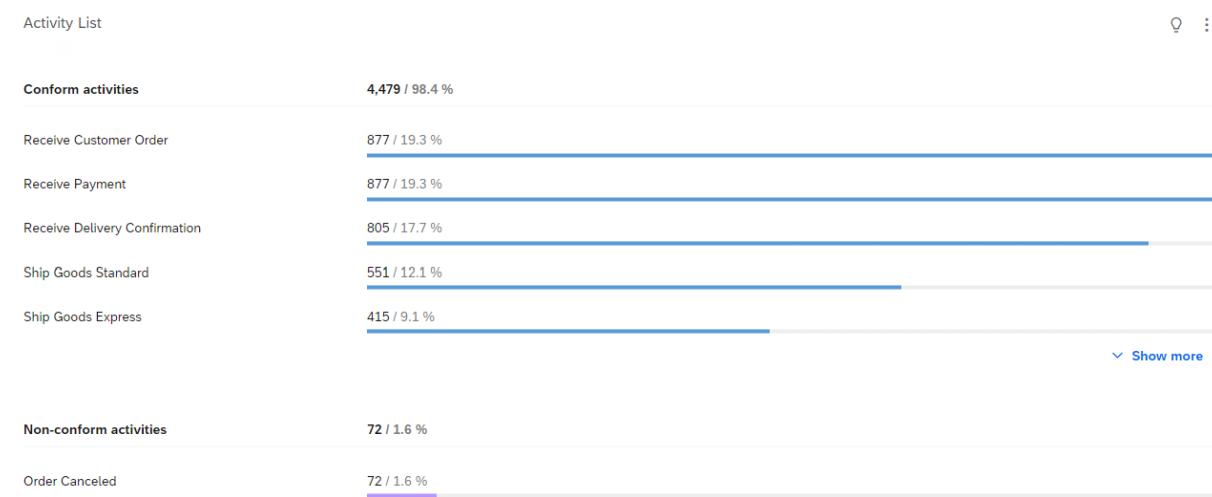
For all activities, the total number of occurrences is given in absolute numbers, as well as percentages.

#### Prerequisites

A BPMN model is linked to the dashboard or investigation. See more in [Link a BPMN Diagram to a Dashboard \[page 336\]](#) and [Link a BPMN Diagram to an Investigation \[page 319\]](#).

#### Adding the Widget

To add a widget to a dashboard or investigation, select *Create Widget* or *Add widget* respectively, then choose the widget type you need.



The widget displays up to five activities by default. To show all activities, click *Show more*. You can reduce the number of activities again with *Show less*.

## Widget Settings

To open the widget settings, choose  (more options) in the widget and select [Edit](#). Then, apply your changes.

Option	Mandatory	Description
Name	no	Specify a name for the widget. If you don't provide a name, the widget type is set as the name.
Description	no	A description adds context to the data. When a description exists, an info icon  is displayed on the widget. When users select the icon, the description is shown.

### 4.5.3.2 *Process Conformance*

Check if the actual process flow, as recorded in the event log, matches the planned model and vice versa. Identify hotspot activities in variants and see how actual paths look like.

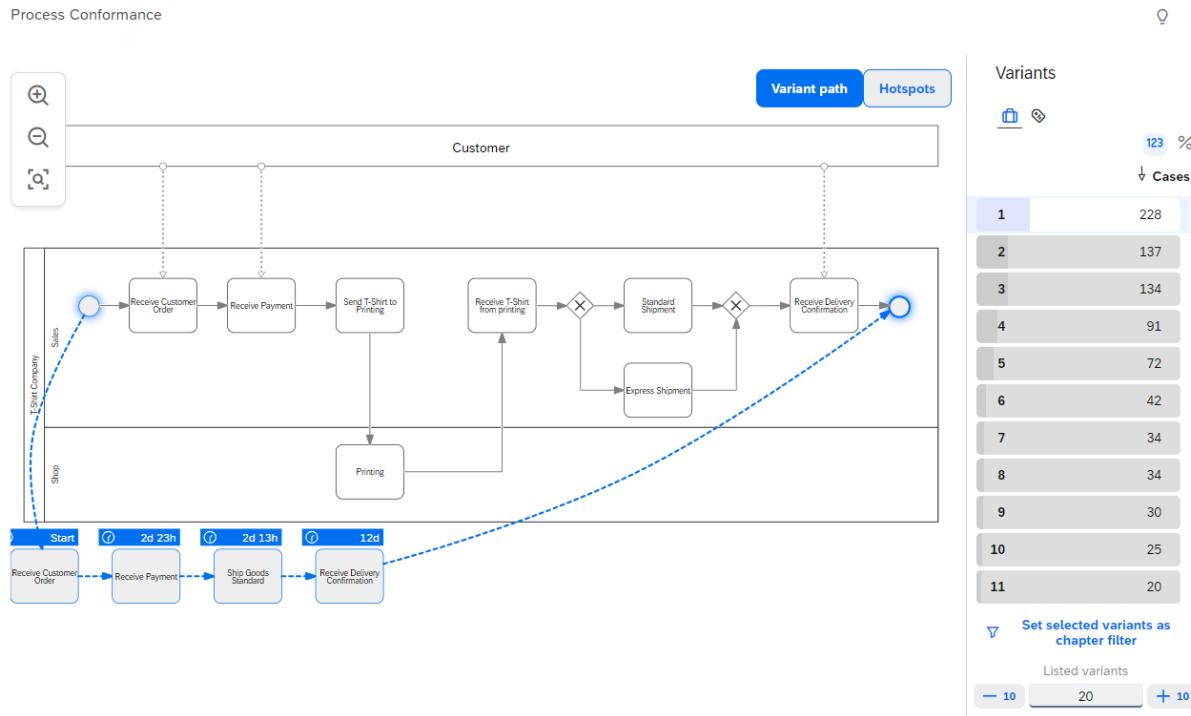
You can browse through all variants one by one. If you want to compare several variants, we recommend using the [Variant Explorer](#) widget.

## Prerequisites

A BPMN model is linked to the dashboard or investigation. See more in [Link a BPMN Diagram to a Dashboard \[page 336\]](#) and [Link a BPMN Diagram to an Investigation \[page 319\]](#).

## Adding the Widget

To add a widget to a dashboard or investigation, select [Create Widget](#) or [Add widget](#) respectively, then choose the widget type you need.



The BPMN model is always displayed in the background, while the paths or hotspots are displayed as overlays. You explore the different variants with the panel on the right.

## Widget Settings

To open the widget settings, choose (more options) in the widget and select [Edit](#). Then, apply your changes.

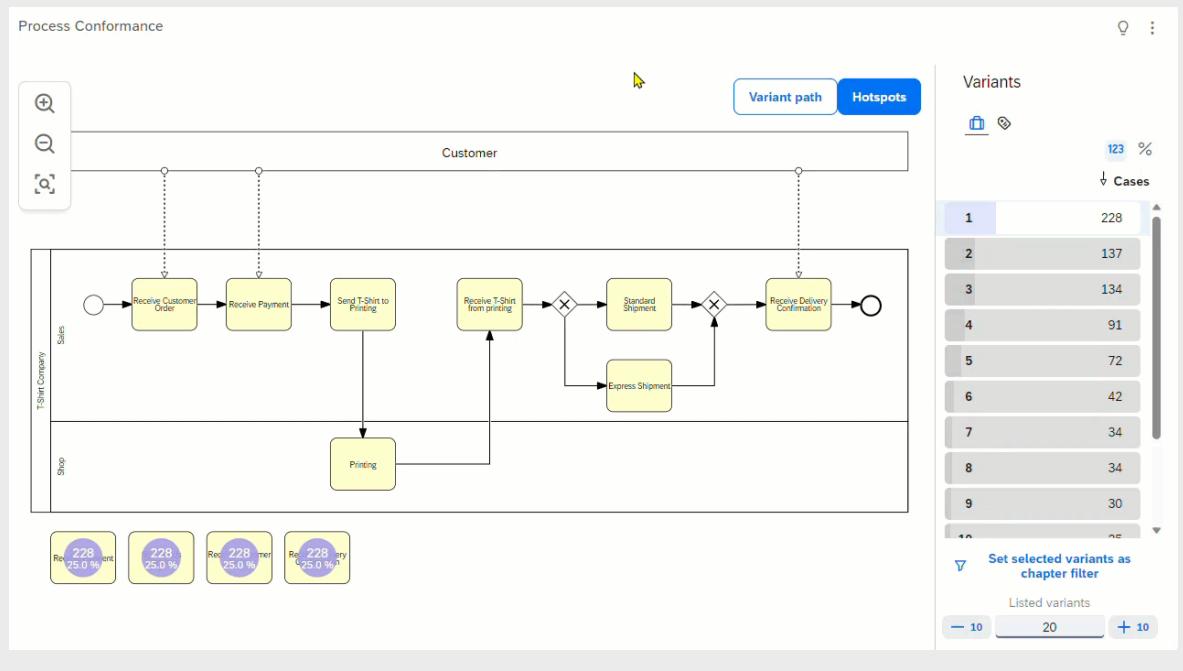
Option	Mandatory	Description
Name	no	Specify a name for the widget. If you don't provide a name, the widget type is set as the name.
Description	no	A description adds context to the data. When a description exists, an info icon  is displayed on the widget. When users select the icon, the description is shown.

## Viewing a Variant Path or Hotspots

With [Variant path](#) and [Hotspots](#), you can switch between path view and hotspot view.

## Example

Watch how to switch between path view and hotspot view



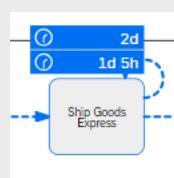
The following options are available:

- **Variant path:** Displays the average activity sequence of a variant.
  - Variant paths are highlighted in blue.
  - The average duration between activities is always displayed.
  - If an activity is executed several times, the different durations are displayed on top of each other. At the bottom is the duration of the first execution. Above that is the duration for the second occurrence within the same case, and so on.

## Example

View an express shipping activity that is done twice

The first shipment lasts on average 1 day and 6 hours, the second 2 days.



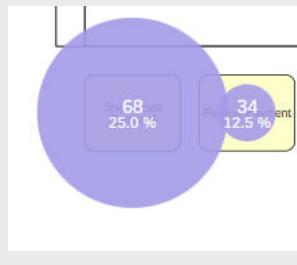
- **Hotspot:** Displays how often activities of a process variant have been executed.
  - Hotspots are marked with a turquoise circle and display the execution frequency in total numbers and in percent.
  - The circle size indicates the execution frequency.

## ❖ Example

[View a hotspot example](#)

For the selected variant, the following applies:

- 68 times goods were shipped using the standard shipping, which is 25% of all activities.
- Receiving a t-shirt from printing occurs 34 times, which is 12.5% of all activities.
- Shipping goods with express was never executed.



## Exploring Variants

You can explore each variant with the following options:

- Sort the variants by the following criteria:
  -  Number of cases
  -  Duration attribute  
Select a duration attribute from the drop-down list.
  -  Cost attribute  
Select a cost attribute from the drop-down list.
- Change the sort order with  and 
- Switch between total numbers and percentages with  and 
- View the path of each variant by selecting or deselecting the variants in the panel on the right

## Applying a Variant Filter

A variant filter narrows down data to the activities of one process variant.

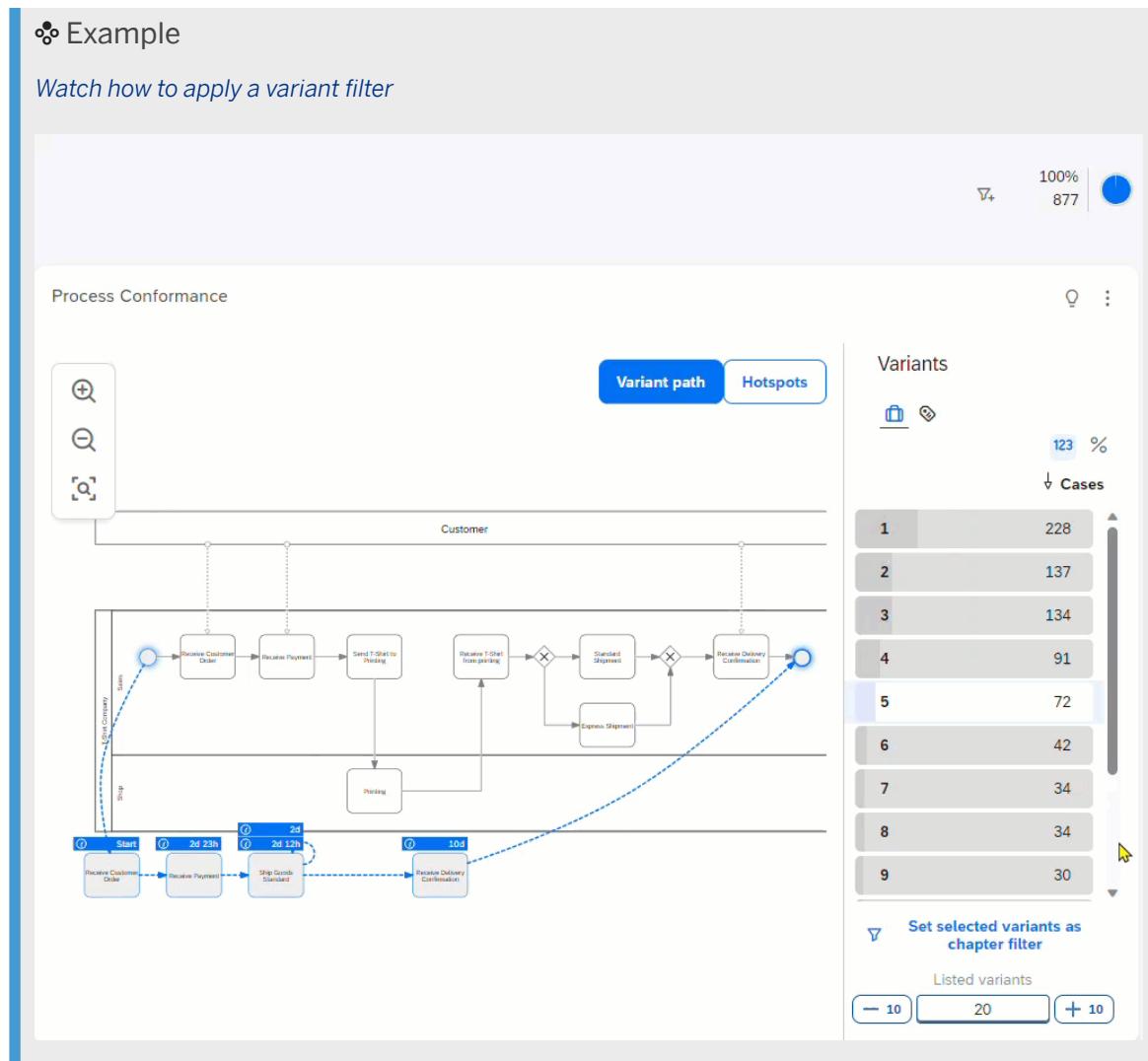
To create a filter based on a process variant, follow this step:

- Select a variant and click  [Set selected variants as chapter filter](#).

The filter applies to the entire dashboard or investigation.

## ❖ Example

*Watch how to apply a variant filter*



This filter option is available in addition to the filter function in the widget menu, read more in section [Apply filters \[page 443\]](#).

## Zooming in and out the Process Model

You've the following options:



Zoom in



Zoom out



Zoom to fit the process model to the widget size

---

You can also press **[ctrl]** on your keyboard and use your mouse wheel/trackpad to zoom in and zoom out.

## Related Information

[Variant Explorer \[page 431\]](#)

### 4.5.3.3 Process Diagram

Display the latest revision of a process model from SAP Signavio Process Manager. From the widget, you can open the model in the editor of SAP Signavio Process Manager, or compare it with other revisions or models.

These types can be displayed:

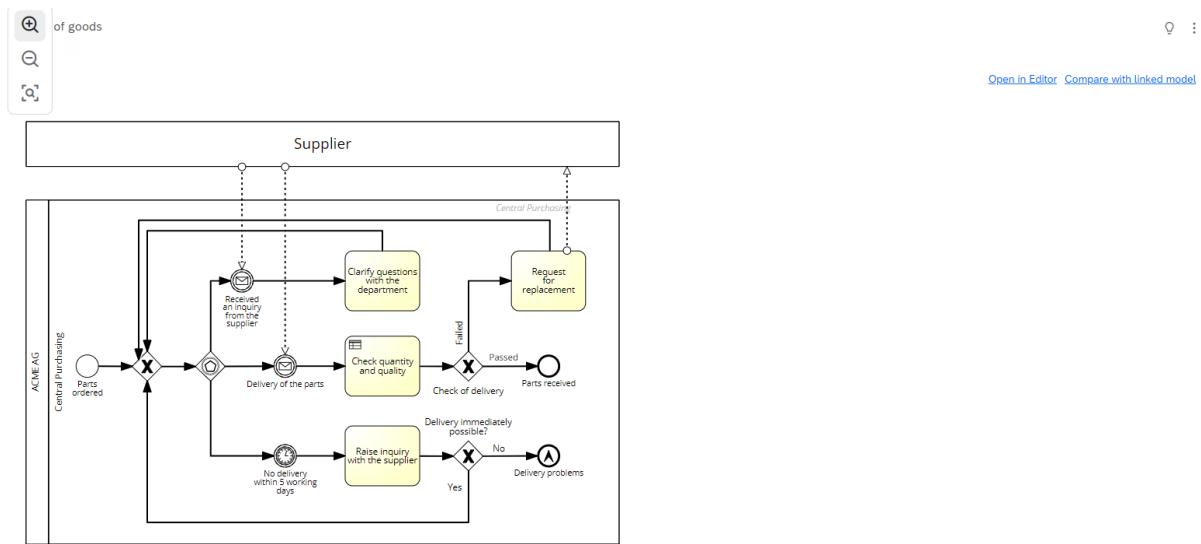
- BPMN diagrams, see section [Business Process Modeling and Notation \(BPMN\)](#)
- [Value Chains](#)
- [Customer Journey Maps](#)

## Prerequisites

A BPMN model is linked to the dashboard or investigation. See more in [Link a BPMN Diagram to a Dashboard \[page 336\]](#) and [Link a BPMN Diagram to an Investigation \[page 319\]](#).

## Adding the Widget

To add a widget to a dashboard or investigation, select [Create Widget](#) or [Add widget](#) respectively, then choose the widget type you need.



## Widget Settings

To open the widget settings, choose (more options) in the widget and select [Edit](#). Then, apply your changes.

Option	Mandatory	Description
Name	no	Specify a name for the widget. If you don't provide a name, the widget type is set as the name.
Description	no	A description adds context to the data. When a description exists, an info icon  is displayed on the widget. When users select the icon, the description is shown.
Diagram	yes	Type to search the diagram you want to display in the widget.

## Opening the Diagram in SAP Signavio Process Manager Editor

To open the diagram in SAP Signavio Process Manager, click [Open in Editor](#).

## Comparing Diagrams

The following applies:

- The widget always displays the latest revision of a diagram.
- In a dashboard or investigation, a specific diagram revision is linked.

You've the following options:

Option	This option is available in the following case:	Description
Compare with previous version	The same diagram is linked in the widget and in the dashboard or investigation	SAP Signavio Process Manager opens in comparison view, displaying the latest revision in the widget and the revision linked in the dashboard or investigation.
Compare with linked model	Different diagrams are linked in the widget and in the dashboard or investigation	SAP Signavio Process Manager opens in comparison view, displaying the diagram in the widget and the diagram linked in the dashboard or investigation.

## Zooming in and out the Diagram

You've the following options:



Zoom in



Zoom out



Zoom to fit the process model to the widget size

You can also press **Ctrl** on your keyboard and use your mouse wheel/trackpad to zoom in and zoom out.

### 4.5.3.4 Process Discovery

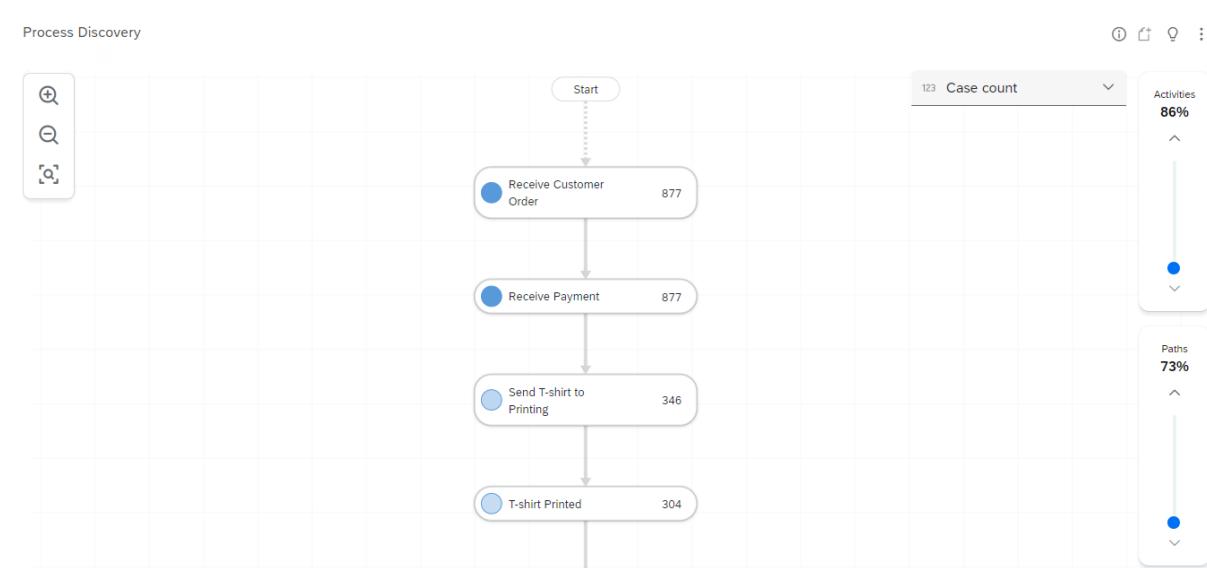
View a process model that is generated based on the event log data and understand how your process is performing, in terms of complexity and efficiency. Analyze conformance, cycle times, and occurrences of the individual activity sequences.

By default, the widget initially displays the most common or significant activities and paths.

On the widget, you can view the entire process or parts of it by adjusting the percentage of activities and paths that are displayed. The higher the percentage, the more activities or paths are displayed.

## Adding the Widget

To add a widget to a dashboard or investigation, select *Create Widget* or *Add widget* respectively, then choose the widget type you need.



## Widget Settings

To open the widget settings, choose (more options) in the widget and select *Edit*. Then, apply your changes.

Option	Mandatory	Description
Name	no	Specify a name for the widget. If you don't provide a name, the widget type is set as the name.
Description	no	A description adds context to the data. When a description exists, an info icon  is displayed on the widget. When users select the icon, the description is shown.

## Displaying Event and Case Count, Cycle Times, and Metrics

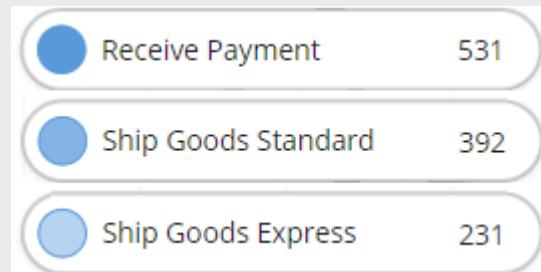
The following options are available:

- *Event count*: Display how often activities are executed.

- The line width shows the occurrence of activities.
- The number on an activity shows how often it was executed.
- The number on a connector shows how often the related activities have followed one another.
- **Case count:** Display how many unique cases are involved in each activity.
  - The number on an activity shows how many cases passed through an activity.
  - The color of the circle in an activity shows the number of cases. The darker the color, the higher the case count.

### ❖ Example

View activities with colored circles of different brightness



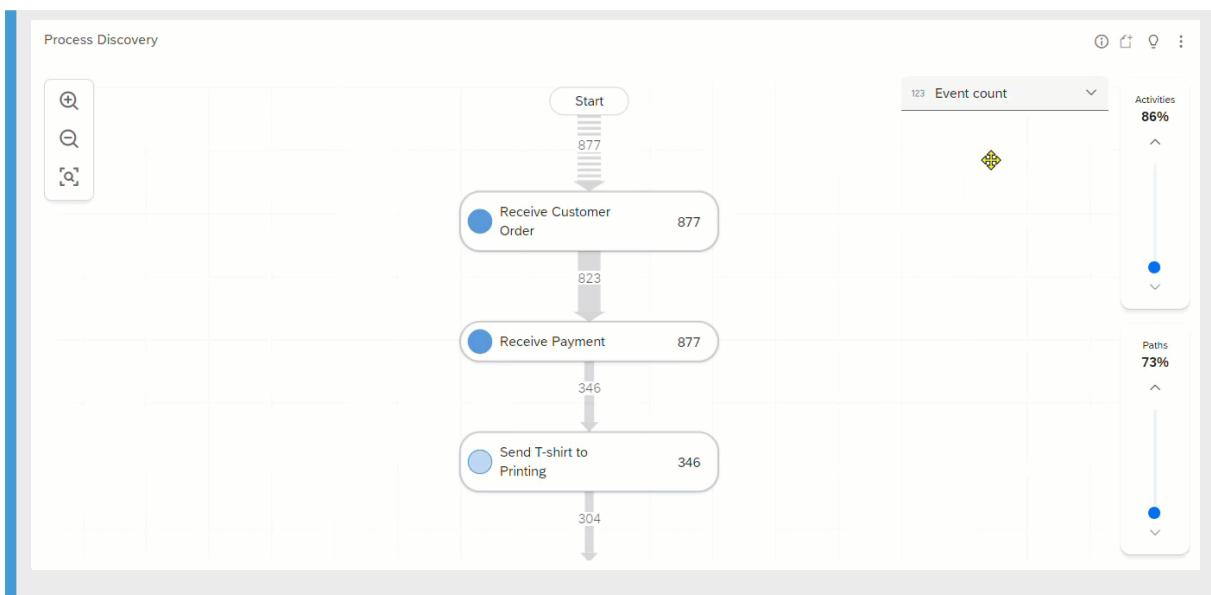
- **Cycle time:** Display how much time is between two activities or how long an activity takes.
  - Events are sorted by timestamp. If multiple events have the same timestamp, they're sorted alphabetically by name.
  - The line width shows the duration between activities.
  - The number on a connector shows the average duration between two activities.
- **Metrics:** Select the metric to display on the activities.
  - If thresholds have been set for a metric, the color of the circle indicates how the current metric value relates to the defined thresholds.

### → Remember

Only metrics of the aggregation type **over events** are available for selection here. To learn where metrics over events or cases are available, see [Where to use metrics \[page 480\]](#).

### ❖ Example

Watch how to switch between occurrences and cycle time



## Setting the Number of Displayed Activities and Paths

You can set how many activities and paths are displayed with the sliders:

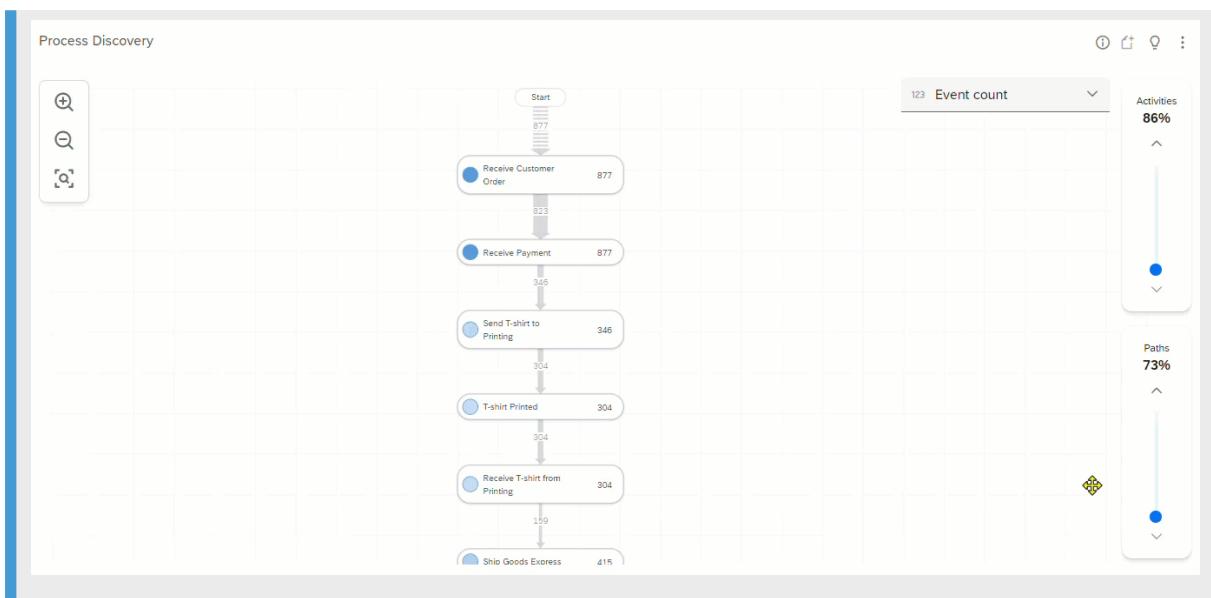
- If you change the activities percentage, more or less activities are displayed in the diagram. Activities are added or removed based on a significance algorithm, with frequency being an important factor.
- If you change the paths percentage, more or less of the paths are displayed for the currently displayed activities. Paths are added or removed based on the frequency of the path.

For example, when you change the percentage of activities to 60%, the widget displays 60% of activities with the highest frequency.

When changing percentages, newly added activities and paths are colored blue for a few seconds to highlight the addition.

### Example

Watch how to change the number of displayed activities and paths



## Comparing Multiple Process Discoveries

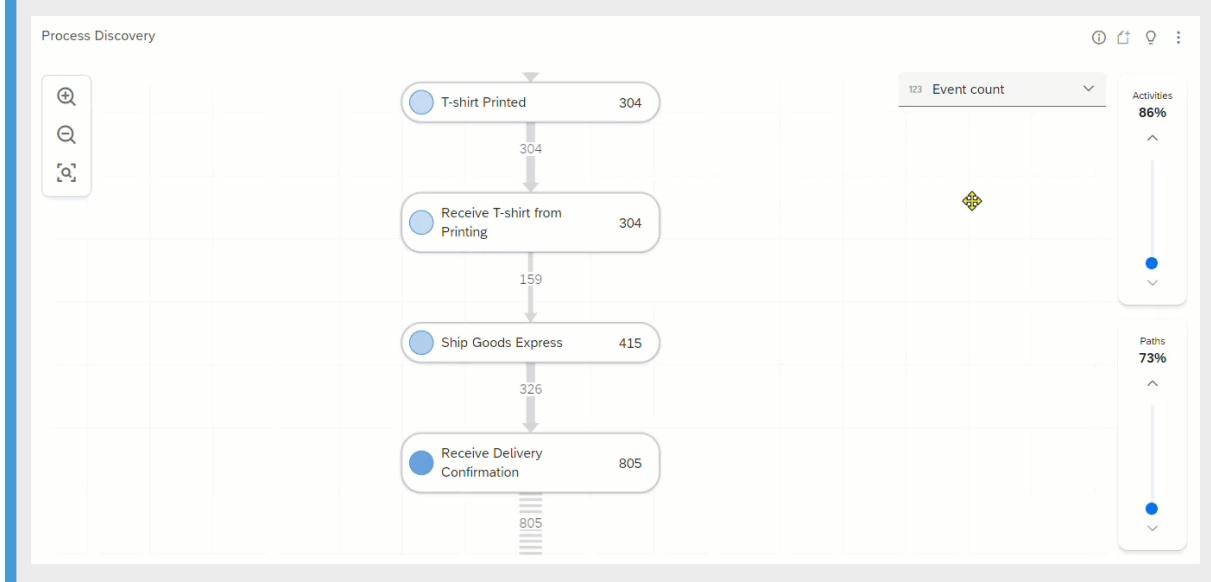
To visually compare multiple discoveries, add several *Process Discovery* widgets to your dashboard or investigation.

## Creating an Activity Filter or a Sequence Filter

You can select one or more activities or a connector in the widget and create a filter from that selection.

### Example

Watch how to apply a filter



You can apply your filter to the widget or the dashboard or investigation.

To create a filter from selected items, follow these steps:

1. In the widget, select the items you want to filter.  
You can select a single activity, multiple activities, or a connector.
2. Click  **Add** in the widget and select one of the following options:
  - *Filter widget*: The filter applies only to the widget.
  - *Filter dashboard* or *Filter investigation*: The filter applies to all widgets on the dashboard or investigation.

The filter options menu opens.

3. Select the filter option.

What options are available depends on how much and which elements you've selected.

Your selection	Filter options
<b>One activity selected</b>	<ul style="list-style-type: none"><li>• Cases that contain the selected activity</li><li>• Cases that don't contain the selected activity</li></ul>
<b>Multiple activities selected</b>	<ul style="list-style-type: none"><li>• Cases that contain all selected activities</li><li>• Cases that don't contain selected activities</li></ul>
<b>One connector selected</b>	<ul style="list-style-type: none"><li>• Cases where the first related activity is directly followed by the second related activity</li><li>• Cases where the first related activity isn't directly followed by the second related activity</li><li>• Cases where the first related activity is eventually followed by the second related activity</li><li>• Cases where the first related activity isn't eventually followed by the second related activity</li></ul>

The filter is applied.

This filter option is available in addition to the filter function in the widget menu, read more in section [Apply filters \[page 443\]](#).

## Zooming In and Out the Process Model

You've the following options:

	Zoom in
	Zoom out
	Zoom to fit the process model to the widget size

You can also press **[ctrl]** on your keyboard and use your mouse wheel/trackpad to zoom in and zoom out.

### 4.5.3.5 Process Funnel

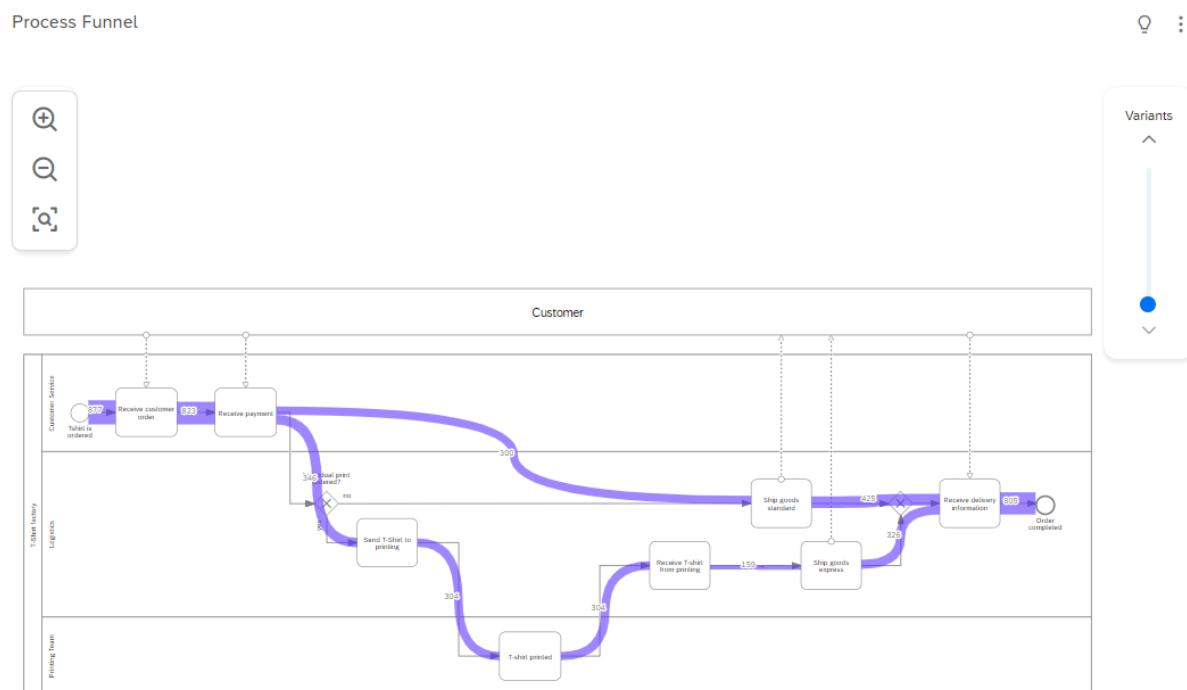
See for each variant which and how many cases follow a specific path. Find out where cases enter and leave the process and whether activities outside the process exist.

#### Prerequisites

A BPMN model is linked to the dashboard or investigation. See more in [Link a BPMN Diagram to a Dashboard \[page 336\]](#) and [Link a BPMN Diagram to an Investigation \[page 319\]](#).

#### Adding the Widget

To add a widget to a dashboard or investigation, select *Create Widget* or *Add widget* respectively, then choose the widget type you need.



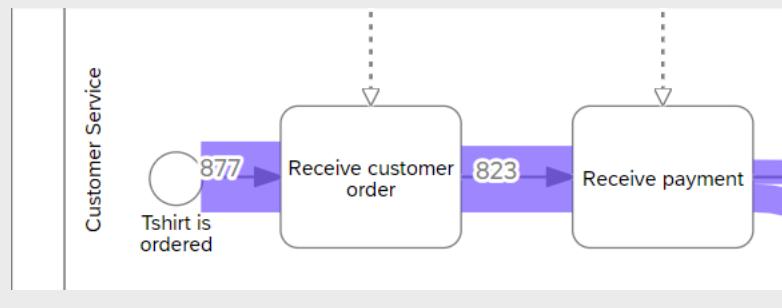
The following applies:

- The traffic patterns in your data are displayed as blue lines.
- The line width shows how much traffic follows a particular pathway.
- Circles at the end of a line show where customers enter or leave the process.
  - A circle with a triangle shows where traffic enters the process.
  - A circle with a square shows where traffic exits.

- Circles with numbers show where traffic outside of the main traffic pattern enters and exits the process.

### Example

*View activities with entry and exit points*



## Widget Settings

To open the widget settings, choose (more options) in the widget and select [Edit](#). Then, apply your changes.

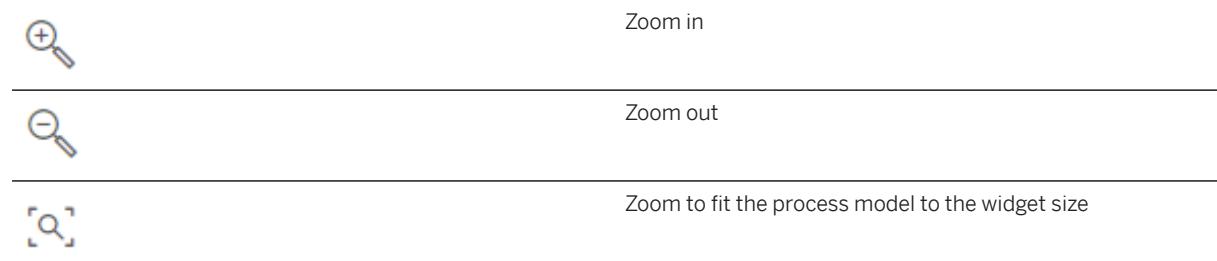
Option	Mandatory	Description
Name	no	Specify a name for the widget. If you don't provide a name, the widget type is set as the name.
Description	no	A description adds context to the data. When a description exists, an info icon  is displayed on the widget. When users select the icon, the description is shown.

## Setting the Number of Variants

You can set how many variants are displayed with the [Variants](#) slider.

## Zooming in and out the Process Model

You've the following options:



You can also press `Ctrl` on your keyboard and use your mouse wheel/trackpad to zoom in and zoom out.

### 4.5.3.6 Variant Explorer

Deep dive into the variants of your process, explore their distribution, and compare them with each other. Analyze conformance, cycle times, and occurrences of the individual activity sequences.

You can display one or several variants at a time and export a BPMN model based on selected variants.

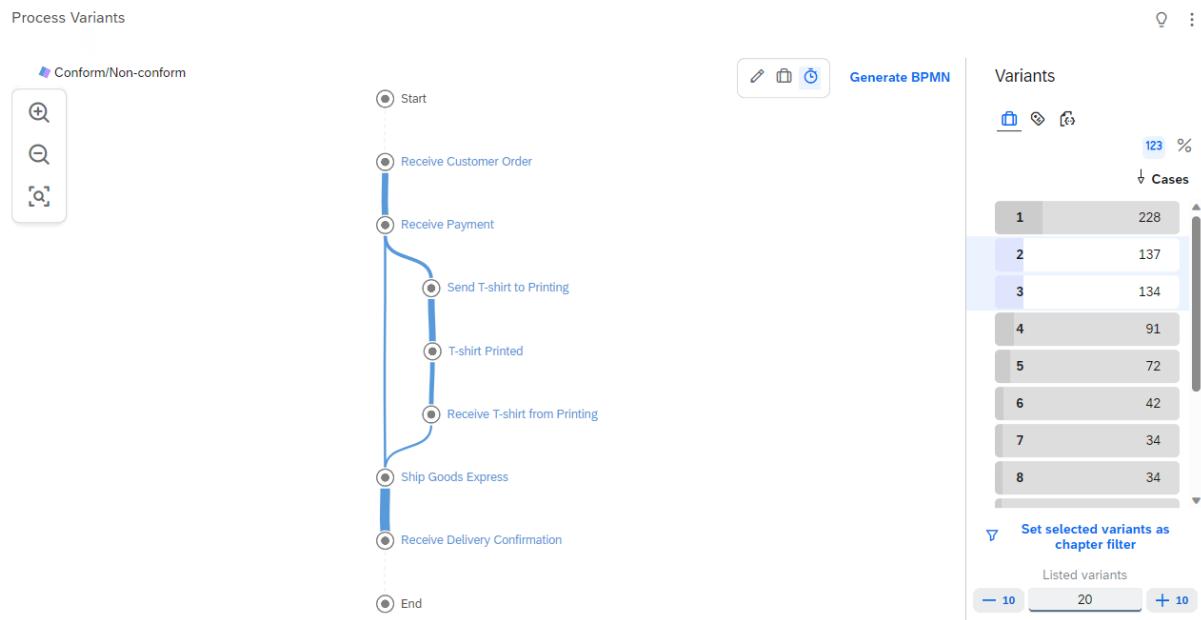
To check whether activities of a variant conform with the flow of a BPMN model or to view hotspot activities, we recommend using the *Process Conformance* widget.

## Prerequisites

A BPMN model is linked to the dashboard or investigation. See more in [Link a BPMN Diagram to a Dashboard \[page 336\]](#) and [Link a BPMN Diagram to an Investigation \[page 319\]](#).

## Adding the Widget

To add a widget to a dashboard or investigation, select *Create Widget* or *Add widget* respectively, then choose the widget type you need.



## Widget Settings

To open the widget settings, choose (more options) in the widget and select [Edit](#). Then, apply your changes.

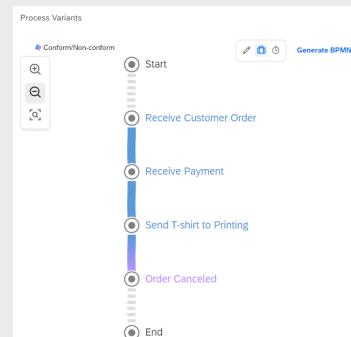
Option	Mandatory	Description
Name	no	Specify a name for the widget. If you don't provide a name, the widget type is set as the name.
Description	no	A description adds context to the data. When a description exists, an info icon  is displayed on the widget. When users select the icon, the description is shown.

Option	Mandatory	Description
Conformance	yes	<p>Specify whether the conformance of activities is displayed.</p> <p>If yes, all activities are color-coded as follows:</p> <ul style="list-style-type: none"> <li>• turquoise: conforming activities</li> <li>• lilac: non-conforming activities</li> </ul> <p>Without conformance is the default setting.</p>

### ❖ Example

View a process variant with conforming and non-conforming activities.

In this example, the activities **Receive Customer Order** and **Receive Payment** – colored turquoise – conform to the process, but the activity **Order Canceled** – colored lilac – doesn't conform.



## Display Occurrences and Cycle Times

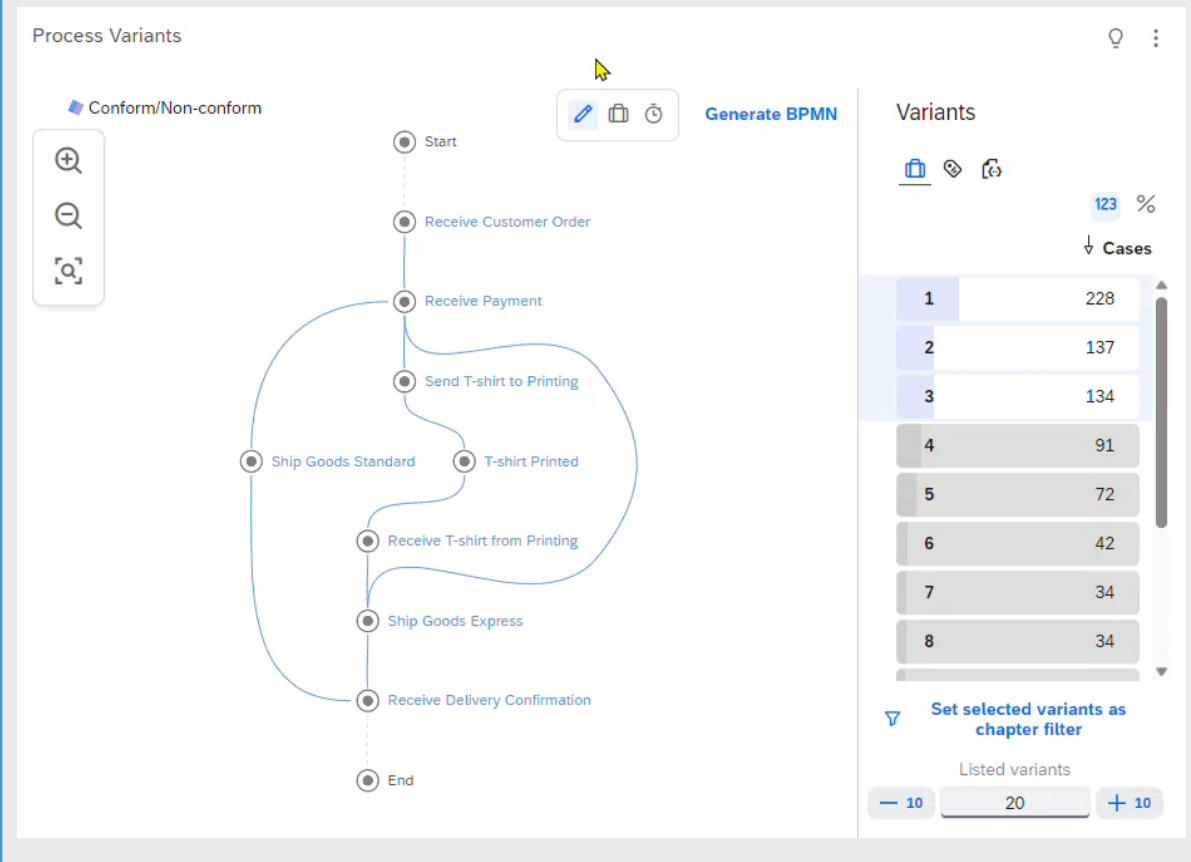
You can display occurrences and cycle times in the process flow. The following options are available:

- Process flow without occurrences or cycle time
- Occurrences
- Cycle time

The thickness of the paths within the process flow indicates the number of cases.

## Example

Watch how to display occurrences or cycle times.



## Explore the Variants

You've the following options:

- Choose the value to display for each variant:

- Number of cases
- Select an attribute from the drop-down list.
- Select a metric from the drop-down list.

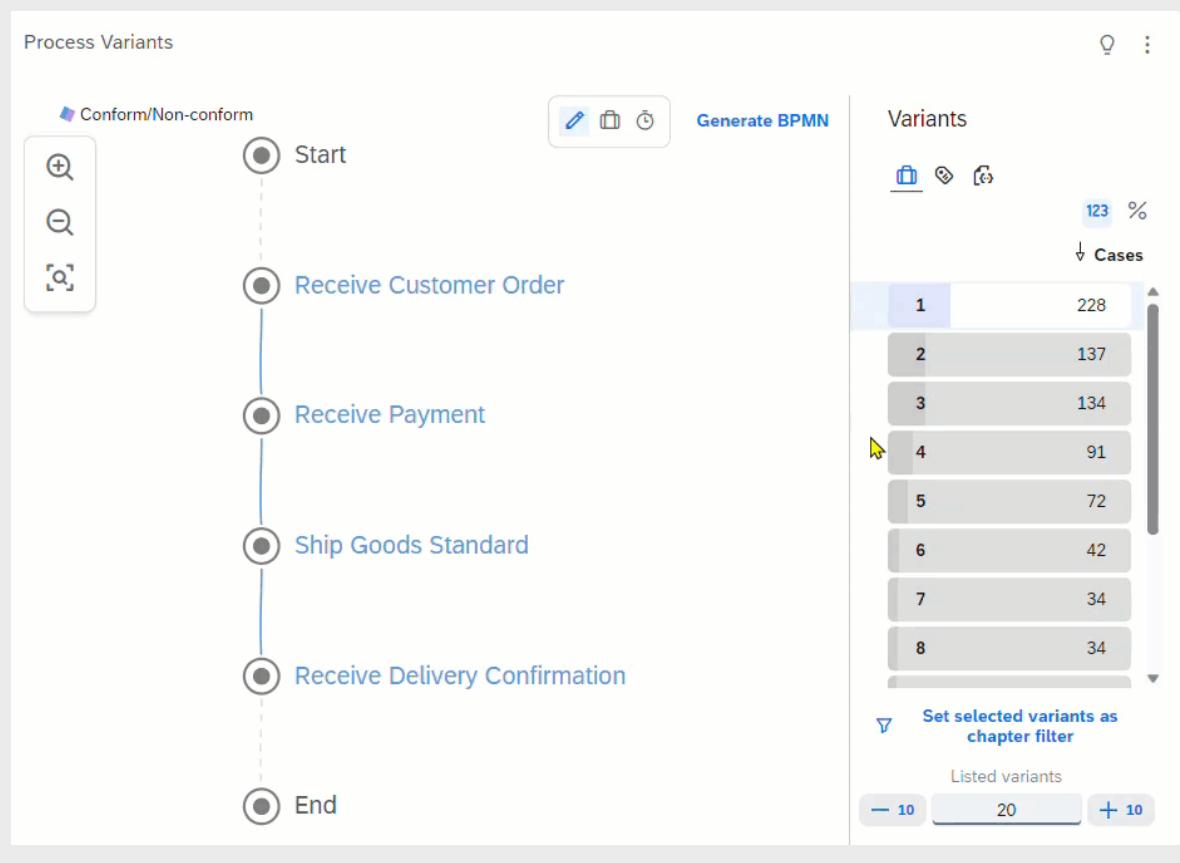
### Note

Only metrics of the aggregation type **over cases** are available here. Read more in section [Where to use metrics \[page 480\]](#).

- Change the sort order with  $\downarrow$  and  $\uparrow$  in the column header.
- Switch between total numbers and percentages with **123** and **%**.
- View the path of one or more variants by selecting or deselecting the variants in the panel on the right.
- View the number of cases and the duration by selecting an activity or a line between activities.
- Increase or decrease the number of variants to display with **+ 10** or **- 10**. By default, up to 20 variants are displayed.

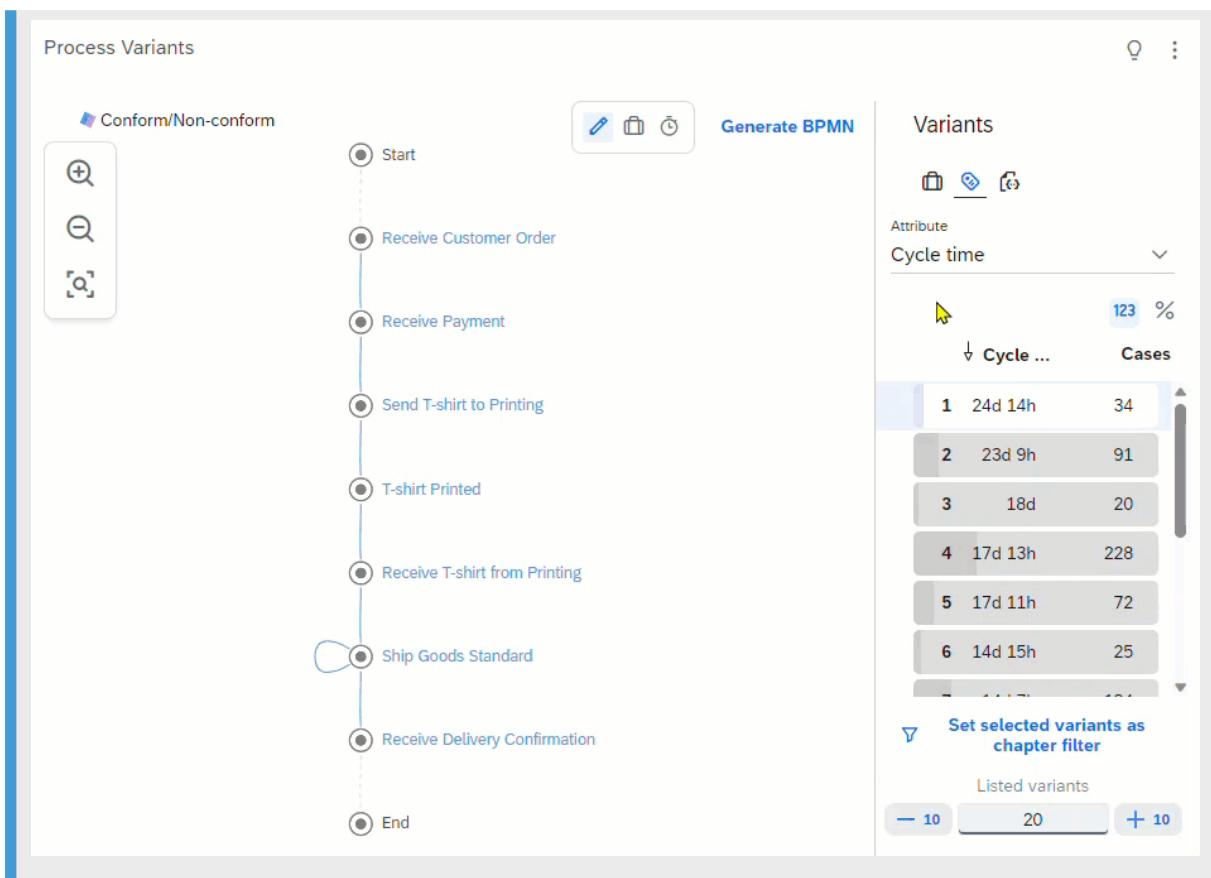
### ❖ Example

Watch how to view the path of one or more variants by selecting or deselecting the variants.



### ❖ Example

Watch how to select an attribute to display and switch from total numbers to percentages.



## Exporting Variants as a BPMN Model

Follow these steps:

1. Select one or more variants in the panel on the right.
2. Select [Generate BPMN](#).  
The SAP Signavio Process Manager editor opens with the process model of the variant.
3. You can name the process model, apply changes if necessary, and save the process model.  
Read more in section [Move and change elements](#).

## Applying a Variant Filter

A variant filter narrows down data to the activities of one or more process variants.

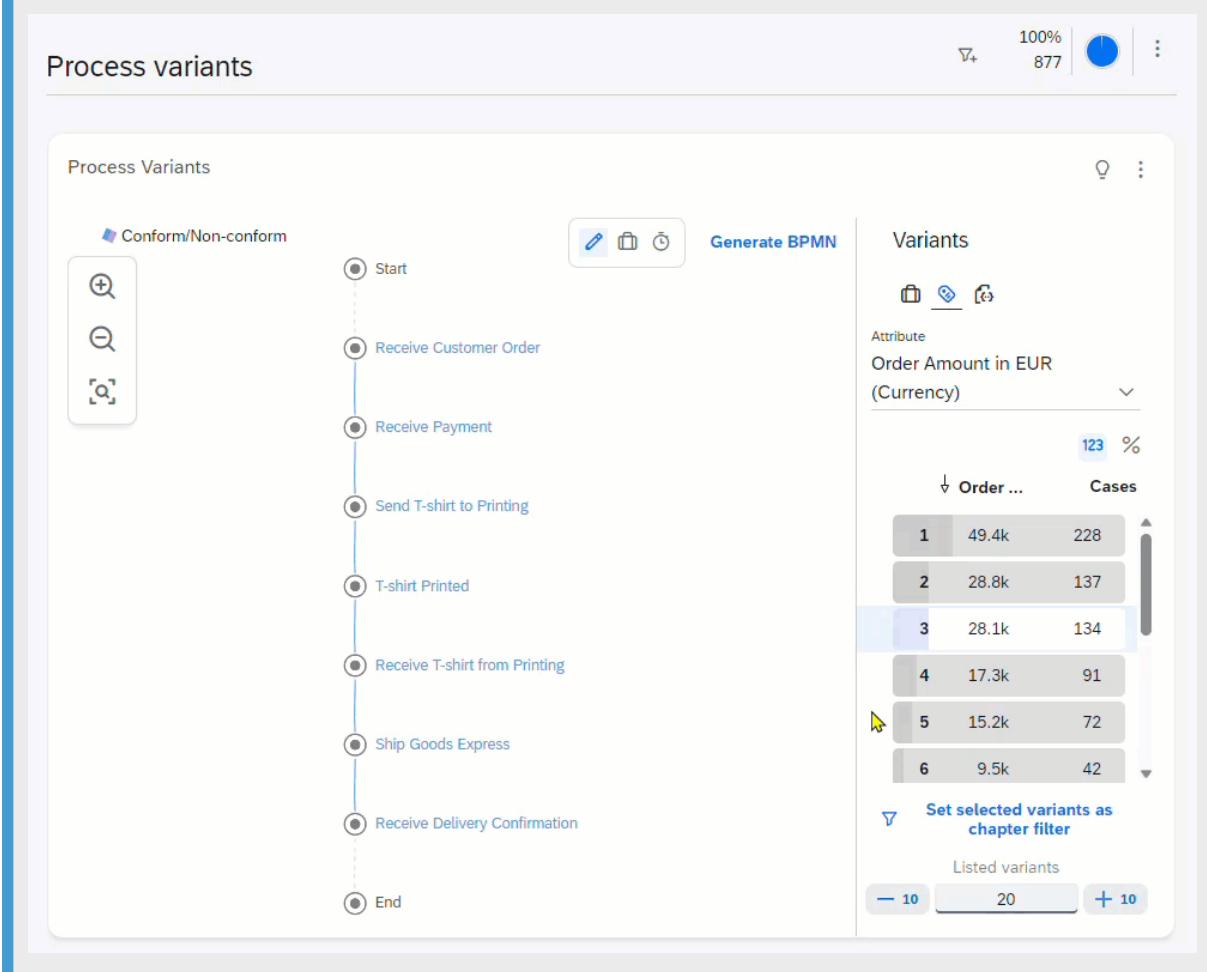
Follow these steps:

1. Select one or more variants, then (filter icon).
2. If your widget is on a dashboard, select [Apply selection as filter to current dashboard](#).  
The filter applies to the dashboard. If the dashboard has pages, the filter applies to all pages.

- If your widget is on an investigation, select *Apply selected variants as chapter filter*.  
The filter applies to the chapter with the widget. If no chapter exists, the filter applies to the investigation.

### Example

Watch how to apply a variant filter.



This filter option is available in addition to the filter function in the widget menu, read more in section [Filter process data \[page 443\]](#).

## Zooming In and Out the Process Model

You've the following options:



Zoom in



Zoom out



Zoom to fit the process model to the widget size

You can also press **[ctrl]** on your keyboard and use your mouse wheel/trackpad to zoom in and zoom out.

## Related Information

[Process Conformance \[page 416\]](#)

## 4.5.4 Utility Widgets

Learn how to add additional information to your data analysis using these SAP Signavio Process Intelligence widgets. For example, you can provide numbers or formulas in the grid of cells of a spreadsheet, or text information in rich text fields.

These widgets are available:

[Spreadsheet \[page 438\]](#)

Learn how to add a spreadsheet to your process analysis. With a spreadsheet, you can include additional information on your data analysis, and perform quick calculations with functions and formulas.

[Text \[page 442\]](#)

Use the text box to include additional information about your process analysis. Common formatting options are available.

### 4.5.4.1 Spreadsheet

Learn how to add a spreadsheet to your process analysis. With a spreadsheet, you can include additional information on your data analysis, and perform quick calculations with functions and formulas.

To add a widget to a dashboard or investigation, select *Create Widget* or *Add widget* respectively, then choose the widget type you need.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

## Widget Settings

To open the widget settings, choose  (more options) in the widget and select [Edit](#). Then, apply your changes.

Setting	Mandatory	Description
Name	no	Specify a name for the widget. If you don't provide a name, the widget type is set as the name.
Description	no	The description is displayed as info text when users click the info icon (  ) on the widget.

## Insert Options

You can just type information into a spreadsheet.

When pasting content, the context menu provides the following options:

- Insert row above
- Insert row below
- Insert column left
- Insert column right
- Remove row
- Remove column
- Undo
- Redo
- Read only

## Formatting Options

When selecting content, the context menu provides the following options:

Alignment	Text Formatting
Left	Bold
Right	Italic
Center	Underline
Justify	Strike

Alignment	Text Formatting
Top	
Middle	
Bottom	

## Functions and Formulas

The following functions and formulas are supported:

Function or Formula	Example
Any numbers, negative and positive as float or integer	1, -2, 1.45, -3.67
Arithmetic operations	+, -, /, *, and ^
Logical operations	AND(), OR(), NOT(), and XOR()
Comparison operations	=, >, >=, <, <=, and <>
Math constants	PI() and E()
String operations	concatenation, for example, -(2&5) returns -25
Cell coordinates	A1
Variables	TRUE, FALSE, and NULL

For information on how to use these functions and formulas, read more in [Microsoft's documentation for Excel formulas and functions](#).

## 4.5.4.2 Text

Use the text box to include additional information about your process analysis. Common formatting options are available.

To add a widget to a dashboard or investigation, select *Create Widget* or *Add widget* respectively, then choose the widget type you need.

### Widget Settings

To open the widget settings, choose  (more options) in the widget and select *Edit*. Then, apply your changes.

Setting	Mandatory	Description
Name	no	Specify a name for the widget. If you don't provide a name, the widget type is set as the name.
Description	no	The description is displayed as info text when users click the info icon (  ) on the widget.

### Insert and Formatting Options

Type or paste information into a *Text* widget.

Select some text to use the following formatting options:

-  Make the font bold
-  Make the font italic
-  Insert a link
-  Start a bullet list
-  Start a numbered list
-  Change the font size

-  Set text in quotes

## 4.6 Filters

SAP Signavio Process Intelligence allows you to filter the process data to focus on relevant information. Filters can be combined on multiple levels and are immediately applied to the displayed data, providing a more efficient and tailored analysis.

### Events and Cases

Event-level filters modify cases by including or excluding events based on the applied filter criteria. Event-level filtering can leave behind cases with empty event lists.

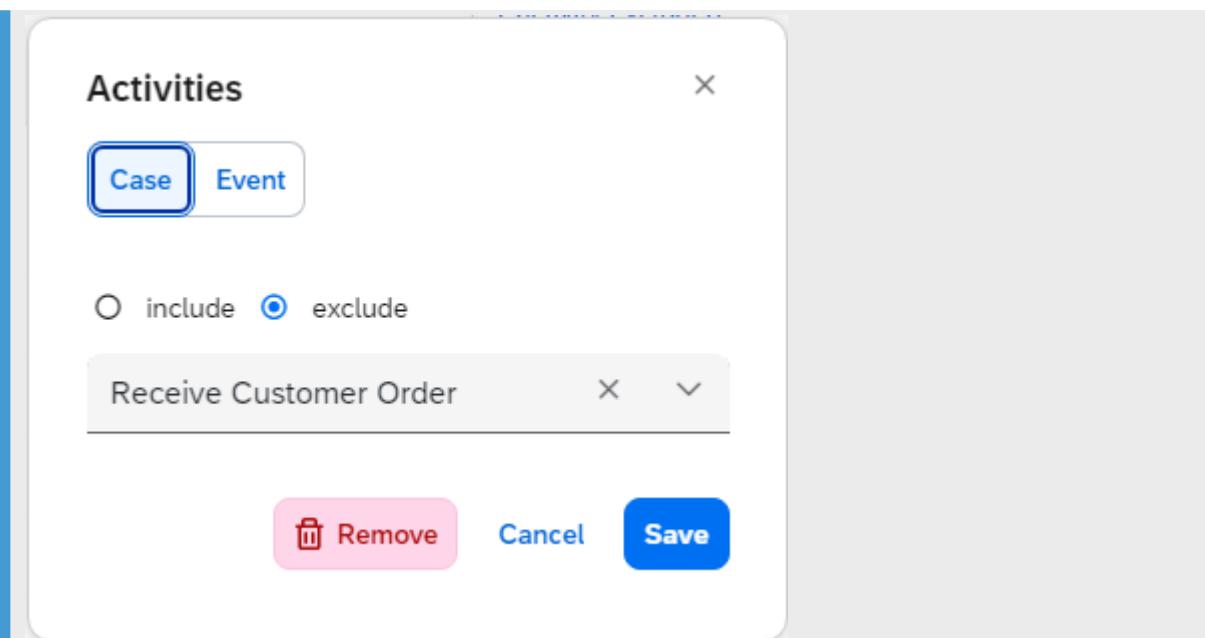
Case-level filters are always applied to complete cases in the process.

### ❖ Example

Given the following data in your process:

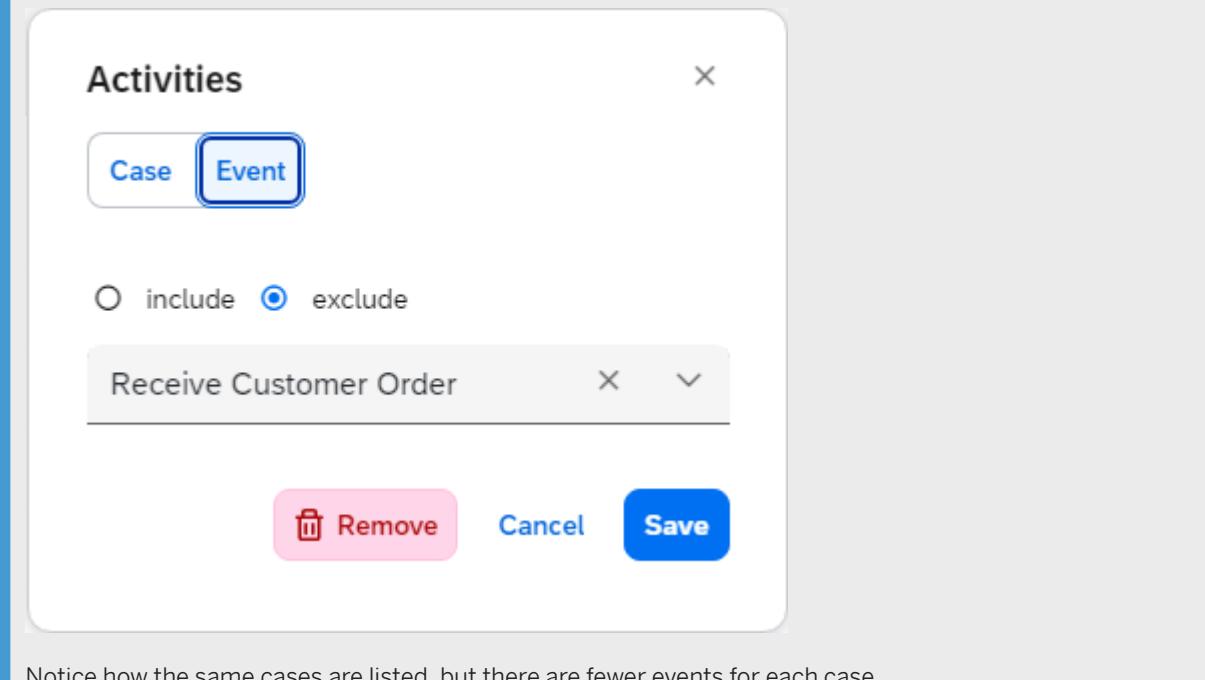
case_id	event_name
00007	Receive Customer Order Receive Payment Send items to Printing Items Printed Receive items from Printing Ship Goods Standard Receive Delivery Confirmation
00008	Receive Customer Order Change Order Quantity Receive Payment Ship Goods Express Receive Delivery Confirmation
00009	Receive Customer Order Receive Payment Receive Payment Ship Goods Express Receive Delivery Confirmation
00010	Receive Customer Order Change Order Quantity Receive Payment Ship Goods Express Receive Delivery Confirmation

The following case-level configuration filters out all cases with a 'Receive Customer Order' event.



The result is an empty list because all cases have a 'Receive Customer Order' event.

However, the same configuration on event-level returns the cases without the 'Receive Customer Order' events in the result set.



Notice how the same cases are listed, but there are fewer events for each case.

case_id	event_name
00007	Receive Payment Send items to Printing Items Printed Receive items from Printing Ship Goods Standard Receive Delivery Confirmation
00008	Change Order Quantity Receive Payment Ship Goods Express Receive Delivery Confirmation
00009	Receive Payment Receive Payment Ship Goods Express Receive Delivery Confirmation
00010	Change Order Quantity Receive Payment Ship Goods Express Receive Delivery Confirmation

## Application Levels

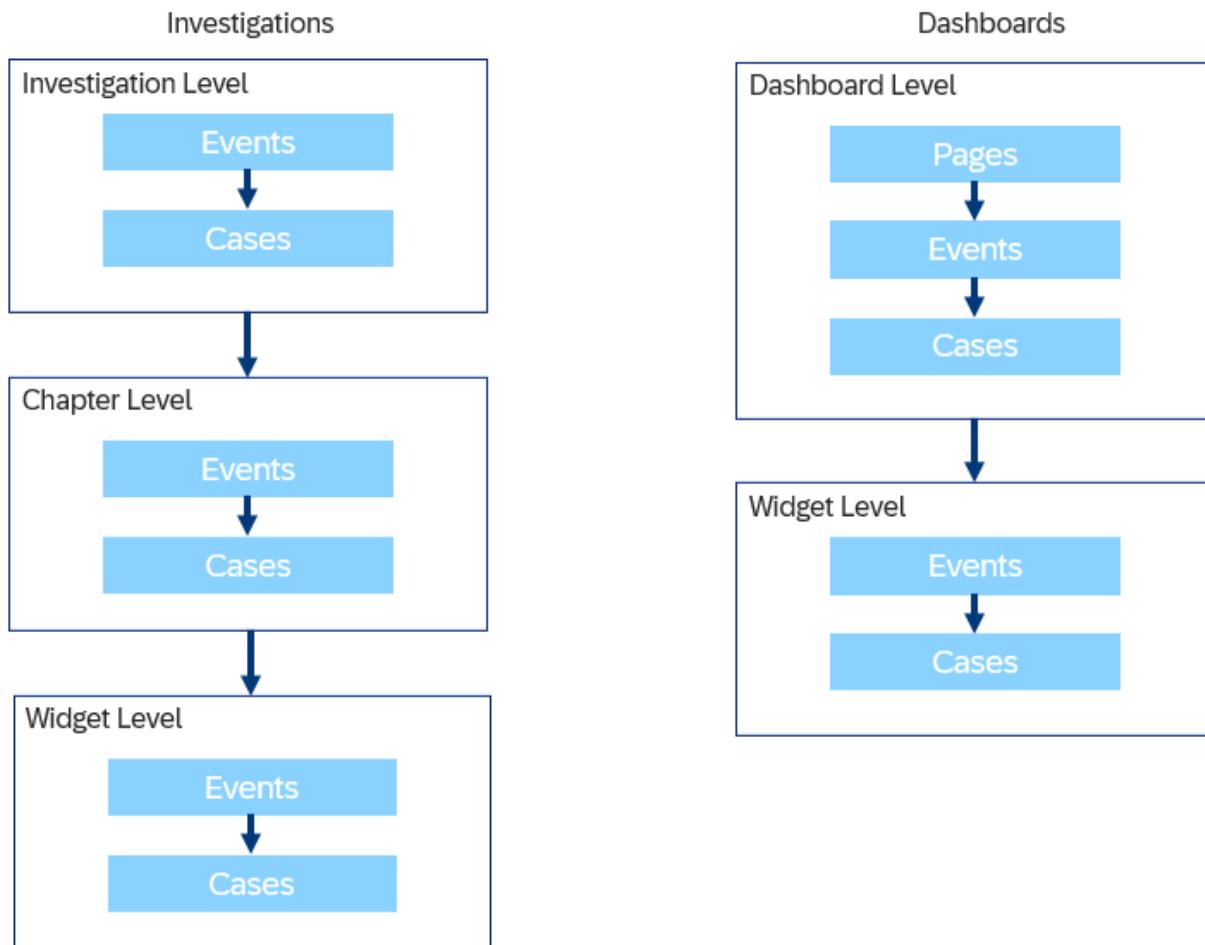
- Insights level, where filters are applied to the insights you create in the *Auto-insights* tab.
- Dashboard level, where the filters impact data across all pages and widgets or a specific page.
- Investigation level, in which the filters are applied to all chapters and widgets.
- Chapter level, where filters affect all widgets in a specific chapter of an investigation.
- Widget level, which restricts the filter's effect to that particular widget.
- Value case level, where the filter is applied on a particular value case calculation.

Each of these levels can have multiple filters. Filters across all levels are combined using the logical **AND** operator.

## Application Order for Investigations and Dashboards

The order in which the data is filtered depends on the type of filter and at which level the filter was applied, but not in what order the filters were created or are displayed on the user interface.

The filter order begins at the highest level and gradually narrows down. At each level, event-level filters are always applied before case-level filters.



## Filter Result

Any filter or change to a filter is immediately applied to the displayed data.

The number of cases included in the filter result is displayed in the investigation header. View an example below.

Example

Investigation

Activities  
1 activity excluded

Starts with  
Receive Customer ...

Case cycle time  
≥ 1 - < 10 day

21%  
185

For this investigation, three filters were created. The result includes 185 cases, which is 21% of the cases.

On widgets, the filter icon in the widget header indicates how many filters were created. View an example below.

## Example



Two filters are applied to the widget. When you hover over the filter icon , the absolute and percentage number of cases are displayed.

## Additional Filters for Widgets

Some widgets provide additional filter options:

- [Breakdown \[page 353\]](#)
- [Distribution \[page 354\]](#)
- [Over time \[page 355\]](#)
- [Process Conformance \[page 355\]](#)
- [Process Discovery \[page 355\]](#)
- [Variant Explorer \[page 357\]](#)

## Related Information

[Filter Types \[page 448\]](#)

[FILTER EVENTS Clause](#)

## 4.6.1 Filter Types

Get to know the different types of filters available in SAP Signavio Process Intelligence.

### Activities

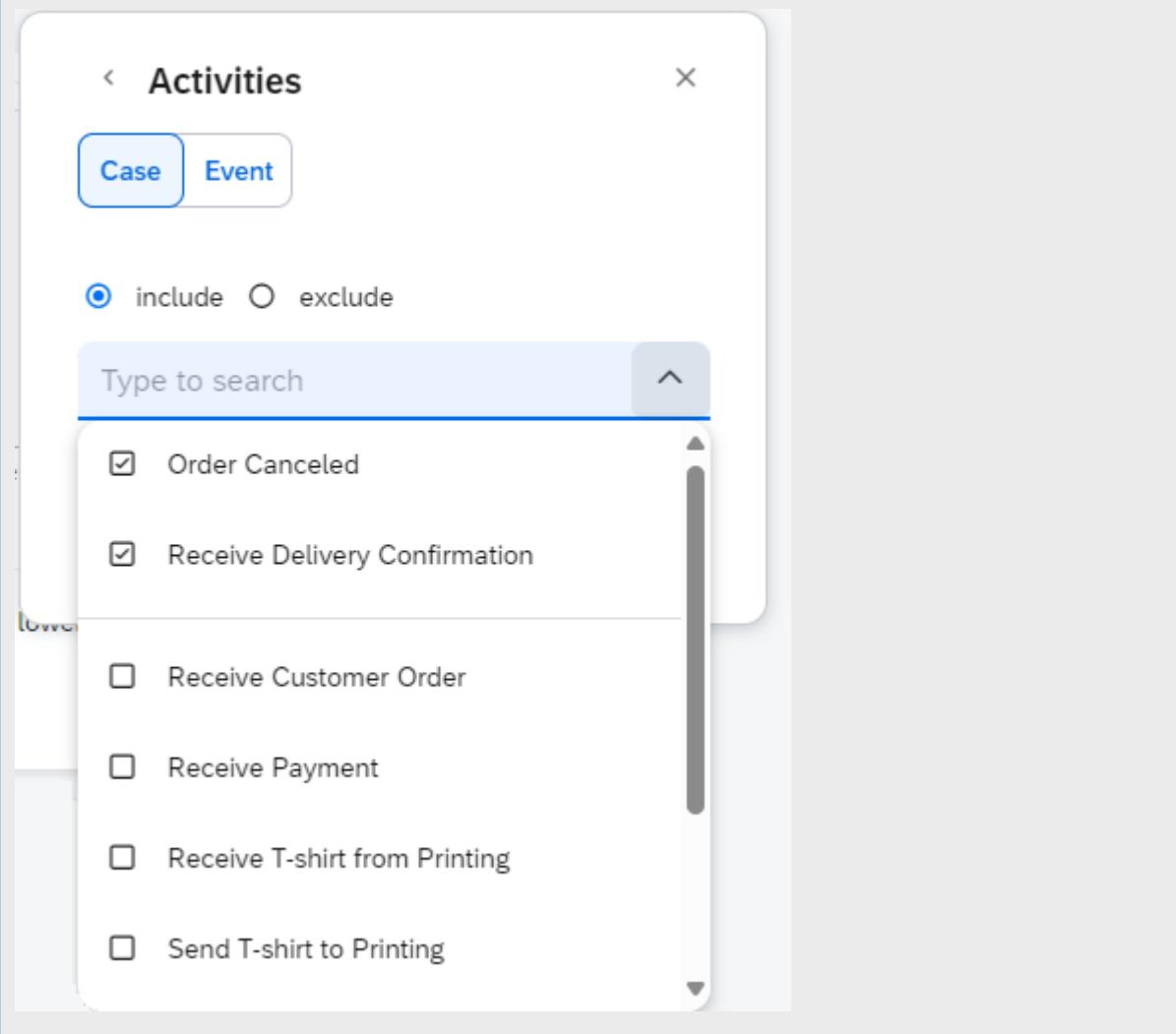
Use this filter to find cases by including or excluding events.

Choose whether to filter on case or event level:

- **Case:** Only show cases that meet the specified conditions.
- **Event:** Show all cases but filter events based on the specified conditions.

Then, specify whether to include or exclude, and pick the events. To find cases that include certain events while excluding other events, two separate filters are needed.

### ⌚ Example



## Advanced Filter

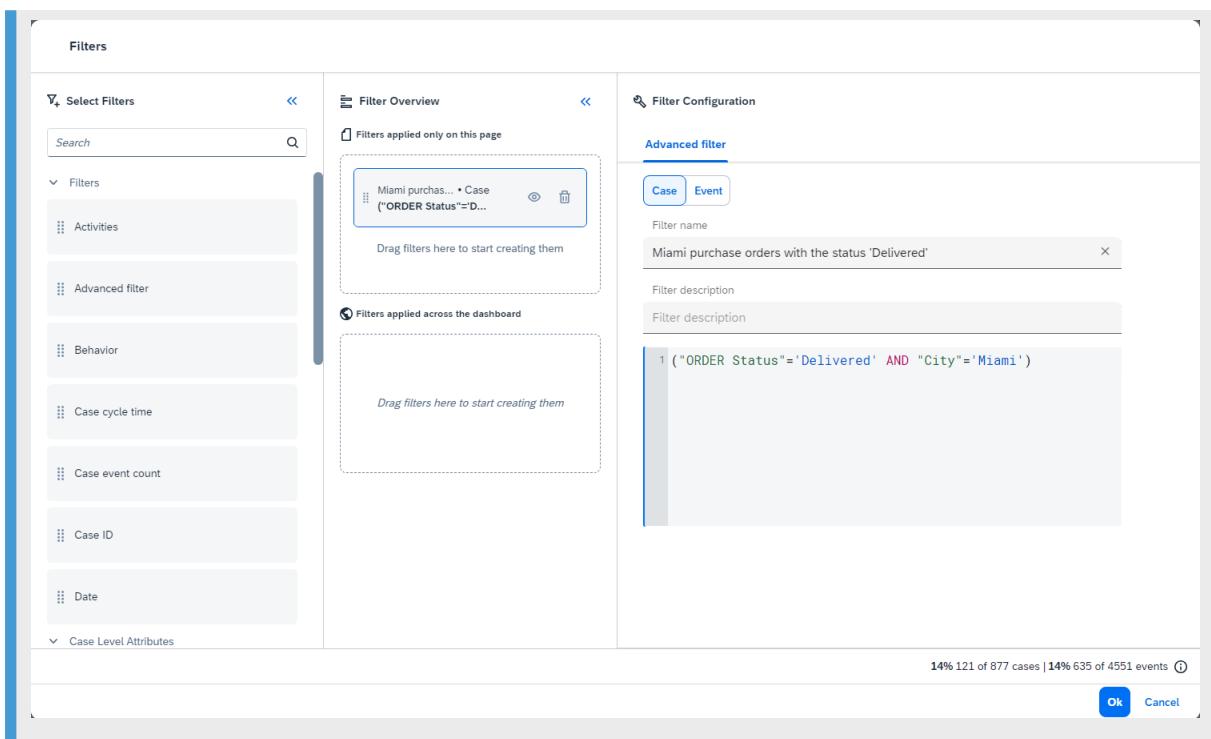
Filter for data using your own conditions, written in SIGNAL. For example, you can filter for all Miami purchase orders with the status 'Delivered' by applying the condition ("ORDER Status"='Delivered' AND "City"='Miami').

Choose whether to filter on case or event level:

- **Case:** Only show cases that meet the specified conditions.
- **Event:** Show all cases but filter events based on the specified conditions.

### ⌚ Example

[View the filter with an example condition](#)



## ⓘ Note

- This filter is only available on dashboards and Auto-insights.
- Multiple filters are always combined with the logical AND operator.
- A filter can only be saved when the SIGNAL code syntax is correct.
- Calculated attributes aren't supported, for example, attributes determined with the BUCKET() function or the CASE WHEN expression.

For more information on SIGNAL, follow these links:

- Read how to specify conditions in [WHERE clause](#).
- Read how to filter on event-level in [FILTER EVENTS Clause](#).
- Read about the SIGNAL editor functions like autocompletion, color scheme, and error linting in section [The SIGNAL Code Editor \[page 512\]](#).

## Behavior

Use this filter to find cases with activities that show a certain behavior. For example, you can focus on cases that start or end with certain activities, include certain activity sequences, or include or exclude rework.

These are the options:

Behavior	Description
<a href="#">Starts/ends with</a>	Show cases that start or end with a certain activity.

Behavior	Description
<a href="#">Sequence</a>	Show cases where a certain activity is directly, eventually (indirectly), never, or never directly followed by another activity.
<a href="#">Repeats/loops</a>	Show cases with or without rework. A case includes rework when activities were repeated.  When searching for cases with rework, you can specify how often activities were repeated.

## Case Cycle Time

Use this filter to find cases with a certain cycle time.

You can specify a minimum, a maximum, or both.

⌚ Example

The dialog box is titled "Case cycle time". It has two tabs: "Case" (selected) and "Event".  
 - \*\*From\*\*: Contains a dropdown with "≥" and a unit dropdown set to "days".  
 - \*\*Min\*\*: An empty input field.  
 - \*\*Unit\*\*: A dropdown set to "days".  
 - \*\*To\*\*: Contains a dropdown with "<" and a unit dropdown set to "days".  
 - \*\*Max\*\*: An empty input field.  
 - \*\*Unit\*\*: A dropdown set to "days".  
 At the bottom are "Cancel" and "Save" buttons, with "Save" being highlighted.

## Case Event Count

Use this filter to find cases with a certain number of events.

You can specify a minimum, a maximum, or both.

#### Example

The screenshot shows a modal dialog titled "Case event count". At the top, there are two tabs: "Case" (which is selected) and "Event". Below the tabs, there are two sections for filtering: "From" and "To". Each section has a dropdown menu with operators " $\geq$ " and " $\leq$ ", followed by a text input field. The "From" section is labeled "Min" and the "To" section is labeled "Max". At the bottom right of the dialog are two buttons: "Cancel" and "Save".

## Case ID

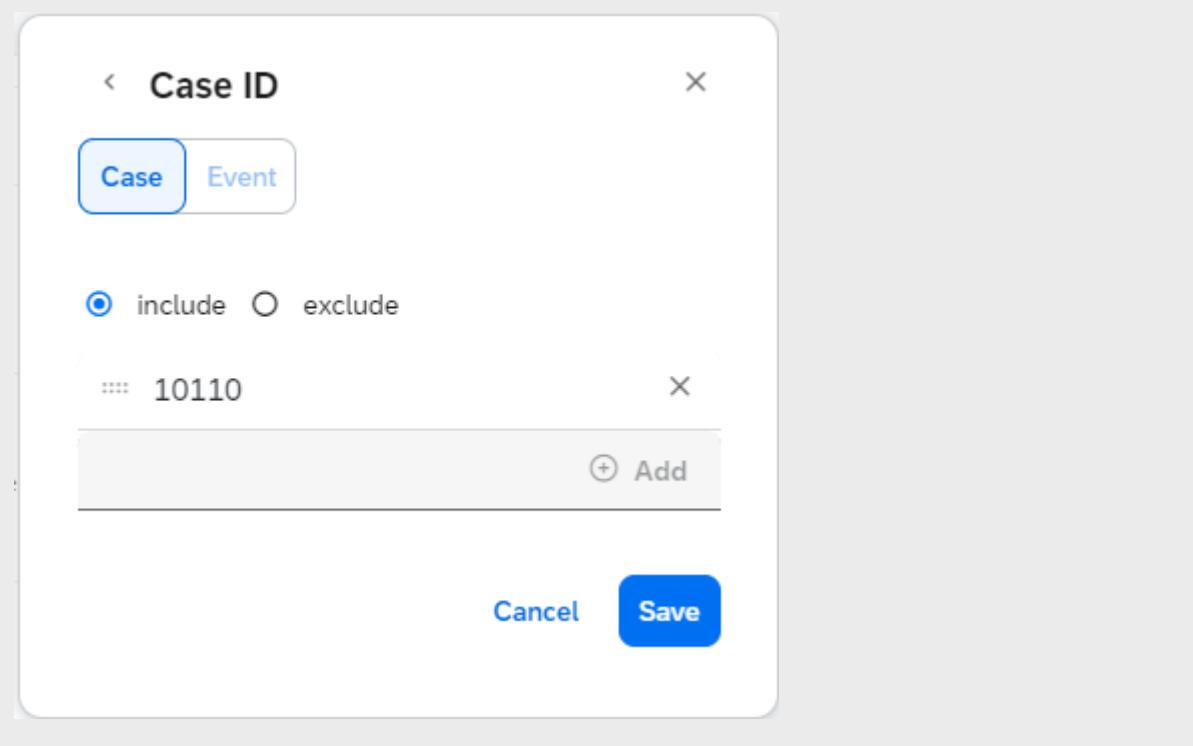
Use this filter to analyze cases with certain IDs.

To get the ID of the cases to be analyzed, create a [Case Table](#) and copy the ID from there.

#### ⓘ Note

Make sure to only enter the ID and only enter an ID once. If you enter leading or trailing spaces or enter an ID multiple times, the filter doesn't return any result.

### ❖ Example



For more information on how to create a [Case Table](#) widget, see [Case Table \[page 353\]](#).

## Date

Use this filter to find cases that have a certain status during a specified date range.

Choose whether to filter on case or event level:

- [Case](#): Only show cases that meet the specified conditions.
- [Event](#): Show all cases but filter events based on the specified conditions.

For filtering on case level, specify whether to find cases that are started, running, ended, or started and ended. Then, you pick one of these date range options:

- [Rolling date range](#): Display data from a fixed amount back in time to today's date. If you set the filter to 10 days, for example, data from the last 10 days is displayed.
- [Custom date range](#): Display the exact date range by selecting a start date and an end date.

When filtering on event level, you directly pick the date range option.

## About the Case Statuses

Since a case potentially spans many days, weeks, or other periods of time, you have to define exactly what you're searching for.

Status	Description
<i>Started</i>	Find all cases where the first event happens in the specified period of time.
<i>Running</i>	Find all cases that started before or in the specified period of time, but aren't yet finished.
<i>Ended</i>	Find all cases where the last event happened in the specified period of time.
<i>Started and ended</i>	Find all cases that started before or in the specified period of time and that are finished.

#### ⓘ Note

The [Date](#) filter is not available on value cases.

## Case and Event-Level Attributes

Choose an attribute to find cases where the attribute does or doesn't have a certain value.

Choose whether to filter on case or event level:

- [Case](#): Only show cases that meet the specified conditions.
- [Event](#): Show all cases but filter events based on the specified conditions.

The data type of the selected attribute determines the filtering options. For each filtering option, there's an example below.

#### ⚖ Example

For choice attributes, you can specify whether to include or exclude them.

The screenshot shows a modal dialog box with the title "City". At the top left is a back arrow and at the top right is a close button (X). Below the title are two tabs: "Case" (which is highlighted with a blue border) and "Event". Underneath the tabs is a radio button group with two options: "include" (which is selected, indicated by a blue outline) and "exclude". Below this is a text input field containing the value "Houston". To the right of the input field are two small buttons: a "X" button and a double arrow "▼" button. At the bottom of the dialog are two buttons: "Cancel" on the left and a large blue "Save" button on the right.

For numbers, you can specify a minimum, maximum, or both.

The dialog title is "Order Amount in EUR". It has tabs for "Case" (selected) and "Event". There are two sets of input fields: one for "From" (Min) and one for "To" (Max). Both sets include a dropdown with operators " $\geq$ " and " $\leq$ ", a text input field with the value "200" or "500", and a "Min" or "Max" label. At the bottom are "Cancel" and "Save" buttons.

From	Min
$\geq$	200

To	Max
$\leq$	500

Cancel Save

For durations, you can specify a minimum, maximum, or both, as well as the period of time.

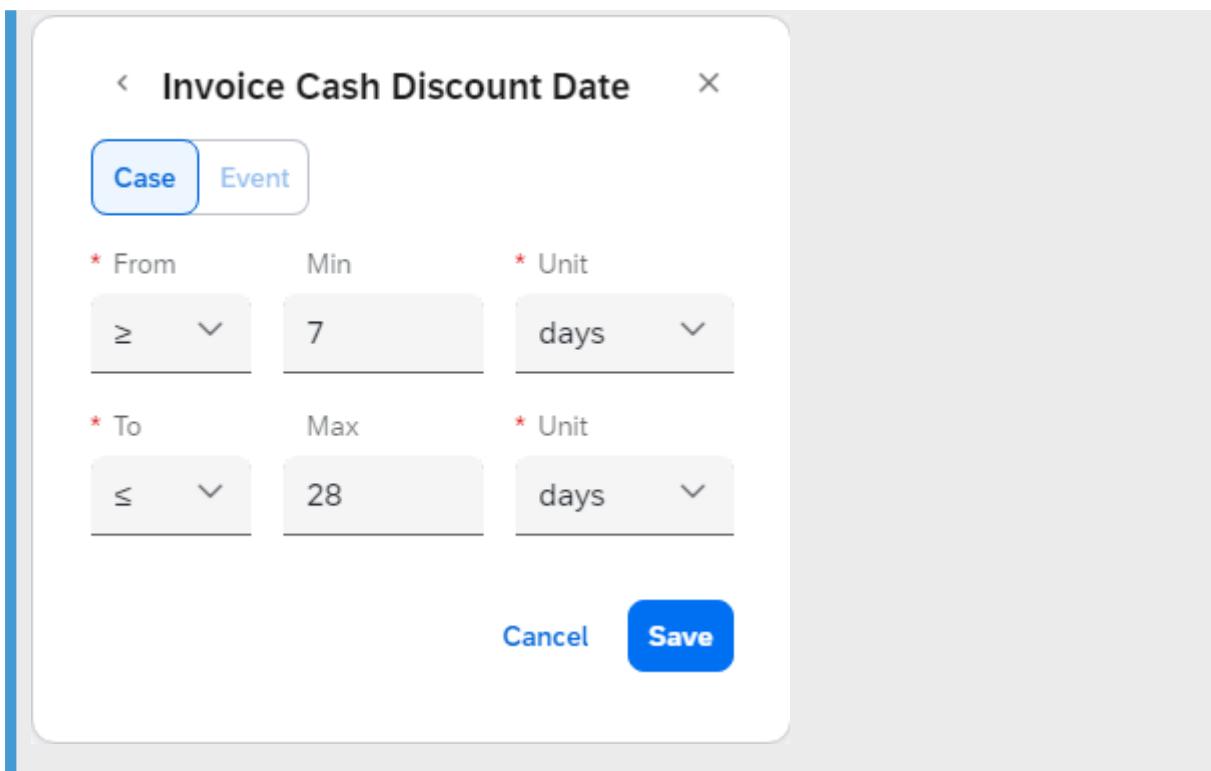
The dialog title is "Lead time". It has tabs for "Case" (selected) and "Event". There are two sets of input fields: one for "From" (Min) and one for "To" (Max). Each set includes a dropdown with operators " $\geq$ " and " $\leq$ ", a text input field with values "2" or "10", a dropdown for "Unit" with "days", and a "Min" or "Max" label. At the bottom are "Cancel" and "Save" buttons.

From	Min	Unit
$\geq$	2	days

To	Max	Unit
$\leq$	10	days

Cancel Save

For dates, you can specify the start date, end date, or both.



## 4.6.2 Managing Dashboard Filters

Learn how to create, edit, and delete a dashboard filter in SAP Signavio Process Intelligence.

### Procedure

- To navigate to the dashboard filter user interface:
  - a. In the sidebar, select (*Processes*) and then choose your process from the list.
  - b. Choose your dashboard.
  - c. On your dashboard, select (*Add filter*). This displays the filter user interface.
- To create a dashboard filter:
  - a. Choose a filter or case level attribute in the *Select Filters* pane.
  - b. Drag-and-drop your filter or case level attribute to the filter overview pane. Choose to apply the filter to the page, or the whole dashboard, by dropping the attribute in the appropriate panel.
  - c. Completing the previous step activates options in the filter configuration pane. Configure your filter here.
  - d. Choose .Multiple filters can be applied.
- To edit filters on a dashboard:

- a. Select your filter, listed above your dashboard.
  - b. Edit the filter.
  - c. Choose .
- To control whether the filter is applied, select to hide the filter or to show the filter.
  - To delete a filter from a dashboard:
    - a. Select to delete your filter.
    - b. Choose .

### 4.6.3 Managing Investigation Filters

Learn how to create, edit, and delete an investigation filter in SAP Signavio Process Intelligence.

#### Procedure

- To navigate to your investigation:
  - a. Choose (*Processes*) in the sidebar, then select your process from the list.
  - b. Select the *Investigations* tab and choose your investigation.
- To create an investigation filter:
  - a. Select (*Add filter*) to open the add new filter dialog.
  - b. Select a filter type and specify the data to include or exclude.
  - c. Select *Save* to confirm.
- To edit an investigation filter:
  - a. Select your filter.
  - b. Edit your filter.
  - c. Select *Save*.
- To delete an investigation filter:
  - a. Select your filter.
  - b. Select (*Remove (Delete)*) to delete your filter.

## 4.6.4 Managing Auto-insights Filters

Learn how to create, edit, and delete an Auto-insights filter in SAP Signavio Process Intelligence.

### Context

By default, the Auto-insights tab generates insights for all valid case-level metrics in your metric collection, and all case-level attributes in your event log. If you add or change a filter and save it, new insights are generated to reflect the new filter. Filters applied in the Auto-insights tab are not applied to investigations or dashboards.

### Procedure

- To navigate to your auto-insight filter user interface:
  - a. Choose  (*Processes*) in the sidebar, then select your process from the list.
  - b. Select the *Auto-insights* tab.
  - c. Select  (*Filters*) above your auto-insights. This displays the filter user interface.
- To create an Auto-insights filter:
  - a. Choose an attribute in the *Select Filters* pane.
  - b. Drag-and-drop your filter or case level attribute to the *Filter Overview* pane.
  - c. Completing the previous step activates options in the *Filter Configuration* pane. Configure your filter here.
  - d. Multiple filters can be applied.
  - e. Choose *Ok* to save and close the filter user interface.
- To edit an Auto-insights filter:
  - a. In the *Filter Overview* pane, select a filter that you want to edit.
  - b. Edit your filter in the *Filter Configuration* pane.
  - c. Confirm changes with *Ok*.
- To control whether the filter is applied, select  to hide the filter or  to show the filter.
- To delete an Auto-insights filter:
  - a. Select  (*Delete*) for the filter that you want to remove.
  - b. Confirm with *Ok*. The filter is deleted and removed from all auto-insights on the page.

## 4.6.5 Managing Value Case Filters

Learn how to create, edit, and delete a value case filter in SAP Signavio Process Intelligence.

### Procedure

- To navigate to the filter user interface of a value case:
  - a. Choose  (*Processes*) in the sidebar, then select your process from the list.
  - b. Select the *Value Cases* tab and choose your value case.
  - c. Select  *Filters (Filter)*. This displays the filter user interface.
- To create a value case filter:
  - a. Choose your filter or case level attribute in the *Select Filters* pane and drag-and-drop it to the *Filter Overview* pane.
  - b. Completing the previous step activates options in the *Filter Configuration* pane. Configure your filter here.
  - c. Select   to apply the filter and recalculate the value case's metric and monetary values.
- To edit a value case filter:
  - a. Select the filter that you want to edit and apply your changes.
  - b. Confirm with  . The filter is updated and the value case's metric and monetary values are recalculated.
- To control whether the filter is applied, select  to hide the filter or  to show the filter.
- To remove a value case filter:
  - a. Select  (*Delete*) on the filter that you want to delete.
  - b. Confirm with  . The filter is removed and the value case's metric and monetary values are recalculated.

### Related Information

[Value Analysis \[page 513\]](#)

## 4.6.6 Managing Widget Filters

Learn how to create, edit, hide, and delete a widget filter in SAP Signavio Process Intelligence.

### Procedure

- To navigate to your dashboard or investigation:
  - a. In the sidebar, select  (*Processes*) and then choose your process from the list.
  - b. Select the *Dashboards* or *Investigations* tab and choose your dashboard or investigation.
- To create a widget filter on your dashboard:
  - a. On your widget, select  then *Add filter*. This displays the filter user interface.
  - b. Choose your filter or case level attribute in the *Select Filters* pane and drag-and-drop it to the *Filter Overview* pane.
  - c. Completing the previous step activates options in the *Filter Configuration* pane. Configure your filter here.
  - d. Select  *Ok*  to apply the filter.
- To create a widget filter on your investigation:
  - a. On your widget, select  then *Add filter*. This displays the filter user interface.
  - b. Choose your filter and configure it.
  - c. Select *Save* to apply your filter.
- To edit a dashboard widget filter:
  - a. On your widget, select  . This displays the filter user interface.
  - b. In the *Filter Overview* pane, select a filter that you want to edit and make your changes.
  - c. Select  *Ok*  to apply the changes.
- To edit an investigation widget filter:
  - a. On your widget, select  . This displays a list of your filters.
  - b. Select  to edit the filter.
  - c. Change the filter and select *Save*. The filter is updated and applied to the investigation.
- To hide and show filters on a dashboard widget:
  - a. On your widget, select  . This displays a list of your filters.
  - b. Filters are listed in the filter overview pane. Select  to remove your filter or  to apply your filter.
  - c. Select  *Ok*  to apply the changes.
- To delete filters from a dashboard widget:
  - a. On your widget, select  . This displays the filter user interface.
  - b. Select  (*Delete*) to delete your filter.
  - c. Select  *Ok*  to apply the changes.
- To delete filters from an investigation widget:
  - a. On your widget, select  . This displays a list of your filters.

- b. Select  to delete your filter.

## 4.7 Insights

Introduction to insights, one of the data analysis options in SAP Signavio Process Intelligence.

An insight captures your data and discoveries at a specific point in time. You can think of an insight like a note, where you write down your findings and if you wish, share them with your teammates.

Insights can be created manually, or generated automatically. This section explains how to create and save insights, who can work with them, how to manage them, and the underlying technology behind the algorithms that generate them.

Select the links below to learn more about each topic.

### [Manual Insights \[page 461\]](#)

Manual insights are ones which you capture yourself. This section explains how to create and save manual insights for investigations, dashboards, and widgets.

### [Auto-Insights \[page 463\]](#)

This section explains how to use auto-insights to discover anomalies and trends in your process data.

### [Managing Insights \[page 473\]](#)

This section explains how to navigate, view, edit, and delete your insights.

### [Who Can Work With Insights \[page 476\]](#)

Learn which access rights you need to work with insights.

### [Effects of Filters and Process Views on Insights \[page 476\]](#)

Learn how filters and process views affect insights.

### [Comments \[page 477\]](#)

Learn how to view comments, how to write or delete comments, and how to mention others.

### [Data Snapshots and Highlights \[page 478\]](#)

Learn about data snapshots and data highlight in insights.

## 4.7.1 Manual Insights

Manual insights are ones which you capture yourself. This section explains how to create and save manual insights for investigations, dashboards, and widgets.

Select the links below to learn more about each topic.

### [Creating Insights in Investigations, Dashboards, and Widgets \[page 462\]](#)

Learn how to create an insight in an investigation, dashboard, or widget in SAP Signavio Process Intelligence.

## 4.7.1.1 Creating Insights in Investigations, Dashboards, and Widgets

Learn how to create an insight in an investigation, dashboard, or widget in SAP Signavio Process Intelligence.

### Context

#### ⓘ Note

Access to the [Initiatives](#) feature requires a license for SAP Signavio Process Transformation Manager.

For more information, see [User Administration, Authentication, and Authorization](#) in the *Security Guide for SAP Signavio Process Transformation Manager*.

### Procedure

1. To open your process, choose  ([Processes](#)) in the sidebar, then select your process from the list.
2. In [Investigations](#) or [Dashboards](#), select the investigation or dashboard in which you want to create an insight.
3. To add a new insight:
  - a. If your investigation, dashboard or widget doesn't already have saved insights, select the  icon.
  - b. If your investigation, dashboard or widget already has saved insights, select  [Create Insight](#).
4. Edit your insight's settings as needed. You have the following options:
  - Enter a title and details for your insight.
  - Use the [Status](#) dropdown list to set the insight's status. By default, it's set to [Open](#).
  - In the [Initiatives](#) field, you can specify which initiative the insight is associated with.
  - Use the [Assignee](#) field to add or change the insight's assignee.
  - In the [Business Impact](#) and [Priority](#) fields, you can rate your insight by its business impact or priority.

The insight is saved automatically. The saved insight includes a  icon. Selecting the icon opens the insight's associated investigation, dashboard, or process, in a new window.

#### ⓘ Note

- In some cases, a data snapshot is saved along with the insight. This snapshot shows the data at the specific time that the insight was created, and can't be edited afterwards. In SAP Signavio Process Intelligence, data snapshots are captured in [Breakdown Over time](#), [SIGNAL table](#), [Value](#), and [Correlation](#) widgets. For more information, see [Data Snapshots and Highlights \[page 478\]](#).

- If you don't have access to a specific process in SAP Signavio Process Intelligence , you see a restricted access message instead of the snapshot. The insight's title and description remain visible.

5. Select to exit the insight creation dialog. To delete the insight, select (*Delete*).

## Related Information

[Managing Insights \[page 473\]](#)

## 4.7.2 Auto-Insights

This section explains how to use auto-insights to discover anomalies and trends in your process data.

The automatic generation of insights is performed by integrated algorithms. Auto-insights are generated based on the valid case-level metrics in your metric collection, and all case-level attributes in the event log. The cycle time metric is available by default in every process. So, you can generate cycle time-based insights instantly. The more metrics in your metric collection, the longer it can take to generate insights.

Select the links below to learn more about each topic.

[Generating Auto-Insights in Investigations and Dashboards \[page 464\]](#)

Learn how to generate auto-insights in an investigation or dashboard.

[Generating Auto-insights in the Auto-insights Tab \[page 465\]](#)

Learn how to generate auto-insights in the *Auto-insights* tab of your process. Insights can be generated here even if there aren't any investigations or dashboards yet.

[Comparison of Auto-Insights in Investigations, Dashboards and the Auto-Insights Tab \[page 466\]](#)

Learn how auto-insights differ between investigations or dashboards, compared to the *Auto-insights* tab.

[Saving Auto-Insights \[page 467\]](#)

Learn how to save the insights you've generated automatically from the *Auto-insights* tab, or turn them into a widget on an investigation or dashboard.

[Insights Algorithms \[page 468\]](#)

Learn about the algorithms that generate auto-insights in SAP Signavio Process Intelligence.

## 4.7.2.1 Generating Auto-Insights in Investigations and Dashboards

Learn how to generate auto-insights in an investigation or dashboard.

### Context

Filters applied to the investigation or dashboard are taken into account when generating insights. For more information, see [Filters \[page 443\]](#).

By default, insights are generated for all valid case-level metrics in your metric collection, and all case-level attributes in your event log.

### Procedure

1. To open your process, choose  (*Processes*) in the sidebar, then select your process from the list.
2. The process overview opens. In *Investigations* or *Dashboards*, select the investigation or dashboard for which you want to create an insight.
3. To generate insights, select  *Auto-insights*. If you'd like to generate insights only for specific metrics and attributes, select  (*Automated Insights settings*). Choose your settings, then confirm with *Apply*.

### Results

Insights generation starts, and a progress bar displays the insight generation progress. The time needed for generation depends on the volume of the data set and whether the data was cached previously. In the meantime, you can visit other pages, and the generation will continue in the background.

When generation is complete, the insights are displayed if found.

You can use the dropdown list to group the insights by metric. The insights are then grouped by the valid metrics from your metric collection from which they have been generated. By default, it is set to *Ungrouped*.

If any filters were applied to the investigation or dashboard at the time an insight was generated, they are displayed in the insight's settings under *Applied Filter*.

For information about saving a generated insight, see [Saving Auto-Insights \[page 467\]](#).

### Related Information

[Managing Insights \[page 473\]](#)

[Edit, move, and delete widgets \[page 347\]](#)

## 4.7.2.2 Generating Auto-insights in the Auto-insights Tab

Learn how to generate auto-insights in the *Auto-insights* tab of your process. Insights can be generated here even if there aren't any investigations or dashboards yet.

### Context

#### ⓘ Note

This page describes how to generate insights using the existing *All Auto-insights* feature. If you are a participant in the *Text to Insights* beta release, see [AI-assisted Process Analyzer \(Beta\)](#).

By default, the *Auto-insights* tab generates insights for all valid case-level metrics in your metric collection, and all case-level attributes in your event log. If you add or change a filter and save it, new insights are generated to reflect the new filter. Filters applied in the Insights tab are not applied to investigations or dashboards. For more information, see [Filters \[page 443\]](#).

### Procedure

1. To open your process, choose  (*Processes*) in the sidebar, then select your process from the list.  
The process overview opens.
2. Select *Auto-insights*.  
The auto-insights tab opens.
3. Select *All Auto-insights*. You have the following options. Changing your settings generates new auto-insights automatically:
  - If you have access to more than one process view, select  (*Process view*) to choose which one to use for auto-insights generation.
  - To generate insights only for specific metrics and attributes, select  (*Automated Insights settings*). Choose your settings, then confirm with *Apply*.

### Results

Insights generation starts, and a progress bar displays the insight generation progress. The time needed for generation depends on the volume of the data set and whether the data was cached previously. In the meantime, you can visit other pages, and the generation will continue in the background.

When generation is complete, the insights are displayed if found.

You can use the dropdown list to group the insights. The default setting is *Ungrouped*. Selecting *Group by Metric* displays a list of all valid metrics in the metric collection for which insights have been generated. The

number of insights is displayed alongside each metric. Select  to view the insights for a particular metric.

Choose  to open the metric in a new tab.

Enter a keyword in the **Search** field to find insights that include specific terms.

For information about saving a generated insight, see [Saving Auto-Insights \[page 467\]](#).

### 4.7.2.3 Comparison of Auto-Insights in Investigations, Dashboards and the Auto-Insights Tab

Learn how auto-insights differ between investigations or dashboards, compared to the *Auto-insights* tab.

	Insights for investigations or dashboards	Insights generated on the Auto-insights tab
<b>Process view</b>	<p>Insights are generated based on the process view that is configured for the investigation or dashboard.</p> <p>For investigations, you can only change the process view if you have the manager or analyst role for a process.</p> <p>For dashboards, you can change the process view as soon as multiple process views are assigned to you.</p>	<p>Insights are generated based on the process view that is assigned to you.</p> <p>When multiple process views are assigned to you, you can choose which one to use for insights generation.</p>
<b>Filters</b>	<p>When filters are applied to the investigation or dashboard, insights are generated only for the filtered data.</p>	<p>When filters are applied, insights are generated only for the filtered data.</p>
<b>Widgets</b>	<p>The widgets on your investigation or dashboard have no effect on insights generation.</p>	<p>Not applicable</p>

### Related Information

[Generating Auto-Insights in Investigations and Dashboards \[page 464\]](#)

[Generating Auto-insights in the Auto-insights Tab \[page 465\]](#)

## 4.7.2.4 Saving Auto-Insights

Learn how to save the insights you've generated automatically from the *Auto-insights* tab, or turn them into a widget on an investigation or dashboard.

### Prerequisites

You have generated an auto-insight.

### Context

#### ⓘ Note

Access to the *Initiatives* feature requires a license for SAP Signavio Process Transformation Manager.

For more information, see [User Administration, Authentication, and Authorization](#) in the *Security Guide for SAP Signavio Process Transformation Manager*.

### Procedure

- To save your insight, select the icon. You have the following options:
- Save as an insight:
  - a. Select [Save to insights](#). The insight creation dialog opens in a side panel.
  - b. If needed, configure the insight's *Status*, *Initiative*, *Details*, *Business Impact*, and *Priority*.

The insight is saved.

Select to return to [My Insights](#).

The saved insight includes a icon. Selecting the icon opens the insight's associated investigation, dashboard, or process, in a new window.

- Save your insight as a widget:
  - a. Select [Save as widget](#).
  - b. Choose whether to save the widget to an investigation or dashboard, then select the specific location as required.
  - c. Confirm with [Save](#).

The widget is created and you can further explore the data in it.

#### ⓘ Note

Insights showing correlations between case-level metrics cannot be saved as a widget.

## Related Information

[Generating Auto-Insights in Investigations and Dashboards \[page 464\]](#)

[Generating Auto-insights in the Auto-insights Tab \[page 465\]](#)

### 4.7.2.5 Insights Algorithms

Learn about the algorithms that generate auto-insights in SAP Signavio Process Intelligence.

#### ⓘ Note

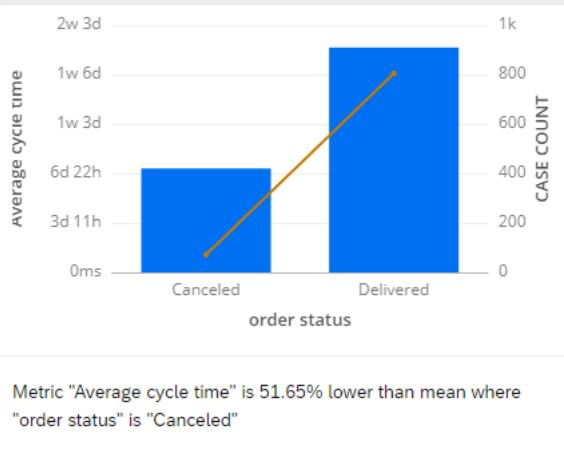
- The algorithms work only with valid metrics in the metric collection. The algorithms don't work with metrics in the metric library, as they are not valid by default.
- The algorithms work only on case-level metrics.
- A maximum of 20 insights on outliers are displayed per algorithm.

### Anomaly Detection Algorithm

Anomaly detection is based on the identification of outliers. This algorithm defines an outlier as a value that falls outside the range of the weighted mean +/- twice the weighted standard deviation (95% significance). To identify outliers, the algorithm groups each metric based on selected attributes. The algorithm first calculates the aggregated metric value for each group. The second calculation is the mean of the metric values over all groups, weighted by the number of cases underlying each group.

Outliers are displayed in a bar chart. The chart displays the metric values as bars, with its value axis on the left. The number of cases is displayed as a line, with its value axis on the right. To view a chart displaying an outlier, select the example below.

#### ⚡ Example



### ⓘ Note

- Only one insight is created per metric value and attribute pair.
- An attribute must have 2 to 500 distinct values to be considered for insights generation. The number of rows isn't limited.

## Anomaly Detection Over Time Algorithm

This algorithm identifies outliers in time series data, which can indicate important points in time where something unusual happened. This algorithm defines an outlier as a data point that falls outside the range of the mean +/- twice the standard deviation (95% significance). Note that this algorithm doesn't incorporate any weighting.

The algorithm creates a time series for each metric selected. The time series sequence is automatically determined as days, weeks, or months, based on the total time range.

To identify outliers, the algorithm applies a sliding window to the time series and performs a z-score analysis. The sliding window is roughly 10% of the size of the total number of time buckets.

The algorithm's mathematical formula is shown below:

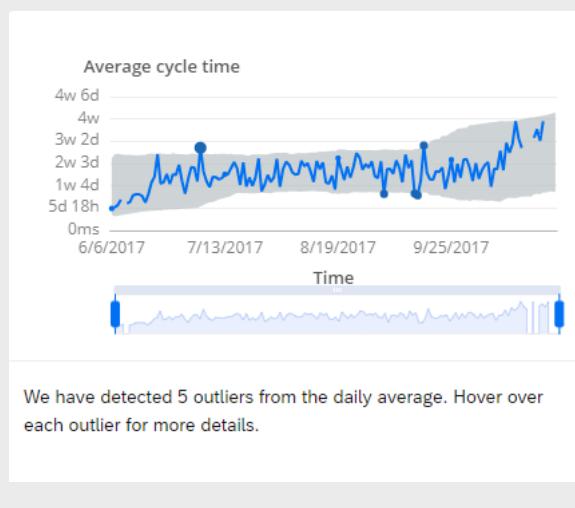
$$\mu_i = \frac{\sum_{j=0}^i x_j}{n} \quad \sigma_i = \sqrt{\frac{\sum_{j=0}^i (x_j - \mu_i)^2}{n}} \quad \zeta_i = \frac{(x_i - \mu_i)}{\sigma_i}$$

The insight includes a graph, with the outliers highlighted as blue points. You can view more details about an outlier by hovering over it. You can use the *Time* slider to narrow the displayed time frame.

A gray area is also shown, which is the statistical acceptance threshold over which a spike in the time series is considered an outlier or anomaly. The gray area visualizes the maximum rolling deviation from the average as a Z-score criteria of 2.0 defined by the algorithm. The highlighted outliers are the ones that breach the gray area threshold.

To view a graph showing outliers, select the example below.

## • Example



## ⓘ Note

- The gray area and outlier visualizations are not displayed in the graph if the insight is saved as a widget.
- An attribute must have 2 to 500 distinct values to be considered for insights generation. The number of rows isn't limited.

## Correlation Algorithm

Correlation determination is based on the Pearson Correlation Coefficient.

The algorithm calculates the coefficient for all pairs of case level attributes with numeric values, and also between case-level metrics in the metric collection. Custom attributes are also considered. Only strong correlations and anti-correlations are returned. Insights are provided when the calculation produces one of the following results:

- The coefficient is  $\geq 0.7$  and  $\leq 0.95$ .
- The coefficient is  $\leq -0.7$  and  $\geq -0.95$ .

Insights are displayed for the 5 strongest correlations.

## ⓘ Note

Insights showing correlations between case-level metrics cannot be saved as a widget.

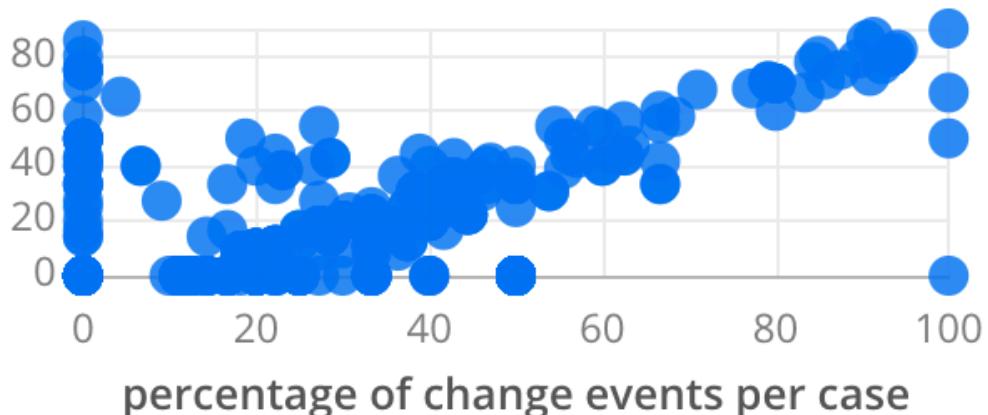
To view graphs displaying correlations, select the examples below.

❖ Example

Correlations between two metrics:

### Correlation between "percentage of..." ...

percent of events affected by rework



"percentage of change events per case" is correlated with "percent of events affected by rework" with a correlation coefficient of 0.93

❖ Example

Correlations between two attributes:

### Correlation between "last fi invoice item cash discount days 1" and "po cash discount days 1"

...

po cash discount days 1



last fi invoice item cash discount days 1

"last fi invoice item cash discount days 1" is correlated with "po cash discount days 1" with a correlation coefficient of 0.90

## Related Information

[Custom attributes for event-level analysis \[page 30\]](#)

[Work with Metrics \[page 480\]](#)

## 4.7.3 Managing Insights

This section explains how to navigate, view, edit, and delete your insights.

Select the links below to learn more about each topic.

### [Viewing Saved Insights \[page 473\]](#)

Learn how to view your saved insights.

### [Editing Insights \[page 474\]](#)

Learn how to edit insights, and which insight properties can be edited.

### [Deleting Insights \[page 475\]](#)

Learn how to delete insights.

### 4.7.3.1 Viewing Saved Insights

Learn how to view your saved insights.

#### Prerequisites

Open the process that contains your insights.

#### Procedure

1. To view your saved insights, select the  icon. You can find this icon:

- In the process header.
- In an investigation, dashboard, or widget, in which you have insights saved.

The [My Insights](#) side panel opens, displaying your saved insights.

2. You have the following options:

- Use the [Filter By](#) and [Sort by](#) dropdown lists to filter and sort your insights as needed. The default sort setting is [Sort by Last Changed](#).
- The creator and last editor of the insight, along with their respective timestamps, are shown in the insight details view. The time or date displayed is based on your current timezone.
- To share an insight, choose the insight you want to share, then select  to manage access and share it with other members. Users with access to the process view for which the insight was created already have access to the insight, so you don't need to share it with them again.

### 4.7.3.1.1 Navigating from an Insight to the Original Investigation or Dashboard

To not lose track of an insight's context, insights that were captured manually link back to the investigation or dashboard where they were created.

#### Context

This option is only available in the following cases:

- The insight was created manually.
- You have access to the process where the investigation or dashboard was created.
- The investigation or dashboard isn't private.

#### Procedure

1. To open your process, choose  (*Processes*) in the sidebar, then select your process from the list.
2. Navigate to your insights management page by selecting *Insights*.
3. Select *Saved* to view all saved insights, then choose the insight.

The insight side panel opens.

4. To open the insight's original investigation or dashboard, select .

### 4.7.3.2 Editing Insights

Learn how to edit insights, and which insight properties can be edited.

#### Prerequisites

You have navigated to the insight you wish to edit.

##### Note

Access to the *Initiatives* feature requires a license for SAP Signavio Process Transformation Manager.

For more information, see [User Administration, Authentication, and Authorization](#) in the *Security Guide for SAP Signavio Process Transformation Manager*.

## Procedure

1. To open the insight settings dialog, select the insight.
2. Update the insight settings as needed. Changes are saved automatically. You have the following options:
  - Enter a title for your insight.
  - Use the *Status* dropdown list to set the insight's status. By default, it is set to *Open*.
  - In the *Initiatives* field, you can specify which initiative the insight is associated with.
  - If you're adding your insight to an initiative which has been shared with others, you can use the *Assignee* field to add or change the insight's assignee.
  - In the *Business Impact* and *Priority* fields, you can rate your insight by its business impact or priority.
3. Select to exit the insight settings dialog.

### 4.7.3.3 Deleting Insights

Learn how to delete insights.

#### Prerequisites

You have navigated to the insight you wish to delete.

#### Context

Deleted insights cannot be restored.

#### Procedure

1. To open the insight settings dialog, select the insight.
2. Select (*Delete*).

#### Results

The insight is deleted.

## 4.7.4 Who Can Work With Insights

Learn which access rights you need to work with insights.

All users who have access to your process in SAP Signavio Process Intelligence can work with insights as follows:

	Manager	Analyst	Consumer
Manually create insights	yes	yes	yes
Generate auto-insights	yes	yes	yes
Edit insights	yes	yes	yes
Comment on insights	yes	yes	yes
Save generated insights as widgets	yes	yes	-
Delete insights	yes	yes	yes

## 4.7.5 Effects of Filters and Process Views on Insights

Learn how filters and process views affect insights.

### ⓘ Note

Access to the [Initiatives](#) feature requires a license for SAP Signavio Process Transformation Manager.

For more information, see [User Administration, Authentication, and Authorization](#) in the *Security Guide for SAP Signavio Process Transformation Manager*.

## Filters of Investigations, Dashboards, or Widgets

Filters are automatically applied to the following operations:

- Capture insights manually
- Generate auto-insights
- Save insights as widgets

If filters exist for an investigation, dashboard, or a widget, the filters are stored in all created insights. To view the filters applied to an insight, you need to open the insight.

If filters have been applied to an investigation, dashboard, widget, or the [Auto-insights](#) tab, the filters are stored in all created insights. To view the filters applied to an insight, you need to open the insight.

Changes to filters aren't applied to existing insights. When you change a filter, you need to create new insights.

## Process Views

Process views control the data for which users can create insights. Also, users can only access insights for process views to which they have access, or which have been shared with them explicitly - either directly, or as part of an initiative.

If insights exist for a process view, changes to the process view aren't applied to the existing insights. So, the data snapshot is still visible to anyone with access to the process view. If you want to restrict a process view, we recommend to create a new process view and re-assign the users.

## Related Information

[Filter process data \[page 443\]](#)

[Generating Auto-insights in the Auto-insights Tab \[page 465\]](#)

[Define access to process data with process views \[page 26\]](#)

## 4.7.6 Comments

Learn how to view comments, how to write or delete comments, and how to mention others.

Currently, you can only add comments to insights.

### Adding, Editing, and Deleting Comments

Select an insight to write, edit, delete or leave comments. Then, select *Comments* to display all comments related to that insight.

You have the following options:

- Use *Status* to filter comments that are open, resolved, or rejected, or to view all comments.
- To write a comment, enter your text in the *Add a comment* field and select *Comment*.  
Your comment will now appear in the list.
- Use @ to mention someone in a comment.
- To resolve a comment, select *Resolve*.
- To reply to a comment, select *Reply*.
- Select  to manage comments:

Action	Description
Reject	Dismiss a comment.
Edit	Modify or update the content of a comment.

Action	Description
Delete	Permanently remove a comment from comment view.

## Notifications For Comments

You can also receive notifications about insight comments. Select the links below to learn more.

## Related Information

[Notifications \[page 14\]](#)

[In-App Notifications \[page 15\]](#)

[Email Notifications \[page 16\]](#)

[Managing Insights \[page 473\]](#)

## 4.7.7 Data Snapshots and Highlights

Learn about data snapshots and data highlight in insights.

### ⓘ Note

Access to the [Initiatives](#) feature requires a license for SAP Signavio Process Transformation Manager.

For more information, see [User Administration, Authentication, and Authorization](#) in the [Security Guide for SAP Signavio Process Transformation Manager](#).

## About Data Snapshots

When you add insights to the following widgets, a snapshot of the data is included:

- [Breakdown \[page 353\]](#)
- [Over time \[page 355\]](#)
- [SIGNAL table \[page 356\]](#)
- [Value \[page 357\]](#)
- [Correlation \[page 357\]](#)

Other widgets don't provide a visual snapshot of the data. Data snapshots are also included while generating auto-insights.

## ⌚ Example

*View an insight with a data snapshot*

Metric "Average cycle time" is 51.65% lower than mean where "order status" is "Canceled"

Business Impact



Priority



### Snapshot

🕒 Captured on Jul 19, 2024



## ⌚ Example

*View an insight without a data snapshot*

This process doesn't follow our standard flow. The sequence is incorrect.

Business Impact



Priority



### Snapshot

🕒 Captured on Jul 18, 2024

This insight is associated with the investigation Investigation for Sales Data. No visualization is available.



## Insights with a Highlighted Data Area

### ⓘ Note

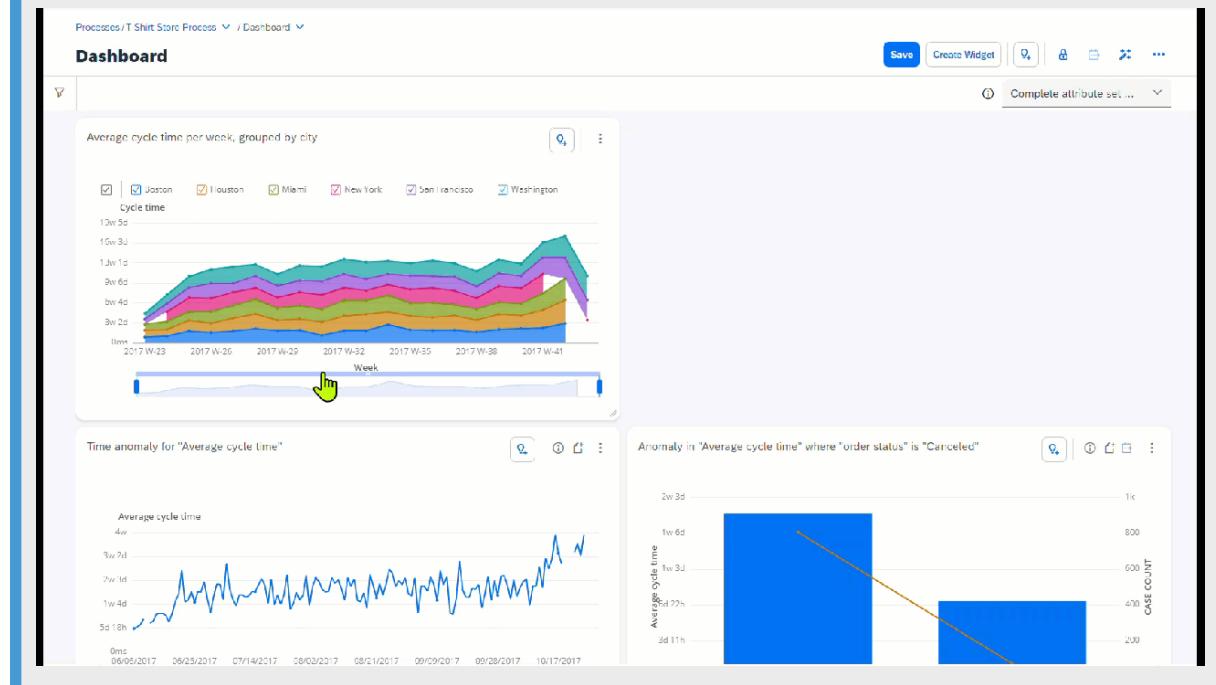
This option is only available for *Breakdown* and *Over time* widgets.

To draw attention to specific data displayed on a widget, you can create an insight with a highlighted data area.

For that, select the data that you want to highlight and create the insight. Your highlight and current zoom level are saved to the data snapshot.

### ⚡ Example

*Watch how to create an insight with a highlighted data area*



## 4.8 Work with Metrics

How to work with business metrics (KPIs) in SAP Signavio Process Intelligence to evaluate, measure, and benchmark the performance of business processes.

A metric is a quantifiable measure that you can use to evaluate and track the performance of your processes. Such quantifiable measures can be, for example:

- durations like the average cycle time
- percentages like the automation rate
- amounts like the number of non-conformant cases
- other aggregations like the net promoter score (NPS) for each activity

To calculate a metric value, SIGNAL code is used. The system executes the code of a metric as needed for the metric aggregation type.

## Metric Collection

Each process has a metric collection containing all metrics that are available for process analytics. By default, the `Average cycle time` metric is available in every process.

You can add metrics to the metric collection by assigning them from the metric library or by creating your own metrics.

To access the metric collection, open your process and choose the [Metrics](#) tab.

## Metric Library

Our metric library provides you with preconfigured metrics. Some of them are agnostic, others are tailored to specific business processes. Some metrics work out of the box, others can contain variables or SIGNAL code that you need to customize.

All metrics in the metric library are managed by SAP Signavio.

## Prerequisites

You can set up and manage metrics for a process when the following prerequisites are met:

- The process contains data. Without data, metrics you import or create will remain invalid until data is uploaded.
- You have SIGNAL knowledge to create your own or customize existing metrics.

## Who Can Work With Metrics

All users who have access to your process in SAP Signavio Process Intelligence can work with metrics as follows:

	Manager	Analyst	Consumer	Read more
Add metrics from the library	yes	yes	-	<a href="#">Add from metric library [page 496]</a>
Edit and delete metrics	yes	yes	-	<a href="#">Edit and delete metrics [page 499]</a>

	Manager	Analyst	Consumer	Read more
Create custom metrics	yes	yes	-	<a href="#">Create a custom metric [page 496]</a>
Export and import metrics	yes	yes	-	<a href="#">Export and import metrics [page 500]</a>
Select a source system type in the process settings to provide default values for metric variables	yes	-	-	<a href="#">Auto-assign variable values based on the source system [page 510]</a>
Manage widgets in investigations and dashboards	yes	yes	-	<a href="#">Add widgets to a dashboard [page 345]</a> <a href="#">Add widgets to an investigation [page 345]</a>
Add a metric bar with preconfigured widgets to an investigation	yes	yes	-	<a href="#">Add metrics to an investigation [page 324]</a>
Save a SIGNAL query as a new metric in the configuration dialog of the <i>Value</i> widget	yes	yes	-	<a href="#">Configure with a SIGNAL query [page 357]</a>
Show a metric as a value on the <i>Variant Explorer</i> widget	yes	yes	yes	<a href="#">Explore the variants [page 357]</a>

## Where to Use Metrics

You can configure widgets to display metric values. The widget in which a metric can be used depends on the metric aggregation type. The following table describes the different options.

### Note

You can only select metrics of an aggregation type supported by that widget. Metrics aggregated **over cases** will not appear in the list of available metrics for a widget supporting aggregation **over events**, and vice versa.

Aggregation type	Where and how you can use the metric
Over cases	<p>You can configure the following widgets to display metrics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Breakdown [page 353]</a></li> <li>• <a href="#">Over time [page 355]</a></li> <li>• <a href="#">Variant Explorer [page 357]</a></li> <li>• <a href="#">Value [page 357]</a></li> </ul>

### ❖ Example

[View a Breakdown widget with the average cycle time metric](#)

The metric is grouped by customer type and city.

The figure shows a breakdown of average cycle time across different cities and customer types. The Y-axis represents cycle time in days and hours, ranging from 0ms to 115d 17h. The X-axis shows two categories: Premium and Standard. Each category has a stacked bar representing cycle time for various cities: Miami (blue), Boston (orange), San Francisco (green), Houston (pink), New York (purple), and Washington (teal). The total cycle time for Premium is 46d 7h, and for Standard is 92d 14h.

Customer Type	Miami	Boston	San Francisco	Houston	New York	Washington	Total Cycle Time
Premium	~10h	~5h	~10h	~2h	~1h	~1h	46d 7h
Standard	~10h	~5h	~10h	~2h	~1h	~1h	92d 14h

Aggregation type	Where and how you can use the metric
Over events	<p>Metrics of this type can be displayed as values in the <a href="#">Process Discovery [page 355]</a> widget. Read more in section <a href="#">Explore the variants [page 357]</a>.</p>

### Example

[View a Process Discovery widget with the average customer satisfaction \(NPS\) for each activity](#)

When you select the activity, the NPS is shown with up to 2 decimal places. For example, the activity **Receive Payment** has an NPS of 7.14.

```

graph TD
    Start((Start)) --> RCOrder((Receive Customer Order))
    RCOrder --> RP((Receive Payment))
    RP --> STP((Send T-shirt to printing))
    STP --> TP((T-shirt Printed))

```

## About Aggregation Types

The metric aggregation types determine how metrics are calculated and where they can be used.

### Over Cases

Metrics of this type return one value for a group of cases, for example, the average cycle time for all cases in the month of July.

Aggregation input is the standard case level event log, where each case is one record in the log.

When used with variants, for example in the [Variant Explorer](#) widget, the metric returns the value for the cases that make up a variant.

### Example

[View a metric that calculates the average cycle time from the first to the last event](#)

SIGNAL code:

```
AVG( (SELECT LAST(end_time)) - (SELECT FIRST(end_time)) )
```

In this example, the average cycle time for all cases is 15 days and 2 hours.

The screenshot shows the configuration of a metric. On the left, there's a form with sections for 'Name and description', 'Aggregation type and unit', and 'SIGNAL code'. In the 'Name and description' section, the name is 'Average cycle time' and the description is 'Average cycle time calculated from the first to the last event'. Under 'Aggregation type and unit', the aggregation type is set to 'Over cases' and the unit is 'Choose unit type'. In the 'SIGNAL code' section, the code is:

```
1 AVG([  
2   (SELECT LAST(end_time)) - (SELECT FIRST(end_time))  
3 ])
```

On the right, a preview window shows the value '15d 2h'. At the bottom, there are buttons for 'Preview', 'Attributes', 'Cancel', and a highlighted 'Save' button.

## Over Events

Metrics of this type return one value for each event (activity) in the event log, for example, the average customer satisfaction for events.

Aggregation input is the flattened event log, where each event is represented as one record in the log.

When displaying an over events metric in the *Process Discovery* widget, the metric value is returned for each event in the process diagram.

### Example

*View a metric that calculates the percentage of automated events, based on the definition of the status 'Automated'*

SIGNAL code:

```
AVG(IF("Automation Status"='Automated',1,0))*100
```

In this example, 87% percent of the events are automated.

The screenshot shows the SAP Signavio Process Intelligence Metric Library interface. On the left, a form is being filled out for a new metric:

- Name and description**: The name is "Automation rate".
- Description**: The description is "Percentage of automated events".
- Aggregation type and unit**: The aggregation type is set to "Over events".
- Unit**: The unit is "%".
- SIGNAL code**: The code is `1 AVG(IF("Automation Status"='Automated',1,0))*100`.

On the right, a preview window displays the metric value as **87%**. Below the preview are two buttons: **Preview** (highlighted) and **Attributes**. At the bottom right are **Cancel** and **Save** buttons.

## How Filters Affect Metric Results

If filters are applied to investigations, dashboards, or widgets, metrics return the value for the filtered set of cases. When you change a filter, metric values are immediately updated.

## Related Information

[The Metric Library \[page 491\]](#)

[The Metric Collection \[page 487\]](#)

[Add Metrics to a Process \[page 496\]](#)

[Add metrics to an investigation \[page 501\]](#)

[Add widgets to an investigation \[page 345\]](#)

[Metrics overview \[page 493\]](#)

## 4.8.1 The Metric Collection

All metrics in the metric collection are available for analyzing and mining a process. Read here how to manage the metric collection.

Each process has a metric collection containing all metrics that are available for process analytics. By default, the `Average cycle time` metric is available in every process.

You can add metrics to the metric collection by assigning them from the metric library or by creating your own metrics.

To access the metric collection, open your process and choose the [Metrics](#) tab.

This page describes the activities you can carry out to manage the metric collection.

### View Labels

Some metrics have labels to provide context:

Label	Description
New	Metrics that were added to the collection are highlighted with a blue line until either 7 days have passed or you open them in the side panel.

**Example**

An example of the blue line highlight.

Automatic payment block removal  
Number of invoices where payment blocks where removed by non-dialog users

Amount of time spent on dropouts  
Total cycle time of all cases until the last event before dropout

### Search for Metrics

To search for metrics by their name, use the search field on the top of the metric list.

### Sort Metrics

To sort the metrics, select the table headers. You can sort by the following:

Name	Sort metrics alphabetically by name.
------	--------------------------------------

<b>Progression</b>	Cannot be sorted. Sort metrics numerically by their latest value.
<b>Result</b>	Sort metrics by their result.
<b>Status</b>	Sort metrics by their current status.
<b>Aggregation Type</b>	Sort metrics by whether they are aggregated by events or cases. Read more in section <a href="#">Aggregation types [page 480]</a> .
<b>Widgets</b>	Sort metrics by how often they are used in widgets.

## View a Metric's Recent Progression, Result, Direction, and Last Change

The progression of a metric visualizes the history of that metric's value. It shows the value at points where the user uploads and updates a dataset in a process. For more information, see [Metric Progression \[page 489\]](#).

The *Result* column shows the metric result calculated over the event log. If a metric direction is specified, an arrow showing the metric's change (trending up or trending down) is displayed. The arrow color is green or red, depending on whether the metric change is defined as positive or not. For more information about metric direction, see section [General Settings \[page 495\]](#).

### Example

*Metric collection, showing progression, result, and direction of a metric:*

The screenshot shows a table within the Metric Library interface. The columns are labeled: Name, Progression, Result, Aggregation Type, and Usage. A single row is visible for the metric 'Revenue' (overall income). The 'Progression' column shows a blue arrow pointing upwards, indicating an increase. The 'Result' column displays two values: €195,608.44 and €10,129.18, with a green arrow between them. The 'Aggregation Type' column shows 'Over cases', and the 'Usage' column shows the number '8'. There is also a 'More' button next to the usage count.

## Share Metrics

You can link directly to a metric and share this link with others.

In the metric collection, select **... (More)** > *Copy link*. The link is then copied to your clipboard. Following this link takes you to that metric's details.

## View a Metric's Settings

To view and configure the settings of a metric, open the metric settings page by selecting the metric from the collection.

## Related Information

- [Metric Settings \[page 494\]](#)
- [Add Metrics to a Process \[page 496\]](#)
- [Edit and Delete Metrics \[page 499\]](#)
- [Assigning Values to Variables \[page 510\]](#)
- [Select Process Views for Metrics \[page 502\]](#)

### 4.8.1.1 Metric Progression

Learn how to view the progression of a metric and define thresholds for it.

#### Prerequisites

For a metric to have its progression displayed, the metric must be in your metric collection, must be valid, and must have a calculated value.

#### About Progression

The progression of a metric visualizes the history of that metric's value. It shows the value at points where the user uploads and updates a dataset in a process. Progression is aggregated by the selected time interval (for example, day, week, month). The progression of a metric can be viewed in the *Progression* column in the metric collection, and in more detail within the metric settings.

#### Progression in the Metric Collection

The metric collection's *Progression* column shows the progression of each metric listed. A simplified preview of the line chart is displayed, showing up to six of the latest values. The last value of the metric is also displayed, along with any change over its preceding value. The last value of metric progression is an aggregation for the selected interval, and may vary from the latest metric result.

To view an example of the *Progression* column in the metric collection, select the example below:

Example

The screenshot shows a table within the Metric Library. The columns are: Process view, Name, Progression, Result, Aggregation Type, and Usage. The 'Revenue' metric is selected, showing a line chart with six data points and a final value of €195,608.44. A note indicates the value is 'Over cases'. The 'Aggregation Type' is '8' and 'Usage' is '\*\*\*'.

Process view:	Name	Progression	Result	Aggregation Type	Usage
Complete attribute set (default)	Revenue overall income		€195,608.44 ↗ €10,129.18	Over cases 8	***

## Progression in Metric Settings

Selecting your metric from the metric collection opens its settings panel. The *Progression* tab allows you to view and edit your metric's progression settings, as described below:

**Threshold:** Add threshold values to the graph. From the drop-down, choose which type of threshold to add:

- **Line:** Adds a single horizontal line to the graph. Enter a number into *Value* to determine where on the vertical axis the line appears. You can also provide a *Label* for this line.
- **2 regions:** Functions like the *Line* threshold, but also adds color to the horizontal regions above and below the threshold line. You can use *Color above* and *Color below* to change each region's color.
- **3 regions:** Functions like the 2 regions threshold, but also adds another threshold line, dividing the chart into three regions.

An interval selector allows you to choose between levels of precision for the time axis. Select *Day*, *Week*, *Month*, *Quarter*, or *Year* to calculate average values for the chosen interval.

A line chart is displayed, showing the metric's average value over a selected interval. Tooltips show the value of individual data points. Hover over a data point to see its value.

### ⓘ Note

The metric's actual value may differ from the latest value in the line chart, since the latest value is an average of values in the interval.

A range swiper allows you to restrict the displayed time range.

For information about your metric's progression history, select (*Overview of all the metric progression updates*). You can export the displayed information with *Export to CSV* .

To view an example of the *Progression* tab in the metric settings, select the example below:

### ⚙ Example



### → Remember

When you set up thresholds for a metric, the colors of the thresholds are displayed in the *Process Discovery* widget, indicating how the current metric value relates to the defined thresholds. For more information, see [Process Discovery \[page 423\]](#).

## 4.8.2 The Metric Library

Learn how to use and navigate the metric library.

Our metric library provides you with preconfigured metrics. Some of them are agnostic, others are tailored to specific business processes. Some metrics work out of the box, others can contain variables or SIGNAL code that you need to customize.

All metrics in the metric library are managed by SAP Signavio.

Find a list of the default metrics and a description of their variables in section [Metrics overview \[page 493\]](#).

### Access the Metric Library

Follow these steps:

1. Open your process and select the [Metrics](#) tab.
2. Open the metric library using [Metric Library](#).

The metric library opens. The following options exist to browse the metric library:

- [View labels \[page 491\]](#)
- [Filter for metrics \[page 492\]](#)
- [Search for metrics \[page 492\]](#)
- [Sort metrics \[page 492\]](#)
- [Preview metrics and assign variable values \[page 493\]](#)

### View Labels

Some metrics have labels to provide context:

Label	Description
New	We regularly add more metrics to the library. New metrics are marked with this label for 90 days after release.
Recommended	In the process settings, you can choose a system type and a set of process types. A metric is labeled as 'Recommended' if its system type matches your chosen system type and its process type matches any of your chosen process types.
Added	Metrics you have already added to your metric collection.

## Filter for Metrics

To filter for metrics, use the following drop-down menus:

<b>Aggregation Type</b>	Filter metrics by whether they're aggregated by events or cases. Read more in section <a href="#">Aggregation types [page 480]</a> .
<b>System Type</b>	Filter metrics by system type.
<b>Process Type</b>	Filter metrics by whether they're generic or specific for a process, for example Order-to-Cash.
<b>Analysis Objective</b>	Filter metrics by use case, for example to analyze automation rates, cycle time, or conformance.

If you've already chosen a system type and a set of process types for your process, selecting [Recommended Metrics](#) filters metrics based on your choices.

## Search for Metrics

To search for metrics by their name, use the search field on the top of the metric list.

## Sort Metrics

To sort the metrics, select the table headers. You can sort by the following:

<b>Name</b>	Sort the metrics by name.
<b>Result</b>	Sort the metrics by their resulting value when applied to your process data.
<b>Aggregation Type</b>	Sort metrics by whether they're aggregated by events or cases. Read more in section <a href="#">Aggregation types [page 480]</a> .
<b>System Type</b>	Sort the metrics by systems for which the metric is relevant, for example SAP Ariba.
<b>Process Type</b>	Sort metrics by whether they're generic or specific for a process, for example Order-to-Cash.
<b>Analysis Objective</b>	Sort metrics by use case, for example to analyze data for the level of automation, the cycle time, or conformance.

## Preview Metrics and Assign Variable Values

Select a metric to preview it. The preview opens in a side panel displaying the following metric settings:

- Result when applied to your process data
- Name and description
- Aggregation type
- Unit (shown in the result, if available)
- SIGNAL code
- Variables if available
- The system types for which this metric is recommended.

You can already assign your values to variables here or do that at a later point of time in the metric collection. You can find a description of metric variables in section [Metrics overview \[page 493\]](#).

If you've specified the system from which your process data originates, default values are assigned to the variables of recommended metrics.

## Related Information

[Add Metrics to a Process \[page 496\]](#)

[Assigning Values to Variables \[page 510\]](#)

[The Metric Collection \[page 487\]](#)

[Metrics overview \[page 493\]](#)

### 4.8.2.1 Metrics overview

List of process-independent and process-specific business metrics (KPIs) in SAP Signavio Process Intelligence

The following metrics are available in the metrics library:

- [Process-Agnostic Metrics](#)
- [Metrics for Acquire to Onboard \(SAP S/4HANA\)](#)
- [Metrics for Acquire to Onboard \(SAP ECC\)](#)
- [Metrics for Attract to Acquire Talent \(SAP SuccessFactors\)](#)
- [Metrics for Incident to Resolution \(ServiceNow\)](#)
- [Metrics for Inspect to Quality \(SAP S/4HANA\)](#)
- [Metrics for Inspect to Quality \(SAP ECC\)](#)
- [Metrics for Invoice to Cash \(SAP S/4HANA Cloud Public Edition\)](#)
- [Metrics for Invoice to Cash \(SAP S/4HANA\)](#)
- [Metrics for Invoice to Pay \(SAP S/4HANA\)](#)
- [Metrics for Invoice to Pay \(SAP ECC\)](#)
- [Metrics for Issue to Resolution \(Jira Service Management for Cloud\)](#)

- Metrics for Issue to Resolution (Jira Service Management for Data Center and Server)
- Metrics for Lead to Opportunity (Salesforce Sales Cloud)
- Metrics for Lead to Opportunity (SAP Sales Cloud)
- Metrics for Lead to Quote (Salesforce Sales Cloud)
- Metrics for Make to Stock (SAP S/4HANA)
- Metrics for Make to Stock (SAP ECC)
- Metrics for Manage Personal Employee Information (SAP SuccessFactors)
- Metrics for Manage Transportation Execution (SAP Transportation Management)
- Metrics for Manage Warehouse and Inventory, Outbound Processing (SAP EWM)
- Metrics for Meter to Cash (SAP S/4HANA Utilities)
- Metrics for Meter to Cash (SAP for Utilities (IS-U))
- Metrics for Operate Manufacturing (SAP Digital Manufacturing)
- Metrics for Operate to Maintain (SAP S/4HANA)
- Metrics for Operate to Maintain (SAP ECC)
- Metrics for Order to Cash (SAP S/4HANA)
- Metrics for Order to Cash (SAP ECC)
- Metrics for Procure to Pay (SAP Ariba)
- Metrics for Procure to Pay (SAP S/4HANA)
- Metrics for Procure to Pay (SAP ECC)
- Metrics for Project to Cash (SAP S/4HANA Cloud Public Edition)
- Metrics for Request to Service (SAP Service Cloud)
- Metrics for Source Products and Services (SAP Ariba)
- Metrics for Vendor Invoice Management (OpenText)

### 4.8.3 Metric Settings

A metric has a range of associated settings. View and configure these using Metric Settings.

To access Metric Settings, open the Metric Collection for a process and select a metric from the list. The metric's settings are arranged into sections:

- General
- Signal
- Progression
- Usage
- History

You can navigate directly to a section by selecting the tab bearing its name.

The following sections describe the settings and how you can configure them.

## General Settings

In the *General* section, you have the following configuration options:

- Enter or update your metric's name and description in the *Name* and *Description* fields. The metric name must be unique in the associated process. In order to avoid metrics being considered duplicates, avoid very similar names, such as 'Metric 1', 'Metric 1', 'Metric {1}', and 'Metric\_1'.
- Select whether your metric should be aggregated over cases or over events the *Aggregation type* check boxes.
- The *Unit* dropdown list allows you to specify your units as duration, currency, or suffix, if needed.
- You can enable rounding and select the rounding type using the *Rounding* dropdown list.
- The *Metric direction* dropdown list allows you to specify which type of metric change is considered positive.

### ❖ Example

A t-shirt store uses a metric to track how many of their orders are canceled per month. They aim to reduce the number of canceled orders. As such, they select their metric direction as *Positive is down*. The t-shirt store uses a different metric to track their revenue every month, which they aim to increase. For this metric, they select the metric direction *Positive is up*.

## View and Edit the SIGNAL Code

In the *Signal* section, the code of the metric is displayed along with a listing of the process attributes and variables. The attributes are organized into *Case level* and *Event level*. In some cases, the variables are labeled. Variables from the metric library are labeled *Library*. Empty variables are labeled *Empty*. Invalid variables are grayed out and cannot be used.

- You can search the list of attributes by typing into the *Search* textbox. All attributes not matching the search criteria are filtered out.
- You can update the metric code by altering it in the textbox and then pushing the *Save* button.

### ⚠ Caution

Altering the code resets a metric's progression.

## Show Where a Metric is Used

In the *Usage* section, you can see where a metric is used.

- Under *Investigation* is displayed all investigations featuring this metric.
- Under *Dashboard* is displayed all dashboards featuring this metric.

You can go directly to the using investigation or dashboard via its corresponding *Link* ↗.

## View a Metric's History

Metrics maintain a history of the changes made to them, which is available in the [History](#) section. You can explore several aspects of the metric's history:

- The date and time of each change is displayed, along with the avatar of the user who made it. Hovering over the avatar shows a tooltip containing that user's email address. The nature of the change is displayed in bold text. The metric's result appears on the right.
- Expand the change to see details of how the metric was modified, including the name of the changed property, and its original and updated values.

### 4.8.4 Add Metrics to a Process

Learn how to add, create, or duplicate metrics.

Adding metrics to your process allows analysts to use them for process mining.

#### ① Note

If you want to have variable values assigned automatically to your metrics, select a source system first. For more information, see [Auto-Assigning Variable Values Based on the Source System \[page 510\]](#).

To add a metric, you have the following options:

- [Add from metric library \[page 496\]](#)
- [Duplicate a metric \[page 497\]](#)
- [Create a custom metric \[page 497\]](#)
- [Import metrics \[page 498\]](#)
- [Add from widget configuration dialog \[page 498\]](#)

#### Add from Metric Library

Follow these steps:

1. Open your process and select the [Metrics](#) tab.  
The metric collection opens. It displays the metrics that were already added to the process.
2. Open the metric library using [Metric Library](#).  
The metric library opens.
3. Select the metrics you want to add by ticking the checkboxes.
4. Confirm with [Add to Collection](#).  
The metrics are added to your process.

## Duplicate a Metric

Follow these steps:

1. Open your process and select the [Metrics](#) tab.  
The metric collection opens.
2. For the metric to be duplicated, open its action menu  and choose *Duplicate*.  
The dialog for adding a metric opens.
3. You can edit the metric, read more in section [Edit a metric \[page 499\]](#).
4. Confirm with [Save](#).  
The metric is added at the top of metric collection.

## Create a Custom Metric

Follow these steps:

1. Open your process and on the Metrics tab, select [Create Metric](#).  
The dialog for adding a custom metric opens.
2. Enter a name and a description.
3. To define whether the metric calculates values over cases or events, select the aggregation type. Read more in section [Aggregation types \[page 480\]](#).
4. You can select a unit type from the [Unit](#) drop-down list.
  - [Duration](#): The duration is displayed in the widget.
  - [Currency](#): Choose a currency value from the drop-down list, for example EUR or USD.
  - [Suffix](#): Enter your custom text. To include a space between the value and the text, enter a space first and then your text.A unit can also be set in [Value](#) widgets, read more in section [Add a unit \[page 357\]](#).
5. You can select which type of rounding to apply to the metric value using the [Rounding](#) drop-down.
  - No rounding: Displays the calculated value as it is.
  - Round up: Rounds the decimal value up to the next higher value at the chosen level of precision.
  - Round down: Rounds the decimal value down to the next lower value at the chosen level of precision.
  - Round to closest: Rounds the decimal value to the closest value at the chosen level of precision. A trailing digit above or equal to 5 causes rounding to the next higher value.You can alter the rounding precision by adjusting the number of decimal places. Use the buttons beside the [Rounding](#) drop-down.

6. Enter your SIGNAL code.

Read about the SIGNAL editor functions like autocompletion, color scheme, and error linting in section [The SIGNAL Code Editor \[page 512\]](#).

Select [Show Attributes](#) to view the case or event attributes, custom attributes, and the events within the attributes. A preview of the SIGNAL query result is displayed in the metric header.

7. If the code contains variables, you need to assign values. For more information, see [Assigning Values to Variables \[page 510\]](#).
8. Confirm with [Create](#).  
The metric is added to your process.

## Import Metrics

### ⓘ Note

You can only import metrics available as JSON files. For example, the metric export creates such files.

Follow these steps:

1. Open your process and select the [Metrics](#) tab.  
The metric collection opens.
2. Begin the metric import process with the  (Import) icon.  
The file selection dialog opens.
3. Select your JSON file and choose [Next](#).  
If any of the imported metrics conflict with an existing metric, you'll be prompted to resolve these conflicts.  
After that, the metrics are added to your process.

Read how to export metrics in section [Export and import metrics \[page 500\]](#).

## Add from Widget Configuration Dialog

### ⓘ Note

This feature is only available on [Value](#) widgets.

Follow these steps:

1. To set up the [Value](#) widget, follow the instructions in section [Add and configure the widget \[page 357\]](#) and select the configuration option [SIGNAL code](#).
2. After adding SIGNAL code, choose [Save as New Metric](#).  
The code is added to the metric collection of your process. Users can select the metric when they configure new widgets.  
If you select [Save as New Metric](#) again, another metric is created.

## Related Information

[The Metric Collection \[page 487\]](#)

[Edit and Delete Metrics \[page 499\]](#)

[Assigning Values to Variables \[page 510\]](#)

[Invalid Metrics \[page 503\]](#)

[Resolving Conflicts \[page 500\]](#)

## 4.8.5 Edit and Delete Metrics

Learn how to edit the query code, the unit, or other settings of a metric, and how to delete metrics from your process.

When you edit a metric, the following applies:

- You can edit any metric that you have added to your process.
- Any change applies only to the metric added to your process. The metric in the library remains unchanged.

### Edit a Metric

Follow these steps:

1. Open your process and select the [Metrics](#) tab.  
The metric collection opens.
2. Select the metric you want to edit.  
The dialog for editing a metric opens.
3. Apply your changes. The available settings are described in [Metric Settings \[page 494\]](#).
4. Confirm with [Save](#).  
Your changes are applied to the metric.

### Delete a Metric from the Process

#### ⓘ Note

Deleting a metric can't be undone and breaks the widgets in which the metric is used.

It's not possible to delete a metric from the library.

To delete a metric from your process, follow these steps:

1. Open your process and select the [Metrics](#) tab.  
The metric collection opens. The [Widgets](#) column shows how many widgets use a metric.
2. For the metric to be deleted, open its action menu [...](#) and choose [Delete](#).  
If a widget was configured with this metric, the corresponding investigation is displayed.
3. Confirm with [Delete](#).  
The metric is deleted. Any widget that used the deleted metric needs to be reconfigured.

### Related Information

[Add widgets to an investigation \[page 345\]](#)

[Edit, move, and delete widgets \[page 347\]](#)

## 4.8.6 Export and Import Metrics

Learn how to share metrics between SAP Signavio workspaces using the export and import functions.

With these functions, you can use your metrics in different workspaces.

A metric file can contain one or more metrics.

### Export Metrics

Follow these steps:

1. Open your process and select the [Metrics](#) tab.  
The metric collection opens.
2. Select the metrics you want to export by ticking the checkboxes.
3. Choose [Export](#).  
The metrics are exported as a JSON file. The file is saved to your browser's download folder.

### Import Metrics

#### ⓘ Note

You can only import metrics available as JSON files. For example, the metric export creates such files.

Follow these steps:

1. Open your process and select the [Metrics](#) tab.  
The metric collection opens.
2. Begin the metric import process with the (Import) icon.  
The file selection dialog opens.
3. Select your JSON file and choose [Next](#).  
If any of the imported metrics conflict with an existing metric, you'll be prompted to resolve these conflicts.  
After that, the metrics are added to your process.

### Resolving Conflicts

In some cases, conflicts are created when importing metrics. For example:

- A JSON file you are importing contains duplicate metrics within the file.
- A metric you are importing is a duplicate of one of your existing metrics.
- You are importing duplicate metrics from the metric library.
- You are importing invalid metrics (for example, a metric has missing attributes).

Even if the content of metrics is different (such as SIGNAL code, variables, or aggregation type), metrics are considered duplicates if their names are identical or very similar - for example, 'Metric 1', 'Metric 1', 'Metric {1}', and 'Metric\_1'. The metric name must be unique in the associated process.

In case of any conflicts, the import dialog prompts you to resolve them.

1. If there are conflicts within a JSON file you are importing, the import dialog displays details about the conflicts. To resolve the conflicts, you must open the JSON file, make the required changes (for example, renaming duplicate metrics), and save your changes. To continue, select *Import*, then select the amended JSON file.
2. If several tabs appear, ensure the *Conflicts* tab is selected.
3. If a metric you're importing conflicts with an existing metric, a section named *Conflicted metrics* is available. Expand this section.
4. For each conflict, the original name is shown with a *New metric name* beside it. You can change the suggested name to something else if you prefer.
5. Once all conflicts are resolved, *Confirm* and then *Import*.

#### Note

An imported metric and an existing metric might also be identical in both name and content. This is called a match. A *Match* tab appears during import, allowing you to review any matching metrics.

## Related Information

[Assigning Values to Variables \[page 510\]](#)

[Select Process Views for Metrics \[page 502\]](#)

## 4.8.7 Add metrics to an investigation

Learn how to configure widgets to display the output of metrics, or add a metrics bar to an investigation. Also read how to delete metrics from the metrics bar.

#### Note

You need the manager or analyst role for a process to use these functions.

## Configure widgets to display the output of a metric

To configure widgets to display the output of one or more metrics, follow the instructions in section [Add widgets to an investigation \[page 345\]](#)

## Add a metrics bar

The metrics bar contains widgets that are preconfigured with metrics. You specify the widgets that are displayed in the bar.

### Note

A user with the manager role needs to add metrics to the process before you can select metrics for the metrics bar. Read more in section [Add Metrics to a Process \[page 496\]](#).

The following applies to the metrics bar:

- The metrics bar is always located at the top of an investigation. You can't move it.
- You can change the order in which the metrics are displayed.
- The widget for each metric is preconfigured. You can't edit these widgets.

To add a metrics bar, follow these steps:

1. Open your process and select *Investigations*.
2. Select  for your investigation, then *Settings*.  
The investigation settings window opens.
3. Select one or more metrics using the *Configure metrics bar* drop-down list.
4. Confirm with *Done*.  
The metrics are displayed in your investigation.

## Remove a metric from the metrics bar

Follow these steps:

1. Open your process and select *Investigations*.
2. Select  (*more options*) for your investigation, then *Settings*.  
The investigation settings window opens.
3. Under *Configure metrics bar*, select  (*delete*) for the metric you want to remove.
4. Confirm with *Done*.  
The metric is no longer displayed in the investigation.

## 4.8.8 Select Process Views for Metrics

Learn how to configure widgets to display the output of metrics, or add a metrics bar to an investigation.

A process view can restrict access to data in such a way that a metric cannot deliver results. In this case, the metric becomes invalid. If multiple process views are assigned to you, you can check for each process view if the metrics in the metrics collection are valid.

Follow these steps:

1. Open your process and select the [Metrics](#) tab.  
The metric collection opens.
2. Select a process view from the [Select process view](#) drop-down list.  
The metric statuses are updated accordingly.

## Related Information

[Edit and Delete Metrics \[page 499\]](#)

[Invalid Metrics \[page 503\]](#)

[The Metric Collection \[page 487\]](#)

## 4.8.9 Invalid Metrics

Sometimes metrics work out of the box, other times they require configuration.

When metrics are invalid, we provide support as follows:

- In the metric collection, hover over the [Invalid](#) label of a metric to view a tooltip suggesting solutions.
- In the metric settings, the cause of the problem is displayed in an error message below the metric's title.

The following sections describe common causes of invalid metrics.

## Missing Values for Variables

The metric query refers to variables for which no values were set.

To fix the metric, add missing variable values or customize the existing ones. For more information, see [Assigning Values to Variables \[page 510\]](#).

## Incorrect Query

The SIGNAL query is incorrect.

To fix the metric, customize the SIGNAL query. For support, read more in the following sections:

- [Edit a metric \[page 499\]](#)
- [SAP Signavio Analytics Language](#)
- [View data and event attributes \[page 487\]](#)

## Access Restrictions

A metric can be invalid because you do not have access to the queried data. In this case, contact the user with the manager role for your process and request access to the data. Access to data is provided using process views, read more in section [Define access to process data with process views \[page 26\]](#).

## Metrics Imported Without Process Data

If metrics are imported into the metric collection before process data is uploaded, all metrics will be marked with the status 'Invalid'.

Also, a warning message appears in the metrics collection guiding you to import the process data and then choose your system type in the process settings.

## 4.8.10 Variables

A variable is an entity where information can be maintained and referenced, for example in the SIGNAL code editor. This section describes the types of variables you can use in your metrics, and how to create them.

Select the links below to learn more.

### [Library Variables \[page 504\]](#)

Learn about library variables and how to view and edit them.

### [Custom Variables \[page 505\]](#)

Custom variables are variables that you create yourself. This section describes how to create and manage custom variables, and which data types and expressions you can use.

### [Assigning Values to Variables \[page 510\]](#)

Learn how to assign values to metric variables automatically, manually, or in bulk.

### 4.8.10.1 Library Variables

Learn about library variables and how to view and edit them.

## Context

A library variable is a variable coming from a metric template created while adding metrics from the metric library. The variable can be used in a metric's SIGNAL interface and shared between multiple metrics.

### ⓘ Note

Like custom variables, library variables must have unique names.

To view and edit your library variables, follow the steps below:

## Procedure

1. Open your process and select the [Metrics](#) tab.
2. Select [Library Variables](#).  
A side panel opens, displaying your library variables.
3. Edit your library variables as needed. You have the following options:
  - Filter with  ([Filter empty variables](#)).
  - Locate specific variables by entering search terms in [Search](#).
  - Use the text field to choose or enter a value for each variable. Variable values can be SIGNAL expressions, thresholds, events, or attributes.
  - Selecting a metric's view icon  opens the settings page of that metric.
4. Confirm your changes with [Save](#), or exit the side panel with [Cancel](#).

## 4.8.10.2 Custom Variables

Custom variables are variables that you create yourself. This section describes how to create and manage custom variables, and which data types and expressions you can use.

Select the links below to learn more.

### [Viewing Custom Variables \[page 505\]](#)

Learn how to view and navigate your custom variables.

### [Creating Custom Variables \[page 506\]](#)

Learn how to create custom variables.

### [Importing Custom Variables \[page 507\]](#)

Learn how to import custom variables.

### [Permitted Expressions and Data Types in Variables \[page 507\]](#)

Learn which expressions and data types you can use in variables.

### [Custom Variable Settings \[page 508\]](#)

Learn how to view and configure the settings of a custom variable.

## 4.8.10.2.1 Viewing Custom Variables

Learn how to view and navigate your custom variables.

To access your custom variables, open your process, then select [Variables](#). Your custom variables are displayed, under the following headings:

- **Name:** The business name of the variable, as defined in its settings. You can sort by alphabetical order with  $\leq$  (ascending) or  $\geq$  (descending).
- **Reference name:** The name generated from the business name (*Name*) when the variable was created. For more information, see [Custom Variable Settings \[page 508\]](#).
- **Value:** The variable value, as defined in its settings.
- **Status:** Displays a label showing whether the variable is valid or invalid. If a variable is invalid, hover over the label to view a tooltip suggesting solutions.
- **Metrics:** Displays how many metrics that variable is used in.

Select **...** (More) to view more options such as (*Duplicate*), (*Export*), (*Copy link*), and (*Delete*).

## 4.8.10.2.2 Creating Custom Variables

Learn how to create custom variables.

### Context

This topic explains how to create a custom variable in the *Variables* tab of your process.

If you enter a non-existent variable into the SIGNAL code editor, the dialog displays a *Create Variable* button. Selecting this button opens the custom variable creation dialog described below.

For more information about which types of expressions and data types are permitted in variables, see [Permitted Expressions and Data Types in Variables \[page 507\]](#).

### Procedure

1. Open your process and in the *Variables* tab, select *Create Variable*.  
The custom variable creation dialog opens.
2. In *Business Name*, enter the name your organization is using for this variable. The variable name must be unique in the associated process. In order to avoid variables being considered duplicates, avoid very similar names, such as 'Variable 1', 'Variable 1', 'Variable {1}', and 'Variable\_1'. Once entered, the dialog generates and displays the variable's *Reference Name*. Both names must be unique. Note that if you update *Business Name* later, *Reference Name* remains the same.
3. If needed, you can also fill out the *Description* field.
4. In the *Value* text field, enter the SIGNAL code to be used in your variable. The side panel displays *Case Attributes* and *Event Attributes*. Select an attribute to expand its list of distinct values. Select to copy an attribute name or value. You can then paste it into the text field.
5. Confirm with *Create*.

The variable is saved and can be used in your metrics.

## Related Information

[Importing Custom Variables \[page 507\]](#)

[Custom Variable Settings \[page 508\]](#)

### 4.8.10.2.3 Importing Custom Variables

Learn how to import custom variables.

#### Procedure

1. Open your process and select the *Variables* tab.

The custom variables in the process are displayed.

2. To import a new custom variable, select (*Import*).

The custom variable import dialog opens.

3. Follow the instructions in the dialog, then confirm with *Import*.

The variable is saved and can be used in your metrics.

## Related Information

[Creating Custom Variables \[page 506\]](#)

[Custom Variable Settings \[page 508\]](#)

### 4.8.10.2.4 Permitted Expressions and Data Types in Variables

Learn which expressions and data types you can use in variables.

#### Expressions in Variables

The following expressions can be used in variables:

Expression or Keyword	Examples
Identifier	ColumnName; "ColumnName"

Expression or Keyword	Examples
Array of identifiers	"Column", Column2
Literal	'Some string';30
Array of literals	'City 1', 'City2'
Matching patterns	Column1 -> "Column2" -> Column3
Comparison expressions	occurrence > 1; Current Status category != 'Done'
Comparison expressions	occurrence > 1; Current Status category != 'Done'
Expressions for NULL values	InvoiceLastDunnedOn IS NOT NULL
LIKE and ILIKE expressions	'Amsterdam' LIKE 'A%'
Matching expressions	Event Created By User Type MATCHES ('Dialog')
Expression AND	( "ORDER Status" = 'Delivered' AND "City" = 'Boston' )
Expression IN	Event Created By User Type IN ('System', 'Service')
Expression OR	IncidentPriority = 1 OR "IncidentCategory" = 'Urgent'

## Data types

The following data types are supported:

- Strings
- Numbers stored as double precision floating point
- Timestamps stored with millisecond precision, without time zone information.
- Durations stored with millisecond precision
- Booleans

Both case and event attributes can be NULL, indicating the absence of a value or an unknown value.

### 4.8.10.2.5 Custom Variable Settings

Learn how to view and configure the settings of a custom variable.

To access your custom variable's settings page, open your process, select [Variables](#), then select a custom variable from the list. The variable's settings page opens, displaying the following sections:

- General

- Value
- Usage
- History

You can navigate directly to a section by selecting the tab bearing its name.

The following sections describe the settings and how you can configure them.

## General

In the *General* section, you have the following configuration options:

- Update the name your organization is using for this variable in *Business Name*. The variable name must be unique in the associated process. In order to avoid variables being considered duplicates, avoid very similar names, such as 'Variable 1', 'Variable 1', 'Variable {1}', and 'Variable\_1'. Note that your variable's *Reference Name* is generated from the business name at the time the variable is created. If you update *Business Name* later, *Reference Name* remains the same.
- Update the *Description* field.

## Value

In the *Value* section, a text panel is displayed along with a listing of the process attributes. The attributes are organized into *Case level* and *Event level*.

- You can search the list of attributes by typing into the *Search* textbox. All attributes not matching the search criteria are filtered out.
- Update the variable value by altering it in the text panel, then selecting *Save*.

## Usage

In the *Usage* section, you can see which metrics or widgets a variable is used in. Select  to open a metric or widget.

## History

The *History* section displays a list of the times and dates in which the variable was created or changed. Select  to see details of how the variable was modified, including the name of the changed property, and its original and updated values.

### 4.8.10.3 Assigning Values to Variables

Learn how to assign values to metric variables automatically, manually, or in bulk.

Select the links below to learn more.

#### [Auto-Assigning Variable Values Based on the Source System \[page 510\]](#)

Learn how to assign values to metric variables automatically.

#### [Manually Assign Variable Values to a Single Metric \[page 511\]](#)

Learn how to assign values to metric variables manually.

#### [Bulk-Assigning Variable Values to All Metrics in a Process \[page 511\]](#)

Learn how to assign variable values in bulk.

#### 4.8.10.3.1 Auto-Assigning Variable Values Based on the Source System

Learn how to assign values to metric variables automatically.

#### Context

If a metric's code has variables, you need to assign values to them, like SIGNAL expressions, thresholds, events, or attributes. Otherwise, the metric can't determine the KPI.

By specifying the system from which your process data originates, default values are provided to metrics variables automatically.

##### Note

This function doesn't change the metrics created before a source system was specified.

Follow these steps:

#### Procedure

1. Open your process and select  ([Settings](#)).
2. On the [Data](#) tab, select a source system from the [Select system type](#) drop-down list, for example SAP S/4HANA.

Changes are saved automatically. When you add metrics to your process, matching values are automatically assigned to variables in the metric. The assigned value can come from one of two places:

- If the variable doesn't already exist in the metric collection, the variable takes the template value for that system type.

- If the variable does already exist in the metric collection, the variable takes the existing value used in the collection.

ⓘ Note

If you alter the variable's value, that change propagates to all objects referencing the variable.

### 4.8.10.3.2 Manually Assign Variable Values to a Single Metric

Learn how to assign values to metric variables manually.

#### Procedure

1. Open your process and select the [Metrics](#) tab.

The metric collection opens.

2. Select the metric you want to edit.

The metric settings appear. If the query has variables, each appears in the [Signal](#) section in a text field below the query.

3. Enter the variable values, for example SIGNAL expressions, thresholds, events, or attributes.

4. Confirm with [Save](#).

The variables are set.

### 4.8.10.3.3 Bulk-Assigning Variable Values to All Metrics in a Process

Learn how to assign variable values in bulk.

#### Procedure

1. Open your process and select the [Metrics](#) tab.

The metric collection opens.

2. Select [Library Variables](#).

The dialog for editing variables opens, displaying the library variables of all metrics in the process.

3. Search for the variable you wish to add values to. You can search by variable name, filter empty variables, and see in which metrics a variable is used. Select ⓘ to view the settings of a specific metric.

4. Enter the variable values, for example, SIGNAL expressions, thresholds, events, or attributes.
5. Confirm with [Save](#).

The variable values are set.

## 4.9 The SIGNAL Code Editor

Get to know the SIGNAL editor functions like autocomplete, color scheme, and error linting. This editor is used to configure SIGNAL queries, for example in widgets, metrics, OData views, and filters.

### Autocompletion

Autocompletion helps you to quickly write SIGNAL queries while minimizing typing and syntax errors.

Autocomplete support is location-specific. For example, if your cursor is in the SELECT area of the query, suggestions include variables, attributes, and metrics. In other areas of the query, autocomplete supports query operators, functions, and expressions.

To trigger autocomplete, press [\*Ctrl + Space\*](#) for Windows or [\*control + Space\*](#) for Mac. This opens a list and you can select a completion. The list of items is filtered and narrowed down as you type. The SIGNAL editor in the widget builder provides the option to show the necessary keyboard shortcut ( [Show keyboard shortcut](#)).

On a Mac, if the shortcut doesn't work, this combination of keystrokes is probably mapped to some other function. Check and change the mapping under [System Settings > Keyboard > Keyboard Navigation > Keyboard Shortcuts](#).

### Color Scheme

The color scheme for code simplifies reading and writing queries.

The different pieces of code are colored as follows:

- keywords are pink, for example, SELECT, GROUP BY, and FROM
- functions are yellow, for example, COUNT, MAX, and FLATTEN
- identifiers are green, for example, attributes and table names
- comments are orange

Colored SIGNAL code example:

```
1 SELECT COUNT (case_id), (SELECT FIRST ("City"))
2 -- this is a comment
3 FROM THIS_PROCESS
4 ORDER BY 1 DESC
5 LIMIT 500
```

## Error Linting

The SIGNAL code editor provides a linter that parses the code to detect errors. Each error in a row is indicated by a wavy underscore. If available, additional information is displayed when you hover the error.

Error linting example:

```
1 SEL □ missing FROM at 'FRO' , (SELECT FIRST ("City"))
2 --
3 FRO THIS_PROCESS
4 ORDER BY 1 DESC
5 LIMIT 500
```

## Related Information

[Add Metrics to a Process \[page 496\]](#)

[Add widgets to a dashboard \[page 345\]](#)

[Add widgets to an investigation \[page 345\]](#)

[Advanced Filter \[page 449\]](#)

[Actions \[page 530\]](#)

[OData Views \[page 36\]](#)

[SAP Signavio Analytics Language](#)

[Creating Charts and Tables Using SIGNAL Code \(SIGNAL Mode\) \[page 376\]](#)

## 4.10 Value Analysis

Value analysis helps you to quantify the business impact of your process mining or transformation projects.

Value analysis enables you to use a structured approach for calculating the savings potential when improving a certain metric. Important information can be maintained directly in the tool. Value analysis calculations are performed using proven formulas provided by SAP Value Lifecycle Management (VLM).

Select the links below to learn more.

[Create a Value Case \[page 514\]](#)

Learn how to create a value case for a metric in SAP Signavio Process Intelligence.

[Delete a Value Case \[page 515\]](#)

Learn how to delete a value case from SAP Signavio Process Intelligence.

[Calculation Formulas for Value Analysis \[page 516\]](#)

Learn how we calculate the potential value (*Profit & Loss* or *Working Capital*) for a value case. The potential value is the amount of money you can expect to save or gain by implementing a process improvement activity.

### [View Saved Value Cases \[page 516\]](#)

Learn how to view and interpret your saved value cases in SAP Signavio Process Intelligence.

### [Edit a Value Case \[page 518\]](#)

Learn how to view and edit the details of a value case.

### [Link a Value Case to an Initiative \[page 519\]](#)

Learn how to link a SAP Signavio Process Intelligence value case to an initiative in SAP Signavio Process Transformation Manager.

### [Who Can Work With Value Cases \[page 521\]](#)

Learn about the levels of access different users have to value cases.

## 4.10.1 Create a Value Case

Learn how to create a value case for a metric in SAP Signavio Process Intelligence.

### Context

#### ⓘ Note

You need the manager or analyst role for a process to create value cases.

Creating a value case allows you to perform value analysis on your data. A value case is a small project, based on exactly one metric and value calculation. Each value case belongs to a specific value driver.

You can create value cases from the metric library, using metrics which are not yet in your metric collection. You can also create value cases directly from your metric collection.

### Procedure

- Select the headings below to expand each section.
- **Create a value case from the metric library:**
  - a. Open your process and select *Metrics*, then choose *Metric Library*.
  - b. To create value cases in bulk, use the checkboxes to select the metrics as needed. To create a single value case, you can either select the metric checkbox, or select the metric itself to open the metric preview sidebar and view the metric's value calculation.
  - c. Choose *Create Value Case*.
  - d. Confirm which value driver should be associated with your value case.

The selected metrics are added to your metric collection and your value cases are created.

If your value case does not have a pre-defined calculation formula, you can enter your own formula. For more information, see [Calculation \[page 518\]](#).

If there is any missing information, matches, or conflicts, when adding metrics, a dialog pops up, prompting you to resolve these issues. For more information, see [Resolving Conflicts \[page 500\]](#).

- **Create a value case from the metric collection:**

- a. Open your process and select [Metrics](#).
- b. To create value cases in bulk, use the checkboxes to select the metrics as needed. To create a single value case, you can either select the metric checkbox, or select the metric itself to open its settings page.
- c. Choose [Create Value Case](#).
- d. Confirm which value driver should be associated with your value case. The value driver is either assigned automatically from the metric library, or must be selected manually.

The selected metrics are added to your metric collection and your value cases are created.

If your value case does not have a pre-defined calculation formula, you can enter your own formula. For more information, see [Calculation \[page 518\]](#).

- **Create a value case from the Value Cases tab:**

- a. Open your process and select [Value Cases](#).
- b. In the [Create Value Case](#) dropdown, select [From Metrics Library](#) or [From Collection](#) as needed.

The metric library or metric collection opens. From here, you can create value cases as described in the previous sections.

## 4.10.2 Delete a Value Case

Learn how to delete a value case from SAP Signavio Process Intelligence.

### Context

 Note

- You need the manager or analyst role for the [Process view](#) of a value case to delete value cases.
- Deleting a value case can't be undone.
- A deleted value case is automatically removed from any initiative to which it might be linked.

### Procedure

1. Open your process and choose the [Value Cases](#) tab.
2. Select the checkboxes on the left of one or more cases that you wish to delete.
3. Select  ([Delete](#)).
4. Confirm that you wish to delete the value cases.  
The value cases will be deleted.

### 4.10.3 Calculation Formulas for Value Analysis

Learn how we calculate the potential value (*Profit & Loss* or *Working Capital*) for a value case. The potential value is the amount of money you can expect to save or gain by implementing a process improvement activity.

Potential value is calculated as the difference between the baseline monetary impact and the target monetary impact. Both the baseline and target monetary impact are calculated based on a predefined formula, or one that's customized by you.

The formula uses the following:

- The metric which has been selected for the value case.
- SAP-suggested assumptions (for predefined formulas): These are default assumptions defined by SAP. For example, hourly rates for manual processing, average process times.
- The annualization factor: *Baseline Monetary Impact per Year* and *Target Monetary Impact per Year* are calculated for a year using the annualization factor. The denominator represents number of days that you've selected in the baseline date range.

#### Note

Learn how the potential value can be recalculated by referring to the *Calculation* section in [Edit a Value Case \[page 518\]](#).

You can modify the potential value calculation to ensure that it:

- Accurately reflects how the changes will impact your organization.
- Is manually calculated, in case it isn't available automatically.

### Related Information

[View Saved Value Cases \[page 516\]](#)

### 4.10.4 View Saved Value Cases

Learn how to view and interpret your saved value cases in SAP Signavio Process Intelligence.

To view your saved value cases, open your process and select *Value Cases*. The tab displays a list of your value cases under the following headings.

<i>Heading</i>	<i>Description</i>
<i>Value Driver</i>	<p>A value driver is a metric category, with value analysis driving a specific value. One metric can have multiple value calculations which belong to different value drivers.</p> <p>Each value driver belongs to one impact area. This can be either <i>Working Capital</i> or <i>Profit &amp; Loss</i>. These values are calculated by adding up the <i>Potential Value</i> of the individual rows.</p> <ul style="list-style-type: none"> <li>• <i>Working Capital (one-time)</i>: The expected total monetary gain from a process improvement is a one-time gain. For example, reduction in order rejection rate will positively impact the working capital.</li> <li>• <i>Profit &amp; Loss (recurring)</i>: The expected monetary gain from a process improvement is recurring, implying continuous gains over a period of time. For example, once the automation rate increases, the company saves money every year if high automation rate is maintained.</li> </ul>
<i>Name</i>	By default, a value case has the same name as the metric for which it was created. Select the value case to open its settings and update its name, if needed.
<i>Baseline Date Range</i>	The range for historical data with defined baseline value. The default baseline (at time of creating the value case) is the previous 12 months.
<i>Baseline</i>	The metric result for the baseline date range.
<i>Current</i>	The current value of the value driver. This value is calculated based on the last 30 days.
<i>Target</i>	Target value for the metric.
<i>Potential Value</i>	<p>Targeted monetary result, for example, savings.</p> <p>The type of value driver and its underlying metric determines if the <i>Potential Value</i> is for <i>Working Capital</i> or <i>Profit &amp; Loss</i>. See <i>Value Driver</i> above for the definition of both.</p>

## Related Information

[Calculation Formulas for Value Analysis \[page 516\]](#)

[Edit a Value Case \[page 518\]](#)

## 4.10.5 Edit a Value Case

Learn how to view and edit the details of a value case.

### ⓘ Note

- You need the manager or analyst role for the [Process view](#) of a value case to edit or filter value cases.

To access the details of a value case in SAP Signavio Process Intelligence, open your process, choose the [Value Cases](#) tab, and select the value case from the list.

On top of the page, see a section with some information about the value case, like its [Value Driver](#), [Potential Value](#), and so on. For more details about what these terms mean, see [View Saved Value Cases \[page 516\]](#).

Select  ([Filters](#)) to apply a filter on your value case and recalculate the metric and monetary values. For more information, see [Filters \[page 443\]](#).

The value case also contains the following two tabs:

### General

From the [General](#) tab, configure the settings according to your requirement. For example, you can update the name, add a description, update the process view, or change the value driver.

### ⓘ Note

- Changing the value driver of a value case doesn't change its calculation formula.
- Each value case is linked to a single [Process view](#). The process view is determined automatically, based on your selection while creating the value case. You can change it from the [General](#) tab only if you have access to more than one process view.

### Calculation

In the [Calculation](#) tab, you have the following settings:

#### Calculation

This section allows you to review and update the formula and the values used for the calculation of the potential value. You can't add any special functions to the formula - it's purely mathematical.

We provide pre-defined formulas for metrics that are assigned to a value driver. For other metrics, you need to manually add the formula yourself.

#### Baseline State

This section quantifies the initial performance of the metric measurement, along with the associated monetary value. It's the value collected from your system before the process improvement efforts, so you can measure your progress against it.

## Target State

This section shows the monetary impact based on the target or improvement percentages. You can edit the target value to automatically update the improvement percentage. This also affects the potential value. Otherwise, the improvement percentage remains fixed, even when you update the formula or the other values.

## Calculation Details

This section shows the calculated values, and how they were calculated.

### ⓘ Note

- Once you save the edits that you made to the formula or the values, the *Potential Value* is recalculated and updated. You can also select *Cancel* to delete all the changes.
- Baseline Monetary Impact per Year* and *Target Monetary Impact per Year* are calculated for a year using the annualization factor. The denominator represents the number of days that you've selected in the baseline date range.

## Related Information

[Calculation Formulas for Value Analysis \[page 516\]](#)

[Link a Value Case to an Initiative \[page 519\]](#)

## 4.10.6 Link a Value Case to an Initiative

Learn how to link a SAP Signavio Process Intelligence value case to an initiative in SAP Signavio Process Transformation Manager.

## Prerequisites

### ⓘ Note

Access to this feature depends on your license.

The actions available to you in a specific initiative or insight depend on your access rights.

For more information, see [User Administration, Authentication, and Authorization](#) in the *Security Guide for SAP Signavio Process Transformation Manager*.

## Procedure

You can either link an existing initiative to a value case or create a new initiative for your value case. To link an initiative to a value case, follow these steps:

1. Open your process and click the [Value Cases](#) tab.
2. Select the value case to which you'd like to link an initiative.
3. Select [+ \(Add\)](#) under *Initiative*.

You can link your value case to an existing initiative (if available) by choosing [Select Initiative](#). If you choose this option, you don't need to continue with the steps provided below.

4. To link your value case to a new initiative, select [Create New Initiative](#).
5. Enter your initiative's title and description.
6. Review the rest of the initiative settings. You have the following options:
  - Set your initiative's status with the [Status](#) dropdown list.
  - Choose your initiative's [Start Date](#) and [End Date](#).
  - Add members to your initiative using the [Add Members](#) section. Search for the user groups or individuals you want to add. Use the accompanying dropdown list to choose their roles. In the initiatives management view, you can see all the members and their roles.

### ⓘ Note

Only owners can grant and manage access to an initiative.

- When you create an initiative, you are automatically set as the owner.
7. Select [Create](#).
- A new initiative is created.
8. Select the newly created initiative from the dropdown.

## Results

The value case is linked to the initiative. You can also remove or change the initiative for your value case by selecting [X \(Cancel\)](#) or [Change](#) under *Initiative*.

## Related Information

[Initiatives in Process Transformation Manager](#)

## 4.10.7 Who Can Work With Value Cases

Learn about the levels of access different users have to value cases.

All users who have access to the [Process view](#) of a particular value case can use the value case as follows:

	Manager	Analyst	Consumer
Create value cases	Yes	Yes	No
Edit value cases	Yes	Yes	No
Filter value cases	Yes	Yes	No
Delete value cases	Yes	Yes	No
View value cases	Yes	Yes	Yes
Link value cases to initiatives	Yes, if they have a SAP Signavio Process Transformation Manager license and Editor or Owner role for the initiatives.	Yes, if they have SAP Signavio Process Transformation Manager license and Editor or Owner role for the initiatives.	Yes, if they have SAP Signavio Process Transformation Manager license and Editor or Owner role for the initiatives.

## 4.11 Root Cause Analysis

Root cause analysis allows you to understand why a value driver, metric, or KPI is off target.

Uncovering improvement potential and understanding what drives process performance indicators, along with their monetary values, requires manual slicing and dicing of the event log. Automated root cause analysis uncovers the subsets of cases from a process (subgroups) that drive process performance and ranks them by their contribution.

For example, your goal is to improve the automation rate in the Procure to Pay process. Currently, the automation rate is 40% and you're wondering why it has been below the target of 60% in the last quarter. By running a root cause analysis, you'll find all improvement potential to achieve your goal.

### 4.11.1 Running an Analysis

Learn how to create, run, or rerun a root cause analysis.

#### Context

This procedure orders an analysis to run on your process data. The analysis identifies a set of subgroups contributing to the performance of your process or providing insight into why it deviates from the specified target.

The analysis results are presented in a waterfall chart, which clearly highlights the key subgroups affecting your current process performance and identifies any deviations from the specified target. Additionally, it illustrates the improvement potential by showing the gap between your current performance and your desired target performance. The comprehensive view allows you to identify areas for optimization and prioritize actions to enhance overall process efficiency.

## Procedure

1. Select your process from the list of processes and then choose the [Root Causes](#) tab.

The results of the previous analyses are displayed on the tab. However, results aren't stored permanently and are deleted automatically after a certain time frame.

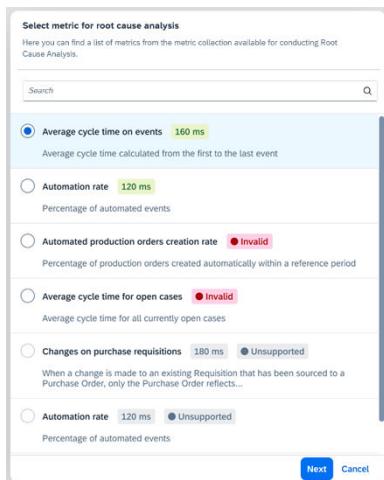
2. Begin the analysis with [Create Analysis](#).

If there are previous analysis results, create a new analysis with or rerun the existing one with .

3. Choose a metric from the list of available metrics and select [Next](#). You can also use the search field to filter the list.

### Note

Metrics are pulled from the metric collection. Not all metrics are supported. For more information about available metrics, see [Metrics Limitation \[page 523\]](#).



4. Configure the following analysis settings:

- a. **Target performance:** Set a target value you want to achieve for the selected metric:

- Set the relative percentage if you have a percentage target value. To distinguish between positive and negative contributions, specify whether you want an increase or decrease for the metric.
- Enter an exact value if your target number is already defined.

- b. **Process view:** Choose the process view of the selected metric. If only one view is available, it's selected by default, and this field isn't displayed.

- c. **Date:** Define a time span where every case that has at least one event within that time span is included in the analysis:

- [Entire date range](#): Selection of all cases in the process.

- *Rolling date range*: Selection of the entered number of days before today to the current moment according to your time zone.
  - *Custom date range*: Selection of the exact time period.
- d. **Case Attributes**: Select the case attributes related to the metric you want to analyze.
- e. **Filter Cases**: Filter each case attribute by its values, if necessary.  
For more information about case-level filters, see [Filters \[page 443\]](#).
5. Configure advanced parameters of the analysis algorithm by clicking *Advanced*, if necessary.  
For more information about advanced parameters, see [Advanced Parameters \[page 525\]](#).
6. Choose *Run analysis* to start the analysis.

## Results

A progress indicator is displayed while the analysis is underway. The time until analysis completion depends on event log size and number of case attributes.

Upon completion, the results are displayed. The next step is to interpret the results.

## Related Information

[Interpreting the Results \[page 526\]](#)

[Metrics Limitation \[page 523\]](#)

[Advanced Parameters \[page 525\]](#)

### 4.11.1.1 Metrics Limitation

A root cause analysis runs on a specific type of metrics only and requires specific SIGNAL queries.

Metrics must be aggregated over cases. The following SIGNAL queries are supported:

```
AGGREGATION(X) [FILTER Y] [*SCALING]
```

The SIGNAL query supported values

Function	Value
AGGREGATION	<ul style="list-style-type: none"> <li>• AVG</li> <li>• SUM</li> <li>• COUNT</li> <li>• COUNT(DISTINCT)</li> </ul>

Function	Value
X	<ul style="list-style-type: none"> <li>• A case attribute.</li> <li>• A conditional statement:</li> </ul> <pre>CASE WHEN "attribute" = 'literal' THEN 1 ELSE 0 END</pre> <p>(Note that DISTINCT is not allowed in this statement, otherwise, the metric isn't supported).</p>
FILTER Y	An optional filter to include only cases that contain a specific event, for example:
SCALING	An optional scaling factor.

### ❖ Example

```
SUM(cost_in_usd)
AVG(cost_in_thousand_eur) * 1000
SUM( CASE WHEN "automated" = 'yes' THEN 1 ELSE 0 END )
COUNT(case_id) FILTER (WHERE event_name MATCHES ('manual_intervention'))
```

## Exceptions

- The average cycle time metric is the default supported metric for every process. For its query, scaling or filters aren't supported:

### ❖ Example

```
AVG((SELECT LAST(end_time)) - (SELECT FIRST(end_time)))
```

- The case count ratio metric is an exception because it has a special SIGNAL query:

### ⓘ Note

Metrics with the AGGREGATION(X) / AGGREGATION(Y) query format aren't supported, except for the case count ratio metric.

### ❖ Example

```
COUNT(case_id) FILTER (WHERE event_name MATCHES ('literal')) / COUNT(case_id)
* scaling
COUNT(case_id) FILTER (WHERE event_name MATCHES ('rework')) / COUNT(case_id)
* 100
```

## 4.11.1.2 Advanced Parameters

Advanced parameters are configuration options provided to the analysis algorithm to adjust a metric analysis to fit specific needs. Adjusting advanced parameters lets you guide the analysis in your preferred direction, resulting in more valuable results.

### Context

The algorithm identifies subgroups with high improvement potential and operates within a fixed maximum time limit. In large or complex event logs, valuable results can be found in deeper subgroups.

### Procedure

1. In *Minimum subgroup size*, enter the number of cases for each subgroup or select it by clicking the - or + buttons. The analysis includes only subgroups with the specified number of cases or more.
2. In *Time limit on arborist operations (in min)*, set the maximum time that the root cause analysis algorithm spends on each branch of its decision tree. You can set the time limit up to 10 minutes.

This limit is the maximum time that the core algorithm runs. If you work with larger event logs, you can increase the default time to obtain deeper subgroups. Note that the overall analysis runtime can be more or less than this limit, depending on the event log.

3. In *Confidence level*, set the percentage of confidence in the improvement. This setting controls how actively the algorithm prunes subgroups that don't show improvement potential.  
The algorithm evaluates the improvement potential for each subgroup. It also tests whether this potential is consistent with random fluctuations observed in the data. Subgroups with random improvement potential and confidence higher than the set level are pruned. Setting a higher value results in more conservative removal, meaning more nodes remain in the data grid. Setting a lower value allows more active removal, meaning fewer nodes remain in the data grid.

4. In *Maximum exploration depth*, choose levels of the analysis tree depth. This setting determines how deep the algorithm can go when building the analysis tree.

Each level represents a new condition added to the previous set of conditions on which cases are filtered. By limiting maximum depth, you control how many layers of conditions the algorithm can explore. The algorithm goes from a generic to a more specific subgroup.

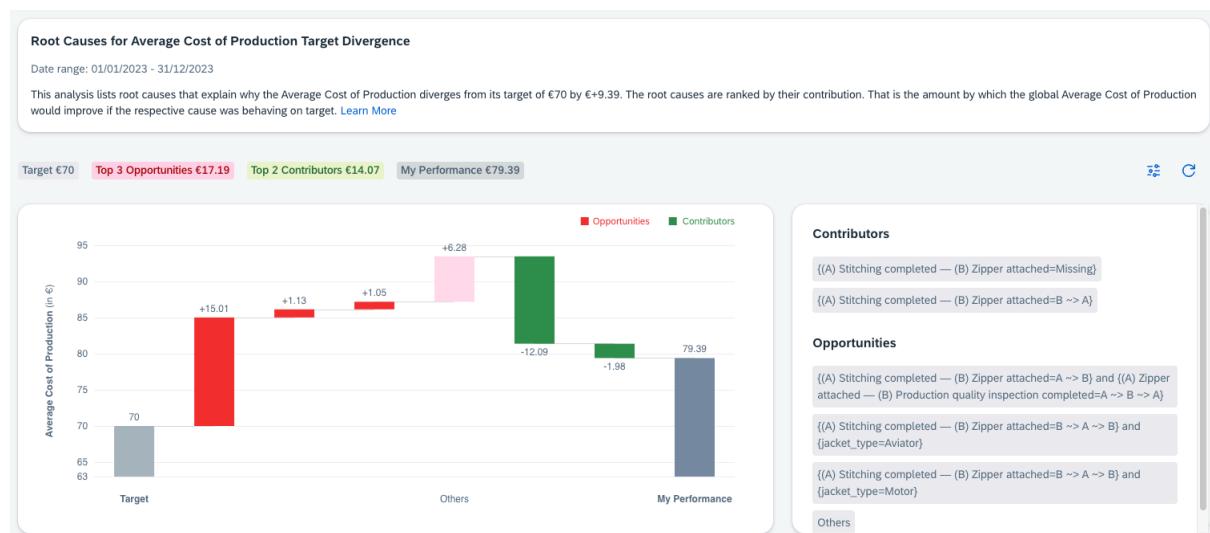
5. In *Constraints per level of depth*, select case attributes for each level defined in the previous field. Choose which case attributes the algorithm uses at each level of the analysis tree.  
You can guide the tree structure by assigning specific conditions to specific levels. These constraints change the algorithm's default structure, giving you more control over how subgroups are formed and how the analysis is organized.

For example, you can set "Country" at level one and "City" at level two. As a result, the "Country" grouping is at the top level of the data grid, and the "City" grouping is at the level below. Thus, you see subgroups with "Country" = "Germany" **and** "City" = "Berlin", but not subgroups with only "City" = "Berlin".

## 4.11.2 Interpreting the Results

Learn how to interpret the results of a root cause analysis.

When an analysis has been completed, you're presented with results like in this example:



This analysis lists root causes that explain why the average cost of production diverges from its target of €70 by +€9.39. The root causes are ranked by their contribution. That is the amount by which the global average cost of production would improve if the respective cause was behaving on target.

## Subgroups

A subgroup is a subset of cases from a process and is specified by a WHERE filter (a feature of the SIGNAL query language). Each subgroup can positively or negatively affect a process.

The algorithm behind root cause analysis identifies non-overlapping subgroups. In other words, each case from the process data becomes a member of only one subgroup. This ensures a consistent explanation of the performance.

Performance contribution is attributed to individual subgroups. For more information, see [Contribution \[page 527\]](#).

The following sections explain how to interpret each area of the results.

## Improvement Potential Summary

The following items sit at the top left of the screen:

- **Top 4 Opportunities:** The sum of contributions of the four most effective detractors of target performance. This shows by how much the overall metric could improve if these four detractors performed on target.

- **Contributors:** The sum of contributions of the four most effective promoters of target performance. This shows by how much the overall metric could worsen if these four promoters performed on target.
- **My Performance:** The overall process performance as measured by the chosen metric during the selected time period. For more information, refer to [Contribution \[page 527\]](#).
- **Target Performance:** The target performance defined in the analysis settings.

## Chart

The chart visualizes both the top opportunities and the top contributions, in other words, the subgroups with the largest absolute contributions (negative or positive).

To the right of the chart, the definitions of each subgroup are listed. Each definition is presented as the expression part of a `WHERE` clause.

### Note

To improve readability, the definition omits certain elements of the usual syntax, such as quotation marks.

## Contribution

Contribution is the impact on the global metric due to the subgroup being off target.

### Example

- KPPurch460 metric is 'FI-AP items cleared after net due date'
- Global performance = 34%
- Target performance = 17% (50% relative improvement)
- Subgroup performance = 54%
- Contribution = -5%

If invoices for company code 0023 were to be late 17% instead of 54%, then the global performance would improve by 5% to 29%.

Contribution respects exhaustiveness and exclusivity. In other words, the sum of the contributions of two independent subgroups equals the contribution of their union. Consequently, the sum of the contributions of MECE subgroups equals the difference between the reference level and the observed global performance.

## Data Grid

The data grid below the top subgroup section shows a hierarchical table of all subgroups that the algorithm identified as relevant during the analysis. It allows manual exploration of the analysis results with the goal of finding insights. Find more details in [Data Grid \[page 528\]](#).

### 4.11.3 Data Grid

Shows the full set of analysis results in a hierarchical structure.

Subgroups	Contribution (in €) ⓘ	Signal Strength ⓘ	Average Cost of Productio...	Case Count
▼ jacket_type	-12.09 (-15.23%)	+21.48 (+27.06%)		
▼ Aviator		↑ +7.71 (+9.71%)	114.73	1,770
> (A) Stitching completed — (B) Zipper attached	+8.36 (+10.53%)			
▼ size		+7.71 (+9.71%)		
> L	↑ +1.65 (+2.08%)	117.75	355	
XL	↑ +1.6 (+2.02%)	115.7	360	
S	↑ +1.6 (+2.02%)	115.67	360	
XS	↑ +1.44 (+1.82%)	111.74	355	
M	↑ +1.41 (+1.78%)	112.68	340	

### The User Interface

Each row in the data grid is either a subgroup or a partition, which is a grouping of subgroups. The data grid contains the following columns:

- **Subgroups**: This column contains the subgroup definitions and allows navigation through the results. Subgroups are displayed hierarchically and arranged into partitions.
- **Contribution**: Indicates the impact of a partition or subgroup on the overall performance. Depending on its level in the hierarchy, the contribution column shows one of the following:
  - For a subgroup, the column displays the subgroup's absolute contribution.
  - For a partition, the column displays the sum of all positive and negative contributions of the subgroups constituting this partition.
- **Signal Strength**: Applies to subgroups only. A statistical measure of how the behavior of a subgroup's population differs from that of its parent. This measure doesn't consider the subgroup's size, in other words the case count.
- **Metric**: Applies to subgroups only. Displays the metric value for every subgroup.
- **Case Count**: Applies to subgroups only. The number of cases within the subgroup.

### Available Interactions

The data grid can be adjusted in a number of ways to make exploration easier:

- Arranging columns: To arrange a column, select ⚡ (move icon) in its column header. This displays a number of options, including pinning the column in place or moving it left or right.

#### ⓘ Note

Since it's used to navigate the grid, the **Subgroups** column can't be arranged and is always the leftmost column.

- Adjust column width: A column's width can be adjusted by clicking and dragging the edge between the column's heading and the column to its immediate right. Columns have a minimum width.
- Ordering: Rows can be arranged into ascending or descending order based on a specific column. Rows can be re-ordered by hovering over the right side of a column's heading, clicking  (funnel icon), and then selecting ascending or descending. The column used to order the rows is indicated by the row on the right side of a column heading.
- Filtering: Rows can be filtered by minimum or maximum values for every column. Filters are defined below the ordering settings of a column.

#### 4.11.4 Troubleshooting Root Cause Analysis

Find solutions to problems and frequently asked questions.

Question	Solution
Why can't I look at the subgroups with the largest signal?	Signal strength only measures the statistical difference between a subgroup and its parent. This doesn't necessarily imply a large impact on the overall performance. Small subgroups can deviate significantly from the parent group while still having only a small effect due to their size. Finding actionable and impactful insights requires navigating the data grid by contribution and signal strength at the same time.
I was expecting to see a specific subgroup in the data grid. Why doesn't it appear?	The underlying root cause analysis algorithm makes no assumptions about the data or the context of the process. All results are based on a statistical analysis. The absence of a subgroup in the data grid indicates that other subgroups were statistically more relevant. You can validate the results by comparing subgroups manually in a dashboard.
Why is the sum of all positive and negative contributions different between partitions. Shouldn't it be the same for all partitions?	Theoretically, every partition explains the full difference between the actual performance and the target. However, the algorithm ignores subgroups that are too small or statistically insignificant. Consequently, the results might not contain all subgroups of every partition. In those cases, all positive and negative contributions in a displayed partition don't make up the sum of a parent group's contribution.

# 5 Actions

Use actions to automatically query process data and act on the results, for example, by executing a task or starting a process. This section describes when to use actions, what you need to set up actions, where to set up actions, and information about the time format used in actions.

For each action, you specify a SIGNAL query and one or more tasks. The SIGNAL query produces results when the action is run. These results are then used in the defined tasks. For example, you can define that if there are more than 10 unprocessed purchase orders, an email is sent to the responsible persons.

## When to Use Actions

Use actions in the following cases:

- You want to be informed automatically about critical process dynamics.
- You want to extend the reach of process mining results to multiple stakeholders.
- You want to perform some tasks in other SAP or non-SAP systems.

For example, you can set up email notifications for tickets that exceed a certain processing time. Then, you can immediately approach affected customers or even prevent a breach of your service level agreement.

## What You Need to Set Up Actions

You can set up and manage actions for a process when the following prerequisites are met:

- You have the manager or analyst role for the process for which you want to set up actions.
- The process contains data. Without data, you can't set up actions.
- You've SIGNAL knowledge to specify the queries performed with the action.
- Some actions can be set up only when a workspace administrator has integrated the necessary application with SAP Signavio Process Intelligence.

## Where to Set Up and Manage Actions

You can set up actions in different places as follows:

Where	Description
On the <a href="#">Actions</a> overview, choose <a href="#">New Action</a> .	Set up an action from scratch; nothing is preselected. All actions can be managed here.

Where	Description
In a process, go to the <a href="#">Actions</a> tab and choose <a href="#">Create</a> .	The process is preselected.
	The actions created for the current process can be managed here. Also, you can access the results for these actions.
On an investigation, choose  ( <a href="#">Create Action</a> ).	The process and the process view from the investigation are preselected.
On a dashboard, choose  ( <a href="#">Create Action</a> ).	The process and the process view from the dashboard are preselected.
On a widget, choose  ( <a href="#">Create Action</a> ).	The process and the process view are preselected, the SIGNAL query from the widget is taken over.
 Note	Any changes you make to an action created that way, are not reflected in the original widget. The same principle applies in reverse; changes made later to the widget are not reflected in the action.

To start setting up actions, choose a task from the list in section [Action Setup \[page 532\]](#) and follow the instructions.

## UTC Time

Times are expressed in UTC, for example, execution times that you see on the overview pages or in the history of an action.

### Example

#### [What is UTC?](#)

UTC is Coordinated Universal Time, the main standard by which clocks are globally synchronized. A UTC timestamp represents time measured at 0° longitude. All time zones are offset from UTC to calculate local time. For example, Central European Time (CET) is UTC+1. A local time of 09:00 CET would be 08:00 UTC.

UTC doesn't change with seasons and isn't affected by daylight saving. Therefore, Central European Summer Time (CEST) is UTC+2. A local time of 10:00 CEST would be 08:00 UTC.

## Related Information

[Action Configuration for Workspace Administrators \[page 565\]](#)

## 5.1 Action Setup

Get to know the various tasks, which are available for actions, and learn how to start the action setup.

To start setting up an action, choose a task and follow the instructions:

### [Send E-Mails \[page 532\]](#)

Learn how to set up e-mail notifications that contain SIGNAL query results.

### [Send Messages to Microsoft Teams \[page 537\]](#)

Learn how to send messages with SIGNAL query results to Microsoft Teams.

### [Integrate Using Webhooks \[page 542\]](#)

Learn how to integrate SAP Signavio Process Intelligence with any SAP and non-SAP system that supports webhooks. Webhooks are custom callbacks that are used to notify systems of events. In our context, they allow you to send SIGNAL query results to other systems.

### [Send Messages to SAP Cloud Integration \[page 546\]](#)

Learn how to send SIGNAL query results to SAP Cloud Integration, which can process received messages and route them to other SAP and non-SAP cloud and on-premise applications.

### [Start Business Processes and Automations in SAP Build Process Automation \[page 550\]](#)

Learn how to set up actions that trigger business processes and automations in SAP Build Process Automation. These actions transform the SIGNAL query result into the complex data structure defined by a SAP Build Process Automation workflow and provide the capability to facilitate a single level of nesting.

### [Send Messages to SAP Event Mesh \[page 557\]](#)

Actions of this type send messages with SIGNAL query results to a named queue and optionally to a topic in SAP Event Mesh. Any SAP or non-SAP application with a queue subscription can then process the data.

### 5.1.1 Send E-Mails

Learn how to set up e-mail notifications that contain SIGNAL query results.

You can set up e-mail notifications for yourself and others. Every time the action is run, an e-mail with a custom subject and message is sent. The first five rows of the SIGNAL query result are displayed in the e-mail body. The full result set is attached as a CSV or XLS file. If you configure the action to send only new data, the attached file also contains only new data.

#### **ⓘ Note**

If the SIGNAL query result is empty, no action task will be run.

## Prerequisites

- You have the manager or analyst role for the process for which you want to set up actions.

- The process contains data. Without data, you can't set up actions.
- You've SIGNAL knowledge to specify the queries performed with the action.

## Setting Up E-Mail Notifications

Follow these steps:

1. Choose any of these options:
  - On the entry page of SAP Signavio Process Intelligence, choose *Actions* in the sidebar, and then *New Action*.
  - On an investigation, dashboard, or widget, choose *Create Action*.

**Note**

This option is only available on widgets that display a bar chart, pie chart, table, or value.

2. On the *Create New Action* page, specify settings for the following:
    - Under *General*, the process and the data view, run frequency, collaborators, and more
    - Under *SIGNAL*, the condition that must be met for the action to be executed
    - Under *Task*, what happens when the action is executed
 See the sections below to learn more about the configuration details.
  3. With *Add Task*, you can add more tasks to your action.
  4. You can save actions with incomplete settings as drafts and complete their configuration later.
  5. Once all settings are specified, save with *Create*.
- The action is created, and the action overview opens. To view results for your action immediately, you can run it manually.

## General

Specify the following settings:

Setting	Description	Default
<i>Action Name</i>	The name for your action	-
<i>Process</i>	<p>The process from which data is queried and sent to receiving applications.</p> <p>The full process list is displayed, however, you can only select a process to which you've access.</p>	-
<i>View</i>	The process view that defines which process data you can view and query.	The process view assigned to you is preselected. If you've multiple process views assigned, you need to select one.

Setting	Description	Default
<i>Run Frequency</i>	<p>To specify when to run the action, select an option:</p> <ul style="list-style-type: none"> <li>• <b>Data Load:</b> The action is run each time data is uploaded to the process.</li> </ul> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p><b> ⓘ Note</b></p> <p>The minimum time between data loads must be 30 minutes to trigger an action. Data loads that occur at shorter intervals will not trigger an action.</p> </div> <ul style="list-style-type: none"> <li>• <b>Custom Recurrence:</b> Choose the recurrence frequency — daily, on weekdays, weekly, or monthly — that you want, and then select options for the frequency. For any date and time set with the scheduler, the Coordinated Universal Time (UTC) standard is used.</li> </ul> <p>If you want to be notified of noncompliant activities, we recommend executing the action daily or whenever data is uploaded. Weekly or monthly notifications can be suitable for management summaries, for example, when you want to know how many purchase orders weren't yet processed.</p>	<i>Data Load</i>
<i>Collaborators</i>	<p>Select the users or user groups who can manage the action and view its results in SAP Signavio Process Intelligence.</p> <p>You can select any users or user groups who have access to the process.</p>	No collaborators are specified.
<i>Enable notification</i>	<p>Specify whether to receive notifications for new results in SAP Signavio Process Intelligence.</p>	Notifications are sent.

Setting	Description	Default
<a href="#">Only send new data</a>	<p>Choose whether to send the full result set or just new data queried from the process since the action was last run.</p> <p>No matter what the setting is here, the full result set of any performed action is available in SAP Signavio Process Intelligence, and you can switch between all, new, and recurring results.</p>	Just new data is sent.

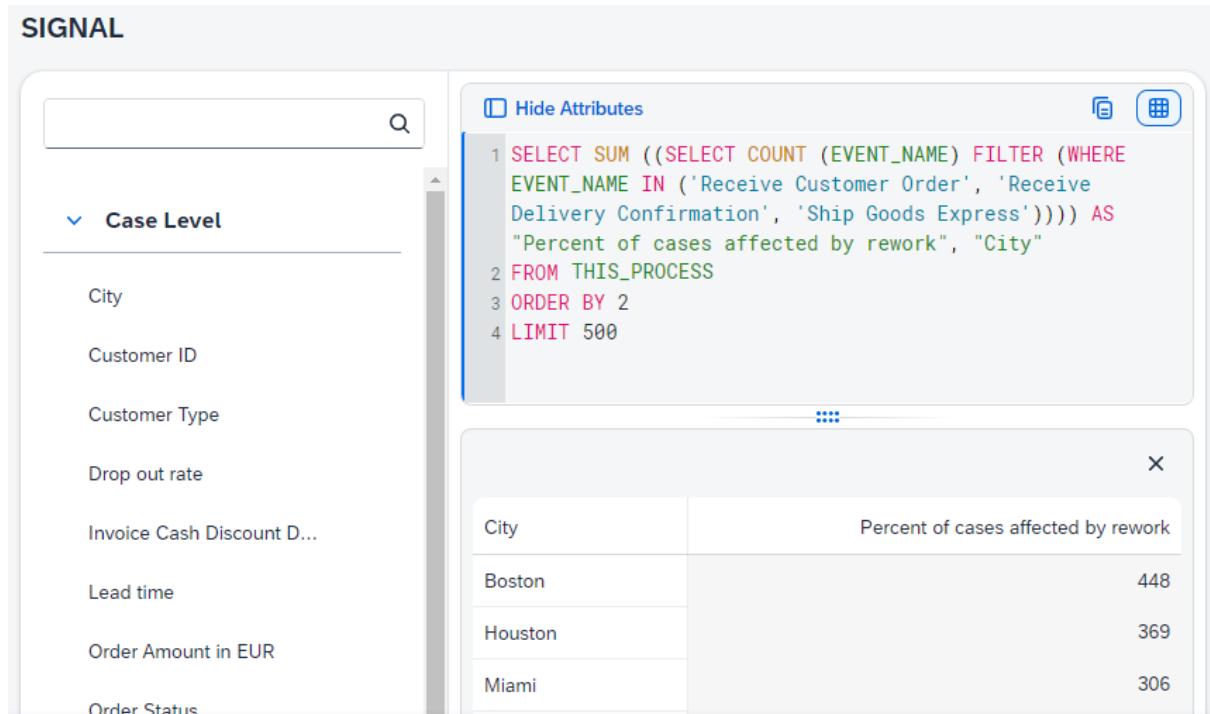
## SIGNAL

Enter your SIGNAL query in the code editor. The result is displayed below.

If you've created the action on a widget, the SIGNAL query from the widget is taken over automatically. You can edit the query here. However, any changes you make are not reflected in the original widget. The same principle applies in reverse; changes made to the widget are not reflected in the action.

For your convenience, you have the following options:

- Hide and show attributes with .
- Copy the query with  ([Copy to clipboard](#)).
- Hide and show the query result table with .



The screenshot shows the SIGNAL editor interface. On the left, there's a sidebar with various filter options like 'Case Level', 'City', 'Customer ID', 'Customer Type', 'Drop out rate', 'Invoice Cash Discount D...', 'Lead time', 'Order Amount in EUR', and 'Order Status'. The main area has a code editor with the following SQL query:

```

1 SELECT SUM ((SELECT COUNT (EVENT_NAME) FILTER (WHERE
2 EVENT_NAME IN ('Receive Customer Order', 'Receive
3 Delivery Confirmation', 'Ship Goods Express')))) AS
4 "Percent of cases affected by rework", "City"
5 FROM THIS_PROCESS
6 ORDER BY 2
7 LIMIT 500
  
```

To the right of the code editor is a table showing the results of the query:

City	Percent of cases affected by rework
Boston	448
Houston	369
Miami	306

Read about the SIGNAL editor functions like autocomplete, color scheme, and error linting in section [The SIGNAL Code Editor \[page 512\]](#).

## Task

To define what happens when the action is run, specify the following:

Setting	Description
<i>Task Type</i>	Select <a href="#">Send as Email</a> .
<i>Recipient</i>	Users or groups listed here receive an e-mail with results each time the action is run. You can also add external e-mail recipients, who do not have an SAP Signavio Process Intelligence account. <div style="border-left: 3px solid #e67e22; padding-left: 10px; margin-top: 10px;"><p><b>⚠ Caution</b></p><p>Please ensure you are not sharing sensitive internal data with external parties. Breaching this protocol could jeopardize your company's security and violate your privacy policy. Always double-check the list of recipients before saving the action.</p></div>
	When a user is specified as a collaborator in the <b>General</b> settings of an action, they're added as recipients automatically. Conversely, if a user is removed from the collaborator list, they're also removed from the recipient list.
<i>Subject</i>	Enter a text to be sent as the e-mail subject.
<i>Message</i>	Enter a text to be sent as the e-mail message. <ul style="list-style-type: none"><li>• For text formatting, use <b>B</b> (<i>Bold</i>), <b>i</b> (<i>Italic</i>), <b>U</b> (<i>Underline</i>), or <b>S</b> (<i>Strikethrough</i>).</li><li>• For text color, choose the <b>A</b> drop-down menu and select a default color from the palette or set a custom color.</li></ul> You can also use <a href="#">Insert Placeholder</a> to insert action details as boilerplate text into your message: <ul style="list-style-type: none"><li>• <b>Recipient</b>: Name of the e-mail recipient</li><li>• <b>Result Table</b>: Query result table</li><li>• <b>Result Link</b>: Link to   in your SAP Signavio Process Intelligence workspace</li><li>• <b>Action Name</b>: Specified name of your action</li><li>• <b>Workspace Name</b>: Specified name of your workspace</li></ul>
<i>Include the results as an attachment</i>	Choose an option: <ul style="list-style-type: none"><li>• Active: SIGNAL query results are attached as CSV or XLS files.</li><li>• Inactive: E-mails only include the subject and message text.</li></ul>

## Related Information

[Running Actions Manually \[page 563\]](#)

[Activating and Deactivating Actions \[page 564\]](#)

[Viewing Action Results \[page 563\]](#)

### 5.1.2 Send Messages to Microsoft Teams

Learn how to send messages with SIGNAL query results to Microsoft Teams.

SIGNAL query results can be posted as messages to channels in Microsoft Teams. Every time the action is run, a message with query results is sent to the specified channel.

#### Note

If the SIGNAL query result is empty, no action task will be run.

Users with access to the Microsoft Teams channel can view the message.

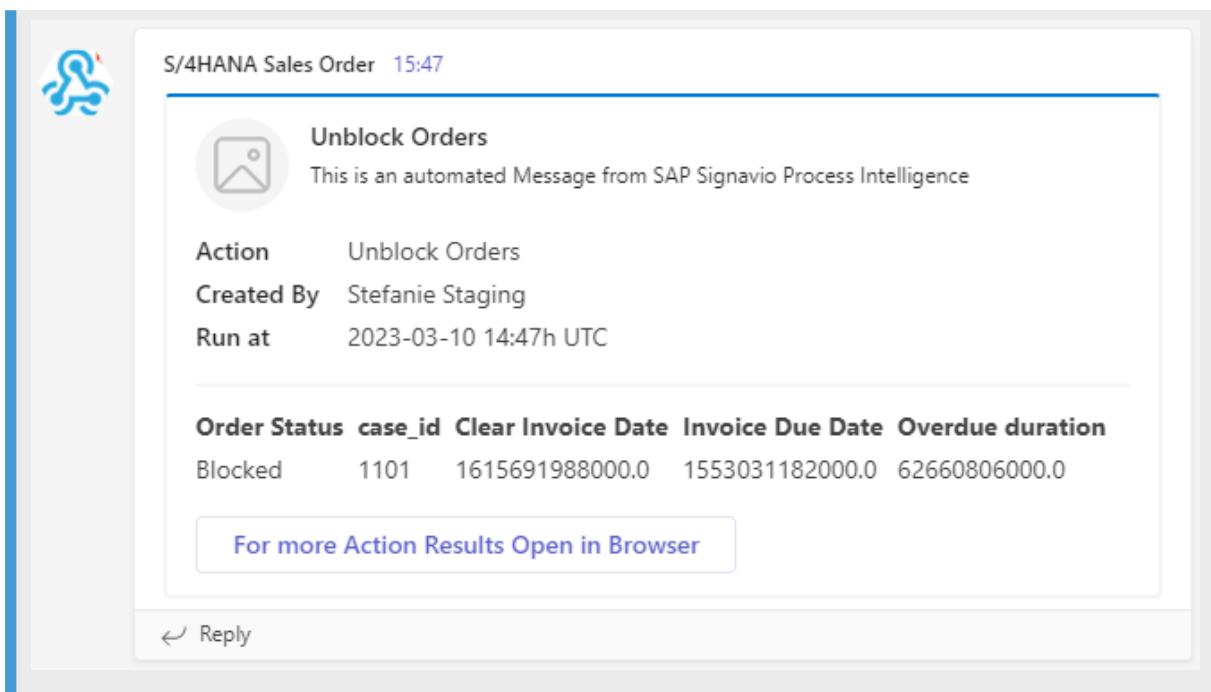
The message in Microsoft Teams includes information about the action and some results. If necessary, a custom text message can be added. From the message, you can go to the full result set in SAP Signavio Process Intelligence.

#### Example

[View an example message in Microsoft Teams](#)

The example message includes the following details:

- Webhook name in Microsoft Teams: S/4HANA Sales Order
- Action name: Unblock Orders
- Creator of the action: Stefanie Staging
- Action execution time: March 10, 2023 at 14:47 UTC
- Result: one blocked order with the case ID 1101



## Prerequisites

- You have the manager or analyst role for the process for which you want to set up actions.
- The process contains data. Without data, you can't set up actions.
- You've SIGNAL knowledge to specify the queries performed with the action.
- An incoming webhook was created for the Microsoft Teams channel to which you like to send messages. To create an incoming webhook in Microsoft Teams, follow the instructions in the [Microsoft Teams documentation](#).

## Setting Up Microsoft Teams Messages

Follow these steps:

1. Choose any of these options:
  - On the entry page of SAP Signavio Process Intelligence, choose [Actions](#) in the sidebar, and then [New Action](#).
  - On an investigation, dashboard, or widget, choose [Create Action](#).

### Note

This option is only available on widgets that display a bar chart, pie chart, table, or value.

2. On the [Create New Action](#) page, specify settings for the following:
  - Under [General](#), the process and the data view, run frequency, collaborators, and more

- Under *SIGNAL*, the condition that must be met for the action to be executed
- Under *Task*, what happens when the action is executed

See the sections below to learn more about the configuration details.

3. With *Add Task*, you can add more tasks to your action.
4. You can save actions with incomplete settings as drafts and complete their configuration later.
5. Once all settings are specified, save with *Create*.

The action is created, and the action overview opens. To view results for your action immediately, you can run it manually.

## General

Specify the following settings:

Setting	Description	Default
<i>Action Name</i>	The name for your action	-
<i>Process</i>	<p>The process from which data is queried and sent to receiving applications.</p> <p>The full process list is displayed, however, you can only select a process to which you've access.</p>	-
<i>View</i>	The process view that defines which process data you can view and query.	The process view assigned to you is preselected. If you've multiple process views assigned, you need to select one.

Setting	Description	Default
<i>Run Frequency</i>	<p>To specify when to run the action, select an option:</p> <ul style="list-style-type: none"> <li>• <b>Data Load:</b> The action is run each time data is uploaded to the process.</li> </ul> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p><b> ⓘ Note</b></p> <p>The minimum time between data loads must be 30 minutes to trigger an action. Data loads that occur at shorter intervals will not trigger an action.</p> </div> <ul style="list-style-type: none"> <li>• <b>Custom Recurrence:</b> Choose the recurrence frequency — daily, on weekdays, weekly, or monthly — that you want, and then select options for the frequency. For any date and time set with the scheduler, the Coordinated Universal Time (UTC) standard is used.</li> </ul> <p>If you want to be notified of noncompliant activities, we recommend executing the action daily or whenever data is uploaded. Weekly or monthly notifications can be suitable for management summaries, for example, when you want to know how many purchase orders weren't yet processed.</p>	<i>Data Load</i>
<i>Collaborators</i>	<p>Select the users or user groups who can manage the action and view its results in SAP Signavio Process Intelligence.</p> <p>You can select any users or user groups who have access to the process.</p>	No collaborators are specified.
<i>Enable notification</i>	<p>Specify whether to receive notifications for new results in SAP Signavio Process Intelligence.</p>	Notifications are sent.

Setting	Description	Default
<a href="#">Only send new data</a>	<p>Choose whether to send the full result set or just new data queried from the process since the action was last run.</p> <p>No matter what the setting is here, the full result set of any performed action is available in SAP Signavio Process Intelligence, and you can switch between all, new, and recurring results.</p>	Just new data is sent.

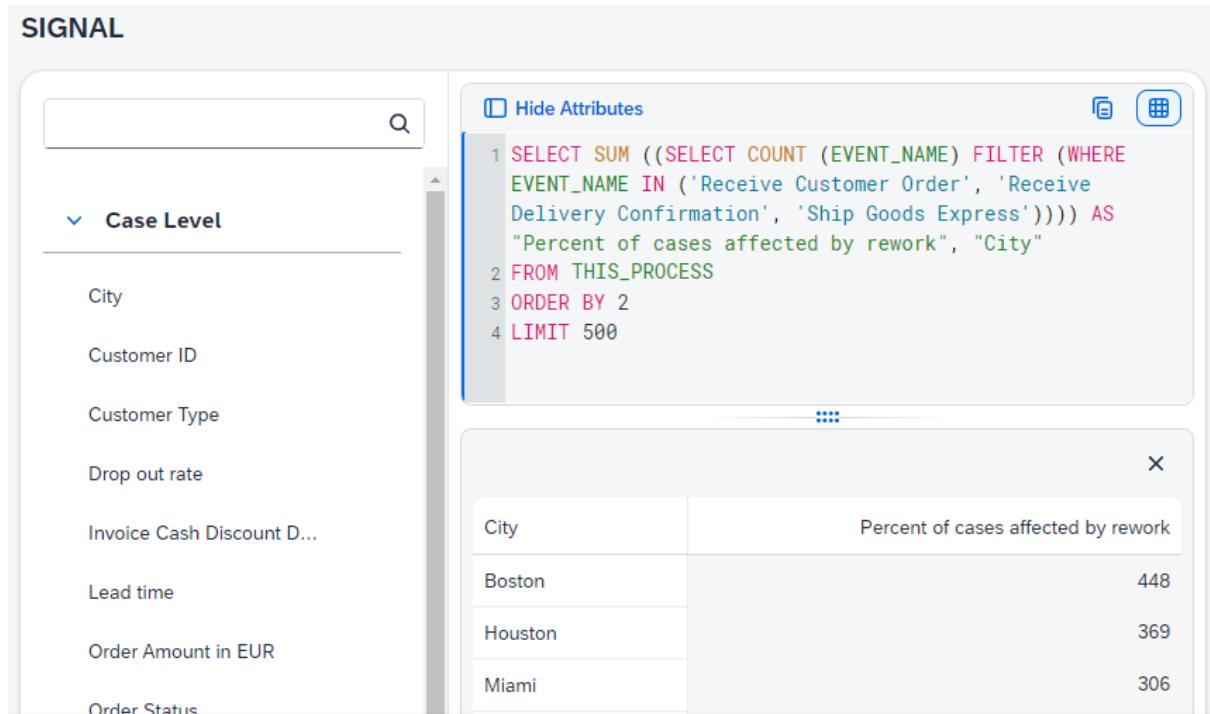
## SIGNAL

Enter your SIGNAL query in the code editor. The result is displayed below.

If you've created the action on a widget, the SIGNAL query from the widget is taken over automatically. You can edit the query here. However, any changes you make are not reflected in the original widget. The same principle applies in reverse; changes made to the widget are not reflected in the action.

For your convenience, you have the following options:

- Hide and show attributes with .
- Copy the query with  ([Copy to clipboard](#)).
- Hide and show the query result table with .



The screenshot shows the SIGNAL editor interface. On the left, there's a sidebar with various filter options like 'Case Level', 'City', 'Customer ID', 'Customer Type', 'Drop out rate', 'Invoice Cash Discount D...', 'Lead time', 'Order Amount in EUR', and 'Order Status'. In the center, there's a code editor window with a 'Hide Attributes' button. The code is:

```

1 SELECT SUM ((SELECT COUNT (EVENT_NAME) FILTER (WHERE
2 EVENT_NAME IN ('Receive Customer Order', 'Receive
3 Delivery Confirmation', 'Ship Goods Express')))) AS
4 "Percent of cases affected by rework", "City"
5 FROM THIS_PROCESS
6 ORDER BY 2
7 LIMIT 500
  
```

Below the code editor is a result table with three columns: 'City', 'Percent of cases affected by rework', and numerical values (448, 369, 306) corresponding to Boston, Houston, and Miami respectively.

Read about the SIGNAL editor functions like autocomplete, color scheme, and error linting in section [The SIGNAL Code Editor \[page 512\]](#).

## Task

To define what happens when the action is run, specify the following:

Setting	Description
<i>Task Type</i>	Select <a href="#">Send as Microsoft Teams Notification</a> .
<i>Webhook Endpoint</i>	Paste the URL from your Microsoft Teams webhook.
<i>Message</i>	Enter a text message.

## Related Information

[Running Actions Manually \[page 563\]](#)

[Activating and Deactivating Actions \[page 564\]](#)

[Managing Actions and Their Tasks \[page 561\]](#)

### 5.1.3 Integrate Using Webhooks

Learn how to integrate SAP Signavio Process Intelligence with any SAP and non-SAP system that supports webhooks. Webhooks are custom callbacks that are used to notify systems of events. In our context, they allow you to send SIGNAL query results to other systems.

#### ⓘ Note

If the SIGNAL query result is empty, no action task will be run.

To connect to a secured Web service endpoint, you can use different authentication methods. For example, when you want an action to trigger custom SAP BTP services that require credentials, you can set up basic HTTP authentication.

For advanced connectivity options or transformation of the action results, we recommend integrating SAP Cloud Integration, which can process received messages and route them to other SAP and non-SAP cloud and on-premise applications. See section [Send Messages to SAP Cloud Integration \[page 546\]](#).

## Prerequisites

- You have the manager or analyst role for the process for which you want to set up actions.
- The process contains data. Without data, you can't set up actions.
- You've SIGNAL knowledge to specify the queries performed with the action.
- A webhook URL is required to set up the integration. To create a webhook in your SAP or non-SAP system, follow the instructions in the documentation of your SAP or non-SAP system.

## Setting Up the Integration

Follow these steps:

1. Choose any of these options:

- On the entry page of SAP Signavio Process Intelligence, choose  [Actions](#) in the sidebar, and then [New Action](#).
- On an investigation, dashboard, or widget, choose  [Create Action](#).

### Note

This option is only available on widgets that display a bar chart, pie chart, table, or value.

2. On the [Create New Action](#) page, specify settings for the following:

- Under [General](#), the process and the data view, run frequency, collaborators, and more
- Under [SIGNAL](#), the condition that must be met for the action to be executed
- Under [Task](#), what happens when the action is executed

See the sections below to learn more about the configuration details.

3. With [Add Task](#), you can add more tasks to your action.
4. You can save actions with incomplete settings as drafts and complete their configuration later.
5. Once all settings are specified, save with [Create](#).

The action is created, and the action overview opens. To view results for your action immediately, you can run it manually.

## General

Specify the following settings:

Setting	Description	Default
<a href="#">Action Name</a>	The name for your action	-
<a href="#">Process</a>	<p>The process from which data is queried and sent to receiving applications.</p> <p>The full process list is displayed, however, you can only select a process to which you've access.</p>	-
<a href="#">View</a>	The process view that defines which process data you can view and query.	The process view assigned to you is preselected. If you've multiple process views assigned, you need to select one.

Setting	Description	Default
<i>Run Frequency</i>	<p>To specify when to run the action, select an option:</p> <ul style="list-style-type: none"> <li>• <b>Data Load:</b> The action is run each time data is uploaded to the process.</li> </ul> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p><b> ⓘ Note</b></p> <p>The minimum time between data loads must be 30 minutes to trigger an action. Data loads that occur at shorter intervals will not trigger an action.</p> </div> <ul style="list-style-type: none"> <li>• <b>Custom Recurrence:</b> Choose the recurrence frequency — daily, on weekdays, weekly, or monthly — that you want, and then select options for the frequency. For any date and time set with the scheduler, the Coordinated Universal Time (UTC) standard is used.</li> </ul> <p>If you want to be notified of noncompliant activities, we recommend executing the action daily or whenever data is uploaded. Weekly or monthly notifications can be suitable for management summaries, for example, when you want to know how many purchase orders weren't yet processed.</p>	<i>Data Load</i>
<i>Collaborators</i>	<p>Select the users or user groups who can manage the action and view its results in SAP Signavio Process Intelligence.</p> <p>You can select any users or user groups who have access to the process.</p>	No collaborators are specified.
<i>Enable notification</i>	<p>Specify whether to receive notifications for new results in SAP Signavio Process Intelligence.</p>	Notifications are sent.

Setting	Description	Default
<a href="#">Only send new data</a>	<p>Choose whether to send the full result set or just new data queried from the process since the action was last run.</p> <p>No matter what the setting is here, the full result set of any performed action is available in SAP Signavio Process Intelligence, and you can switch between all, new, and recurring results.</p>	Just new data is sent.

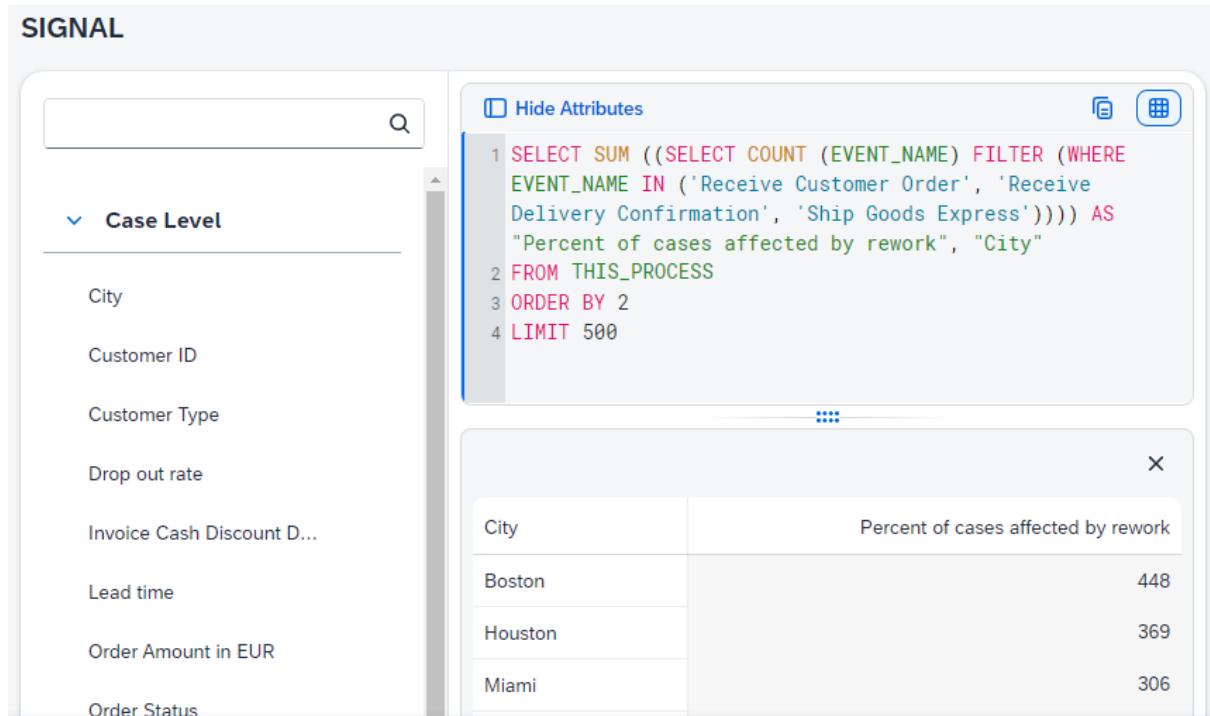
## SIGNAL

Enter your SIGNAL query in the code editor. The result is displayed below.

If you've created the action on a widget, the SIGNAL query from the widget is taken over automatically. You can edit the query here. However, any changes you make are not reflected in the original widget. The same principle applies in reverse; changes made to the widget are not reflected in the action.

For your convenience, you have the following options:

- Hide and show attributes with .
- Copy the query with  ([Copy to clipboard](#)).
- Hide and show the query result table with .



The screenshot shows the SIGNAL editor interface. On the left, there's a sidebar with various filter options like 'Case Level', 'City', 'Customer ID', 'Customer Type', 'Drop out rate', 'Invoice Cash Discount D...', 'Lead time', 'Order Amount in EUR', and 'Order Status'. The main area has a search bar at the top right. Below it, there's a 'Hide Attributes' button and a copy/paste icon. A code editor window contains the following SQL-like query:

```

1 SELECT SUM ((SELECT COUNT (EVENT_NAME) FILTER (WHERE
2 EVENT_NAME IN ('Receive Customer Order', 'Receive
3 Delivery Confirmation', 'Ship Goods Express')))) AS
4 "Percent of cases affected by rework", "City"
5 FROM THIS_PROCESS
6 ORDER BY 2
7 LIMIT 500
  
```

Below the code editor is a table with three columns: 'City', 'Percent of cases affected by rework', and numerical values (448, 369, 306). The table has a close button in the top right corner.

City	Percent of cases affected by rework
Boston	448
Houston	369
Miami	306

Read about the SIGNAL editor functions like autocomplete, color scheme, and error linting in section [The SIGNAL Code Editor \[page 512\]](#).

## Task

To define what happens when the action is executed, specify the following:

Setting	Description
<a href="#">Task Type</a>	Select <a href="#">Webhook</a> .
<a href="#">Webhook Endpoint</a>	Paste the webhook URL.
<a href="#">Authentication Type</a>	Choose the authentication method used to connect to the SAP or non-SAP system: <ul style="list-style-type: none"><li>• <a href="#">None</a>: No authentication is set up.</li><li>• <a href="#">'Basic' HTTP Authentication</a>: Specify a user name and a password.</li><li>• <a href="#">Bearer Token</a>: Specify a Bearer token.</li></ul>
<a href="#">Columns to Send to Webhook</a>	Specify which data from the SIGNAL query result is sent with the notification.

Use [Test Webhook](#) to simulate sending a payload consisting of the column data to the webhook endpoint. If you've specified authentication details, it's also checked whether the provided credentials are correct.

## Related Information

[Running Actions Manually \[page 563\]](#)

[Activating and Deactivating Actions \[page 564\]](#)

[Viewing Action Results \[page 563\]](#)

## 5.1.4 Send Messages to SAP Cloud Integration

Learn how to send SIGNAL query results to SAP Cloud Integration, which can process received messages and route them to other SAP and non-SAP cloud and on-premise applications.

## Prerequisites

- You have the manager or analyst role for the process for which you want to set up actions.
- The process contains data. Without data, you can't set up actions.
- You've SIGNAL knowledge to specify the queries performed with the action.
- Your workspace administrator has integrated an SAP Cloud Integration tenant, otherwise you can't set up an action of this type. For more information, see [Setting Up the Integration with SAP Cloud Integration \[page 568\]](#).

## Setting Up the Action

Follow these steps:

1. Choose any of these options:

- On the entry page of SAP Signavio Process Intelligence, choose  [Actions](#) in the sidebar, and then [New Action](#).
- On an investigation, dashboard, or widget, choose  [Create Action](#).

### Note

This option is only available on widgets that display a bar chart, pie chart, table, or value.

2. On the [Create New Action](#) page, specify settings for the following:

- Under [General](#), the process and the data view, run frequency, collaborators, and more
- Under [SIGNAL](#), the condition that must be met for the action to be executed
- Under [Task](#), what happens when the action is executed

See the sections below to learn more about the configuration details.

3. With [Add Task](#), you can add more tasks to your action.
4. You can save actions with incomplete settings as drafts and complete their configuration later.
5. Once all settings are specified, save with [Create](#).

The action is created, and the action overview opens. To view results for your action immediately, you can run it manually.

## General

Specify the following settings:

Setting	Description	Default
<a href="#">Action Name</a>	The name for your action	-
<a href="#">Process</a>	<p>The process from which data is queried and sent to receiving applications.</p> <p>The full process list is displayed, however, you can only select a process to which you've access.</p>	-
<a href="#">View</a>	The process view that defines which process data you can view and query.	The process view assigned to you is preselected. If you've multiple process views assigned, you need to select one.

Setting	Description	Default
<i>Run Frequency</i>	<p>To specify when to run the action, select an option:</p> <ul style="list-style-type: none"> <li>• <b>Data Load:</b> The action is run each time data is uploaded to the process.</li> </ul> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p><b> ⓘ Note</b></p> <p>The minimum time between data loads must be 30 minutes to trigger an action. Data loads that occur at shorter intervals will not trigger an action.</p> </div> <ul style="list-style-type: none"> <li>• <b>Custom Recurrence:</b> Choose the recurrence frequency — daily, on weekdays, weekly, or monthly — that you want, and then select options for the frequency. For any date and time set with the scheduler, the Coordinated Universal Time (UTC) standard is used.</li> </ul> <p>If you want to be notified of noncompliant activities, we recommend executing the action daily or whenever data is uploaded. Weekly or monthly notifications can be suitable for management summaries, for example, when you want to know how many purchase orders weren't yet processed.</p>	<i>Data Load</i>
<i>Collaborators</i>	<p>Select the users or user groups who can manage the action and view its results in SAP Signavio Process Intelligence.</p> <p>You can select any users or user groups who have access to the process.</p>	No collaborators are specified.
<i>Enable notification</i>	<p>Specify whether to receive notifications for new results in SAP Signavio Process Intelligence.</p>	Notifications are sent.

Setting	Description	Default
<a href="#">Only send new data</a>	<p>Choose whether to send the full result set or just new data queried from the process since the action was last run.</p> <p>No matter what the setting is here, the full result set of any performed action is available in SAP Signavio Process Intelligence, and you can switch between all, new, and recurring results.</p>	Just new data is sent.

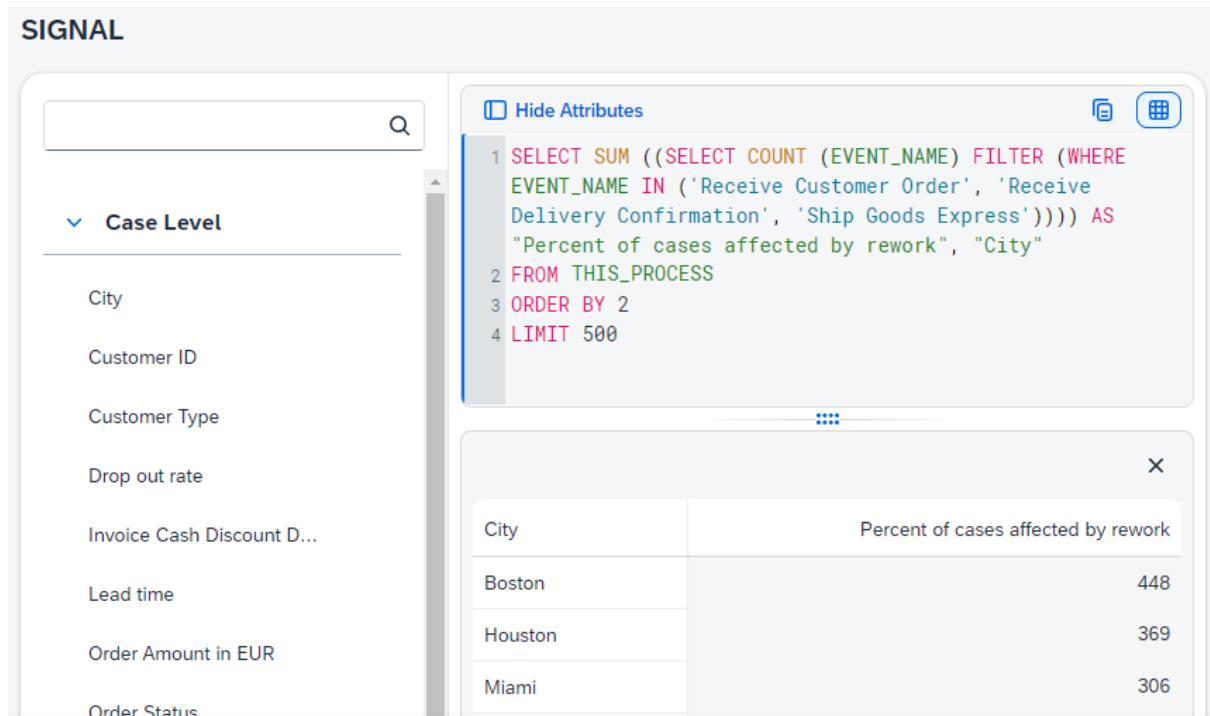
## SIGNAL

Enter your SIGNAL query in the code editor. The result is displayed below.

If you've created the action on a widget, the SIGNAL query from the widget is taken over automatically. You can edit the query here. However, any changes you make are not reflected in the original widget. The same principle applies in reverse; changes made to the widget are not reflected in the action.

For your convenience, you have the following options:

- Hide and show attributes with .
- Copy the query with  ([Copy to clipboard](#)).
- Hide and show the query result table with .



The screenshot shows the SIGNAL editor interface. On the left, there's a sidebar with various filter options like 'Case Level', 'City', 'Customer ID', 'Customer Type', 'Drop out rate', 'Invoice Cash Discount D...', 'Lead time', 'Order Amount in EUR', and 'Order Status'. The main area has a code editor with the following SQL query:

```

1 SELECT SUM ((SELECT COUNT (EVENT_NAME) FILTER (WHERE
2 EVENT_NAME IN ('Receive Customer Order', 'Receive
3 Delivery Confirmation', 'Ship Goods Express')))) AS
4 "Percent of cases affected by rework", "City"
5 FROM THIS_PROCESS
6 ORDER BY 2
7 LIMIT 500
  
```

To the right of the code editor is a results table:

City	Percent of cases affected by rework
Boston	448
Houston	369
Miami	306

Read about the SIGNAL editor functions like autocomplete, color scheme, and error linting in section [The SIGNAL Code Editor \[page 512\]](#).

## Task

To define what happens when the action is executed, specify the following:

Setting	Description
<a href="#">Task Type</a>	Select <a href="#">SAP Cloud Integration</a> .
<a href="#">Integration Flows</a>	Choose the integration flow that is meant to process the message. The list includes only integration flows for receivers that are REST services.
<a href="#">Select Attributes</a>	Specify which data from the SIGNAL query result is sent with the message.

Use [Test Connection](#) to simulate sending a payload consisting of the column data to the SAP Cloud Integration endpoint, and checking the authentication credentials.

## Related Information

[Running Actions Manually \[page 563\]](#)

[Activating and Deactivating Actions \[page 564\]](#)

[Managing Actions and Their Tasks \[page 561\]](#)

## 5.1.5 Start Business Processes and Automations in SAP Build Process Automation

Learn how to set up actions that trigger business processes and automations in SAP Build Process Automation. These actions transform the SIGNAL query result into the complex data structure defined by a SAP Build Process Automation workflow and provide the capability to facilitate a single level of nesting.

For example, you can use a business process in SAP Build Process Automation to unblock sales orders that exceed a credit limit. Every time the action is run and blocked sales orders are found, a business process in SAP Build Process Automation is started, either for each sales order or combining the sales orders that belong together. In the first case, five business processes are started if the SIGNAL query returns five blocked sales orders. In the second case, all blocked sales orders belonging to the same case are combined in one business process, given that the case ID was chosen as the primary key.

### Note

If the SIGNAL query result is empty, no action task will be run.

## Prerequisites

- You have the manager or analyst role for the process for which you want to set up actions.
- The process contains data. Without data, you can't set up actions.
- You've SIGNAL knowledge to specify the queries performed with the action.
- Your workspace administrator has integrated an SAP Build Process Automation tenant, otherwise you can't set up an action of this type. Read more in section [Setting Up Integration with SAP Build Process Automation \[page 565\]](#).

## Setting Up the Action

Follow these steps:

1. Choose any of these options:
  - On the entry page of SAP Signavio Process Intelligence, choose [Actions](#) in the sidebar, and then [New Action](#).
  - On an investigation, dashboard, or widget, choose [Create Action](#).
2. On the [Create New Action](#) page, specify settings for the following:
  - Under *General*, the process and the data view, run frequency, collaborators, and more
  - Under *SIGNAL*, the condition that must be met for the action to be executed
  - Under *Task*, what happens when the action is executedSee the sections below to learn more about the configuration details.
3. With [Add Task](#), you can add more tasks to your action.
4. You can save actions with incomplete settings as drafts and complete their configuration later.
5. Once all settings are specified, save with [Create](#).  
The action is created, and the action overview opens. To view results for your action immediately, you can run it manually.

### Note

This option is only available on widgets that display a bar chart, pie chart, table, or value.

## General

Specify the following settings:

Setting	Description	Default
<a href="#">Action Name</a>	The name for your action	-

Setting	Description	Default
<a href="#">Process</a>	<p>The process from which data is queried and sent to receiving applications.</p> <p>The full process list is displayed, however, you can only select a process to which you've access.</p>	-
<a href="#">View</a>	<p>The process view that defines which process data you can view and query.</p>	<p>The process view assigned to you is preselected. If you've multiple process views assigned, you need to select one.</p>
<a href="#">Run Frequency</a>	<p>To specify when to run the action, select an option:</p> <ul style="list-style-type: none"> <li>• <a href="#">Data Load</a>: The action is run each time data is uploaded to the process.</li> </ul> <div style="background-color: #f0f0f0; padding: 10px;"> <p><b>① Note</b></p> <p>The minimum time between data loads must be 30 minutes to trigger an action. Data loads that occur at shorter intervals will not trigger an action.</p> </div> <ul style="list-style-type: none"> <li>• <a href="#">Custom Recurrence</a>: Choose the recurrence frequency — daily, on weekdays, weekly, or monthly — that you want, and then select options for the frequency. For any date and time set with the scheduler, the Coordinated Universal Time (UTC) standard is used.</li> </ul> <p>If you want to be notified of noncompliant activities, we recommend executing the action daily or whenever data is uploaded. Weekly or monthly notifications can be suitable for management summaries, for example, when you want to know how many purchase orders weren't yet processed.</p>	<a href="#">Data Load</a>

Setting	Description	Default
<i>Collaborators</i>	Select the users or user groups who can manage the action and view its results in SAP Signavio Process Intelligence.  You can select any users or user groups who have access to the process.	No collaborators are specified.
<i>Enable notification</i>	Specify whether to receive notifications for new results in SAP Signavio Process Intelligence.	Notifications are sent.
<i>Only send new data</i>	Choose whether to send the full result set or just new data queried from the process since the action was last run.  No matter what the setting is here, the full result set of any performed action is available in SAP Signavio Process Intelligence, and you can switch between all, new, and recurring results.	Just new data is sent.

## SIGNAL

### ⓘ Note

Every row in the SIGNAL query result maps to one business process instance or automation instance. For example, a query result with 5 rows will trigger 5 instances, each getting one result row as input.

Enter your SIGNAL query in the code editor. The result is displayed below.

If you've created the action on a widget, the SIGNAL query from the widget is taken over automatically. You can edit the query here. However, any changes you make are not reflected in the original widget. The same principle applies in reverse; changes made to the widget are not reflected in the action.

For your convenience, you have the following options:

- Hide and show attributes with .
- Copy the query with  ([Copy to clipboard](#)).
- Hide and show the query result table with .

**SIGNAL**

The screenshot shows the SIGNAL editor interface. On the left, there's a sidebar with a search bar and a 'Case Level' dropdown menu containing options like City, Customer ID, Customer Type, Drop out rate, Invoice Cash Discount D..., Lead time, Order Amount in EUR, and Order Status. On the right, there's a code editor window with the following SQL query:

```

1 SELECT SUM ((SELECT COUNT (EVENT_NAME) FILTER (WHERE
2 EVENT_NAME IN ('Receive Customer Order', 'Receive
3 Delivery Confirmation', 'Ship Goods Express')))) AS
4 "Percent of cases affected by rework", "City"
5 FROM THIS_PROCESS
6 ORDER BY 2
7 LIMIT 500
  
```

Below the code editor is a results table with three columns: City, Percent of cases affected by rework, and a third column which is partially visible. The table contains the following data:

City	Percent of cases affected by rework
Boston	448
Houston	369
Miami	306

Read about the SIGNAL editor functions like autocomplete, color scheme, and error linting in section [The SIGNAL Code Editor \[page 512\]](#).

## Task

To define what happens when the action is executed, specify the following:

Task Type	Select <a href="#">SAP Build Process Automation</a> .
Trigger	<p>Select the business process or automation artifact that you want to start.</p> <p>Which business processes and automations are available depends on the SAP Build Process Automation tenant that has been integrated by your workspace administrator.</p>

## *Map Parameters*

### Note

This option is only available after a trigger was selected.

Map the values from the SIGNAL query result to the parameters of the business process or automation artifact. Business process parameters nested up to the first level are supported.

To map, select the result values on the left and the input parameters on the right. The mapped result values are then used as input parameters.

Mandatory input parameters must have a mapped query value, otherwise you can't save the task.

If there are more input parameters on the right than are available in the list of result values on the left, you need to adjust the SIGNAL query to return more values.

---

[Send a request for](#)

Choose an option:

- [every row](#): A business process in SAP Build Process Automation is started for each row in the query result. For example, if the query returns five blocked sales orders, five business processes are started.
- [every primary key](#): Specify the attribute used to bundle query results. In SAP Build Process Automation, one business process is then started for all query results with the same primary key.

### Example

Assume a query result with two distinct case IDs, and one case ID appears twice.

case_id	case_dat	item_id	item_des	voice_st
case_id	e	item_id	c	atus
1007	5/14/20 22	1	Tablet	Blocked
1007	5/14/20 22	2	Laptop	Blocked
1008	3/6/202 2	1	Monitor	Blocked
		2		

Sending a request for every row starts three business processes.

Sending a request for every primary key while choosing the case ID as the primary key, starts two business processes:

- one for the case ID '1007', which includes both rows with case ID '1007'
- one for the case ID '1008'

## Related Information

[Running Actions Manually \[page 563\]](#)

[Activating and Deactivating Actions \[page 564\]](#)

[Managing Actions and Their Tasks \[page 561\]](#)

[Setting Up the Integration with SAP Build Process Automation \[page 565\]](#)

## 5.1.6 Send Messages to SAP Event Mesh

Actions of this type send messages with SIGNAL query results to a named queue and optionally to a topic in SAP Event Mesh. Any SAP or non-SAP application with a queue subscription can then process the data.

For example, let's assume that an action sends messages to SAP Event Mesh when new employees are hired. And let's also assume that SAP Ariba has a corresponding queue subscription. Then, SAP Ariba can automatically place hardware and software equipment orders as soon as new employee accounts appear in the system data.

### ⓘ Note

If the SIGNAL query result is empty, no action task will be run.

## Prerequisites

- You have the manager or analyst role for the process for which you want to set up actions.
- The process contains data. Without data, you can't set up actions.
- You've SIGNAL knowledge to specify the queries performed with the action.
- Your workspace administrator has integrated an SAP Event Mesh instance, otherwise you can't set up an action of this type. Read more in section [Setting Up the Integration with SAP Event Mesh \[page 567\]](#).

## Setting Up the Action

Follow these steps:

1. Choose any of these options:
  - On the entry page of SAP Signavio Process Intelligence, choose [Actions](#) in the sidebar, and then [New Action](#).
  - On an investigation, dashboard, or widget, choose [Create Action](#).

### ⓘ Note

This option is only available on widgets that display a bar chart, pie chart, table, or value.

2. On the [Create New Action](#) page, specify settings for the following:
  - Under [General](#), the process and the data view, run frequency, collaborators, and more
  - Under [SIGNAL](#), the condition that must be met for the action to be executed
  - Under [Task](#), what happens when the action is executedSee the sections below to learn more about the configuration details.
3. With [Add Task](#), you can add more tasks to your action.
4. You can save actions with incomplete settings as drafts and complete their configuration later.
5. Once all settings are specified, save with [Create](#).  
The action is created, and the action overview opens. To view results for your action immediately, you can run it manually.

## General

Specify the following settings:

Setting	Description	Default
<i>Action Name</i>	The name for your action	-
<i>Process</i>	<p>The process from which data is queried and sent to receiving applications.</p> <p>The full process list is displayed, however, you can only select a process to which you've access.</p>	-
<i>View</i>	The process view that defines which process data you can view and query.	The process view assigned to you is preselected. If you've multiple process views assigned, you need to select one.
<i>Run Frequency</i>	<p>To specify when to run the action, select an option:</p> <ul style="list-style-type: none"><li>• <i>Data Load</i>: The action is run each time data is uploaded to the process.</li></ul>	<i>Data Load</i>
	<p><b>① Note</b></p> <p>The minimum time between data loads must be 30 minutes to trigger an action. Data loads that occur at shorter intervals will not trigger an action.</p>	
	<ul style="list-style-type: none"><li>• <i>Custom Recurrence</i>: Choose the recurrence frequency — daily, on weekdays, weekly, or monthly — that you want, and then select options for the frequency. For any date and time set with the scheduler, the Coordinated Universal Time (UTC) standard is used.</li></ul> <p>If you want to be notified of noncompliant activities, we recommend executing the action daily or whenever data is uploaded. Weekly or monthly notifications can be suitable for management summaries, for example, when you want to know how many purchase orders weren't yet processed.</p>	

Setting	Description	Default
<i>Collaborators</i>	Select the users or user groups who can manage the action and view its results in SAP Signavio Process Intelligence.  You can select any users or user groups who have access to the process.	No collaborators are specified.
<i>Enable notification</i>	Specify whether to receive notifications for new results in SAP Signavio Process Intelligence.	Notifications are sent.
<i>Only send new data</i>	Choose whether to send the full result set or just new data queried from the process since the action was last run.  No matter what the setting is here, the full result set of any performed action is available in SAP Signavio Process Intelligence, and you can switch between all, new, and recurring results.	Just new data is sent.

## SIGNAL

Enter your SIGNAL query in the code editor. The result is displayed below.

If you've created the action on a widget, the SIGNAL query from the widget is taken over automatically. You can edit the query here. However, any changes you make are not reflected in the original widget. The same principle applies in reverse; changes made to the widget are not reflected in the action.

For your convenience, you have the following options:

- Hide and show attributes with .
- Copy the query with  ([Copy to clipboard](#)).
- Hide and show the query result table with .

**SIGNAL**

The screenshot shows the SIGNAL editor interface. On the left, there's a sidebar with a search bar and a dropdown menu labeled "Case Level" which is expanded to show "City", "Customer ID", "Customer Type", "Drop out rate", "Invoice Cash Discount D...", "Lead time", "Order Amount in EUR", and "Order Status". On the right, there's a code editor window with the following SQL query:

```

1 SELECT SUM ((SELECT COUNT (EVENT_NAME) FILTER (WHERE
2 EVENT_NAME IN ('Receive Customer Order', 'Receive
3 Delivery Confirmation', 'Ship Goods Express'))) AS
4 "Percent of cases affected by rework", "City"
5 FROM THIS_PROCESS
6 ORDER BY 2
7 LIMIT 500
  
```

Below the code editor is a results table with three columns: "City", "Percent of cases affected by rework", and a third column that is partially visible. The table contains the following data:

City	Percent of cases affected by rework
Boston	448
Houston	369
Miami	306

Read about the SIGNAL editor functions like autocomplete, color scheme, and error linting in section [The SIGNAL Code Editor \[page 512\]](#).

## Task

To define what happens when the action is executed, specify the following:

Task Type	Select <a href="#">SAP Event Mesh</a> .
Queue	Select the queue to which you want to send SIGNAL query results.  You can select one queue per task.  Which queues are available depends on the SAP Event Mesh instance that has been integrated by your workspace administrator.
Topic	In addition to a queue, you can also select a topic to which the message is sent.  You can select one topic per task.  If no topic is specified, the message is sent only to the selected queue.
Columns	Specify which data from the SIGNAL query result is sent with the message.

## Related Information

[Running Actions Manually \[page 563\]](#)

[Activating and Deactivating Actions \[page 564\]](#)

[Managing Actions and Their Tasks \[page 561\]](#)

[Send Messages to SAP Event Mesh \[page 557\]](#)

## 5.2 Managing Actions and Their Tasks

Get to know the options to manage your actions, for example, how to view actions and edit them, add or remove tasks, or delete actions. This section also explains how to navigate from an action to the linked process.

### Viewing Actions

You can only view the actions that you've set up or to which you're assigned as a collaborator.

To access the *Actions* overview, choose  (*Actions*) in the sidebar.

All objects are organized on tabs as follows:

Tab	Description
<a href="#">Overview</a>	List of the actions that you've set up. Here, you can manage your actions.
<a href="#">Results</a>	List of results for all action runs in your workspace. You have access to the results of the actions that you have set up or to which you're assigned as a collaborator.

### Editing an Action

Follow these steps:

1. Choose any of these options:

- On the *Actions* overview, open the  menu of the action that you want to edit and select *Edit*.
- On the action details page, choose *Edit* for the action you want to change.

- On a widget with an action, choose  (*Actions*), then *Edit Action*.

2. Apply your changes and confirm with *Update*.

The action is updated. Changes are applied when the action is run again.

## About Action Drafts

You can save actions with incomplete settings as drafts and complete their configuration later. Drafts are marked so on the [Actions](#) overview.

To continue configuring, select a draft.

A saved action can't be put back into draft mode, even if you edit the action later.

Only actions that were saved with complete settings can run and send results.

## Adding and Removing Tasks

Follow these steps:

1. On the [Actions](#) overview, open the  menu of the action that you want to edit and select [Edit](#).
2. On the configuration page, you have the following options:
  - To add a task, scroll down and choose [Add Task](#). Then, specify the task settings.
  - To remove a task, choose [Delete](#).
3. Confirm with [Update](#).

The action is updated. Changes are applied when the action is run again.

## Navigating to the Linked Process

Each action includes a link to the process for which the action is configured. You can view this link as follows:

- On the [Actions](#) overview, in the [Process](#) column
- When you open an action, among the details given in the header menu

To open the process, select the link.

## Deleting an Action

When you delete an action, the action results are also deleted.

### Note

Deleting an action can't be undone.

Follow these steps:

1. On the [Actions](#) overview, open the  menu of the action you want to delete and choose [Delete](#).

2. Confirm in the dialog and choose *Delete*.

The action and its results are deleted.

## Related Information

[Action Setup \[page 532\]](#)

[Activating and Deactivating Actions \[page 564\]](#)

[Running Actions Manually \[page 563\]](#)

[Monitoring Action Performance in History \[page 564\]](#)

[Action Configuration for Workspace Administrators \[page 565\]](#)

## 5.3 Running Actions Manually

Learn how to run an action manually and view the SIGNAL query results, for example, to check whether the your configuration provides the expected results.

Follow these steps:

1. On the *Actions* overview, open the  menu of your action and select *Run now*.  
The action and its tasks are executed.

## Related Information

[Managing Actions and Their Tasks \[page 561\]](#)

[Monitoring Action Performance in History \[page 564\]](#)

[Viewing Action Results \[page 563\]](#)

## 5.4 Viewing Action Results

You can view the results of an action in SAP Signavio Process Intelligence when you've set up the action or are assigned as a collaborator.

To access action results, choose any of the following options:

- On the *Actions* overview, open the *Results* tab and choose from the list of all actions that were run.
- Open your action and on the *Results* tab, choose from the list of result sets.

You can filter results as follows:

- *All*: All results
- *New*: Results that weren't displayed in the previous run
- *Recurring*: Results that have been repeated from the previous runs

## Related Information

[Managing Actions and Their Tasks \[page 561\]](#)

## 5.5 Monitoring Action Performance in History

The action history provides details like changes to actions, run times and statuses, as well as error messages for failed runs.

To view the action history, follow these steps:

1. On the [Actions](#) overview, select your action.  
The action details opens, distributing the details on the tabs [Results](#) and [History](#).
2. Select the [History](#) tab to view the performance details of the action.

## Related Information

[Managing Actions and Their Tasks \[page 561\]](#)

## 5.6 Activating and Deactivating Actions

Learn how to activate or deactivate actions.

By default, any new action is activated after creation.

If you want to stop an action from running, you can deactivate it. For that, open the [Actions](#) overview and switch the toggle in the [Inactive / Active](#) column off.

To activate the action again, switch the toggle on.

## 5.7 Action Configuration for Workspace Administrators

Find instructions for workspace administrators on how to set up integrations with other SAP applications. Then, users can set up actions that send SIGNAL query results to the integrated applications.

### Note

You need a workspace administrator account to access the action configuration.

On the [Actions](#) overview, select  in the header menu. This opens the [Configurations](#) page where you set up integrations with other SAP applications.

The following integration options are available:

#### [Setting Up the Integration with SAP Build Process Automation \[page 565\]](#)

Integrate SAP Signavio Process Intelligence with SAP Build Process Automation as a workspace administrator. This integration allows users to set up actions that trigger business processes and automations in your SAP Build Process Automation tenant.

#### [Setting Up the Integration with SAP Event Mesh \[page 567\]](#)

Integrate SAP Signavio Process Intelligence with SAP Event Mesh as a workspace administrator. This integration allows users to set up actions that send messages to a queue and optionally to a topic in your SAP Event Mesh tenant.

#### [Setting Up the Integration with SAP Cloud Integration \[page 568\]](#)

Integrate SAP Signavio Process Intelligence with SAP Cloud Integration as a workspace administrator. This integration allows users to set up actions that send messages to your SAP Cloud Integration tenant.

#### [Editing or Deleting an Integration \[page 569\]](#)

Some actions require integration with SAP or non-SAP applications. Read how to modify or delete these integrations.

### 5.7.1 Setting Up the Integration with SAP Build Process Automation

Integrate SAP Signavio Process Intelligence with SAP Build Process Automation as a workspace administrator. This integration allows users to set up actions that trigger business processes and automations in your SAP Build Process Automation tenant.

## Prerequisites

Make sure that the following prerequisites are met:

- You have an SAP BTP account and a subaccount that you can use to subscribe to the SAP Build Process Automation service.

Find detailed instructions as follows:

- On the SAP Help Portal in section [Subscribe to SAP Build Process Automation](#)
- In the SAP tutorial [Subscribe to SAP Build Process Automation using Booster in SAP BTP Free Tier](#)
- You have a service instance for the SAP Build Process Automation service.

Find detailed instructions as follows:

- On the SAP Help Portal in section [Create a Space and a Service Instance](#)
- In the SAP tutorial [Create a Service Instance in SAP BTP](#)

- You have a service key for the service instance.

The service key contains the configuration parameters, which you need to set up this integration.

Find detailed instructions as follows:

- On the SAP Help Portal in section [Service Keys](#)
- In step 2 of the SAP tutorial [Create a Destination to Trigger Process from any Service](#)

- You have an API key for your SAP Build Process Automation tenant with the API scopes `trigger_read` and `trigger_execute`.

Find detailed instructions on the SAP Help Portal in section [Add API Keys](#).

- Relevant business processes and automations are published and available in your SAP Build Process Automation tenant.

Find detailed instructions as follows:

- On the SAP Help Portal in the sections [Business Process Projects](#) and [Create an Automation](#)
- In the SAP tutorial [Create a Business Processes](#)
- Any business process that is to be started by an action has an API trigger. You can configure the API trigger at the start event of your business process, including defining your input parameters.

Find detailed instructions on the SAP Help Portal in section [Configure and Test API Call to Trigger Process](#).

- For automations that are to be started by actions, an automation trigger is selected.

Find detailed instructions on the SAP Help Portal in section [Add an Automation Trigger to a Project](#).

## Context

You can integrate one SAP Build Process Automation tenant per SAP Signavio workspace.

## Procedure

1. Choose  ([Actions](#)) in the sidebar.
2. On the [Actions](#) overview, select the  icon in the header menu.
3. Create a new integration and select the integration type [SAP Build Process Automation](#).
4. Under [Insert Credentials](#), paste the following:
  - The content from your BTP service key (JSON)
  - The key that was generated during API key creation
5. Confirm with [Create](#).

## Results

If the service key is valid, the integration is created, otherwise, the integration setup fails.

You and other users can now set up actions that trigger business processes in your SAP Build Process Automation tenant.

## Related Information

[Start Business Processes and Automations in SAP Build Process Automation \[page 550\]](#)

## 5.7.2 Setting Up the Integration with SAP Event Mesh

Integrate SAP Signavio Process Intelligence with SAP Event Mesh as a workspace administrator. This integration allows users to set up actions that send messages to a queue and optionally to a topic in your SAP Event Mesh tenant.

### Prerequisites

Make sure that the following prerequisites are met:

- You've set up SAP Event Mesh in your SAP BTP cockpit.  
Find detailed instructions in section [Setting Up SAP Event Mesh in BTP Cockpit](#).
- You've a service instance for the SAP Event Mesh service.  
Find detailed instructions in section [Creating an Event Mesh Instance Using the Default Plan](#).
- You've a service key for the service instance.  
The service key contains the configuration parameters, which you need to set up this integration.  
Find detailed instructions as follows:
  - In section [Service Keys](#)
  - In the SAP tutorial [Create Instance of SAP Event Mesh](#)
- Relevant queues and topics are available in your SAP Event Mesh instance.  
Find detailed instructions as follows:
  - In section [Use SAP Event Mesh](#)
  - In the SAP tutorial [Create Queues and Queue Subscriptions for SAP Event Mesh](#)

### Context

You can integrate one SAP Event Mesh tenant per SAP Signavio workspace.

## Procedure

1. Choose  ([Actions](#)) in the sidebar.
2. On the [Actions](#) overview, select the  icon in the header menu.
3. Create a new integration and select the integration type [SAP Event Mesh](#).
4. Under [Insert Credentials](#), paste the content from your BTP service key (JSON).
5. Confirm with [Create](#).

## Results

If the service key is valid, the integration is created, otherwise, the integration setup fails.

You and other users can now set up actions that send messages to your SAP Event Mesh tenant.

## Related Information

[Send Messages to SAP Event Mesh \[page 557\]](#)

## 5.7.3 Setting Up the Integration with SAP Cloud Integration

Integrate SAP Signavio Process Intelligence with SAP Cloud Integration as a workspace administrator. This integration allows users to set up actions that send messages to your SAP Cloud Integration tenant.

## Prerequisites

- You've two service instances, one with plan 'integration-flow' and one with plan 'api' for your SAP Cloud Integration tenant. They contain the service keys, which you need to set up this integration.  
Find detailed instructions in section [Creating Service Instance and Service Key for Inbound Authentication](#).
- Integration flows have the sender adapter type 'HTTPS'.

## Context

You can integrate one SAP Cloud Integration tenant per SAP Signavio workspace.

## Procedure

1. Choose  (*Actions*) in the sidebar.
2. On the *Actions* overview, select the  icon in the header menu.
3. Create a new integration and select the integration type *SAP Cloud Integration*.
4. Under *Insert Credentials*, paste the following:
  - The service key for the service instance with plan 'integration-flow'
  - The service key for the service instance with plan 'api'
5. Confirm with *Create*.

## Results

If the service key is valid, the integration is created, otherwise, the integration setup fails.

You and other users can now set up actions that send messages to your SAP Cloud Integration tenant.

## Related Information

[Send Messages to SAP Cloud Integration \[page 546\]](#)

## 5.7.4 Editing or Deleting an Integration

Some actions require integration with SAP or non-SAP applications. Read how to modify or delete these integrations.

## Prerequisites

You need an administrator account to use these functions.

## 5.7.4.1 Editing an Integration

### Procedure

1. Choose  (*Actions*) in the sidebar.
2. On the *Actions* overview, choose  in the header menu.
3. Choose  for the integration you want to edit.
4. Apply your changes and confirm with *Update*.

## 5.7.4.2 Deleting an Integration

### Context

#### Note

Deleting an integration can't be undone.

### Procedure

1. Choose  (*Actions*) in the sidebar.
2. On the *Actions* overview, choose  in the header menu.
3. Choose  for the integration you want to delete.
4. Confirm with *Delete Integration*.

The integration is deleted.

# 6 SAP Signavio Analytics Language (SIGNAL)

Understand what SIGNAL is and how to perform process mining tasks on large amounts of event data.

SAP Signavio Analytics Language, SIGNAL is a specialized query language for process analysis. The language is based on SQL. Like SQL, you use queries to retrieve data and perform calculations on the data. However, it is not possible to change or delete process data.

The difference to SQL is the data model. While you usually query data from multiple tables with SQL, SIGNAL queries the data from only one table, which contains nested events. In addition, SIGNAL provides numerous custom functions to work more effectively with this data structure.

SIGNAL is optimized for process mining, for example to determine conformance, cycle times, and rework, and it supports exploration at scale by all kinds of SAP Signavio Process Intelligence users.

With SIGNAL, you can only retrieve data from processes to which you have access.

For detailed information about SIGNAL, the data model and language syntax, see the [SAP Signavio Analytics Language](#) guide.

# 7 Integrate SAP Signavio Process Intelligence and SAP Data Intelligence Cloud

How to ingest data extracted from data intelligence into process intelligence.

The integration of SAP Signavio Process Intelligence and SAP Data Intelligence Cloud provides you with the following capabilities:

- connecting and extracting data from your source systems with SAP Data Intelligence Cloud
- extracting data from tables with more than 100 million rows
- collecting data from source system that are not supported in Process Data Management

For more use cases, see the [Integrating SAP Signavio Process Intelligence and SAP Data Intelligence Cloud](#) blog post.

## Connect, extract, and ingest data

This section outlines how to feed data into SAP Signavio Process Intelligence using a SAP Data Intelligence pipeline.

Follow these steps:

1. Connect SAP Data Intelligence and the source systems from which you want to extract the data. To do so, follow the instructions in [Create a Connection](#) section in SAP Help portal.
2. Configure data extraction in SAP Data Intelligence Cloud. To do so, follow the instructions in [Replicating Data](#) section in SAP Help Portal.
3. Ingest data into SAP Signavio Process Intelligence. You can do this in either of the following ways:
  4. • Send data from SAP Data Intelligence Cloud system to SAP Signavio process data management system through Ingestion API. To ingest data, you must first create an SAP DI Python operator. This operator converts the extracted data into CSV format and triggers the Ingestion API.  
To create a custom DI Python operator, refer to [Custom python operator for beginners](#) blog post and [Configure Python3 operator V2](#) topic in SAP Help Portal. For information about sending data via Ingestion API, refer to the [Ingestion API](#) documentation.
  - Send data to SAP Signavio Process Intelligence through AWS S3 buckets. For more information on configuration, refer to [Connector - AWS S3 \[page 96\]](#) section.  
To ingest data, in the SAP Signavio Process Intelligence, you need to create a new connection with the source system [AWS Connect to S3](#). Read more about adding new connection in the [Create a connection \[page 135\]](#) section. Then, create source data with the same source system and add table by importing the CSV file. This is the CSV file produced by SAP Data Intelligence Cloud. After you have added all the columns and set the primary key, then extract to view the data. Read more about creating new source data in the [Create, edit, and delete source data \[page 178\]](#) section.

# 8 Value Accelerator Library for SAP Signavio Solutions

The value accelerator library for SAP Signavio solutions, an embedded platform within SAP Signavio Process Transformation Suite, functions as a central repository for value accelerators.

With the value accelerator library, you can explore available value accelerators, install them in SAP Signavio Process Intelligence, SAP Signavio Process Manager, SAP Signavio Process Modeler, or SAP Signavio Journey Modeler and tailor them as per your needs in your workspace.

## ⓘ Note

Using value accelerators is optional and not part of the business functionality of the products of SAP Signavio Process Transformation Suite. Value accelerators are subject to change and may be changed, discontinued, or replaced by SAP at any time for any reason without notice.

## Required Licenses to Access Value Accelerator Library

The library is accessible from within SAP Signavio Process Collaboration Hub. For more information, see [Required Licenses and Authorization](#).

## Related Information

[Value Accelerator Library for SAP Signavio Solutions](#)

## 8.1 Accessing and Deleting Installed Accelerators in SAP Signavio Process Intelligence

Learn how to access the content imported from the value accelerator library into SAP Signavio Process Intelligence and how to delete it.

### Finding Installed Value Accelerators

1. Log into SAP Signavio Process Intelligence.  
The [Processes](#) screen appears with the list of processes.

### Note

By default, the newly created processes are displayed first in the list. The sorting indicator next to the *Last Edited* column name uses the process creation date and time to determine the ascending or descending order of the list.

2. Select  next to the *Last Edited* column name to view the processes from oldest to newest.
3. Select  next to the *Last Edited* column name to view the processes from newest to oldest.

For more information about viewing dashboards, see [Dashboards](#).

For more information about viewing metrics, see [The Metric Collection](#).

For more information about viewing process data pipelines, see [Viewing and Managing Process Data Pipelines](#).

### Note

- When installing the accelerator into an existing process, make sure you remember the list of dashboards, metrics, and process data pipelines included in that accelerator. Currently, it's not possible to distinguish between existing content and newly installed content in SAP Signavio Process Intelligence.
- A new process with a value accelerator appears in the processes list with the value accelerator name.

## Deleting Installed Value Accelerators

To delete accelerators that were installed in SAP Signavio Process Intelligence, you have the following options:

- Delete the installed content from the process
  - For more information about deleting dashboards, see [Create, Edit, and Delete Dashboards](#).
  - For more information about deleting metrics, see [Edit and Delete Metrics](#).
  - For more information about deleting process data pipelines, see [Edit and Delete a Process Data Pipeline](#).
- Delete the process
  - For more information, see [Editing and Deleting a Process](#).

### Caution

In SAP Signavio Process Intelligence, deleting an entity can't be undone.

Therefore, check for any dependencies before deleting. For example, deleting a metric will break the widgets that use the metric. After existing dependencies have been resolved, you can delete items that are no longer needed.

### Note

After you've deleted a value accelerator from your workspace, all entries referring to previous installations or installation attempts will still be displayed in the SAP Signavio Process Collaboration Hub settings under [Installed Accelerators](#).

# 9 Plug and Gain Approach

Understand what the plug and gain approach is and how the value accelerators for the plug and gain approach can help you.

The plug and gain approach offers an accelerated approach to business transformation and continuous improvement. It combines the strengths of SAP Signavio Process Transformation Suite to provide you with a predefined starting point for transformation and continuous improvement projects based on data from SAP ERP Central Component (SAP ECC), SAP S/4HANA, or SAP Ariba. Using the plug and gain approach therefore lets you combine the capabilities of SAP Signavio Process Insights and SAP Signavio Process Intelligence. You benefit from being able to get fast data insights from SAP Signavio Process Insights and then combine it with the flexibility offered by the features of SAP Signavio Process Intelligence.

The plug and gain approach lets you load data from SAP Signavio Process Insights to SAP Signavio Process Intelligence quickly and easily. It also allows you to do a deep-dive analysis on process performance and how your processes are actually run. This reduces the time needed to prepare for your transformation and continuous improvement projects significantly, by supporting the process to prepare and deploy faster and promote continuous process improvement. Typical use cases include the following:

- To help reduce the complexity and cost of SAP S/4HANA transformation projects
- To address challenges arising from mergers and acquisitions, resulting in distributed system landscapes and limited process harmonization
- To handle the challenge of ERP systems that have grown historically with custom development, and obsolete configuration settings and data
- To avoid costly process mining projects that require significant setup time before processes can be improved

For detailed information about the plug and gain approach and how to install the corresponding value accelerators for process landscape analysis and specific processes, see the [Getting Started Guide for the Plug and Gain Approach](#).

# 10 Help and Support

There are several ways to find more information and get support for SAP Signavio Process Intelligence.

## Built-In Support

Built-In Support helps you get real-time support and find context-sensitive information from within SAP Signavio Process Intelligence. It provides simplified guided support that allows you to search for knowledge directly within the application.

When you're signed in, you can open the Built-In Support panel by choosing ⓘ (*Built-In Support*) at the top right of the screen. Enter one or more key words and choose from the results displayed in the right-side panel. Filter the results by selecting ▾.

## In-App Help

SAP Signavio Process Intelligence provides on-screen explanations of features and interface elements.

To open the in-app help, use these options:

- In the header, choose ⓘ, then *In-App Help*.
- Press **F1**.

### ⚠ Restriction

Currently, in-app help content is only available on the following pages:

- What's New information on the main page of SAP Signavio Process Intelligence
- Several help topics and a guided tour about the widget builder on any dashboard

To see any of this content, navigate to the main page or any dashboard and open the in-app help.

The following types of help are available:

- ⓘ (Help Topics): Quick reference information about specific user interface elements to help you perform your tasks
- ⚡ (Guided Tours): Guided tours of more complex procedures
- 🔔 (What's New): Information about new features and updates

## SAP Help Portal

You can find an overview of all related documentation at [SAP Signavio Process Intelligence](#).

## SAP Signavio Support

To learn how to get your questions answered when using SAP Signavio products and how to create a support case, see [SAP Signavio Support](#).

## SAP Support Portal

You can find onboarding and support information here:

- [SAP Signavio – Home](#)
- [SAP Signavio Process Intelligence – Home](#)

# Important Disclaimers and Legal Information

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