

X4 BPM



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Last updated: 24.05.2023 2

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# 1 Introduction

# 1.1 What is a BPM Project?

A BPM (Business Project Management) Project is a project type within X4 BPMS that allows you to visualize and model business processes according to the BPMN 2.0 notation standard. BPM Projects contain a predefined folder structure where you can create any number of business processes (BPM Processes \*.bpm).

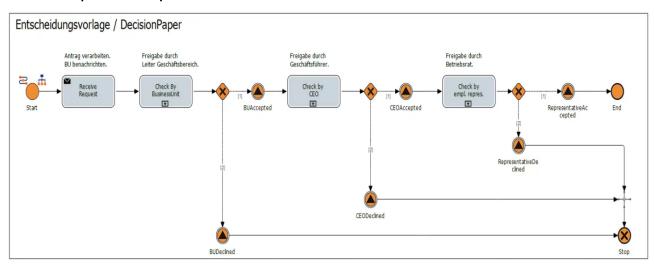
# 1.2 How can I use BPM Projects?

In X4 Designer, within a BPM Project, you can graphically model one or more business processes (BPM Processes \*.bpm).

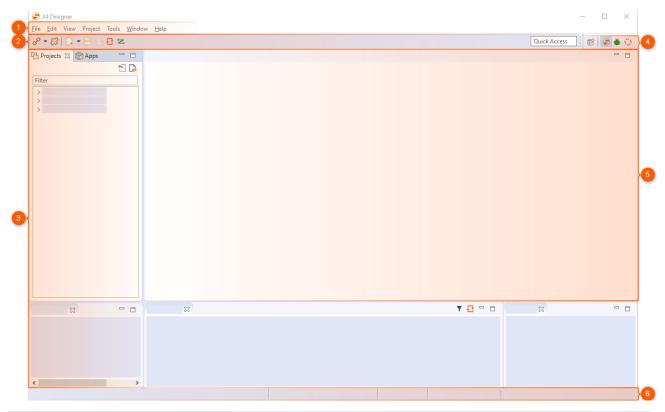
The business process can be represented with different process modules. These can be dragged and dropped into the drawing area and linked to Technical Processes.

In the case of more complex company processes, overarching business processes can be orchestrated in a process landscape (file extension \*.pld) and thus visualized graphically in a clear manner. However, process landscapes are only used for visualization and cannot be executed. A BPM Project can contain only one process landscape, but any number of business processes (\*.bpm).

#### **Decision Paper as Example of a Business Process**



# 2 Interface



1	Menu bar	The menu bar allows to open various functions and editors of the X4 Designer.
2	Toolbar	The toolbar offers different functions and display options. Some symbols are only active, if the corresponding function is available for the selected or opened element, see also Toolbar.
3	Views	Views can be arranged individually via drag-and-drop.
4	Perspectives	Switch between X4 Designer and BPMN Designer perspective.
5	Editors and workspace	Processes and files are opened here for editing in tabs.
6	Status bar	The status bar displays the connected server, the logged-in user and the version.

# 2.1 Toolbar

Various functions and display options can be called up via the toolbar. Some icons are only active if the relevant function is available for the selected or opened element.

P	Connect	Connect to the server
83	Disconnect	Disconnect from the server
	New	Add new element  The insert option varies depending on where you are in the tree structure in the Repository Navigator.
	Save	Save changes in the currently opened window
	Save all	Save all changes
<b>1</b>	Repository Refresh	Perform server-side update
<b>X</b> /	Attach/Detach Debug	Attach debugger to server instance / Detach debugger from server instance
*	Start Debugging	Start Debugger
t.	Undo	Undo last editing step
7	Redo	Restore undone step
of	Cut	Cut selection
	Сору	Copy selection
Î	Paste	Paste selection
<b>&gt;.</b>	Start Debugging	<ul> <li>Call up options for process execution</li> <li>Start Debugging: debug process (show and fix errors)</li> <li>Start Without Debugging: Execute process directly</li> <li>Debug/Run Options: Open Run/Debug settings in X4 Designer</li> </ul>
II	Suspend	Stop debugging process
Þ	Resume	Continue debugging process
	Stop Debugging	Terminate debugging

3.	Step Into	Execute process step (display steps of the subprocess)
Ğ	Step Over	Execute process step (without displaying steps of the subprocess)
<u>_r</u>	Step Return	Jump out of subprocess
•	Toggle Breakpoint	Set or remove breakpoint for marked element
*	Clear all Breakpoints	Delete all breakpoints in this process
63	Quick Watch	Open Quick Watch view to view placeholders, dynamic parameters and context variables with their values during debugging.
<b>(</b>	Output	Open Output view to view the result of each process step during debugging.
Q	Zoom Out	Zoom out view
100%	Zoom	Select zoom level
Q	Zoom In	Zoom view
#	Snap to grid	Display grid and align elements to grid
<b>(7</b> )	Show Process Quality Index	Display Process Quality Index

# 2.2 Context Menu

## Context menu for process components

When you right-click a process component in the X4 Designer's editor area, you have access to different features – depending on the component type and the:

1 dd Component	Add now process component	
Add Component	Add new process component	
riad compenent	riad new process compension	

Layout	Align selected process components
	<ul> <li>Align Horizontal: Align the process components horizontally</li> <li>Align Vertical: Align the process components vertically</li> </ul>
	<ul> <li>Distribute Horizontal: Distribute the process components horizontally</li> </ul>
	<ul> <li>Distribute Vertical: Distribute the process components vertically</li> </ul>
Select All	Select all process components
Copy Process Diagram to Clipboard	Copy the process diagram
Edit Label	Edit the process component's label
Undo	Undo the last editor action
Redo	Redo a previously undone editor action
Сору	Copy a selected process action
Cut	Cut selected process action
Set document	Replace a marked process component with another repository element
Edit	Edit a selected process component (module components and documents only)
Toggle Breakpoint	Set a debug breakpoint for the selected process action
Delete	Delete a selected process component from the process diagram
Validate	Check the subprocess' validity (subprocesses only)
Preview	Open process component in a separate editor tab (Module components and documents only)
Show input schema	Display input schema assigned to the sub-process, if available
Show output schema	Display output schema assigned to the sub-process, if available
Select in Repository Navigator	Show process component in the <b>Repository Navigator</b>
View Call Hierarchy	Display the processes using the selected process component
Refresh	Reload a selected process component from the repository (Module components and documents only)
Bring to Front	Bring a selected symbol to the foreground of the diagram

Bring Forward	Bring a selected symbol one level up towards foreground
Send Backward	Bring a selected symbol one level down towards background
Send to Back	Bring a selected symbol to the background of the diagram
Properties	Display process component properties in the Properties view
Schema Declaration	Specify schema declaration for the process

# Context menu in the Projects view

You can open the context menu by right-clicking on an element within the **Projects** view.

New	Create new elements (processes, directories, adapters, etc.) in the repository
Open / Open with	Open the selected element (process, folder, adapter etc.) with the default editor or a specific editor
Save As Template	Saves the selected element as template
Copy full path to Clipboard undCopy XStore URL to Clipboard	Copy the path of the selected element to the clipboard (as relative folder path or as xstore: // URL)
Cut, Copy and Paste	Cut, copy, or pastes the selected element(s)
Delete	Delete selected element from the repository (irreversible)
Refactor/Rename	Rename an element (and change references, if desired)
Exclude from Project	Exclude the resource from the project
	<ul> <li>The file will remain in the file system, but is no longer part of the project and is grayed out.</li> <li>The usual operations such as opening, editing, copying, deleting, etc. of excluded files are disabled.</li> </ul>
Include to Project	Include an excluded resource to the project
Repair References	Repair incorrect repository resource paths in process diagrams
Validate	Check the selected process's validity
View Call Hierarchy	Display the processes that use the selected elements
Start Without Debugging	Run process directly
Import	Import resource to the repository
Export	Export project or resource
Clean-Up Project	Select and delete unused files from the repository

# 2.3 Perspectives

A perspective is a defined arrangement of views and the editor area. The arrangement of the views can be defined by drag-and-drop.

S X4 Designer	The X4 Designer perspective is the default perspective.
<b>☀</b> Debug	The Debug perspective is an optimized perspective to debug business and technical processes.
• BPMN Designer	The BPMN Designer perspective is an optimized perspective to model business processes.

# 2.3.1 Switching perspectives

In X4 Designer, you can switch between perspectives. The arrangement of the views is kept.

• To change the perspective, click on the icon of the desired perspective in the upper right corner.

# 2.3.2 Reseting perspectives

- 1. To reset a perspective, switch to the perspective.
- 2. Select **Window > Reset Window Layout** in the menu bar.

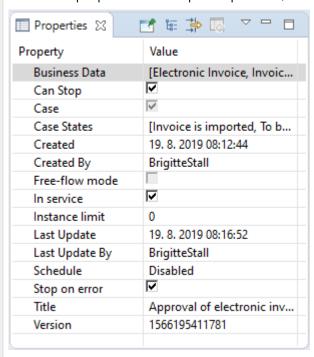
## 2.4 Views

□ Projects	The <b>Projects</b> view displays a tree structure of the connected repository with various elements such as projects, folders, and files. The context menu can be opened by right-clicking on an element in the <b>Projects</b> view. The available options change depending on where in the tree structure the context menu is called.  The <b>Filter</b> text field above the project tree can be used to search for files within the connected repository. Placeholders like * or ? are not possible.  The following actions can be performed using various buttons:  * **Dump from active Editor to Repository Navigator*: Highlight opened file in the editor within the <b>Projects</b> view.  * **Show or hide all files*: Show and hide contents of the file system. Files excluded from the project are grayed out.
♠ Apps	The <b>Apps</b> view displays all X4 Apps that are used to bundle projects.

#### ■ Properties

In the **Properties** view, the properties of selected process modules and of opened processes can be displayed and edited:

- The left column displays the property name, the right column contains the corresponding values.
- A title and a description can be stored for each process. These are displayed in the generated documentation.
- To edit properties of an opened process, click on an empty area on the workplace.



The most common properties are displayed by default, however, additional settings can be made using the **Properties** view toolbar:

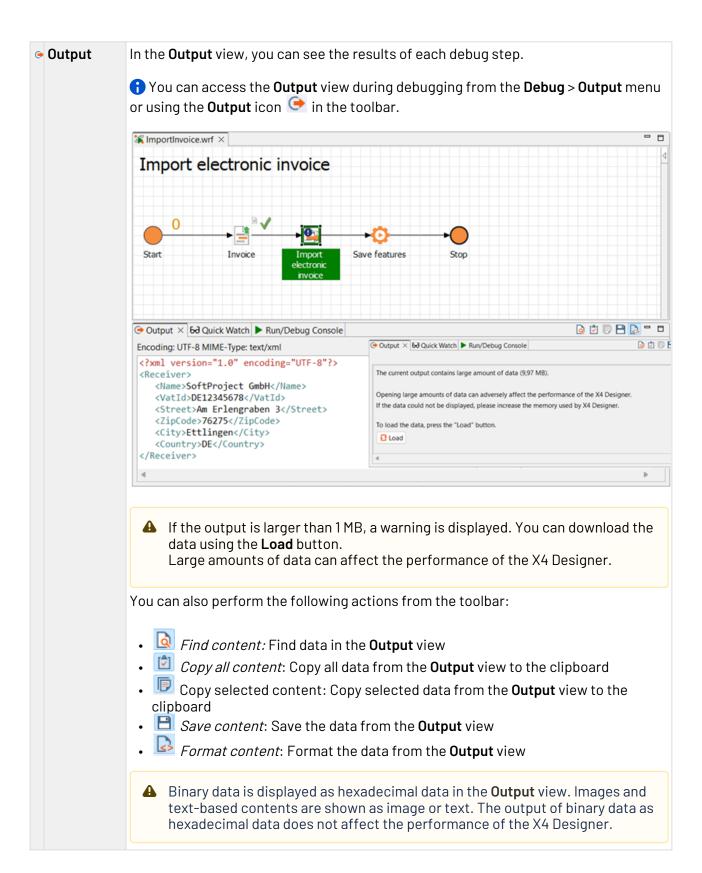
- In to Selection: Pin displayed properties in the Properties view
- Show Categories: Show properties sorted by categories
- Show Advanced Properties: Show advanced properties
- Restore Default Value: Restore to default value
- View Menu: Open additional options

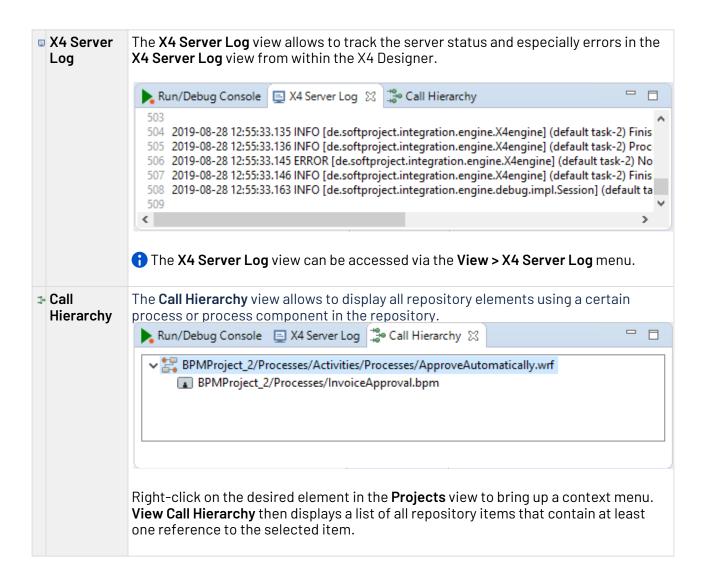
### Run/Debug Console

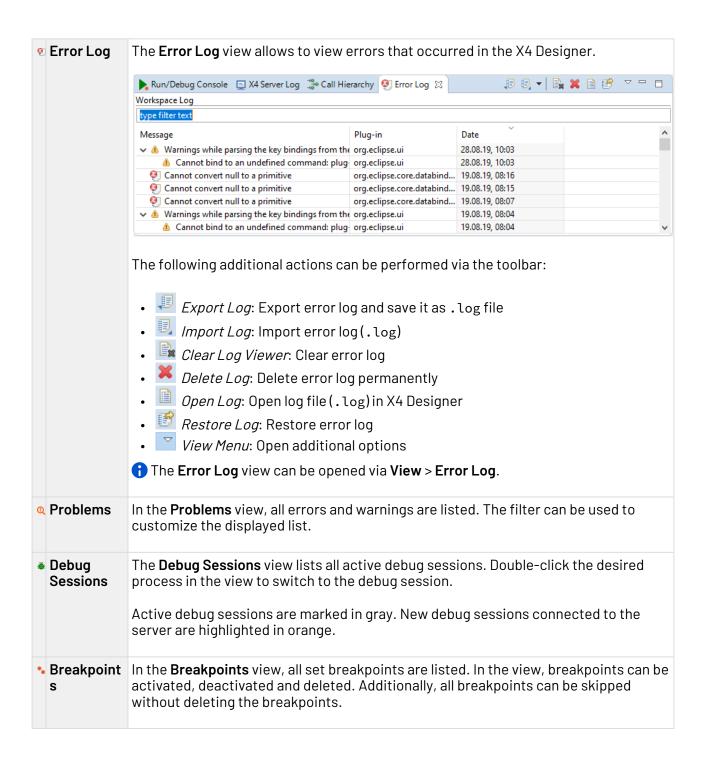
If a process is checked for errors or simulated, debug information is displayed in the **Run/Debug Console** view for each executed process step. Error messages are highlighted in red, successful status messages are green.

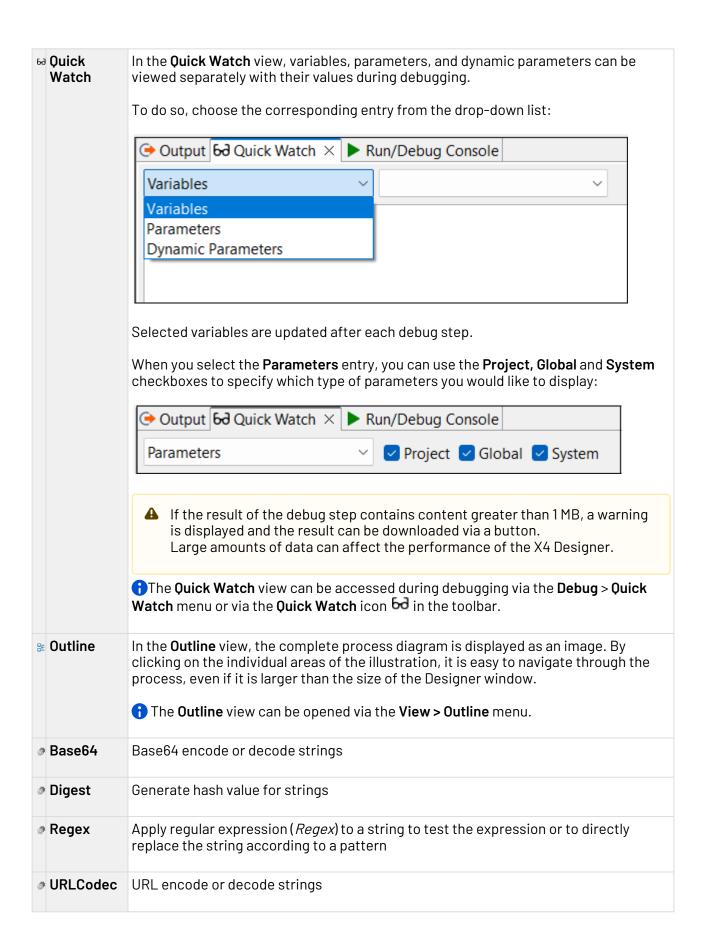
When a process step outputs an intermediate result, it is stored in a temporary file during debugging, which you can view using the corresponding reference (e.g., file: //1376054979039/).

The Run/Debug Console view can be accessed from the View > Run/Debug Console menu.









#### 2.4.1 Open views



A No other views can be opened in the **BPMN Designer** perspective, all relevant views are open by default.

• Select the desired view from the **View** menu in the menu bar.

#### 2.5 **Editors**

In X4 Designer, processes and files are opened in tabs for viewing and editing. The used editor depends on the opened file type.

Editor	Usage	Description
BPMN Editor	.bpm .pld	With the BPMN Editor, you can model business processes according to the notation standard BPMN 2.0.
Database Editor	.stm	With the Database Editor, you can define SQL queries for database connection modules to retrieve data from a relational database.
JSON Editor	.json	With the JSON Editor, you can edit JSON documents directly in the X4 Designer.
Mapping Editor	.xsl .rep	With the Mapping Editor, you can create and edit XSL mappings in a graphical view.
Parameter Editor	.param	With the Parameter Editor, you can create project parameters and project parameter groups to parameterize process components.
Process Editor	.wrf	With the Process Editor, you can graphically model Technical Processes.
XML Editor	.xml .xhtml	With the XML Editor, you can create and edit well-formed XML documents.

XSD Editor	.xsd	With the XSD Editor, you can create an XML Schema Definition for your XML documents.

#### 2.5.1 **BPMN** Editor

The BPMN Editor allows you to model Business Processes in compliance to the notation standard BPMN 2.0. The editor is similar to the Process Editor within X4 Designer regarding layout and functionality, but differs regarding the process components and symbols in the process diagram. The BPMN Editor allows you to link your modeled Business Processes directly to Technical Processes. Without switching the development environment, you can model your Business Processes and Technical Processes, and test and execute them on the X4 Server.

Since BPMN processes can contain non-automatable actions, e. g. human workflows, BPMN processes aren't necessarily executable by the X4 Server. BPMN processes may contain technical processes as subprocess tasks, and can be executed.



The free-flow mode additionally allows to use the BPMN Editor as plain BPMN drawing tool with an extended BPMN palette where the run/debug functionality is disabled.

#### 2.5.2 Database Editor

The Database Editor allows to define SQL queries for database connection components in order to retrieve data from a relational database. The logical separation of the process components SQL statement and database connection allows these components to be used flexibly and multiple times within the X4 Designer.

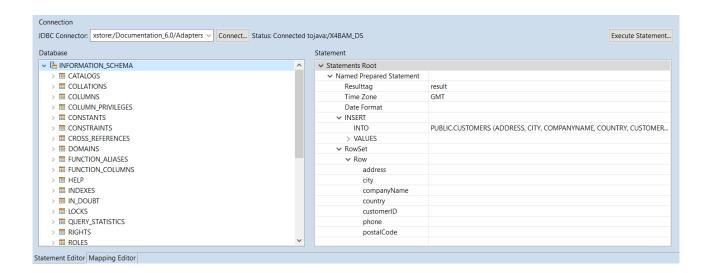


To open the Database Editor create a new SQL statement file (.stm) or open an already existing SQL statement file.

#### The Database Editor's structure

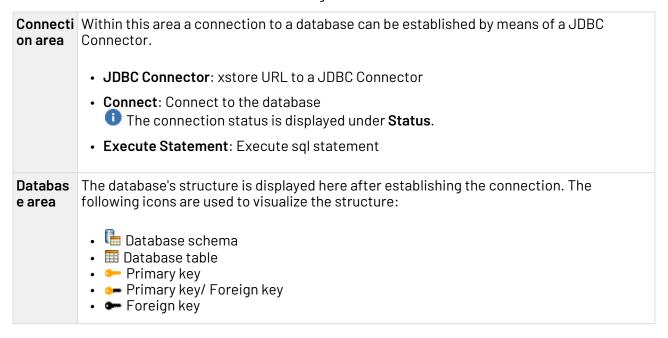
The Database Editor provides two different tools:

- Statement Editor: Allows to connect to a database and displays the structure of the connected database. This structure can be used to create an SOL statement for the database.
- Mapping Editor: Allows to define a mapping for elements of an input XML document to the named parameters of the statement previously created with the Statement Editor. This mapping is subsequently used to create an XSL mapping, which generates a dynamically created input for the JDBC Connector using a suitable input XML document.



#### 2.5.2.1 Statement Editor

The Statement Editor is divided into the following areas:



# nt area

Stateme Here, different statements can be created for the connected database via the context menu:

- New Named Prepared Statement: Create a new Named Prepared Statement in Statements Root
- Edit Named Prepared Statement: Edit Named Prepared Statement
- New RowSet: Create new RowSet.
  - ( Only one RowSet can exist within a Named Prepared Statements. It is generated automatically when creating the Named Prepared Statement. A new RowSet can only be created, if the existing one has been deleted.
- New Row: Add a new row within a RowSet
- New Named Parameter Value: Add a new Named Parameter value within a row
- Edit Named Parameter: Edit Named Parameter
- New SELECT Statement: Create new SELECT statement
- Edit SELECT: Edit SELECT instruction
- Edit FROM: Edit FROM within a SELECT statement
- New INSERT Statement: Create new INSERT statement
- Edit INTO: Edit INTO instruction
- New VALUE Entry: Create new VALUE entry
- Edit VALUE: Edit VALUE
- New UPDATE Statement: Create new UPDATE statement
- Edit UPDATE: Edit UPDATE instruction
- New SET Entry: Create new SET entry
- Edit SET Entry: Edit SET entry
- New DELETE Statement: Create new DELETE statement
- Edit FROM: Edit FROM instruction
- Edit WHERE: Edit WHERE condition
- New Column: Add new column within an INSERT or SELECT instruction
- New Table: Insert new table within an UPDATE or SELECT instruction
- Delete: Delete element
- For further information on how to create and edit statements, see section Creatin g Statements for a Connected Database.

### Drag&Drop actions

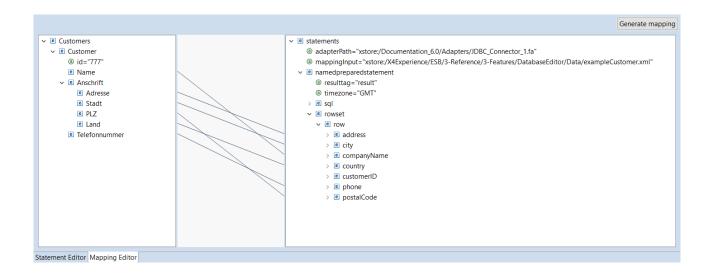
The following Drag&Drop actions can be performed within the Statement area:

SQL statement	Database element	Statement element	Action
SELECT	Column	SELECT	Add the column to be selected.  If the table corresponding to the added column is not already entered within FROM, it will be entered automatically.
	Table	FROM	Add the table from which is to be selected.
UPDATE	Column	SET Entry	Set the column as entry.  If the table corresponding to the added column is not already entered within UPDATE, it will be entered automatically.
	Table	UPDATE	Set the table to be updated.
INSERT	Table	INTO	Set the table into which is to be written.  i If there is already a table, it will be replaced. Already set columns will be deleted thereby.
	Column	INTO	Set the column into which is to be written.  This is only possible, if the column originates from the set table.
DELETE	Table	FROM	Set the table to be deleted.  If there is already a table, it will be replaced.

## 2.5.2.2 Mapping Editor

The Mapping Editor allows to define a mapping for elements of an input XML document to the named parameters of the statement previously created with the Statement Editor. This mapping is subsequently used to create an XSL mapping, which generates a dynamically created input for the JDBC Connector using a suitable input XML document.

The Mapping Editor is divided into the following areas:



Source area	The Source area is on the Mapping Editor's left side. The input XML file can be displayed here and assigned by drag & drop.  The context menu provides the following options:  • Collapse: Collapse a node's child nodes
Linking area	• Expand: Expand the child nodes of the selected node • Remove Input: Remove assigned input XML document  The Linking area is located in the Mapping Editor's middle column. It visualizes the xsl:value-of connections between an element in the source document and a Named Parameter in the statement as line.
Statements area	The Statements area is located on the Mapping Editor's right side. The complete structure of the statement file is displayed here. Moreover, elements of an input XML file can be mapped to the child elements of a Row element.

#### 2.5.3 **JSON Editor**

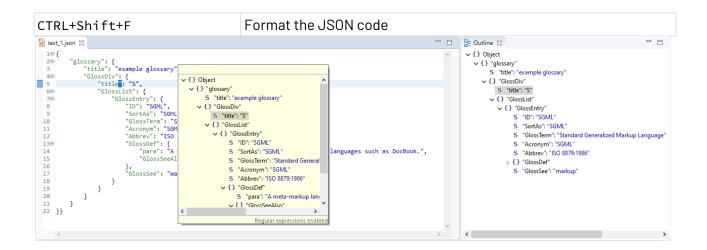
The JSON Editor allows JSON documents to be edited directly within the X4 Designer.

To open the JSON Editor, either create a new JSON Document or open an already existing document.

The Outline view displays the structure of the opened JSON document. Moreover, you can also use the context menu Quick Outline or the shortcut CTRL+0 to open the Quick Outline view and to search for keys and values within the JSON document.

#### **Shortcuts**

CTRL+O	Open the Quick Outline view
--------	-----------------------------



The formatting of the JSON code and the colors for syntax highlighting can be changed under Tools > Options > JSON Editor. For more information, see Configuring the JSON Editor.

## 2.5.4 Mapping Editor

The Mapping Editor allows to create and edit XSL mappings in a graphical interface. Using XSLT, you can transform an XML data structure into another XML data structure or into an XSL-FO document. The Mapping Editor supports you with a graphical interface and with an automatic stylesheet and XPath validation when creating or editing XSL mappings.

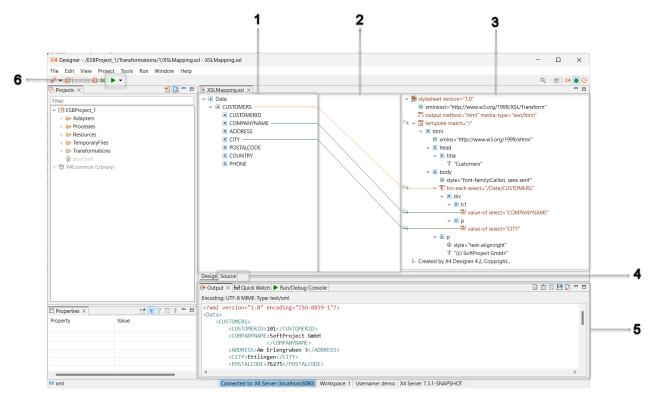
An XSL mapping involves three documents:

- XML source document (or an XML schema to provide the input structure)
- XSLT stylesheet (created with the Mapping Editor)
- Result document (in most cases: XML)

① To open the Mapping Editor, create a new mapping or open an already existing XSL mapping.

### The Mapping Editor's structure

The Mapping Editor is divided into the following areas:



## 1 Source pane The source document to be transformed or an XML Schema file (. xsd) is displayed here. Using the context menu, you can edit selected nodes as follows: • Copy XPath for this element to Clipboard: copy XPath expression of the selected element to the clipboard and use it elsewhere • Assign Input: assign input XML document • Remove Input: remove assigned input XML document Paste Input: insert XML document from the clipboard 2 Linking pane The Linking pane displays lines that visualize the relationships between source and stylesheet nodes. The chapter Tastenkombinationen im Mapping Editor gives you an overview of the most important key combinations helping you to work with XSL stylesheets.

### 3 Stylesheet pane

The Stylesheet pane is where you edit the stylesheet. It displays the XSL stylesheet in an editable tree with specialized features for editing XSLT stylesheets.

The different parts of the stylesheet are displayed with symbols and colored highlighting in the tree view:

• Nodes that contain XSLT instructions are colored brown and have a corresponding icon, e.g.,

for-each select="Data/Customers"

- If a node contains an XPath expression, it is indicated by the XPath icon l
   on the left side. You can click on this icon to edit the XPath expression.
- Virtual nodes (incurred nodes from an assigned XML document or XML schema that do not yet explicitly exist in the XSLT stylesheet) are greyed out.

Using the context menu in the stylesheet pane, you can edit selected nodes as follows:

- Edit XSL Element: Edit selected XSL element
- Rename: Rename the node
- Element: Insert an element
- Attribute: Insert attribute
- Edit: (In case of processing instructions and namespace declarations) Edit node content
- XSL Element: Insert XSL element
  - as Child: as child node
  - Before: as node before the selected node
  - After: as node after the selected node
- Add other nodes: Add other nodes (Namespace, Text, Comme nt, Processing Instruction)
- Add here: (In case of virtual nodes) Convert a virtual node into a real node
- Add Processing Instructions: Insert processing instructions to set Dynamic Parameters.
  - Condition State for status information
  - Log Info for log messages
  - Dynamic Parameter to set dynamic values
  - No Result for empty mapping outputs
- Add Parameter: Insert system, global or project parameters, see Creating and Using Parameters
- Add Parent: Insert a parent element (superordinate element)
- Cut/Copy/Paste: Cut, copy, or paste selection
- Delete: Delete the selected node
- Expand/Collapse: Expand or collapse the child nodes of the selected node
- Assign Virtual Nodes: Insert virtual nodes from an XML document or schema
- Remove Virtual Node: Delete virtual nodes from an XML document or schema

		✓ The XSL Element Creation Wizard allows to create XSL mappings quickly and easily. The wizard offers the complete range of XSLT 2.0 elements and enables to create them easily via the context menu.
		Within the wizard, you can specify whether the new element is to be created before, after or as a child of the selected element. Features like auto-completion, or the display of all available and allowed XSL elements enable faster work.
		Moreover, the wizard allows to set and to edit the attributes of the XSL element. Required attributes are set automatically, optional attributes can be selected and filled as needed.  For attributes that have multiple options to choose from, a drop-down list with all available values is provided.
4	Source and Design view	You can switch between two different views within the Mapping Editor:
		Design: The editor displays the XSLT stylesheet as a tree in a three column view. Here, you can graphically map nodes of the source document/schema to the XSLT stylesheet nodes by drawing connection lines.
		<ul> <li>Source: In this source code view, you can edit the XSLT stylesheet directly in an XML editor</li> </ul>
5	Output	The result of locally run XSL mappings is displayed in the Output view.
		The following additional actions can be performed via the toolbar:
		<ul> <li>Save content of output view: Save the data form the output view</li> <li>Format the content of the output view: Format the data</li> </ul>
		from the output view
6	Run transformation	Via Run Transformation, you can run the XSL mapping locally and display the transformation result in the output view (5).

# 2.5.4.1 Keyboard shortcuts within the Mapping Editor

Useful shortcuts for working with XSL stylesheets within the graphical view of Mapping Editor

# **Drag&Drop Actions**

Reference a value to a target node using xsl:value-of		Drag a node from the source document to the target node		
Reference multiple values into a target node using xsl:value-of		Keep the <b>Alt</b> key pressed and drag all desired nodes from the source document to the target node  Result: An xsl:value-of element will be created whose select attribute contains all referenced nodes. In a next step, this list of nodes can be correlated by using an XPath function like concat() or logical operators.  Example: <xsl:value-of select="Element1Element2"></xsl:value-of>		
Copy a node using xsl:copy-	-of	Keep the <b>Ctrl</b> key pressed, and drag a node fr document to the target node	om the source	
Create a for-each loop for a nusing xsl: for-each	ode	Keep the <b>Shift</b> key pressed, and drag a node to document to the target node	from the source	
	Fund	ction	Shortcut	
Basic functions	Edit	element	Enter	
	Run	XSL transformation	F9	
	Insert element		Ins	
	Insert attribute		Alt+Ins	
	Insert text		Ctrl+Ins	
	Insert surrounding parent element		Ctrl+Shift+Ins	
	Rename a element		Alt+Shift+R	
	Remove selected node		Del	
	Format/indent the code (in Source view)		Ctrl+Shift+F	
Copying nodes	Inse	rt selected node as preceding sibling	Ctrl+ Alt+Up	
	Insert selected node as following sibling		Ctrl+ Alt+Down	
	Insert selected node as preceding parent		Ctrl+Alt+Left	
Moving nodes	Mov	e selected node up	Alt+Up	
	Mov	e selected node down	Alt+Down	
	Move to parent element (pull up)		Alt+Shift+Left	
Navigating trough the stylesheet tree	Go to parent node		Ctrl+Shift+Left	
	Go to	o next node	Ctrl+Shift+Down	

Go to previous node	Ctrl+Shift+Up
Select connected nodes in the source pane and stylesheet pane	Shift+Ins
Restore last selection	Alt+Shift+Down

#### 2.5.5 **Process Editor**

With the Process Editor, Technical Processes can be modeled graphically. For each Technical Process and for the individual process modules, you can also define how they should be executed.

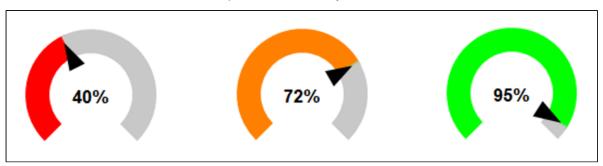
With the Process Editor you can:

- establish connections between different back-end systems,
- · transform data in real time,
- implement business rules in the modeled process and
- debug modeled processes and execute them on the X4 server.

#### 2.5.5.1 Process Quality Index

① The Process Quality Index is an experimental feature. The functionality is currently still limited and is being developed continuously.

The Process Quality Index is a graphical tool that indicates how well an ESB process has been modeled in terms of standards compliance and clarity.



### Rating of the criteria

Criteria	Condition	Rating
Number of elements	<b>100</b> % → <b>&lt; 15</b> elements	45%
	<b>75</b> % → <b>&lt; 20</b> elements	
	<b>50</b> % → <b>&lt; 25</b> elements	
	<b>25</b> % → <b>&lt; 30</b> elements	
	<b>0</b> % → >= <b>30</b> elements	

Criteria	Condition	Rating
Number of stop elements	100% → <3 elements  75% → <4 elements  50% → <5 elements  25% → <6 elements  0% → >= 6 elements	15%
Labels of the elements are not empty	true $\rightarrow$ 100% false $\rightarrow$ 0%	10%
Process title was set (not the name of process file)	true $\rightarrow$ 100% false $\rightarrow$ 0%	5%
Labels of the elements were adjusted (not filename)	true $\rightarrow$ 100% false $\rightarrow$ 0%	5%
No elements on the right side of stop elements	true $\rightarrow$ 100% false $\rightarrow$ 0%	5%
No elements on the left side of start elements	true $\rightarrow$ 100% false $\rightarrow$ 0%	5%
No overlapping elements	true $\rightarrow$ 100% false $\rightarrow$ 0%	5%
Flow Direction Index		5%
Maximum		100%

# 2.5.5.2 Keyboard shortcuts within the Process Editor

All shortcuts of the Process Editor in an overview.

Running and debugging processes   F9		Function	Shortcut or action
Execute and show a single process action (also in subprocesses) while debugging	debugging	Execute process	F9
Cancel debugging	processes		F4
subprocess actions) while debugging  Jump back from the subprocess to the main process while debugging  Pause debugging  Cancel debugging  Carcel + F2  Insert a file from the repository onto the transition via drag&drop When the line expands, drop the symbol.  Move process component while keeping the transition  Delete process component while keeping the transition  Replace process component by another repository file process component to be replaced.  Insert process component behind an unconnected process component to be replaced.  Select the unconnected process component, and automatically create a transition  Select the unconnected process component, press Shift, and drag the repository file behind the selected process component.  Strg+A  Cut out process component  Strg+A  Copy process component  Strg+C  Paste process component  Delete process component  Undo last action  Ctrl+Z  Redo last action  Ctrl+Z  Edit process component  Double-click the symbol			F5
main process while debugging  Pause debugging  Ctrl + F8  Resume paused debugging  Ctrl + F2  Inserting process component from the repository between two connected components and transitions  Move process component while keeping the transition  Delete process component while keeping the transition  Replace process component behind an unconnected components and unconnected component, and automatically create a transition  Editing elements  Editing elements  Main process while debugging  Ctrl + F2  Insert a file from the repository onto the transition via drag&drop When the transition via drag&drop When the line expands, drop the symbol.  Press Alt while moving the process component on the workplace.  Alt + Del.  Drag and drop a repository file on the process component to be replaced.  Select the unconnected process component, press Shift, and drag the repository file behind the selected process component.  Strg+A  Cut out process component  Strg+X  Copy process component  Press Alt while moving the process component to the repository file on the process component to be replaced.  Select the unconnected process component, press Shift, and drag the repository file behind the selected process component.  Strg+A  Cut out process component  Strg+X  Copy process component  Strg+V  Delete process component  Undo last action  Ctrl+Z  Redo last action  Ctrl+Y  Edit process component  Double-click the symbol			F6
Resume paused debugging   F8			F7
Inserting process   Insert process component from the repository between two connected components and transitions		Pause debugging	Ctrl + F8
Inserting process components and transitions    Insert process components and transitions		Resume paused debugging	F8
repository between two connected components and transitions  Move process component while keeping the transition  Delete process component while keeping the transition  Replace process component by another repository file  Insert process component behind an unconnected component, and automatically create a transition  Select all workplace elements  Cut out process component  Cut out process component  Drag and drop a repository file on the process component to be replaced.  Select the unconnected process component, press Shift, and drag the repository file behind the selected process component.  Strg+A  Cut out process component  Cut out process component  Strg+X  Copy process component  Press Alt while moving the process component to the expository file on the process component to be replaced.  Select the unconnected process component, press Shift, and drag the repository file behind the selected process component.  Strg+A  Cut out process component  Strg+X  Copy process component  Strg+C  Paste process component  Del  Undo last action  Ctrl+Z  Redo last action  Ctrl+Y  Edit process component  Double-click the symbol		Cancel debugging	Ctrl + F2
transition  Delete process component while keeping the transition  Replace process component by another repository file  Insert process component behind an unconnected component, and automatically create a transition  Editing elements  Select all workplace elements  Cut out process component  Copy process component  Drag and drop a repository file on the process component to be replaced.  Select the unconnected process component, and automatically the repository file behind the selected process component.  Strg+A  Cut out process component  Cut out process component  Strg+X  Copy process component  Strg+V  Delete process component  Undo last action  Ctrl+Z  Redo last action  Ctrl+Y  Edit process component  Double-click the symbol	process components and	repository between two connected	the transition via drag&drop When
the transition  Replace process component by another repository file  Insert process component behind an unconnected component, and automatically create a transition  Select the unconnected process component, press Shift, and drag the repository file behind the selected process component.  Select all workplace elements  Strg+A  Cut out process component  Copy process component  Strg+C  Paste process component  Delete process component  Undo last action  Ctrl+Z  Redo last action  Edit process component  Double-click the symbol			
repository file process component to be replaced.  Insert process component behind an unconnected component, and automatically create a transition Select the unconnected process component, press Shift, and drag the repository file behind the selected process component.  Editing elements  Select all workplace elements  Cut out process component  Strg+X  Copy process component  Paste process component  Delete process component  Undo last action  Ctrl+Z  Redo last action  Ctrl+Y  Edit process component  Double-click the symbol			Alt + Del.
unconnected component, and automatically create a transition create a transition the repository file behind the selected process component.  Editing elements  Select all workplace elements  Cut out process component  Copy process component  Paste process component  Delete process component  Undo last action  Ctrl+Z  Redo last action  Edit process component  Double-click the symbol			Drag and drop a repository file on the process component to be replaced.
elements       Cut out process component       Strg+X         Copy process component       Strg+C         Paste process component       Strg+V         Delete process component       Del         Undo last action       Ctrl+Z         Redo last action       Ctrl+Y         Edit process component       Double-click the symbol		unconnected component, and automatically	component, press Shift, and drag the repository file behind the
Cut out process component  Copy process component  Paste process component  Delete process component  Undo last action  Redo last action  Ctrl+Z  Redo last action  Ctrl+Y  Edit process component  Double-click the symbol		Select all workplace elements	Strg+A
Paste process component  Delete process component  Undo last action  Redo last action  Edit process component  Double-click the symbol	elements	Cut out process component	Strg+X
Delete process component Undo last action Ctrl+Z Redo last action Ctrl+Y Edit process component Double-click the symbol		Copy process component	Strg+C
Undo last action  Redo last action  Ctrl+Z  Ctrl+Y  Edit process component  Double-click the symbol		Paste process component	Strg+V
Redo last action Ctrl+Y Edit process component Double-click the symbol		Delete process component	Del
Edit process component Double-click the symbol		Undo last action	Ctrl+Z
		Redo last action	Ctrl+Y
Close editor Ctrl+W		Edit process component	Double-click the symbol
		Close editor	Ctrl+W
Save modified element Ctrl+S		Save modified element	Ctrl+S

	Rename repository file	F2
	Move repository file	Move the file into the target folder via drag&drop
	Reload	F5
Changing views	Zoom out of the process diagram	Ctrl+-
	Zoom into the process diagram	Ctrl++

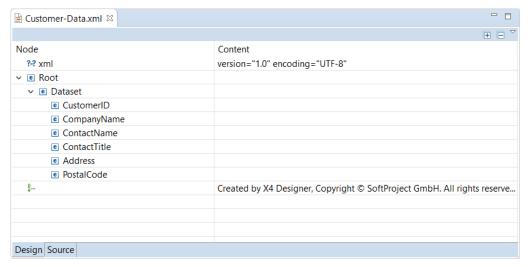
## 2.5.6 XML Editor

Using the XML Editor, you can create and edit well-formed XML documents.

i To open the XML Editor, create a new XML file or open an already existing file.

#### The Structure of the XML Editor

There are two views available for the processing of XML documents, the **Design** view and the **Source** view. You can switch between these to views by using the tabs at the Editor's lower edge.



## The **Design** view displays the tree structure of the opened XML Design view document as a table. In the left column, you find the different nodes, which can be expanded, if child nodes exist. In the right column, the node values are displayed. The context menu provides the following functions: • Remove:Remove selected node • Add DTD Information: Add a DTD (Document Type Definition) structure information • Edit Namespaces: Edit the node's namespaces • Add Attribute: Add new XML attribute • Add Child: Add child node (element, processing instruction • Add Before: Add node before the selected node Add After: Add node behind the selected node In the XML Editor's **Source** view, you can edit the XML document's Source view source code. The editor supports you with the following functions: • Syntax highlighting: Different node types are highlighted with colors. • Check well-formed: XML documents are checked, if they are wellformed when saving. • Syntax completion: The editor suggests elements when you want to insert new nodes • Pretty-Print: Format the XML documents with indents and line breaks to be more readable via the Source > Format menu.

# 3 BPMN Process components and their use

At the right edge of the drawing area there is a toolbar, the palette. It contains process module symbols that you can drag and drop into the drawing area.

Available process components for modeling Business Processes (.bpm)

## 3.1 Events

When creating a new Business Process, a start and an end event are already inserted into the process diagram by default. In addition, further event elements can be dragged from the palette into the process diagram and used during process modeling. The available elements are explained in more detail below.

### 3.1.1 Start

Start: Defines a Business Process's start event according to BPMN 2.0, and allows differentiating between various event types.

### **Properties**

Case Management		
_		
Case State	Case state to be set with this element	
	<b>Possible values:</b> Any already defined case state value; You can manage available case states by clicking , see Managing Case States.	
Technical		
Label	Label of the symbol within the process diagram	
Event	Event type	
	Possible values:	
	<ul> <li>None Start: General start event (Default)</li> </ul>	
	• Error Start: Start event in case of an error	
	<ul> <li>Message Start: Message-based start event</li> </ul>	
	• Multiple Start: Multiple start event	
	• Conditional Start: Start event based on a business rule	
	• Signal Start: Start event that follows a signal	
	• Timer Start: Time-triggered start event	
	<ul> <li>Escalation Start: Start event based on an escalation</li> <li>Compensation Start: Start event based on a compensation</li> <li>Parallel Multiple Start: Multiple parallel start event</li> </ul>	

Setting case states using Start Events

Start Events allow you to set a case state while executing the Business Process. The property Case Management > Case State configures all case states that are available throughout the Business Process. To set a case state, perform the following steps:

- 1. Select the start element, and switch to the **Properties** view.
- 2. Select in property Case Management > Case State a predefined case state, e.g. IN PROGRESS.
  - if the property Case State doesn't provide an option yet, no case state has been defined for the business process. To manage case states, click property Case State and open the case state management by clicking the

button, see Managing Case States.

When executing the Business Process, the case state will now be updated. The case state change is indicated by a corresponding label for the event.



As an alternative, the case state can also be set dynamically using Technical Processes. The Case Management adapter is provided for this purpose.

#### 3.1.2 Intermediate

Intermediate: Defines an intermediate event of a Business Process according to BPMN 2.0 and allows to set a case state using the property Case State, see Managing Case States.

### **Properties**

Case Management		
Case State	Case state to be set with this element  Possible values: Any already defined case state value; You can manage available case states by clicking , see Managing Case States.	
Technical		
Document	Path to the corresponding process within the X4 Repository	
Label	Label of the symbol within the process diagram	

#### Event

#### Event type

#### Possible values:

- None Intermediate: General intermediate event (Default)
- Message Intermediate (Catch): Incoming message intermediate event
- Message Intermediate (Throw): Outgoing message intermediate event
- Cancel Intermediate: Cancelintermediate event
- Compensation Intermediate (Catch): Incoming compensation intermediate event
- Compensation Intermediate (Throw): Outgoing compensation intermediate event
- Error Intermediate: Error intermediate event
- Escalation Intermediate (Catch): Incoming escalation intermediate
- Escalation Intermediate (Throw): Outgoing escalation intermediate event
- Multiple Intermediate (Catch): Incoming multiple intermediate event
- Multiple Intermediate (Throw): Outgoing multiple intermediate event
- Conditional Intermediate: Business rule intermediate event
- Signal Intermediate (Catch): Incoming signal intermediate event
- Signal Intermediate (Throw): Outgoing signal intermediate event
- Parallel Multiple Intermediate: Multiple parallel intermediate event
- Link Intermediate (Catch): Incoming link intermediate event
- Link Intermediate (Throw): Outgoing link intermediate event

#### Setting case states using Intermediate Events

Intermediate Events allow you to set a case state while executing the Business Process. The property Case Management > Case State configures all case states that are available throughout the Business Process. To set a case state, perform the following steps:

- 1. Drag an Intermediate event from the Palette to the workplace.
- 2. Select the event element, and switch to the **Properties** view.
- 3. Select in property Case Management > Case State a predefined case state, e.g. IN PROGRESS.

🛈 If property Case State doesn't provide an option yet, no case state has been defined for the Business Process. To manage case states, click property Case State and open the case state management by clicking the



button, see Managing Case States.

When executing the Business Process, the case state will now be updated. The case state change is indicated by a corresponding label for the event.



As an alternative, the case state can also be set dynamically using Technical Processes. The Case Management adapter is provided for this purpose.

#### Timer-based Intermediate 3.1.3

Timer-based Intermediate: Defines a timer-based intermediate event in a Business Process according to BPMN 2.0 allows to set a case state using the property Case State, see Managing Case States.

#### **Properties**

#### Case Management

Case State Case state to be set with this element

Possible values: Any already defined case state value; You can manage available case states by clicking , see Managing Case States.

#### **Technical**

Durat ion

Waiting time until the event occurs

#### Possible values:

- Any duration specifying days, hours, minutes, seconds and milliseconds
- 9999d 23h 59m 59s 999ms: Maximum waiting time
- Od Oh Om Os Oms: No waiting time (Default)
- As an alternative you can define an end date using Until.

To open the waiting time configuration click on

or double-click the event within the process diagram.

Label

Label of the symbol within the process diagram

#### 3.1.3.1 Setting a Timer-based Intermediate Event

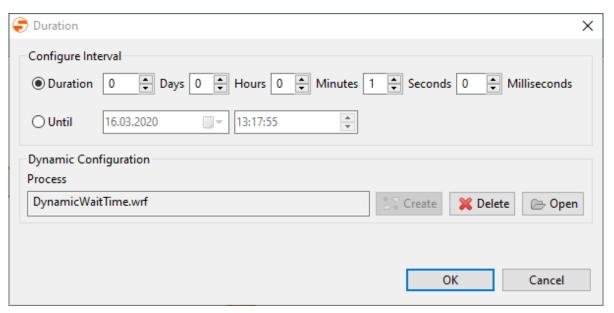
- 1. Drag a Timer-based Intermediate Event from the Palette to the process diagram
- 2. Select the event component and switch to the **Properties** view.
- 3. Select in property Case State a predefined case state, e.g. IN PROGRESS.

(i) If property Case State doesn't provide an option yet, no case state has been defined for the Business Process. To manage case states, click property Case State and open the case state management by clicking the

button, see Managing Case States.

When executing the Business Process, the case state will now be updated. The case state change is indicated by a corresponding label for the event.

- As an alternative, the case state can also be set dynamically using Technical Processes. The Case Management adapter is provided for this purpose.
- 4. Open the waiting time configuration by clicking the button next to the property **Duration** or by double-clicking the event within the process diagram.

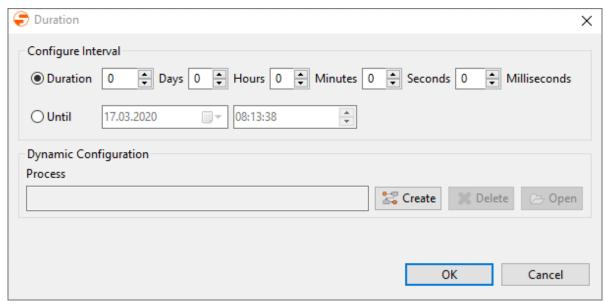


- 5. Configure desired waiting time by specifying days, hours, minutes, seconds and milliseconds.
  - (i) As an alternative you can define an end date using Until.
- 6. Save the configuration with **OK**.

#### 3.1.3.2 Setting Timer-based Intermediate Event Dynamically

Timer-based events can also be configured dynamically using Technical Processes and a corresponding mapping. The corresponding Technical Process is created and managed via the timer-based intermediate event. It is created directly under the corresponding Business Process and cannot be moved.

 Open the waiting time configuration by clicking the button next to the property **Duration** or by double-clicking the event within the process diagram.



2. Click on Create under Dynamic Configuration.



3. Enter the process name and confirm by clicking **OK**.

The process will be created directly below the Business Process and can be edited here.

The Technical Process has to provide the following target structure:

# Sample structure: Time stamp

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<timerBasedConfiguration>
    <untilTimestamp>2020-03-17T17:00:00</untilTimestamp>
</timerBasedConfiguration>
```

#### 3.1.4 Non-Interrupting Intermediate Event

Non-interrupting intermediate event: Defines any non-interrupting intermediate event within a Business Process according to BPMN 2.0 and allows to differentiate between several event types. In contrast to intermediate events, non-interrupt Intermediate events do not interrupt the processing of the bearer activity; the path initiated by the event is activated and executes parallelly.



• Non-Interrupting Intermediate Events are only available within the BPMN Editor's so called Free-flow mode. The Free-flow mode can be enabled when creating new BPM processes and offers an extended palette. Unlike in default mode, the run/debug function is disabled in freeflow mode. Moreover, the mode cannot be changed afterwards.

Document	Path to the corresponding process within the X4 Repository
Label	Label of the symbol within the process diagram

Event	Event type Possible values:
	• Non-Interrupting Message Intermediate (Catch): In coming non-interrupting message intermediate event
	<ul> <li>Non-Interrupting Message Intermediate (Throw): Ou tgoing non-interrupting message intermediate event</li> </ul>
	<ul> <li>Non-Interrupting EscalationIntermediate (Catch): Incoming non-interrupting escalation intermediate event</li> </ul>
	<ul> <li>Non-Interrupting EscalationIntermediate (Throw): Outgoing non-interrupting escalation intermediate event</li> </ul>
	<ul> <li>Non-Interrupting Multiple Intermediate (Catch): Incoming non-interrupting multiple intermediate event</li> </ul>
	<ul> <li>Non-Interrupting Multiple Intermediate (Throw): Outgoing non-interrupting multiple intermediate event</li> </ul>
	<ul> <li>Non-Interrupting Conditional Intermediate: Non-interrupting business rule intermediate event</li> <li>Non-Interrupting Signal Intermediate (Catch): Incoming non-interrupting signal intermediate event</li> </ul>
	<ul> <li>Non-Interrupting Signal Intermediate (Throw): Outgoing non-interrupting signal intermediate event</li> </ul>
	<ul> <li>Non-Interrupting Timer Intermediate: Time- triggered non-interrupting intermediate event</li> </ul>
	<ul> <li>Non-Interrupting Parallel Multiple Intermediate: Multiple non-interrupting parallel intermediate event</li> </ul>

# 3.1.5 End



End: Defines a Business Process's end event according to BPMN 2.0.

Case Management		
Case State	Case state to be set with this element  Possible values: Any already defined case state value; You can manage available case states by clicking , see Managing Case States.	
Technical		
Label	Label of the symbol within the process diagram	

# Event type Possible values: None End: General end event (Default) Terminate End: Cancelling end event (for all process instances) Message End: Message-based end event Cancel End: Cancelling end event (of the current process instance) Compensation End: Compensation end event Error End: End event when an error occurs Escalation End: Escalation end event Multiple End: Multiple end event Signal End: End event that follows a signal

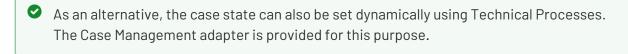
#### Setting case states using End Events

End Events allow you to set a case state while executing the Business Process. The property Case Management > Case State configures all case states that are available throughout the Business Process. To set a case state, perform the following steps:

- 1. Select the end element, and switch to the **Properties** view.
- Select in property Case Management > Case State a predefined case state, e.g. IN PROGRESS.
  - i If the property Case State doesn't provide an option yet, no case state has been defined for the Business Process. To manage case states, click property Case State and open the case state management by clicking the

button, see Managing Case States.

When executing the Business Process, the case state will now be updated. The case state change is indicated by a corresponding label for the event.



## 3.2 Activities

# 3.2.1 Activity

Activity: Defines an activity within a Business Process according to BPMN 2.0. The activity type and its execution behaviour is defined by the corresponding properties respectively by a marker. Activity components allow to link Technical Processes or other Business Processes as subprocesses from the X4 Repository.

Business	Business		
Ad hoc	Marking as ad hoc activity using the symbol Ad hoc activity: Activity that can be executed at any time (only in free flow mode)		
Compensation	Marking as compensating activity by the symbol ← Compensating activity: Activity with which steps are undone that are already successfully completed		
Activity type	Marking of the activity type  Available activity types:  None: General activity, without further marking (default)  Send: Send  Marking of the activity, without further marking (default)  Marking of the activity types:		
Execution type	<ul> <li>Marking of the execution behaviour Available execution behaviour markers: <ul> <li>Single: Single execution (default)</li> <li>○ Loop: Loop</li> <li>■ Parallel Multi-Instance: Parallel multiple execution</li> <li>■ Sequential Multi-Instance: Sequencial multiple execution</li> </ul> </li> </ul>		
Technical			

Document	Path to the linked process within the X4 Repository (set by the X4 Designer). If a component symbol is placed from the palette via drag&drop to the workplace, it is only an empty process component without any reference to a repository file.
Label	Label of the symbol within the process diagram

① The marking ♣ (subprocess) is set automatically as soon as a Business Process (\*.bpm) is linked.

#### 3.2.2 Human Task

Human Task: Human Tasks can be used to visualize human activity. When the Business Process is automated, these Human Tasks are linked to executable . humantask files.

Human tasks (. humantask) allow to configure the Task Management web app and thus the interaction with tasks performed by humans. These tasks are modeled as case management processes, see Case Management – Realize Tasks and Workflows. *Properties* 

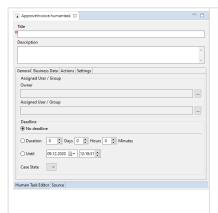
Label	Label of the symbol within the process diagram

#### 3.2.2.1 Creating and using Human Tasks

In order to better visualize human interactions in Business Processes, human task activities can be used when modeling processes. These can then be linked to a human task file (.humantask) in which the configuration of the task is made.

Human Tasks (.humantask) are created below the Business Process via the context menu **New > Human task** or via the toolbar > **Add Human task**. After the creation, the Human Task is opened in the X4 Designer and can be parameterized as follows:

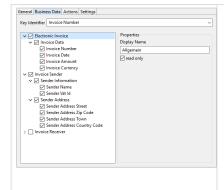
- Title: Title of the task in the Task Management Web App
- Description: Optional description of the task
- General tab: define owner, assigned user or group and deadline for processing



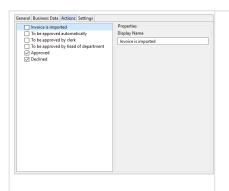
- Owner: owner of the task
- Assigned User/Group: Assigned user or group of the task.
  - i The involved users and groups are created and managed in Keycloak.
- Deadline: Deadline for resolving the task with the following options:
  - No deadline: No deadline
  - Duration: Deadline duration in days, hours and minutes
  - Until: Date and time at which the task must be resolved
  - Case State: Case state to be executed automatically, if the human task's deadline was reached.
    - if a human task with a deadline is executed, the process is automatically resumed with the configured case state after the specified deadline was reached. In this case, the human task is automatically closed and displayed within the Task Management Web AppTask Management Web AppTask Management Web App's navigator node Verfallen (expired). All human tasks that have exceeded the deadline and have been closed automatically are displayed here.

If no case state was set, the process won't be continued automatically.

• Tab Business Data: Define information to be displayed within the Task Management Web App



- Key Identifier: Case feature as key identifier within the Task Management Web App
- Categories, feature groups and features are displayed in a tree structure and can be selected in order to be visible within the Task Management web app
  - Categories are displayed as tabs within the Task Management web app.
- Display Name: Display name of the selected category, feature group or feature
- read only: Mark selected category, feature group and feature as read-only
- Tab Actions: Define actions to be performed within the Task Management Web App



- In Actions the case states to be set by the corresponding user within the Task Management Web App can be defined
- Display Name: Display name of the selected case states within the Task Management Web App

#### • Tab Settings: Advanced settings for case processing



Under Advanced you can allow declining and forwarding of tasks and enable accessing human tasks via interface, see also Accessing Human Tasks via ReST API.

- Task can be declined: Allow declining tasks
- Task can be forwarded: Allow forwarding tasks
- Task can be resubmitted: Allow resubmitting tasks
- Enable access via API: Allow accessing the task via interface



The Task Management adapter allows to define additional actions for a human task.

Under **Documents**, you can allow adding, editing and deleting documents related to a case.

- Enable Documents: Allow processing documents
- Documents can be added/edited: Allow adding and editing documents
- Documents can be deleted: Allow deleting documents

#### Execution on the X4 Server

If a Business Process runs on a human task during execution, the execution of the process is stopped and the human task is generated. The process waits for the necessary human interaction within the Task Management Web App and continues execution as soon as the human task is completed.

#### 3.2.2.2 Parameterizing Human Tasks Dynamically via Technical Processes

Human tasks can not only be configured via the human task files, but also dynamically via Technical

The following human task settings can be overridden in the Technical Process:

- Owner
- Assignee
- Deadline

The Technical Process for parameterizing the human task is created directly under the corresponding human task via the context menu **New > Technical Process** and cannot be moved.

The input and output document for the process is structured as follows:

## Structure of the input and output document <?xml version="1.0" encoding="UTF-8" standalone="yes"?> <HumanTask> <Owner>OwnerName</Owner> <Assignee> <name>AsigneeName</name> <type>user|group</type> </Assignee> <!-- Deadline types (NoDeadline, DurationDeadline, UntilDeadline)--> <NoDeadline /> <DurationDeadline> <Days>7</Days> <Hours>4</Hours> <Minutes>45</Minutes> </DurationDeadline> <UntilDeadline>2019-04-18T14:30:49+02:00</UntilDeadline> </HumanTask>

#### 3.2.2.3 Accessing Human Tasks via ReST API

## Hinweis

BasicAuth login is no longer supported for X4 API, a bearer token is now required to call the X4 API. This can be retrieved via http://localhost:8080/X4/X4Api/ or with the *Keycloak Token* adapter.

This note only applies to X4 API, BasicAuth is still available for the other services. The documentation for the ReST interface can be found at http://localhost:8080/X4/X4Api/.

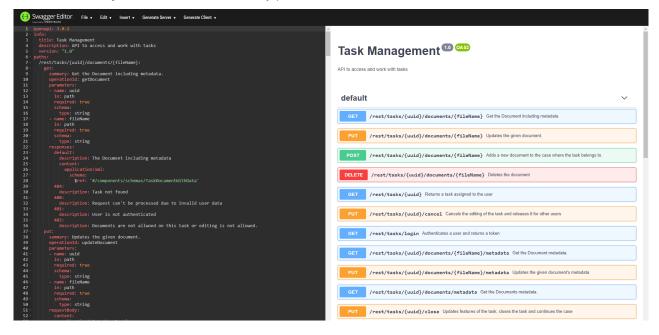
Instead of the *Task Management Web App*, also other applications can be used to display and edit human tasks. The implementation is done via ReST interface, which offers all functionalities also available in the *Task Management Web App*.

Access to the human task via the ReST interface can be enabled separately for each .humantask file.

To enable the connection via the ReST interface, the following settings must be made:

1. Open the human task.

- 2. Open the tab **Settings**.
- Under Advanced select the option Enable access via API.
   Accessing human tasks is now only possible via the interface.



## 3.2.3 Rule

Rule: The rule component allows to depict rules for decisions within a Business

Process. The rules to be applied are defined within decision tables (.rule) according to DMN 1.1. The rules can be automatically checked and the results will be passed to the Business Process for further processing.

① DMN is a standard for modeling decisions within Business Processes. The standard DMN also defines the Simple Expression Language (S-FEEL), a formal expression language for defining a decision logic.

DMN 1.1 with S-FEEL is available online under https://www.omg.org/spec/DMN/1.1/.

#### **Properties**

Label of the symbol within the process diagram

## 3.2.3.1 Creating and Defining Rules



- Default values of type Integer and Decimal cannot be empty.
- For the types Integer and Decimal it is not possible to check if the value is empty.

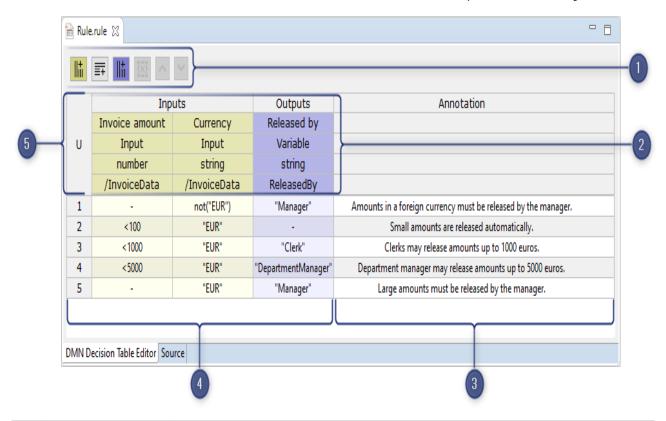
To better depict rules for decisions in Business Processes, rule modules can be used when modeling Business Processes. These can then be linked to a decision table (.rule) in which the rules are defined.



## Combining decision tables

Any number of decision tables can be combined in a Business Process. Output values of one table thus become input values of the following tables. Thus, complex decision trees with corresponding branches can be modeled.

Decision tables (.rule) are created below the Business Process via the context menu New > Rules or via the toolbar 🍛 > Add rules. After the creation, the decision table is opened in X4 Designer.



No.	Element	Description
1	Toolbar	Functions for editing decision tables, depending on context and selection

No.	Element	Description
2	Header area	Settings for defining input and output, whereby several inputs and outputs are possible.  The following cells are available to define the input and output:  1. Free text field for the column name 2. Input or output source • Input / Output: Input from the BPMN process respectively output to
		<ul> <li>be passed to the BPMN process</li> <li>Parameter: Selection of a parameter (only available for input)</li> <li>Variable: Value stored in a variable</li> <li>Case State: Selection of a status</li> <li>Case Feature: Selection of case data</li> </ul>

- Data type of the input or output (string, number, boolean)
- Input path as free text field or selection (depending on the input source) respectively name of the output or variable as free text field or selection (depending on output destination) 3

#### Annotation

Comment field that is not displayed in the output

4

#### Rules

Rules determining how inputs are to be transformed into outputs.

Rules are defined per line in the decision table, whereby the row order determines the check order. A rule has at least one column for processing the input values (Input) and at least one decision result (Output).

Rules in the decision table are entered in the S-FEEL notation. This allows the decision logic to be described in natural language "business-friendly". As a formal markup language with fixed semantics, grammar and defined rules, it allows at the same time the interpretation and execution of values. S-FEEL can interpret strings, numbers, simple arithmetic operations and simple comparison tests.

## i Please note:

- Set strings in quotation marks, e.g. "Head of department".
- For decimal numbers, use a dot as separator, e.g. 5.1.
- If the value of a cell within the input column is not relevant for a rule, enter according to S-FEEL a – (minus sign) into the cell.
- · A decision table can contain a fallback rule that always applies. For this purpose, all cells of the input columns of a fallback rule contain a - (minus sign). Whether a fallback rule makes sense and where it should be in the check sequence depends on the hit policy and the use case.

#### 5

#### Hit policy

Setting regarding the displayed results. It determines how many rules of a decision table can apply and how the results are output.

Rules can be defined in a way that the number and selection of results violates the Hit Policy. In this case, the rules or the hit policy must be corrected depending on the application.

Significance	Possible hit policy violation
<b>U</b> (Unique): Only one rule can match and exactly one result is output.	<ul><li>No applicable rule</li><li>Multiple applicable rules</li></ul>
F (First): One or several rules may apply, but only the first result is output.  Consider the check order!	No applicable rule
<b>A</b> (Any): One or several rules with the same result may apply, but only one result is output.	<ul> <li>No applicable rule</li> <li>Multiple applicable rules with different results</li> </ul>
<b>C</b> (Collect): All applicable results are output without a fixed output sequence.	No applicable rule

① The finished BPMN process with the decision table can be validated and checked for errors within the X4 Designer and executed on the X4 Server. Decision tables can lead to three results: Icon Description The **Rule** component returns one or several results. The intermediate result can be opened. The **Rule** component does not return any results. Possible causes: None of the defined rules apply to the input. • The rules are incorrect, e.g. spelling error. • The hit policy is not suitable. The **Rule** component returns an error because the decision table does not conform to S-FEEL. A report with an explanation of the error can be opened.

# 3.2.3.2 S-FEEL Expressions for Defining Rules

	Operator / Expression Description	
	operator / Expression	
Comparis on	10	Checks whether the input value corresponds to the specified value, e.g. 10
	<ul><li>v:[Variablename]</li><li>f:[Featurename]</li><li>p:</li></ul>	Performs a check based on a variable, feature, custom placeholder, or case state
	<pre>[Placeholdername] • c:[CaseState]</pre>	By pressing the shortcut Ctrl + Space all currently available variables, features, parameters and case states are displayed in a drop-down list.
	<	Checks whether the input value is smaller than the specified value, e.g. < 10
	<=	Checks whether the input value is less than or equal to the specified value, e.g. <= 10
	>	Checks whether the input value is greater than the specified value, e.g. > 10
	>=	Checks whether the input value is greater than or equal to the specified value, e.g. $>= 10$
	not()	Checks whether the input value is not less than or equal to the specified value, e.g. $not(<=10)$
Interval	[110]	Checks whether the input value is greater than or equal to the start value and less than or equal to the end value.
	(110]	Checks whether the input value is greater than the start value and less than or equal to the end value.
	[110)	Checks whether the input value is greater than or equal to the start value and less than the end value.
	(110)	Checks whether the input value is greater than the start value and less than the end value.
Disjunctio n	3,5,7	Checks whether the input value is 3,5 or 7.
	<2,>10	Checks whether the input value is less than 2 or more than 10.

10,[2030]	Checks whether the input value is either 10 or between 20 and 30.
"Meier","Müller,"Weber"	Checks whether the input value is either Meier, Müller or Weber.

(i) An extensive reference to the syntax of the S-FEEL notation can be found in the current specification for DMN 1.1 (Chapter 9) of the Object Management Group under https://www.omg.org/spec/DMN/1.1.

# 3.3 Sequence Flow

Sequence Flow: Connects events, gateways, and activities of a Business Process, and defines a sequence of process actions by the sequence flow's arrow direction.

(i) As soon as you move the mouse over Events, Gateways or Activities, an arrow appears at the bottom right edge of the element. Click and drag the arrow to create a sequence flow line.



Label	Free text area to set a label to the sequence flow (for a clearer layout or documentation purposes)
Log4J Log	Enable logging via <i>Log4j</i> at this position in the process using current input data. To enable Log4j logging, select the property, and click
	<ul> <li>Possible values:</li> <li>Disabled: No Log4j action has been defined (default)</li> <li>Enabled: A Log4j action has been defined</li> </ul>

Save Point	Set Save Point at this point of the process to persist the complete state of the process engine with the processed data and state information when executing a process instance in the file system. The process instance can be restarted from the last saved Save Point via X4 BAM.  Possible values:  No Savepoint: No Save Point has been defined (default).  Save and Continue: Create Save Point and directly continue process execution  Save and Stop: Create Save Point and stop the execution of the process instance  Delete: Delete current Save Point
Source Component	Component from which the sequence flow starts (is set by the X4 Designer)
Target Component	Component to which the sequence flow leads (is set by the X4 Designer)
Priority	For forks (Parallel Gateways (Forking)) and branches (Exclusive Gateways (Forking)): Position in the execution order (priority)  Possible values:  • Any positive integer  • 1: Highest priority (default)
Condition	For condition blocks: Execution condition stored by the <b>Condition Manager</b> .

# 3.4 Gateways

Within Business Processes (process diagrams with file extension .bpm) you can use the following gateways according to BPMN 2.0:

## 3.4.1 Parallel Gateways

•	Parallel Gateway (Forking)	Defines a parallel gateway for logical AND branching according to BPMN 2.0.	
•	Parallel Gateway (Synchronizing)	Defines a synchronizing gateway for parallel sequence flows according to BPMN 2.0.	

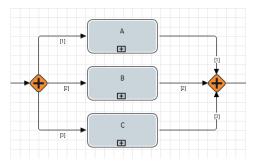
i) If sequence flows are modeled "parallely" with Parallel gateways, this doesn't mean they are executed simutaneously, but that they are equivalent. Within the property Priority, you can define the actual execution order of parallel sequence flows, see Sequence flow.

Lab Free text area to set a label to the branching, respectively the joining (for a clear layout or documentation purposes)

#### Using parallel gateways

- 1. Drag a *Parallel Gateway (Forking)* element from the **Palette** to the process diagram via drag&drop.
- 2. Create a *sequence flow* line for each execution branch to the *Parallel Gateway* (Forking) element.
  - All execution branches are executed independently and use the same input.
- 3. If necessary, change the property Priority of a selected *sequence flow* line to change the execution order of the branches.
  - in executable processes the execution branch with the lowest Priority number will be executed first.
- 4. Drag a Parallel Gateway (Synchronizing) element from the Palette into the process diagram.
- 5. Connect the *sequence flow* lines of the execution branches with the *Parallel Gateway* (Synchronizing) element.
  - In executable processes, the output documents of the last executed process component in the fork will be handed over to the next process steps.

Example: Parallel gateway (forking) with 3 parallel, priorized branches and a Parallel gateway (join)



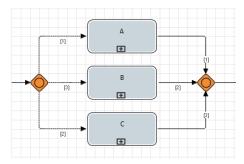
## 3.4.2 Inclusive Gateways

Inclusive Gateway (Forking)	Defines a data-based inclusive gateway for logical OR branching according to BPMN 2.0
Inclusive Gateway (Synchronizing)	Defines a synchronizing gateway to join exclusive databased sequence flows

in practice, constructs with Inclusive gateways often make little sense. Thus, BPM experts recommend to avoid these elements, and to use a combination of Exclusive and Parallel gateways instead.

Label	Free text area to set a label to the branching, respectively the joining (for a clear layout or documentation purposes)
Condi tion	Execution condition (is set by the <b>Condition editor</b> automatically) for the forking; Double-click on the transition line to define conditions or click on to open the <b>Condition editor</b> .

Example: Inclusive gateway (forking) with 3 exclusive branches and a synchronizing Inclusive gateway (synchronizing):



## 3.4.3 Exclusive Gateways

×	Exclusive Gateway (Forking)	Defines a gateway for exclusive forkings according to BPMN 2.0
×	Exclusive Gateway (Synchronizing)	Defines a synchronizing gateway for parallel sequence flows according to BPMN 2.0

#### **Properties**

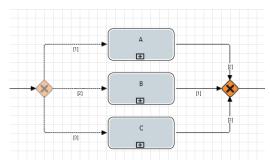
Label	Free text area to set a label for the exclusive forking, respectively the synchronizing (for a clearer layout or documentation purposes)
Condition	Execution condition of the forking (is set by the <b>Condition editor</b> automatically); Double-click on the transition line to define conditions or click on to open the <b>Condition editor</b> .

#### Using Exclusive Gateways

- 1. Drag an *Exclusive Gateway (Forking)* element from the **Palette** to the process diagram via drag&drop.
- 2. For each execution branch, create a *sequence flow* line beginning from the *Exclusive Gateway* (Forking).
  - All execution branches use the same input.
- 3. Double-click the *Exclusive Gateway (Forking)* element to define the conditions for the single execution branches.
  - The **Condition Editor** will be opened. Here, you can define a condition for each selected *sequence flow* line, see Creating conditions.
- 4. If necessary, change the property Priority of a selected *sequence flow* line to change the execution order of the branches.

- ① When executed, the Business Process's execution branch with lowest Priority numb er will be executed first.
- 5. Drag an Exclusive Gateway (Synchronizing) element from the Palette into the process diagram at the point where more than one execution branches shall be joined.
- 6. Connect the sequence flow lines of the execution branches with the Exclusive Gateway (Synchronizing) element.
  - When the Business Process is executed, the output document of the last executed process component in the fork will be handed over to the next process steps, just like in Technical Processes.
- ince BPMN-compliant Business Process do not provide Variable components, context variables can only be evaluated if they were defined within a Technical Process and those Technical Processes are linked to the Business Process as activities. In the Business Process, context variables can be evaluated that were initialized within linked Technical Process, but not within the Technical Processes' subprocesses.

Example: Exclusive gateway (forking) with 3 exclusive forks and synchronizing exclusive gateways (synchronizing)



#### 3.5 **Artefacts**

Within a Business Process (process diagrams with the file extension .bpm) you can use the following artefacts according to BPMN 2.0:

#### 3.5.1 Message flow

Message Flow: If several pools are used to model a collaboration between different parties, the information interchange between the pools is marked with a message flow component.



Please note that message flows can only be used to visualize logical coherences! When executing the Business Process on the X4 Server, only process components are interpreted as data and control flow elements that have been connected with sequence flow lines, see Sequence Flow.

Label	Free text area to label the message flow (useful to layout/document the process diagram)
Line Routing	Possible values:  • Angled: Angled line  • Straight: Straight line (Default)
Line Type	Line style  Possible values:
	<ul> <li>Dash line: Dashed line (Default)</li> <li>Solid line: Solid line</li> <li>Dot line: Dotted line</li> </ul>
Line Color	Message flow color; To change the color select the property and click
Line Source Decorator and Line Target Decorator	Symbol for the beginning and the end of the line  Possible values:  • Circle: Circle/ellipse (Default)  • Empty arrow: Empty arrow  • Association arrow: Open arrow  • Arrow: Filled arrow  • Inverted arrow: Inverted arrow  • Diamond: Filled rhombus  • Empty diamond: Empty rhombus  • Plain: No symbol

#### 3.5.2 Association

Association: Logical connection between process components (events, gateways or activities) and artefacts (such as pools, data objects, annotations or groups) or other drawing elements within a Business Process.



⚠ Please note that association lines can only be used to visualize logical coherences! When executing the Business Process on the X4 Server, only process components are interpreted as data and control flow elements that have been connected with sequence flow lines, see Sequence Flow.

Label	Free text area to label the association (useful to layout/document the process diagram)
Line Routing	Possible values:  • Angled: Angled line  • Straight: Straight line (Default)
Line Type	Line style Possible values:  • Dash line: Dashed line (Default)  • Solid line: Solid line  • Dot line: Dotted line
Line Color	Association color; To change the color select the property and click.  Possible values:  • RGB(RRR, GGG, BBB): 24 bit RGB color code (can be selected with an color picker dialog)  • RGB(0,0,0): Black (Default)

Line Source Decorator and Line Target Decorator	Symbol for the beginning and the end of the line <b>Possible values:</b>
	• Circle: Circle/ellipse(Default)
	• Empty arrow: Empty arrow
	• Association arrow. Open arrow
	• Arrow: Filled arrow
	• Inverted arrow: Inverted arrow
	• Diamond : Filled rhombus
	• Empty diamond: Empty rhombus
	• <i>Plain</i> : No symbol

## 3.5.3 Pool/Lane

Pool/Lane: Structures a Business Process into responsibilities and roles according to BPMN 2.0. Lanes are defined within one or multiple pools and represent the activities' responsibility. Pools represent participating organizations, systems etc. A pool can contain any number of lanes.

•	
Pool Name	Free text name of the pool (if a pool is selected)
Lane Name	Free text name of the lane (if a lane is selected)
Line Color	Line color of the pool or the selected lane; To change the color, select the property and click
	<ul> <li>Possible values:</li> <li>RGB(RRR, GGG, BBB): 24 bit RGB color code (can be selected via a color picker dialog)</li> <li>RGB(0,0,0): Black (default)</li> </ul>
Line Width	Line width of the pool or of the selected lane in pixels  Possible values:  Any positive integer number  1: Line with 1 pixel width (Default)

Fill Color	Fill color of the pool or a selected lane; To change the color select the property and click
	Possible values:
	• RGB(RRR, GGG, BBB): 24 bit RGB color code (can be selected via a color picker dialog)
	• RGB(255, 255, 255): White (default)

#### Using Pools/Lanes in Business Processes

Pools outline involved organizations, systems etc. and may contain multiple lanes. In the pool/lane layout, the chronological progress is visualized mostly from upper left to lower right.

- 1. Insert and edit a pool:
  - Drag the *Pool* symbol



from the Palette to the workplace via drag&drop.

- Scale the pool by clicking and holding the corner handles.
- Change the text label of a pool: In the **Properties** view enter another text in Pool Name.
- Change the formatting: Select the property Fill Color or Line Color in the **Properties** view, and click



to open a color palette.

- 2. Add and edit a lane:
  - Right-click on a pool, and select **Add Lane** from the context menu.
  - Change the text label of a lane: In the **Properties** view enter another text in Pool Name.
  - Change the formatting: Select the property Fill Color or Line Color in the **Properties** view, and click



to open a color palette.

## 3.5.4 Data object

Data Object: Includes any data object, e. g. a file from the X4 Repository.

Document	Path to the linked document within the Repository.
Label	Label of the symbol within the process diagram

Operation	Defines, if the file is to be read or written  Possible values:
	• Read: Read the document into the process, and output content to the next process action (default)
	• Write: Write the document with the data received from the preceding process action

#### 3.5.5 Data store





A Please note that data stores are exclusively used for the visualization of logical connections!

#### **Properties**

Document	Path to the linked document within the Repository
Label	Label of the symbol within the process diagram
Operation	Defines, if the file is to be read or written  Possible values:
	• Read: Read the document into the process, and output content to the next process action (default)
	• Write: Write the document with the data received from the preceding process action

#### 3.5.6 Annotation

[Abc Annotation: Inserts a free annotation whose text can be edited and formatted via double-click in a corresponding dialog.



You can link an annotation with a process component by using an association line.

Hyperlink	Linking defined for the annotation. To create a link enter a valid URL.  You can open the linked URL with Ctrl + click.
Text	Text of the annotation; To change and format the text select the property and click  **Punknown Attachment**

Fill Color	Fill color of the annotation; To change the color select the property and click
	Possible values:
	• RGB(RRR, GGG, BBB): 24 bit RGB color code (can be selected via a color picker dialog)
	• RGB(255, 255, 255): White (default)
Transparent	Set annotation as transparent. By enabling this property the property Fill Color will be ignored.

## 3.5.7 Group

Group: Groups process elements visually in order to show their coherence.

#### **Properties**

Line Color	Line color of the group; To change the color select the property and click  Possible values:
	<ul> <li>RGB(RRR, GGG, BBB): 24 bit RGB color code (can be selected with an color picker dialog)</li> <li>RGB(160, 160, 160): Grey (default)</li> </ul>
Line Width	Line width of the group element  Possible values:  Any positive integer number  2: Dashed line with 2 pixel width (default)

# 3.6 Drawing

Which drawing elements can be used for all process types.:

## 3.6.1 Connection

Connection: Passes the input and the execution state of the preceding process action without modification. It marks the execution branch explicitly for the X4 Server. Within a loop this component marks the return to the first loop component. It connects a Condition component with a Stop component, or helps to change a transition line's position.

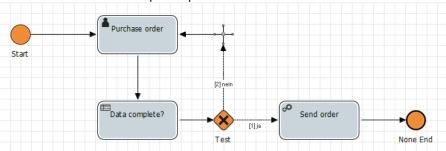
#### **Properties**

Label

Text label of the symbol in the process diagram (can also be edited by pressing F2)

#### Examples

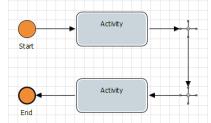
• Connection between condition and the last loop component: Within loops, a Connection comp onent is used as last loop component.



• Connection between condition and stop: Between a Condition component and a Stop compo nent, a Connection component is used.



• Connection to position the transition line: Transition lines are normally positioned automatically. To change the positioning explicitly a connection can be used.



#### 3.6.2 Connector



Connector: Creates a logical connection between elements

① Connector lines can only be used to visualize a logical coherence! When executing the Business Process via the X4 Server, only process components are interpreted as data and control flow elements that have been connected with Sequence Flows in Business Processes, and those components that are connected with Transitions in Technical Processes.

Free text area to label the connector line (useful to layout/document the process diagram)

Line Routing	Line routing
	Possible values:
	• Angled: Angled line
	• Straight: Straight line (Default)
Line Type	Line style Possible values:
	• Dash line: Dashed line (Default)
	• Solid line: Solid line
	• Dot line: Dotted line
Line Color	Connector line color. To change the color, select the property and click
	• RGB(RRR, GGG, BBB): 24-bit RGB color code (can be selected with a color picker dialog)
	• RGB(0,0,0): Black(Default)
Line Source Decorator and Line Target Decorator	Symbol for the beginning of the line  Possible values:
	• Circle: Circle (Default)
	• Empty arrow: Empty arrow
	• Association arrow. Open arrow
	• Arrow: Filled arrow
	• Inverted arrow: Inverted arrow
	• Diamond: Filled rhombus
	Empty diamond: Empty rhombus
	• <i>Plain</i> : No symbol

# 3.6.3 Rectangle and Ellipse

Rectangle	Draws a rectangle
○ <sub>Ellipse</sub>	Draws an ellipse

Line Color	Border color of the drawing element. To change the color, select the property and click
	Possible values:
	• RGB (RRR, GGG, BBB): 24-bit RGB color code (can be selected with a color picker dialog)
	• RGB(0,0,0): Black(Default)
Line Width	Width of the drawing element's border
	Possible values:
	any positive integer number
	• 1: line with a width of 1 pixel (default)
Hide Line	Hide border of the drawing element
Fill Color	Fill color of the drawing element. To change the color, select the property and click
	Possible values:
	• RGB(RRR, GGG, BBB): 24-bit RGB color code (can be selected with a color picker dialog)
	• RGB (255, 255, 255): White (default)
Transparent	Set drawing element as transparent. By enabling this property, the property Fill Color will be ignored.

## 3.6.4 Textbox

Abc Textbox: Inserts a text box, whose content can be edited and formatted in a dialog by double-clicking the box.

Hyperlink	Linking defined for the text box. To create a link, enter a valid URL.
	1 You can open the linked URL with Ctrl + click.
Text	Content of the text box. To edit and format the text, select the property and click

Rotation	Rotation of the text box in degree
	Possible values:
	• 0: no rotation (default)
	• 90: rotate by 90°
	• 180: rotate by 180°
	• 270: rotate by 270°
Fill Color	Fill color of the text box. To change the color, select the property and click
	Possible values:
	• RGB(RRR, GGG, BBB): 24-bit RGB color code (can be selected via a color picker dialog)
	• RGB(255, 255, 255): White(default)
Transparent	Set text box as transparent. By enabling this property, the property Fill Color will be ignored.

# 3.6.5 Polygon

 $\square$  Polygon: Draws a polygon with multiple corner marks

Line Color	Border color of the drawing element. To change the color, select the property and click
Line Width	Width of the drawing element's border  Possible values:  any positive integer number  1: line with a width of 1 pixel (default)

Fill Color	Fill color of the drawing element. To change the color, select the property and click
	Possible values:
	• RGB(RRR, GGG, BBB): 24-bit RGB color code (can be selected with a color picker dialog)
	• RGB (255, 255, 255): White (Default)
Transparent	Transparent fill (do not use a fill color); By enabling this property, the property Fill Color will be ignored.

#### Polyline and Line 3.6.6

W Polyline	Draws a line with multiple way points
/ Line	Draws a straight line

## **Properties**

Line Color	Border color of the drawing element. To change the color, select the property and click  Possible values:  • RGB(RRR, GGG, BBB): 24-bit RGB color code (can be selected with a color picker dialog)  • RGB(0,0,0): Black (default)
Line Width	Width of the drawing element's border Possible values:  • any positive integer number  • 1: line with a width of 1 pixel (default)

#### 3.6.7 Image



Image: Inserts an image frame that allows to include a .gif, .jpg, .png, or a .bmp image file.

① The inserted image will be stored within the process.

Line Color	Border color of the image frame. To change the color, select the property and click
Line Width	Width of the drawing element's border  Possible values:  any positive integer number  1: line with a width of 1 pixel (default)
Image File	Path to the linked image file

# 4 Working with BPM Projects

The X4 Repository is organized in projects. Projects have a file system structure and can contain any folders, processes, process components and other files.

## 4.1 The Structure of BPM Projects

BPM projects have a predefined and unchangeable folder structure, which is created automatically when a new BPM project is created. The automatically created folders and subfolders cannot be deleted, moved or renamed.

Project	At the top level of a BPM project, process landscapes (.pld) can be created.
Processes	Within the Processes folder, any number of BPM processes (.bpm) can be created. This folder also contains the Activities folder with its predefined structure.
Activities	<ul> <li>The Activities folder contains the following subfolders, which can contain only predefined files:</li> <li>Adapters: Only folders and adapter files (.fa and .tra) can be created here.</li> <li>DomainModel: Any number of .domainmodel files can be created in this folder, which contain the definition of the business case data.</li> <li>Processes: Here you can store technical processes (.wrf) in order to link them to your activities.</li> <li>Resources: Resources such as images, text and XML documents and other files can be stored in this folder.</li> <li>TemproraryFiles: Temporarily used files are stored in this folder.</li> <li>Transformations: Transformations (.xsl) and reports (.rep) are stored in this folder.</li> </ul>
Resources	Folders as well as resources such as images, text and XML documents and other files can be stored in this folder.

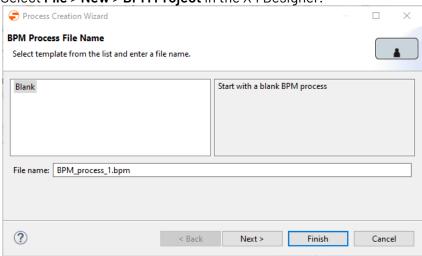
# 4.2 Creating BPM Projects

There are different options to create BPM projects:

- Via New BPM Project on the X4 Designer Welcome page
- Via the context menu New > BPM Project within the Projects view
- Via the File > New > BPM Project menu

#### How to create a BPM Project

1. Select **File > New > BPM Project** in the X4 Designer.



- 2. Select an empty project or an already existing template.
- 3. Enter the project name in **File name**.
- 4. Click **Finish** to create the project.

An empty BPM project with the predefined structure is created within the **Projects** view. You can now select and create various elements for your BPM project using the context menu. The available options change depending on where in the tree structure the context menu is opened.

If you select the **Expert BPM Project** project type when creating the project, you can create an empty BPM project without a predefined folder structure. With this project type, you can work in expert mode and can freely define the folder structure and the elements it contains. **Notes on the usage of BPM projects from older X4 versions:** 

- BPM projects from X4 versions prior to 6.x will automatically be imported into an Expert BPM Project.
- Classic BPM Projects from older X4 versions will be automatically transformed into an Expert BPM Project.

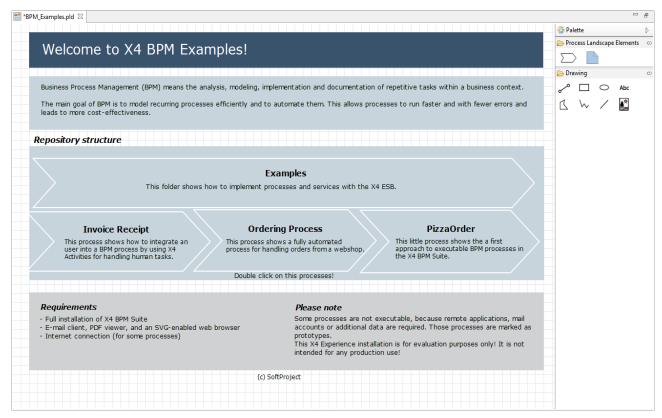
## 4.3 Modelling Process Landscapes

Process Landscapes enable to provide a clear presentation of process landscapes within the X4 Designer and to link processes and other documents.

Process landscapes allow to plot all relevant processes and to document their logical connection in a compact way. Thus, a process landscape provides a bird's eye view on management processes, value chains, and support processes and provides a basis for quality management.

Process landscapes are created at the highest level of a BPM project. Each BPM project may only contain one process landscape with the project name as name, e.g. Demoproject.pld. Process

landscapes are not executable, but provide an overview of Business Processes that can be linked using Block Arrow elements. In addition, with Data Objects you can link any other repository file.



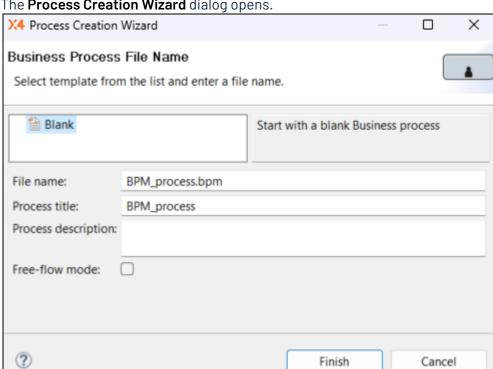
# 4.4 Creating a Business Process

The BPMN Designer enables you to model Business Processes according to BPMN 2.0. You can drag both empty activities from the palette and files from the **Projects** view to the drawing area and configure their properties in the **Properties** view in order to create an executable Business Process.

The Free-flow mode additionally offers the option to use the BPMN Editor as a plain BPMN drawing tool with an extended BPMN palette, where the run/debug functionality is disabled.

To create a new Business Process, proceed as follows:

1. Right-click on the **Processes** folder and choose **New > Business Process...** from the context menu.



The Process Creation Wizard dialog opens.

- 2. Select an empty or an already available template.
- 3. Enter a file name in **File name**.
  - The file name must not contain blanks.
- 4. Enter a process title in **Process title**.

The process title is displayed in the process diagram and can be changed in the **Properties** view via the Title property. Moreover, you can use the Show Title property to show or hide the title.

- 1 To display the Show Title property, choose the Show Advanced Properties icon in the **Properties** view.
- 5. Enter a description in **Process description**. The description is optional.
- 6. If required, enable the free-flow mode for business processes using the Free-flow mode checkbox. If the free-flow mode is enabled, the BPMN Editor is used as a plain BPMN drawing tool with an extended BPMN palette.
  - The run/debug functionality is disabled in the free-flow mode.
- 7. Click **Finish** to create the process.

An empty Business Process with the file extension .bpm will be created in the **Projects** view and will be opened in the BPMN Editor.

- 8. Model the Business Process as desired:
  - Drag elements from the Palette or files from the Projects to the sequence flow or to a free space in the drawing area.
  - Create Sequence Flow connection lines:
    - Move the mouse cursor over the source component to display a small arrow.
    - Click on the arrow, and drag a line to the target component to create a sequence flow.

- In addition, you can:
  - Insert Pools and Swimlanes, see Pool/Lane.
  - Insert Event elements, see Events.
  - Insert Parallel Gateway elements or Exclusive Gateway elements, see Gateways.

## i Tip

An integrated process validator allows the process to be checked for validity via the menu **Project > Validate Project**.

If you integrate files from the **Projects** view in your business process and configure them correspondingly in the **Properties** view correspondingly, you can execute the modeled process by clicking . This does not apply to processes in *Free-flow* mode.

### 4.4.1 Use of private files within Business Processes

If process resources are only to be used within a Business Process, they can be created directly within a parent process. This means that they can only be used in the process context and cannot be called up from other Business Processes.

In general, the same resources can be created within a single Business Process as within a BPM project - be it further Business Processes (.bpm), Technical Processes (.wrf), human tasks (.humantask), rules (.rule) or domain models (.domainmodel).



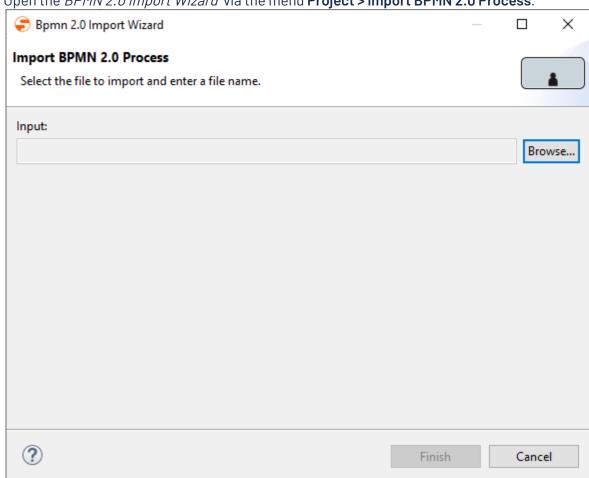
The resources to be used can be created both via the context menu **New** > <resource name> and via the toolbar > Add <resource name>.

The created resources can then be parameterised as usual and incorporated into the process

The created resources can then be parameterised as usual and incorporated into the process diagram via drag & drop from the repository, see also Human Task, Rule, Managing Case States.

# 4.5 Importing Business Processes in BPMN or XML Format

The BPMN 2.0 Import Wizard allows to import process diagrams in .xml or .bpmn format from third party modelling tools as new Business Processes into the X4 Repository.



1. Open the BPMN 2.0 Import Wizard via the menu Project > Import BPMN 2.0 Process.

- 2. Click **Browse** to select the desired file.
  - 1 You can filter for the file via the .xml (default) or .bpmn extension.
- 3. Select the file and confirm the dialog.

The file is now selected within the Wizard.

4. Click Finish to import the file.

The file has been imported and is displayed as Business Process in the Repository Navigator.

#### Properties of Business Processes (.bpm) 4.6

Business Processes (.bpm) are modelled graphically using the BPMN Editor and can be executed on the X4 Server if all modules are parameterized and linked correctly with repository files.

① You can edit the properties of a Business Process in the **Properties** view by clicking on a free area of the BPMN Editor's workspace.

The most common properties are displayed by default, however, additional settings can be made using the Properties view toolbar:

- - Show Categories: Show properties sorted by categories
- Show Advanced Properties: Show advanced properties

### **Properties**

Documentation	
Created	Creation date of the process
Created by	Creator of the process
Last Update	Date of the last change
Last Update by	Name of the last editor
Title	Free text field for the process title
Version	Project version
	1 If no version is set, the time stamp is taken as version.
Technical	
Can Stop	Business Process may be stopped during execution.
	This property is not inherited by subprocesses.
	Possible values:
	True: For standard processes (default)
	False: For critical processes that need to be completed
Free-flow mode	Defines if the <i>free-flow mode</i> is enabled. This unlocks the extended BPMN palette to use the BPMN Editor as a pure BPMN drawing tool.
	<ul> <li>This option can be enabled when creating a Business Process and cannot be changed afterwards.</li> <li>The run/debug functionality for the current Business Process is disabled in Free-flow mode.</li> </ul>

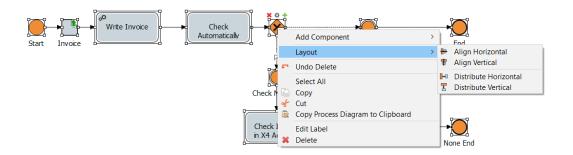
In service	Sets process active or inactive. If inactive processes are executed, they receive the process ID -1. Subprocesses (processes called from other processes) can always be executed independently of this property.
	Possible values:
	True: Process can be executed (default)
	False: Process cannot be executed (only called as subprocess)
Instance limit	Maximum number of instances of this process that can be executed at the same time.
	⚠ Please note!
	Instance limit is ignored, if the process is executed as subprocess.
Schedule	Time scheduling tool enabling the scheduled execution of processes on the X4 Server without X4 Designer; To schedule a process, select this property, and click
	Possible values:
	• Disabled: No schedule is defined (default)
	Enabled: A schedule for this process is defined
Stop on error	Stops the process execution if an error occurs.
	Possible values:
	<ul> <li>True: Stop execution if an error occurs (default)</li> </ul>
	<ul> <li>False: Continue erroneous execution (if possible)</li> </ul>
	, a coe. commac on onloads execution (in possible)
Schema Declaration	Defines schema for input and output of the process.

# 4.7 Aligning process components

Process components can be aligned easily via context menu entry **Layout**. This allows you to generate a clean and structured model quickly and easily.

To align process components, select the required components and open the context menu by right-clicking. Then select **Layout** and the desired option. The following options are available:

- Align Horizontal: Align the process components horizontally
- Align Vertical: Align the process components vertically
- Distribute Horizontal: Distribute the process components horizontally
- Distribute Vertical: Distribute the process components vertically

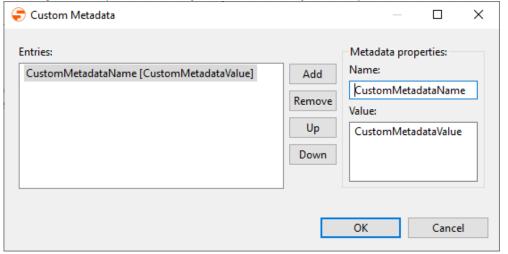


(i) For the options Align Horizontal and Align Vertical at least two process components must be selected, for the options Distribute Horizontal and Distribute Vertical at least three.

# 4.8 Adding Process Metadata

You can add metadata to the process definition of a Business Process or Technical Process, e.g. for documentation purposes.

- 1. In the Process Designer, click on an empty spot in the drawing area to display the process diagram's properties in the **Properties** view.
- Select property Metadata > Manage Metadata, and click
   A dialog will be opened where you can define key/values pairs.



- 3. Enter the metadata properties:
  - In Name, enter the metadata name, e.g. Version.
  - In Value, enter the corresponding metadata value, e.g. 1.1.
- 4. To change the sequence of a selected metadata entry, click **Up** or **Down**.
- 5. Click **OK** to save the metadata.

The metadata have now been added and are displayed in the *Properties* view. The metadata will be saved in the XML storage format of the process definition file.

The **Remove** button allows you to delete selected metadata from the list.

#### 4.9 Import projects

Here you will learn how to import projects and other resources from the local file system into the repository.

#### 4.9.1 Import via drag and drop

From the file system (e.g. from the desktop or Windows Explorer), you can import one or more marked files into the Repository Navigator and thus into the currently connected repository via drag and drop. If a file with the same name already exists at the destination, you will be prompted to enter a new name.



## (i) Note:

- Folder structures are not supported during import, use the corresponding wizard for this.
- For larger file transfers (over 1 MB in total), a confirmation dialogue will be displayed as there may be delays in the transfer as well as memory problems.
- Imported files that contain special or space characters or umlauts in the file name must be renamed before you can open them in X4 Designer.
- Projects have a predefined structure so that the inserted files can only be stored in the respective predefined folder, see also The Structure of ESB Projects

#### 4.9.2 Using the Import Wizard for files and projects



### Note

- Projects have a predefined structure so that the files to be imported can only be stored in the respective predefined folder, see also The Structure of ESB Projects
- Projects can only be imported at the top level and in the predefined project structure, see also The Structure of ESB Projects
- 1. In the menu, click **Project > Import**.
  - The **Resource Import Wizard** is opened.
- 2. Select resource.
  - Select the file to be imported (\*.zip) or the project to be imported via Browse and enter the corresponding name in New project/file name.
- 3. Click Finish.

# 4.10 Export projects

Here you will learn how to export projects and other resources from the repository to the file system.

## 4.10.1 Using the Export Wizard for files and projects

- (i) Note
  - Projects can only be exported if the top project level is selected.
  - In the menu, click Project > Export.
     The Resource Export Wizard is opened.
- 2. Select destination folder.
- 3. Click Save.

#### 5 Case Management

With Case Management in X4 Designer, you can model case-related processes including business data, case states, and case-related tasks.

Define business data and case states directly in the Business Processes - this way, you do not only model the process flow, but also define a process data model at the same time, which allows you to model complex processes, e.g. specific approval processes or processes that pass through various states.

Define categories, groups and features to model your business data. Business data, such as invoice numbers, can be entered directly in the process at runtime and business rules can be defined based on them.

Define various case states directly when modeling the Business Processes. The defined states can be evaluated or set in the created BPMN diagrams via event elements, decision tables, gateway elements or human tasks.

#### 5.1 Implementing processes and workflows

Typically, people can be integrated into Business Processes via tasks. When modelling Business Processes, this is done using a Human Task component.

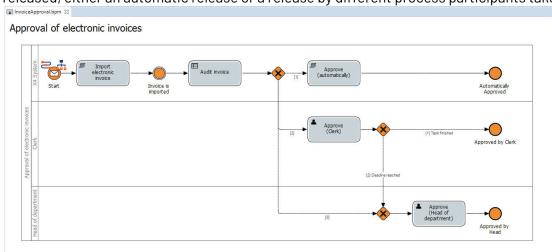
If a Business Process runs on a human task during execution, the execution of the Business Process is stopped and the human task is generated. The process waits for the necessary human interaction within the Task Management Web App and continues execution as soon as the human task is completed.



i With version 7.0 of X4 BPMS, the way processes and workflows are realized with Case Management has been changed. When you upgrade from a 6.x to a 7.x version, existing processes are automatically migrated.

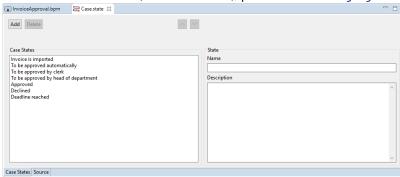
The following example illustrates the typical implementation with the X4 BPMS.

1. Model the Business Process as desired. The example shows a release process in which, depending on the amount of money to be

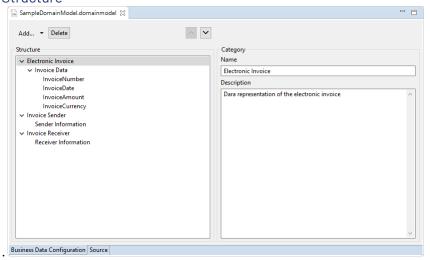


released, either an automatic release or a release by different process participants takes place.

- 2. Define the corresponding case states and business data:
  - To define case states (Case States), please see Managing Case States.



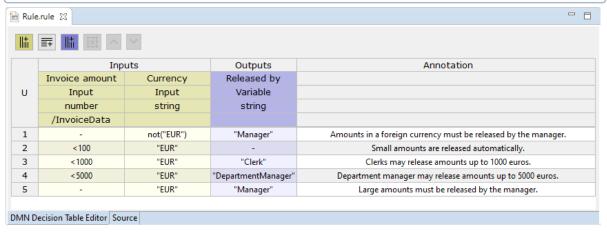
 To define business data (Business Data), please see Managing the Business Data Structure



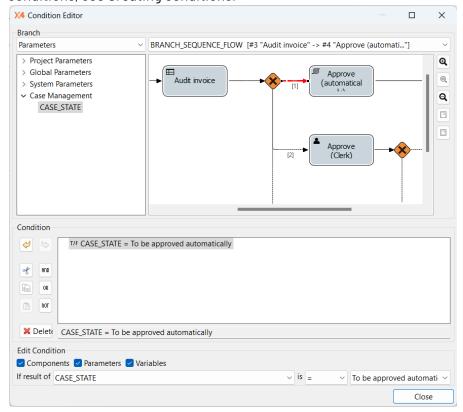
- 3. The data is read via an activity. The activity is linked to a technical process that reads the data and outputs all features via the Case Management adapter.
- 4. The process state is set via an Intermediate.

  The event's property Case State provides all defined case states.

- 5. Decision tables (.rule) are used to store the rules to assign the task to the appropriate person depending on the amount. The input specifies where the data to be checked comes from. Via **Case Feature** the previously defined features (see Managing Case States) are specified.
  - ① Decision tables can also be used to evaluate variables, features, parameters or status values (Case State). To do this, Ctrl + space bar in the rule area can be used to call up all currently available variables (v:variable name), features (f:feature name), parameters (p:parameter name) and operation status values (c:CaseState) in a selection list.



6. A condition component is used to map the various execution branches. The *Condition Editor* allows to use the case states of the currentBusiness Process as evaluation criteria for the conditions, see Creating conditions.



- 7. Configure the corresponding Human Task for each branch and the appearance of the Task Management Web App.
- 8. Save and execute the process.
- 9. Open the Task Management Web App via the menu Tools > X4 Task Management.
- 10. Log in to the Task Management Web App.

The tasks to be edited are displayed within the application.

- ① The rule module evaluates which user is allowed to edit a process.
- 11. Edit the tasks.
  - ① Which editing functions are available depends on the configuration in the Human Task.

# 5.2 Managing Case States

To implement cases with X4 BPM, it is required to define a data structure for the business case within the Business Process. In domain model files (.domainmodel) you can define business data structure in a three-staged hierarchy to the process definition, including descriptions.

#### 5.2.1 Structure of Business Case Data

A case's business data is structured in categories, groups, and features:

- *Categories* group business data on the highest level containing feature groups. Each category has a name, a position within the tree and an optional description.
- *Groups* aggregate business data features of the same category. Each group has a name, a position within the tree and an optional description.
- Features are specific business data properties, e.g. an order date within a feature group. Each feature has a name, a position within the tree and an optional description, a data type, and an optional default value.

Available data types for features are:

String: StringInteger: IntegersDecimal: Decimals

Boolean: Boolean valuesDateTime: Date and time

## 5.2.2 Defining Business Case Data

Business case data can be defined both for individual business processes and for the entire project or several business processes.

- 1. Right-click the .bpm file in the Repository Navigator view.
- 2. Select **New > Domain Model** in the context menu.

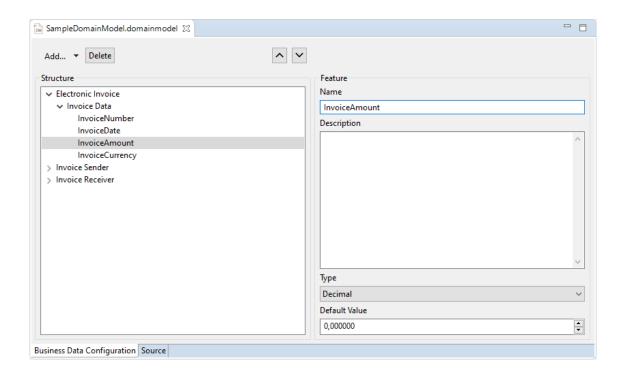


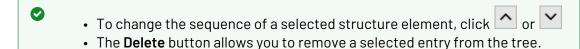
- If the business case data applies to several Business Processes, the corresponding .domainmodel file is created within the repository folder Activiti es > DomainModel.
- If the business case data applies only to one specific Business Process, the corresponding .domainmodel file is created directly below the Business Process. After saving, the .domainmodel file is automatically attached to the Start component.

The file is now created and opened in X4 Designer.



- 3. Define the business data structure and its descriptions.
  - To create a new feature category, click Add or select Add > Category. Then enter a category name (Name) and a corresponding description (Description).
  - To define a feature *group*, click **Add** when a category is selected or select **Add** > **Group**. Then enter a group name (**Name**) and a corresponding description (**Description**).
  - To define a feature, click Add when a group is selected or select Add > Feature. Then enter a feature name (Name), a corresponding description (Description), a data type (Type) and a default value for the feature (Default Value).
     Example:





- 4. Click the 🗎 icon in the toolbar to save.
- 5. Drag the .domainmodel file to the desired Business Process.
  - (i) .domainmodel files created below the Business Process are automatically attached to the Start component. The business data are therefore available in the process and the related Human Tasks.

# 5.3 Managing Case States

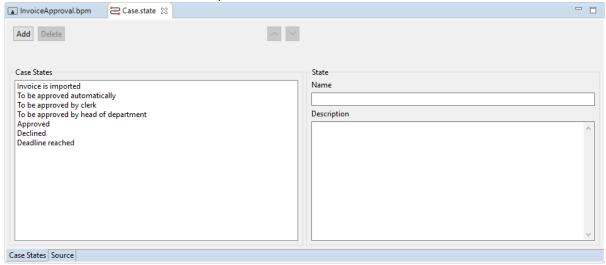
To map processes with X4 BPM, it is necessary to define the required case states of the Business Process. Case states and state descriptions are defined in a separate file (.state).

### 5.3.1 Add case states

1. Right-click the .bpm file in the Repository Navigator view.

2. Select New > Case States in the context menu.

A new .state file is created and opened.



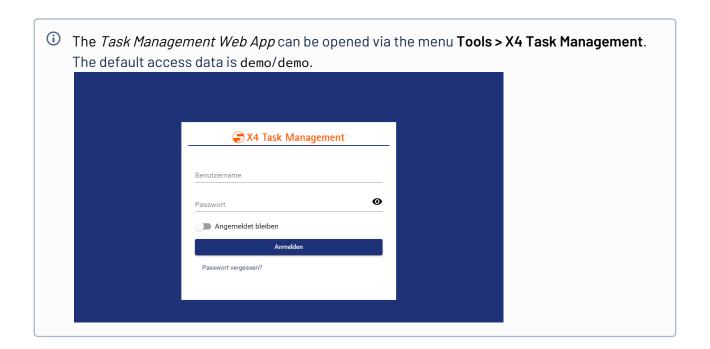
- 3. Click Add to define a new state:
  - In Name, enter the name of the state, e.g. Approved.
  - In **Description**, enter an associated description (optional).
- 4. To change the order of a selected state value, click on or .
- 5. Save file.
- i Use the **Delete** button to delete a selected state value.
- Set case state with intermediate events

You can also set the state of an operation that is to be processed at runtime of the current Business Process with Intermediate Events. Therefore, all process-wide defined process state values are available for selection in the Case Management > Case State property of the Intermediate Event.

# 5.4 Task Management Web App

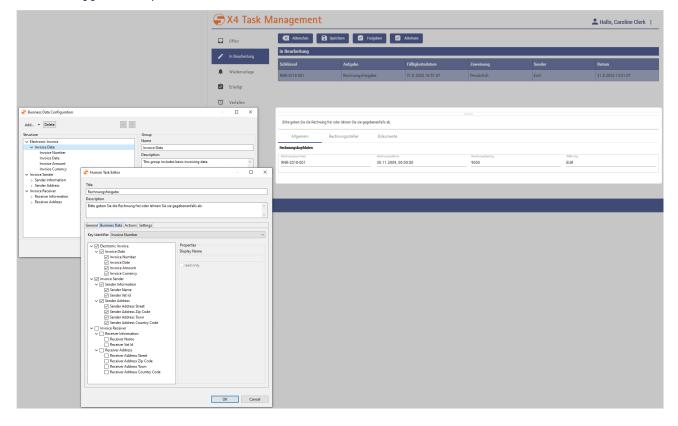
Human Tasks allow integrating people into Business Processes. The *Task Management Web App* provides the user interface for processing the defined tasks.

The *Task Management Web App* already has a predefined structure and predefined functions. However, further settings can be made within the corresponding Business Process and via various settings within the *Human Task Editor*.



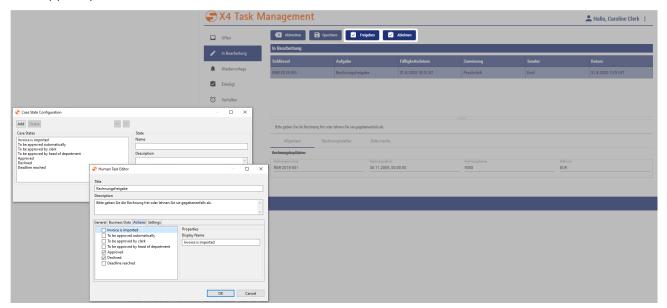
# 5.4.1 Defining and Displaying Business Case Data

Business case data is defined via the Business Process property Business Data, see Managing Case States. Which of the defined business data is actually displayed in the *Task Management Web App* for the user logged in is specified within the *Human Task Editor's* tab **Business Data**.



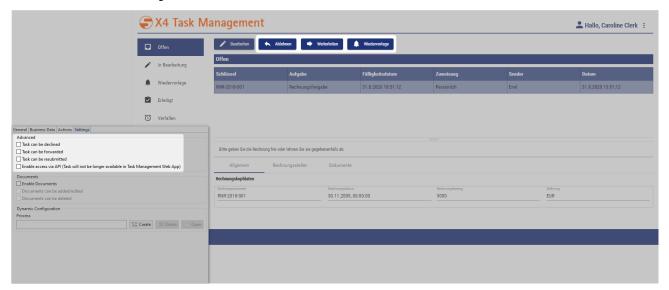
## 5.4.2 Defining and Setting Case States

Case states are defined via the Business Process property Case States, see Managing Case States. Which of the defined states a user can actually set for his tasks within the *Task Management Web App* is specified within the *Human Task Editor's* tab **Actions**.



# 5.4.3 Declining, Forwarding and Resubmitting Tasks

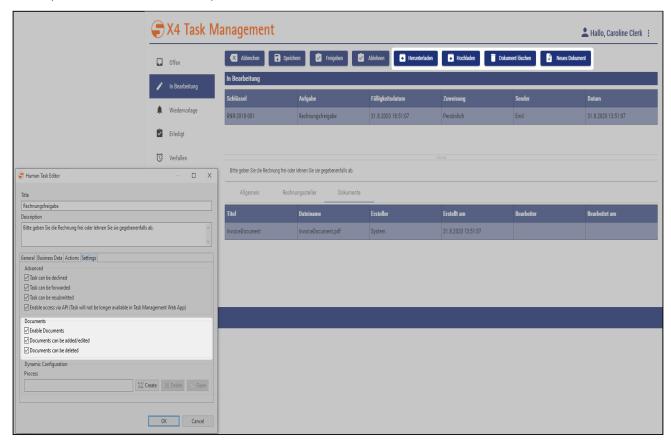
Whether a user should be able to decline, forward or resubmit tasks is specified within the *Human Task Editor's* tab **Settings**, see also Human Task.



## 5.4.4 Displaying and Editing Documents

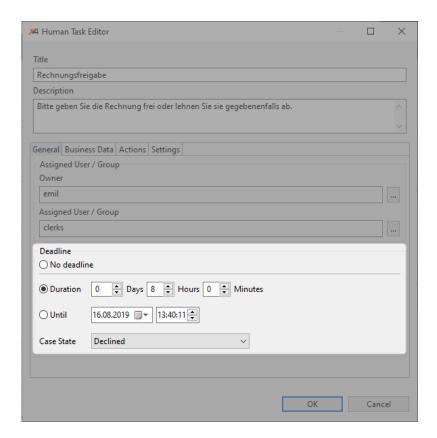
Whether documents can be displayed and processed in the *Task Management Web App* is specified within the *Human Task Editor's* tab **Settings**, see also Human Task.

- Option Enable Documents displays the tab **Dokumente** and the button **Herunterladen** (download) within the *Task Management Web App*.
- Option Documents can be added/edited allows editing (button **Hochladen**) and adding (button **Neues Dokument**) documents.

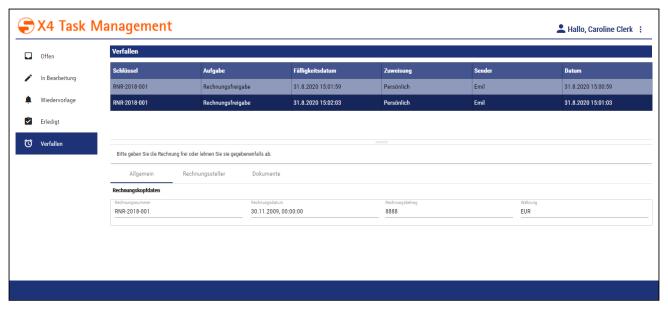


## 5.4.5 Deadline Management for Human Tasks

For each human task a deadline can be defined, which is specified within the *Human Task Editor* under **General > Deadline**. In addition to a duration (Duration), an exact time limit (Until) with a date and time specification can be defined. Moreover, a case state can be specified, which is automatically executed when the task deadline has been reached.

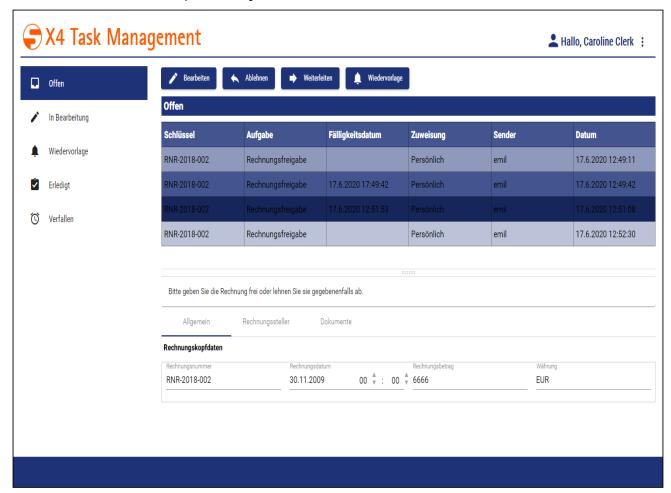


If a human task's deadline was reached before it could be processed and the process was automatically resumed with the configured case state, the human task is automatically closed and displayed within the *Task Management* web app's navigator node **Verfallen** (expired). All human tasks that have exceeded the deadline and have been closed automatically are displayed here.



In order to better recognize processes with a deadline in the Task Management web app, they are highlighted in different colors:

- The due date of the human task was exceeded and the task was automatically closed and moved to the navigator node **Verfallen** (expired).
- The human task is due on the same day.
- The due date for processing the human task is > 24 hours.



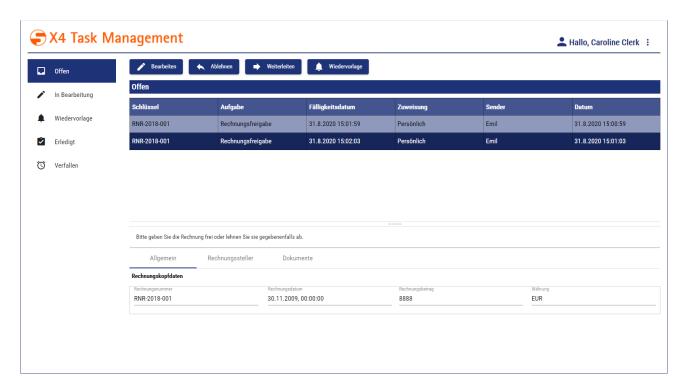
# 5.4.6 Editing Tasks in the Task Management Web App

There are various processing options for tasks that have been assigned to a process participant. These options are explained in the following.

① The Task Management Web App is currently only available in German. Thus, the following editing options are described by means of the German interface.

#### 5.4.6.1 Editing Tasks

After logging in to the Task Management Web App, all open tasks are displayed in an overview (menu Offen). By selecting a task in the task list, its details are displayed on several tabs.



To edit a task proceed as follows:

- 1. Select the task to be edited within the task list of the overview (menu Offen).
- 2. Click on Bearbeiten.
- 3. Select the desired editing option:
  - Freigeben: Release task
  - Ablehnen: Decline task
  - Herunterladen: Download document
  - · Hochladen: Replace existing document
  - Dokument löschen: Delete document
  - Neues Dokument: Upload new document

### 5.4.6.2 Releasing Tasks

To release a task proceed as follows:

- 1. Select the task to be released within the task list of the overview (menu Offen).
- 2. Click on **Bearbeiten** to open the editing view.
- 3. Click on Freigeben.

The task is now moved to the menu entry Erledigt.

### 5.4.6.3 Declining Tasks

To decline a task proceed as follows:

- 1. Select the task to be released within the task list of the overview (menu Offen).
- 2. Click on Ablehnen.

(i) As an alternative, the task can be declined in the editing view. To do this, first click Bearbeiten and then Ablehnen.

The tasks is now sent back to the task owner (Owner).

#### 5.4.6.4 Forwarding Tasks

To forward a task proceed as follows:

- 1. Select the task to be forwarded within the task list of the overview (menu Offen).
- 2. Click on Weiterleiten.

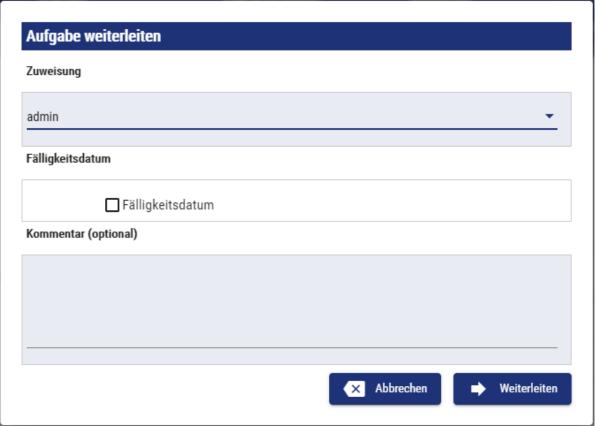
The following dialog is opened:



- 1. Specify the assignment type:
  - Persönlich: The task will be forwarded to a single user
  - Team: The task will be forwarded to a group

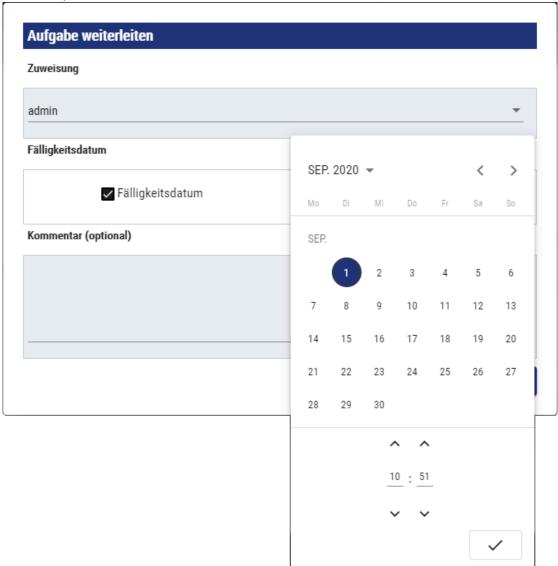
2. Click on Weiter.

The following dialog is opened:



- 3. Specify the forwarding details:
  - Select the corresponding user or group under **Zuweisung**

If required, define a deadline in Fälligkeitsdatum
 To do this, enable the checkbox and select a date and time. Confirm with



- If required, enter a comment in Kommentar.
- 4. Click on Weiterleiten.

The task is forwarded to the specified user or group.

### 5.4.6.5 Resubmitting Tasks

To resubmit a task proceed as follows:

1. Select the task to be resubmitted within the task list of the overview (menu Offen).

2. Click on Wiedervorlge.

The following dialog is opened:



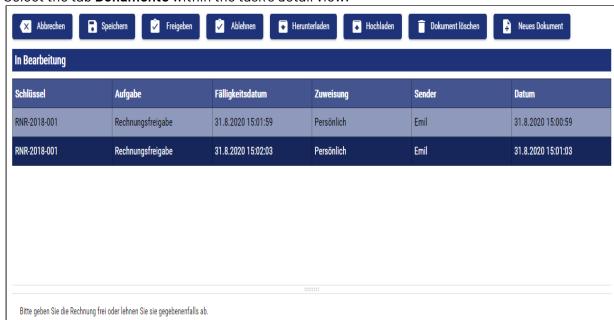
- 3. Enter the desired date and time. Confirm with \_\_\_\_\_.
- 4. If required, enter a comment in Kommentar.
- 5. Click on **OK**.

The task is now moved to the menu entry Wiedervorlage.

## 5.4.6.6 Displaying and Editing Documents

To edit documents attached to a task proceed as follows:

- 1. Select the task to be edited within the task list of the overview (menu Offen).
  - If the task is already being processed, select the corresponding task under the menu entry In Bearbeitung.
- 2. Click on Bearbeiten.



3. Select the tab **Dokumente** within the task's detail view.

The different editing options are now displayed as buttons:

Dokumente

Ersteller

System

- Click Herunterladen to download the document.
- Click Hochladen to upload a new document from the file system and replace the existing document.

Erstellt am

31.8.2020 15:00:59

Bearbeiter

Bearbeitet am

• Click Dokument löschen to permanently delete the document.



Allgemein

InvoiceDocument

Titel

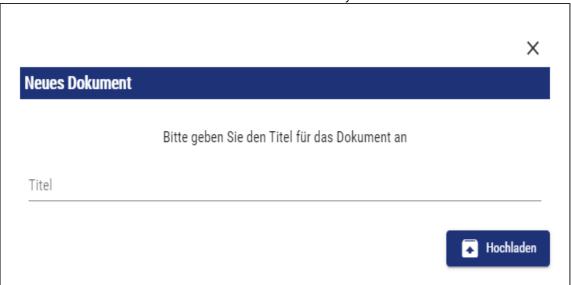
Rechnungssteller

Dateiname

InvoiceDocument.pdf

Deleting a document cannot be undone. Only delete documents if you are sure that you no longer need them.

• Click Neues Dokument to upload a new document. To do this, enter a title in the dialog **Neues Dokument** and select a document from the file system with **Hochladen**.



### 6 Scheduler

The scheduler interface provides an overview of all processes for which a scheduled execution has been defined. In addition, the interface also offers the possibility to configure new time-controlled executions as well as to edit or delete already existing configurations.

When defining schedules, a differentiation is made between the following execution options:

- Startup: Execution of a process at server startup
- CRON: Execution of a process according to certain cron patterns

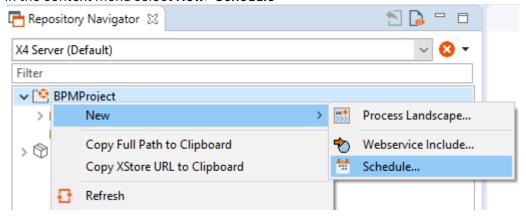
The main functions of the scheduler are:

- Overview of existing schedules
- · Create/edit any number of execution points and intervals per process

### 6.1 Create scheduler



- The scheduler can only be created in **BPM** and **ESB** projects.
- Only one scheduler can be created in a project.
- 1. In the Repository Navigator view, right-click a project.
- 2. In the context menu select New> Schedule



.The scheduler is created and opened.

For further information please visit the section
 Execute scheduled processes

# 6.2 Execute scheduled processes

The following execution options can be distinguished for the scheduled execution of X4 processes:

- Execution of a process at server startup
- Execution of a process according to certain cron patterns

Cron patterns allow you to execute processes at specific times on specific days, for example, every Friday, at 12 noon.

#### 6.2.1 Create new scheduled execution

To create a scheduled execution, proceed as follows:

- 1. In the scheduler .schedule click the desired execution option.
  - a. Cron to execute processes according to specific cron patterns.
  - b. Ustartup to execute processes at server startup.
- 2. Set the desired configuration.
  - For the configuration options of the different types of execution, see:
    - Server start
    - Cron
- 3. Click Save to save the execution.
- i For documentation on the ReST interface, see http://localhost:8080/X4/X4Api/.

#### 6.2.2 Server start

New configurations for executions at server startup can be created using the  $\circlearrowleft$  **Startup** button. A number of options and parameters are available. These are explained in more detail below.

#### **Options**

Name	Freely selectable name for execution
Process	Path to the process in the X4DB  Example: Processes/Activities/Processes/Process.wrf  Click Browse to select a process.  • The process must be in the same project as the scheduler. • The process must not be a sub-process of another process.
Active	Activates the scheduler

Start date	Sets the start date of the scheduler in jjjj-mm-tt hh:mm:ss format <i>Example:</i> 2021-06-01 13:00:00
End date	Sets the end date of the scheduler in jjjj-mm-tt hh:mm:ss format  Example: 2022-08-01 23:00:00  The end date must be in the future.

#### **Parameters**

In the **Parameters** section you can define any number of parameters for the run configuration.

<u>=</u> +	Addrow
<b>=</b>	Remove row
Key	Name of the parameter (any string, ideally NCName).
Value	Optional parameter value

## 6.2.3 Cron

New configurations for executions at server startup can be created via the **Cron** button. A number of options and parameters are available for this. These are explained in more detail below.

### **Options**

Name	Freely selectable name for execution
Process	Path to the process in the X4DB  Example: Processes/Activities/Processes/Process.wrf  Click Browse or drag and drop a process into the field to select a process.  • The process must be in the same project as the scheduler. • The process must not be a sub-process of another process.
Active	Activates the scheduler

Generate Cron expression	Generates a Cron expression
	Possible values:
	<ul><li>Minutes</li><li>Hourly</li><li>Daily</li><li>Weekly</li><li>Monthly</li><li>Yearly</li></ul>
	in the Source tab you can edit the Cron expression manually.  Generating a cron expression is not possible if the cron expression was edited manually.

### **Parameters**

In the **Parameters** section you can define any number of parameters for the run configuration.

<u>≡</u> +	Add row
<b>≡</b> -	Remove row
Key	Name of the parameter (any string, ideally NCName).
Value	Optional parameter value

#### **Profiling** 7

In a file for the monitoring of profiling data (.profiling), you can define whether processes within your project should be logged at runtime. In this file, you can define exactly which processes are included or excluded from logging.

The .profiling file only needs to be created if you want to exclude specific processes from profiling.

#### To create a file for the monitoring of profiling data

- 1. In the **Projects** view, right-click a project.
- 2. Select **New > Monitoring** in the context menu. The monitoring configuration file is created and opened.

Only one .profiling file can be created in a project.

• You can configure the monitoring of profiling data (.profiling file) in the **Design** view and in the **Source** view. Both options are described on the following pages. To access the desired view, click **Design** or **Source** at the bottom of a .profiling file.

## Additional information:

- · Configuring the Monitoring of Profiling Data in the Design View
- · Configuring the Monitoring of Profiling Data in the Source View