Digitize business processes successfully

Accelerate digital transformation with the X4 BPMS low code platform

X4 Data Model



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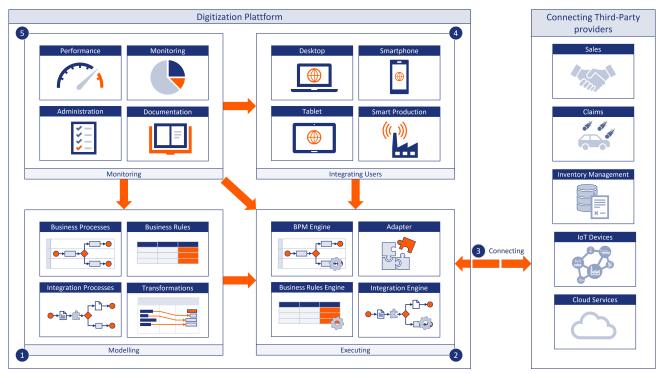
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About the X4 BPMS

Digitalization requires a holistic approach, which presupposes that also the used solution has to reflect that. X4 BPMS supports you as a central platform in solving these challenges. The focus is on modeling, implementing and monitoring your business processes. Therefore, the X4 BPMS contains all necessary tools and is compatible with a variety of interfaces and formats. That helps to avoid isolated information silos and media breaks that inhibit productivity, and accelerate digitization at the same time.

Implementing business processes without programming effort enables a large number of users to enter into the management of business processes. That's important, since employees of the specialist department usually know best what is important in the respective business processes. Therefore, you should rely on the X4 BPMS as a platform whose tools reduce complexity to such an extent that business processes can be analyzed, optimized, modeled, as well as controlled and documented even without programming knowledge. All tools support integrated, graphical process modeling and implementation and generate processes that are executed by the X4 BPMS with high performance.

- X4 Designer: Modelling processes and rules graphically
- X4 Server: Simulating and executing processes and rules
- X4 Adapter: Integrating third-party systems into processes
- X4 Activities: Providing web apps for employees and customers



1 Interface

Eile Edit View Project Tools Wind Ø • Ø • • • • • • Ø • Ø • • • • • • • Projects X Mapps • • • • • • • No • • • • • • • • • •				Quick Access	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Filter					
	83		T 🔂 = 🗆	8	

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.

1.1 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
С	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
B	Save all	Save all changes
Ð	Repository Refresh	Perform server-side update
N / 11	Attach/Detach Debug	Attach debugger to server instance / Detach debugger from server instance
ŧ	Start Debugging	Start Debugger
£	Undo	Undo last editing step
ц,	Redo	Restore undone step
÷	Cut	Cut selection
Ð	Сору	Copy selection
	Paste	Paste selection
•	Start Debugging	 Call up options for process execution Start Debugging: debug process (show and fix errors) Start Without Debugging: Execute process directly Debug/Run Options: Open Run/Debug settings in X4 Designer
	Suspend	Stop debugging process
Þ	Resume	Continue debugging process
	Stop Debugging	Terminate debugging

3.	Step Into	Execute process step (display steps of the subprocess)
•	Step Over	Execute process step (without displaying steps of the subprocess)
. P	Step Return	Jump out of subprocess
•	Toggle Breakpoint	Set or remove breakpoint for marked element
۵	Clear all Breakpoints	Delete all breakpoints in this process
67	Quick Watch	Open Quick Watch view to view placeholders, dynamic parameters and context variables with their values during debugging.
•	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
1	Show Process Quality Index	Display Process Quality Index

1.2 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:

Add Component	Add new process component
---------------	---------------------------

Layout	Align selected process components
	 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
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 Repository Navigator
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		
<i>Copy full path to Clipboard undCopy XStore URL to Clipboard</i>	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 The file will remain in the file system, but is no longer part of the project and is grayed out. The usual operations such as opening, editing, copying, deleting, etc. of excluded files are disabled. 		
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		

1.3 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.

🗢 X4 Designer	The X4 Designer perspective is the default perspective.
▲ 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.

1.3.1 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.

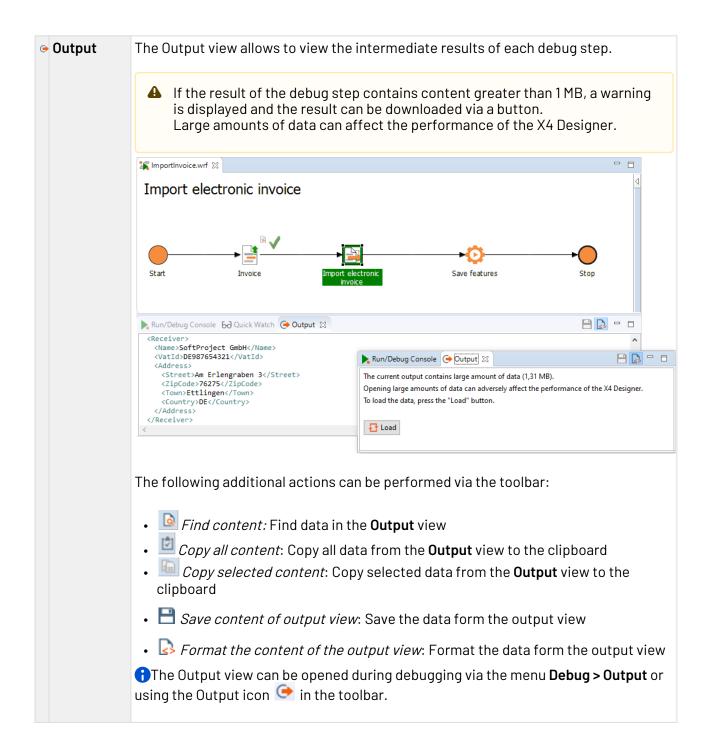
1.3.2 Reseting perspectives

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

1.4 Views

Projects	 The Projects 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 Projects view. The available options change depending on where in the tree structure the context menu is called. The Filter text field above the project tree can be used to search for files within the connected repository. Placeholder like * or ? are not possible. The following actions can be performed using various buttons: Solve from active Editor to Repository Navigator: Highlight opened file in the editor within the Repository Navigator. Show or hide all files: Show and hide contents of the file system. Files excluded from the project are grayed out.
🔊 Apps	The Apps 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 correspondinA title and a describence of the generated do	g values. ription can be stored for each process. These are displayed in		
	Properties 🛛	📑 🛱 🖾 🗸 🗖 🗖		
	Property	Value		
	Business Data	[Electronic Invoice, Invoic		
	Can Stop			
	Case			
	Case States	[Invoice is imported, To b 19. 8. 2019 08:12:44		
	Created Created By	BrigitteStall		
	Free-flow mode			
	In service			
	Instance limit	0		
	Last Update	19. 8. 2019 08:16:52		
	Last Update By	BrigitteStall		
	Schedule	Disabled		
	Stop on error			
	Title	Approval of electronic inv		
	Version	1566195411781		
▶ Run/Debug	can be made using the Pin to Select Pin to Select Show Catego Show Advant Restore Def View Menu: C	roperties are displayed by default, however, additional settings be Properties view toolbar: <i>tion</i> : Pin displayed properties in the Properties view <i>bries</i> : Show properties sorted by categories <i>ced Properties</i> : Show advanced properties <i>ault Value</i> : Restore to default value Open additional options ed for errors or simulated, debug information is displayed in the		
Console	Run/Debug Console w highlighted in red, su When a process step during debugging, wh //1376054979039/)	view for each executed process step. Error messages are ccessful status messages are green. outputs an intermediate result, it is stored in a temporary file nich you can view using the corresponding reference (e.g. file:		



X4 Server Log	The X4 server log view allows to track the server status and especially errors in the X4 Server log from within the X4 Designer.				
	Run/Debug Console X4 Server Log Call Hierarchy 503 504 2019-08-28 12:55:33.135 INFO [de.softproject.integration.engine.X4engine] (default task-2) Finis 505 2019-08-28 12:55:33.136 INFO [de.softproject.integration.engine.X4engine] (default task-2) Proc 506 2019-08-28 12:55:33.145 ERROR [de.softproject.integration.engine.X4engine] (default task-2) Proc 507 2019-08-28 12:55:33.146 INFO [de.softproject.integration.engine.X4engine] (default task-2) Finis 508 2019-08-28 12:55:33.163 INFO [de.softproject.integration.engine.X4engine] (default task-2) Finis 508 2019-08-28 12:55:33.163 INFO [de.softproject.integration.engine.debug.impl.Session] (default task-2) 6 4 6 4 7 5 8 2019-08-28 12:55:33.163 INFO [de.softproject.integration.engine.debug.impl.Session] (default task-2) 6 4 7 4 8 4 9 4				
	1 The Server Log view can be accessed via the View > X4 Server Log menu.				
⇒ Call Hierarchy	The Call Hierarchy view allows to display all repository elements using a certain process or process component in the repository.				
	🕨 Run/Debug Console 📮 X4 Server Log 🍃 Call Hierarchy 🔀 🗖 🗄	3			
	BPMProject_2/Processes/Activities/Processes/ApproveAutomatically.wrf BPMProject_2/Processes/InvoiceApproval.bpm				
	Right-click on the desired element in the Repository Navigator to bring up a contex menu. View Call Hierarchy then displays a list of all repository items that contain at least one reference to the selected item.				

🖲 Error Log	The Error Log view allows to view errors that occurred in the X4 Designer. Run/Debug Console X4 Server Log Call Hierarchy Error Log Image: Server Log					
	Warnings while parsing the key bindings from the A Cannot bind to an undefined command: plug- Cannot convert null to a primitive	org.eclipse.ui	28.08.19, 10:03 28.08.19, 10:03			
	 Cannot convert null to a primitive Cannot convert null to a primitive Cannot convert null to a primitive Warnings while parsing the key bindings from the 	org.eclipse.core.databind org.eclipse.core.databind	19.08.19, 08:15			
	Cannot bind to an undefined command: plug- org.eclipse.ui 19.08.19, 08:04 The following additional actions can be performed via the toolbar:					
	 <i>Export Log</i>: Export Error Log and save it as .log file <i>Import Log</i>: Import Error Log(.log) 					
	 Elear Log Viewer: Clear Error Log Delete Log: Delete Error Log permanently 					
	 <i>Open Log</i>: Open log file (.log) in X4 Designer <i>Restore Log</i>: Restore Error Log <i>View Menu</i>: Open additional options 					
	The Error Log can be opened via the menu View > Error Log.					
Q Problems	In the Problems view, all errors and customize the displayed list.	warnings are list	ed. The filter car	n be used to)	
• Debug sessions The Debug sessions view lists all active debug sessions. In the Debug session double-click the desired process to switch to the debug session.				-		
	Active debug sessions are marked server are highlighted in orange.	in gray. New deb	ug sessions conn	ected to th	ie	
• Breakpoint s	In the Breakpoints view, all set brea breakpoints can be activated, deac can be skipped without deleting the	tivated and delet			oints	

⊌ Quick Watch	In the Quick Watch view, placeholders, dynamic parameters and context variables can be viewed with their values during debugging. Selected variables are updated after each debug step. If the result of the debug step contains content greater than 1 MB, a warning is displayed and the result can be downloaded via a button. Large amounts of data can affect the performance of the X4 Designer.
	Path Series Remote Strates Console & Outer Watch 2: Output Viriable Contains large amount of data (1:1) MB/S. Opening large amounts of data
a Outline ∎	In the Outline view, the complete process diagram is displayed as an image. By clicking on the individual areas of the illustration, it is easy to navigate through the process, even if it is larger than the size of the Designer window. The Outline view can be opened via the menu View > Outline .
Base64	Base64 encode or decode strings
Digest	Generate hash value for strings
Regex	Apply regular expression (<i>Regex</i>) to a string to test the expression or to directly replace the string according to a pattern
URLCodec	URL encode or decode strings

1.4.1 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 Working with Data Model Projects

Using the **Data Model Project** project type you can define complex data models and integrate them in ESB processes and X4 Web Apps. You can represent complex data structures in a Data Model Project, such as a purchase order with addresses and items you re-use in other locations. The major advantage of this approach is the ability to re-use data models, e.g. in web apps, without having to define them multiple times.

2.1 Creating a Data Model Project

To create a new Data Model Project:

- 1. In the X4 Designer, right-click in the **Projects** view and choose **New** from the context menu.
- 2. Choose Data Model Project....

Alternatively, you can click on **New** in the **File** menu and select **Data Model Project...**

- 3. Enter a name for your project in the **Project Creation Wizard** dialog.
- 4. Choose Finish.

Data Model Projects have a predefined folder structure which is automatically created when you create a new Data Model Project.

Entities	This folder is empty when creating a project. You can add 1 to n entitys.
	(i) The Entities folder cannot be deleted, moved, or renamed.
<project>.dat amodel</project>	Project-related file containing the data model definition. You set the relationships between the entitys in this file.

When creating a new Data Model Project the **<Project>.datamodel** file looks as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<DataModel xmlns="http://softproject.de/datamodel/1.0">
        <EntityRelationships>
        </EntityRelationships>
</DataModel>
```

The EntityRelationships element is used to set the relationships between the entities created by you which are represented in the data model. Any relationship you specify will result in a hierarchy. For more information on creating entities, see the Creating entities section.

The EntityRelationships element can contain the following elements:

• OneToOne

- OneToMany
- ManytoOne

These three elements provide of the following attributes for the definition of the relationships between the entities:

Attribute	Description
entity	You can use this attribute to specify the from entity of the relationship.
toEntity	You can use this attribute to specify the target entity of the relationship.
property	You can use this attribute to specify the name which is used to reference the entity specified in toEntity for the entity with respect to the further usage of the data model. You can, for example, specify a delivery address as the property for a
	one-to-one relationship between a customer and an address, as shown in the following example.

Example:

```
<DataModel xmlns="http://softproject.de/datamodel/1.0">
        <EntityRelationships>
        <OneToOne entity="Customer.entity" toEntity="Address.entity"
property="DeliveryAddress"/>
        <OneToMany entity="Customer.entity" toEntity="Order.entity" property="Order"/>
        <ManyToOne entity="Order.entity" toEntity="Customer.entity" property="Customer"/>
        </EntityRelationships>
</DataModel>
```

2.2 Creating Entities

Each entity corresponds to an object in your application, e.g. "order" or "customer". The relationship between two or more entities is represented via associations. Each entity (object) contains fields (properties) and is labeled with a unique technical ID field which is needed for associations.

To create a new entity:

- 1. Right-click on the **Entities** folder.
- 2. Choose **New > Entity**.
- 3. Enter an entity name in the File Creation Wizard dialog.
- 4. Choose Finish.

In the next step, you can add properties to your entity. To do so, double-click on the .entity file in the **Projects** view to open it in the Entity Editor.

Choose Add to add the desired properties, e.g. name or id:

Add Removement	/e			
Name	Туре	Is ID	Mandatory	Read only
name	STRING		₹	
address	STRING		•	
zipcode	INTEGER		•	
city	STRING		v	
id	STRING	•	V	V

(i) You can sort the entries by selecting an entry and move it up or down using the arrows on the top right. This way you can arrange the entries as desired.

The table in the .entity file contains the following fields:

Field	Description			
Name	You enter the desired name for your property in this field.			
	Use the Add button to add a new property.			
	Use the Remove button to remove properties you do not need anymore.			
Туре	You use this drop-down to set the type of the property.			
	Possible values:			
	 STRING INTEGER DECIMAL BOOLEAN DATE DATETIME 			
Is ID	Use this checkbox to define whether the property is a defined ID.			
Mandat ory	Use this checkbox to define whether the property is mandatory or optional.			
Read only	Use this checkbox to define whether the property is read-only.			

(i) In addition to the **Design** view shown above you can also open the .entity file in the **Source** view and define the properties as XML elements and the corresponding attributes.

2.3 Using a Data Model in an ESB Project

To use a data model in an ESB Project:

- 1. Create a new ESB project or open an existing ESB project.
- 2. Right-click on the Transformations folder and choose New > XSL Stylesheet.
- 3. Choose Empty in the File Creation Wizard to create an empty transformation.
- 4. Enter a name for the mapping file and choose **Finish**.
- 5. Move the .datamodel file via drag-and-drop from the Data Model Project into the empty space on the left side of your mapping side.
- 6. The **Select Entities** dialog is opened where you select which entities from your data model are to be included in the mapping file.

The dialog box contains the following options for the example shown in the Creating a Data Model Project section in which the **Customer**, **Address**, and **Order** entities with different relationships were created:

X4 Select Entities	×
Data Model: Demo	\sim
 Order Customer [Customer] Address [DeliveryAddress] Order [Order] Customer Address [DeliveryAddress] Order [Order] Order [Order] Customer [Customer] Address [DeliveryAddress] Address [DeliveryAddress] 	
OK Cancel	

7. Once the structure has been generated and is displayed you can start with the mapping. For more information see Mapping.

2.4 Using a Data Model in an X4 Web App

To use a data model in an X4 Web App:

- Create a new Web App Project or open an existing Web App Project.
- Right-click on the ViewModels folder and choose New > View Model....
- Enter a view model name in the File Creation Wizard dialog and choose Finish.
- Move the .datamodel file via drag-and-drop from the Data Model Project into Properties ele ment in the .viewmodel file.
- The **Select Entities** dialog is opened where you select which entities from your data model are to be referenced in the .viewmodel file.
- •

The entities and their properties are referenced in the .viewmodelfile. You can edit the properties with additional attributes (displayName, readOnly).

Example:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ViewModel xmlns="http://softproject.de/viewmodel/1.0">
    <Properties>
        <Model path="Demo/Entities/Customer.entity">
            <ModelProperty name="Name" displayName="Name" readOnly="false"/>
            <ModelProperty name="Firstname" readOnly="false"/>
            <ModelObject name="DeliveryAddress" path="Demo/Entities/Address.entity">
                <ModelProperty name="City" readOnly="false"/>
                <ModelProperty name="Zip" readOnly="false"/>
                <ModelProperty name="Street" readOnly="false"/>
            </ModelObject>
            <ModelList name="Order" path="Demo/Entities/Order.entity">
                <ModelProperty name="Product" readOnly="false"/>
                <ModelProperty name="Quantity" readOnly="false"/>
                <ModelObject name="Customer" path="Demo/Entities/Customer.entity">
                    <ModelProperty name="Name" readOnly="false"/>
                    <ModelProperty name="Firstname" readOnly="false"/>
                    <ModelObject name="DeliveryAddress" path="Demo/Entities/
Address.entity">
                        <ModelProperty name="City" readOnly="false"/>
                        <ModelProperty name="Zip" readOnly="false"/>
                        <ModelProperty name="Street" readOnly="false"/>
                    </ModelObject>
                </ModelObject>
            </ModelList>
        </Model>
    </Properties>
</ViewModel>
```

Example for embedding a .viewmodel file in a component:

```
<?xml version="1.0" encoding="UTF-8"?>
<DetailComponent xmlns="http://softproject.de/webapp/1.0"
viewmodel="ViewModel.viewmodel">
<Properties>
</Properties>
</Properties>
<FlowLayout>
<Header value="Welcome to my new Web App!" />
<TextBox value="#Customer.Name" />
</FlowLayout>
</DetailComponent>
```