

Administration Guide | PUBLIC
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Administration Guide for PLM System Integration for SAP ERP

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THE BEST RUN SAP

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1 About This Guide

This guide is the central starting point for using PLM system integration for SAP ERP (PLMSI) to integrate SAP ERP with an external PLM system.

> **i Note**
>
> In order to integrate your SAP system with an external PLM system, you also need to procure and install the respective technical non-SAP component, for example the *T4ST* component for the integration of a Siemens Teamcenter system. The joint installation of these components is a mandatory prerequisite in order to realize the integration and support the business scenarios as described in this guide.

The first part of this guide gives an overview of the overall concept of the integration, supported business scenarios, and a possible system landscape, based on a joint installation of PLM system integration for SAP ERP and T4ST.

The second part of the guide covers how to install and implement PLM system integration for SAP ERP. It also provides security and operations information for PLM system integration for SAP ERP.

Product Information

Product	PLM system integration for SAP ERP
Release	2.0
Released	Q4, 2021

This guide addresses the following target audience:

- System administrators
- Technical consultants
- Key users

2 Document History

The following table provides an overview of the most important document changes.

Version	Date	Description
1.0	Q4 2021	Initial version

3 Getting Started

Make sure to read the information in this section before you start the installation and setup of PLM system integration for SAP ERP as part of an integration between SAP ERP and an external PLM system.

3.1 Further Important Documentation

In addition to this document, you can consult the following general resources for the integration, as well as for your SAP system.

Content	Location
Product documentation for SAP ERP, such as installation, operations, and security guides	http://help.sap.com/erp
Information about creating customer incidents	http://support.sap.com/incident Information published on SAP site
SAP Notes search	http://support.sap.com/notes Information published on SAP site
SAP Software Download Center	http://support.sap.com/swdc Information published on SAP site
Product Availability Matrix	http://support.sap.com/pam Information published on SAP site
Early Knowledge Transfer and role-specific learning maps	http://support.sap.com/ekt Information published on SAP site
Network security	https://www.sap.com/community/topics/security.html Information published on SAP site
Performance	https://www.sap.com/about/benchmark/sizing/performance.html Information published on SAP site
Information about support package stacks, latest software versions, and patch level requirements	https://support.sap.com/sp-stacks

3.2 Overview of Required SAP Notes

The following SAP Notes are essential for installing, upgrading, and operating PLM system integration for SAP ERP.

Read the following SAP Notes before you start the installation or upgrade. These SAP Notes contain the most recent information on the installation or upgrade, as well as corrections to the installation or upgrade documentation.

Make sure that you have the up-to-date version of each SAP Note, which you can find on SAP Support Portal at http://support.sap.com/notes.

Important SAP Notes for SAP PLM System Integration and use with SAP ERP

SAP Note Number	Title
3109976	PLM System Integration: Prerequisite Note for Collective Note 3100667 for PLM System Integration, Release 2.0
3066210	Release Information for PLM System Integration for SAP ERP 2.0
3077764	Release Strategy and Maintenance Information for the ABAP add-on PLMSIFND 100
2924308	XI RUNTIME: Report SXMS_BS_CACHE
3100667	Collective Note for PLM System Integration

3.3 Getting Support

PLM system integration for SAP ERP enables the integration of your SAP system with an external PLM system, for example Siemens Teamcenter.

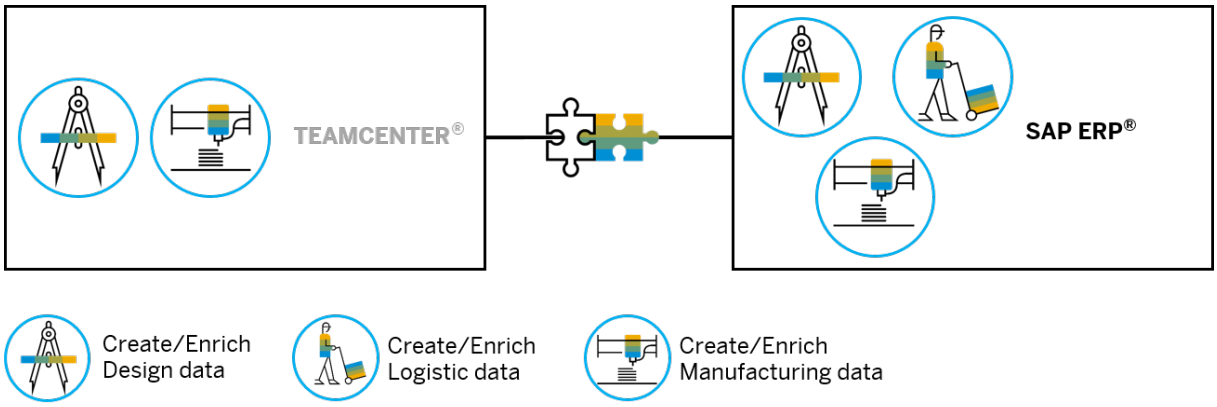
This chapter explains how to get support for PLM system integration for SAP ERP component. If there are issues with an external system and the related installation components, please refer to the support offerings for this system.

To create a support ticket for PLM system integration for SAP ERP, go to the SAP Support Portal. Use the component PLM-INT to report the incident.

- In your support ticket, include the following information:
  - Expected behavior of the integration
  - Actual behavior of the integration
  - Time and date of the issue
  - Document ID and Employee ID, if applicable

4 Solution Architecture

This section outlines the overall solution architecture of the integration between Siemens Teamcenter and SAP ERP.



Overall Solution Architecture - SAP ERP

The integration connects Siemens Teamcenter with the SAP ERP software portfolio. By leveraging the integration, Siemens and SAP are targeting to enable a single digital thread from Design-to-Operate ideation until end of life. A joint installation and integration of Siemens Teamcenter and SAP ERP supports various scenarios that leverage the respective strengths of both partners based on customer business requirements.

You can choose to perform production planning either in SAP ERP or in Siemens Teamcenter. The two systems communicate through a common Meta Domain Model (see next section) using a REST protocol and JSON for interchange.

4.1 Meta Domain Model - Core Concept

The SAP Meta Domain Model (DM) is a data model that helps to reduce the level of complexity when integrating an SAP system with an external PLM system.

To ensure data consistency and quality for subsequent processes, the integration offers a consistent data logic, enabling you to configure your processes without interrupting them. It translates and standardizes the integration between the two systems and provides a stable and aligned process and data model. This is the foundation to establish a reliable and resilient business process.

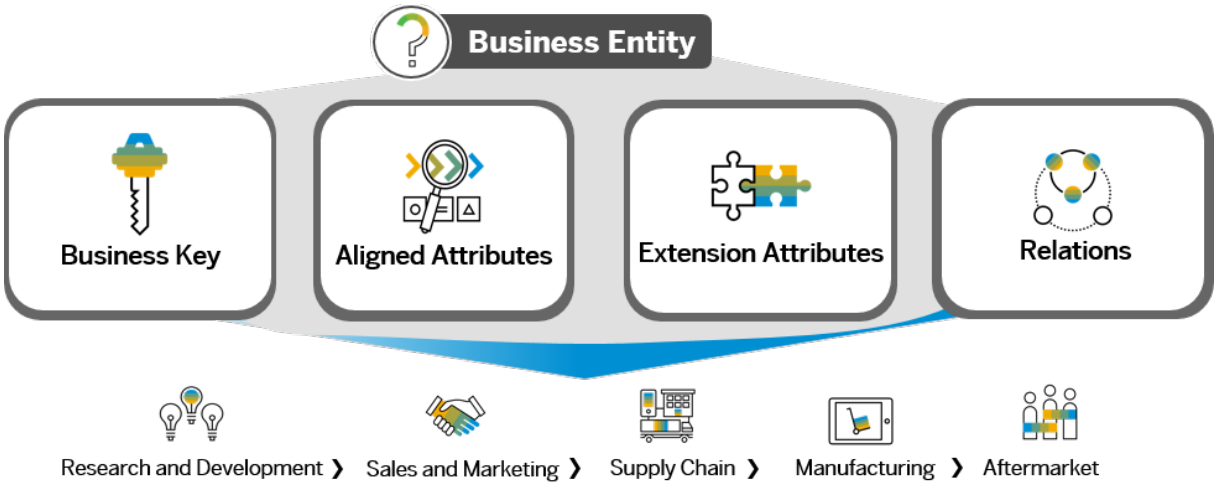
Business Entities

The Meta Domain Model supports certain business entities to enable process integration for various processes. It consists of a set of objects that belong together (material/BOM/document/change record/

change master/classification). A Domain Model entity enables the seamless exchange of product-relevant data for process integration by aligning business semantics across system boundaries. Thus, the Meta Domain Model provides a solid and reliable foundation for supporting harmonized business processes from design to operate.

The Meta Domain Model provides the following business entities that are required for all industries and business processes:

- ProductVersion
- DocumentVersion
- StructureVersion
- ChangeObject



Meta Domain Model - Core Concept

Business Key

The business key consists of:

- ID - The ID allows all process stakeholders to identify a business entity across the lifecycle.
- Version - The version allows all process stakeholders to uniquely identify an object depended of a business entity lifecycle.
- Type – The type allows all process stakeholder to understand the semantic subtype of a business entity.

Aligned Attributes

This is a defined set of attributes that are common for each business entity and independent of system, domain, and process.

Extension Attributes

Not all attributes of a business entity are common or can be aligned across systems and domains in general. However, based on your needs, it may be possible that you need to exchange information from one domain to another. The extension attributes cater for this requirement and support exchanging additional sets of information.

Relations

Relations are used to describe connections between business entities. The integration orchestrates and manages relations between the business entities to feed and enable proper usage.

Extensibility

You can use extensibility to transfer local attributes, which are customer-specific and relevant, for example, for data replication. This data is typically stored in the SAP classification system, but can be mapped to standard SAP attributes in a customer-specific manner. For every entity (for example, product versions, structure versions), additional fields can be added to the standard attributes using a simple key/value table. Extension fields can be used to enhance the standard processing of the integration. The sender specifies in the configuration which fields are transferred for which objects. The receiver on the other hand specifies where this data is stored (for example, additional standard/customer fields, classification).

For several fields, field values can be aligned between the systems. For other fields, codes are mapped in a pre-defined way (for example, material type).

- *Aligned Data Field* means that both systems use (as the default behavior) exactly the same value to exchange data; there's no need to perform a dedicated value mapping (for example, units of measurement in ISO format).
- *Aligned Code List* means that the values are mapped, and that a set of values is preconfigured. You can enhance this value mapping when necessary.

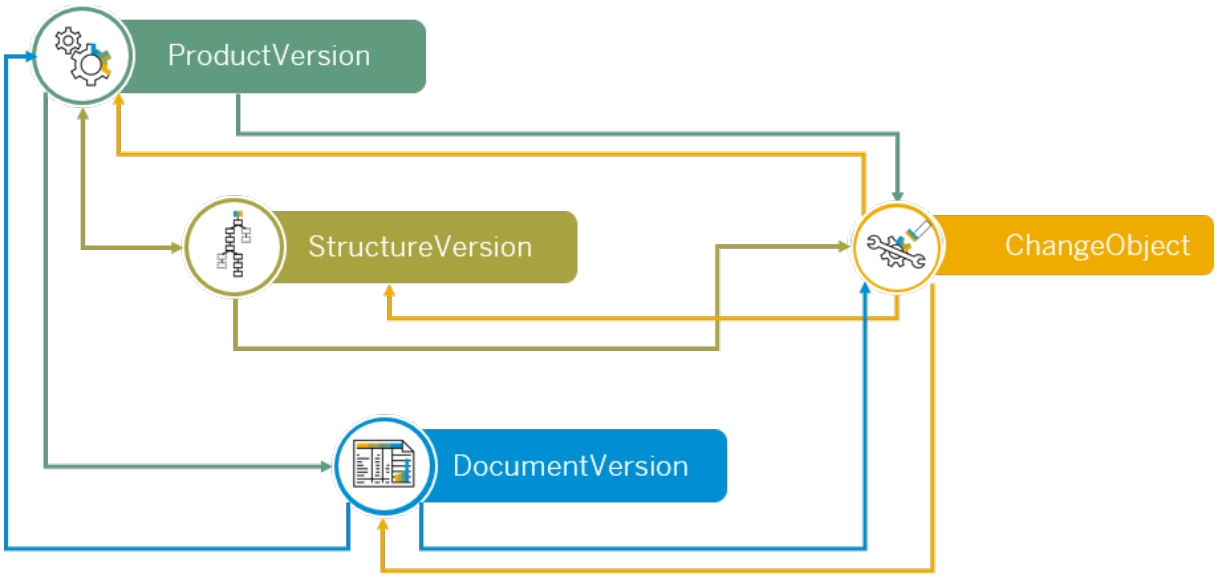
For more information, see the chapter *Define Domain Model Code Lists* in the *Configuration Guide for* PLM system integration for SAP ERP.

An integration process is triggered either by a **process** (for example, by a workflow started in the external system or the SAP system) or by a **user** (for example, manually by a menu function in the external system). It can also be triggered automatically via a data federation UI).

> **i** Note
>
> During data federation between Siemens Teamcenter and SAP ERP, the data isn't persisted in the Siemens Teamcenter system. For more information on data federation, see the *Teamcenter Gateway for PLM system integration by SAP - Generic Configuration Guide*, available on the Siemens Support Center website.

4.2 Main Relations of Business Entities

This chapter outlines the main business entity relations that are supported by an integration between Siemens Teamcenter and SAP ERP.



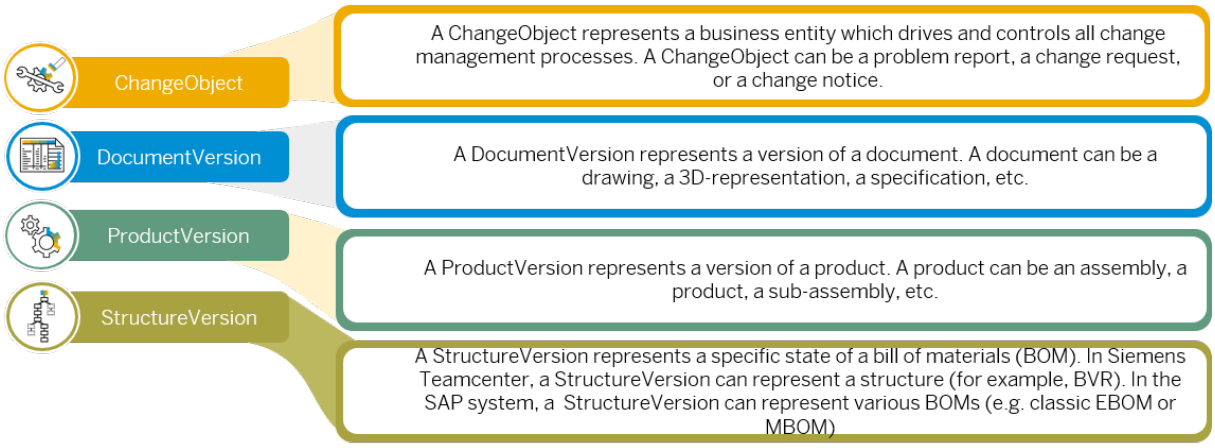
Meta Domain Model - Main Relations of Business Entities

An integration between Siemens Teamcenter and SAP ERP supports the following business entity relations:

- ProductVersion relates to
  - ChangeObject
  - DocumentVersion(s)
- DocumentVersion relates to
  - ChangeObject
  - ProductVersion(s)
- StructureVersion relates to
  - ProductVersion (as header)
  - ProductVersions (as components)
  - ChangeObject
- ChangeObject relates to
  - DocumentVersion
  - ProductVersion
  - StructureVersion

4.3 Supported Business Entities

The model provides the following business entities that are required for all industries and business processes:



Meta Domain Model - Supported Business Entities

Related Information

Supported Business Scenarios [page 16]

4.3.1 Supported Entities for the Integration Between Siemens Teamcenter and SAP S/4HANASAP ERP

The following use cases provide an overview of the different meta domain model entities supported for Siemens Teamcenter.

Meta Domain Model Entity: ChangeObject

A ChangeObject represents a business entity that drives and controls all change management processes. A ChangeObject can represent a problem report, a change request, and a change notice.



Meta Domain Model Entity: ChangeObject

Meta Domain Model Entity: DocumentVersion

A DocumentVersion represents a document version. Within Siemens Teamcenter, a DocumentVersion can represent any item type (for example: design, document). Within the SAP system, a DocumentVersion represents a specific document info record.



Meta Domain Model Entity: DocumentVersion

Meta Domain Model Entity: ProductVersion

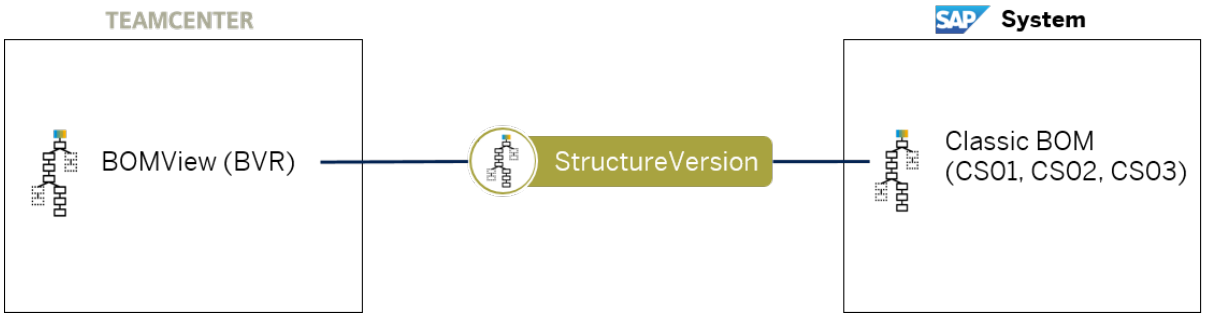
A ProductVersion represents a version of a product. A product can be an assembly, a product, a subassembly, and so on.



Meta Domain Model Entity: ProductVersion

Meta Domain Model Entity: StructureVersion

A StructureVersion represents a specific state of a bill of materials. A bill of materials describes the list of components that are necessary to build the final product.



Meta Domain Model Entity: StructureVersion

5 About the Integration Between Siemens Teamcenter and SAP ERP

This section provides an overview of the integration between Siemens Teamcenter and SAP ERP, based on a joint installation of PLM system integration for SAP ERP (PLMSI) and T4ST.

Product Information and Compatibility

For information on supported product versions of SAP ERP and Siemens Teamcenter as well as the required technical components and their compatibility, see the respective SAP Notes that are mentioned in Overview of Required SAP Notes [page 7]. Also, refer to the Active Integration Gateway Compatibility Matrix provided in the *Teamcenter Gateway for PLM system integration by SAP - Installation Guide*.

Use

An integration between Siemens Teamcenter and SAP ERP helps you to streamline your product development processes in a diverse system landscape. It helps to integrate your existing Siemens Teamcenter data management systems flexibly and brings design data into the SAP Product Lifecycle Management application early on.

The integration enables the smooth exchange of product-relevant data as part of process integration. An aligned Meta Domain Model provides standardized interfaces to simplify the integration. Relevant aspects of the configuration and foundational master data (for example, classification, units of measurement, pick lists, and so on) are exchanged between the Siemens Teamcenter system and the SAP system. SAP master data, like materials and bills of materials, and SAP documents are automatically created and triggered by data transfer from the external PLM system.

Furthermore, the integration enables you to monitor and troubleshoot the data transfer at technical and business level. It also adapts data mapping without coding.

Data Model

An aligned Meta Domain Model between the SAP and Siemens Teamcenter system is foundational to the integration as an intermediate layer. It's an abstraction of the data that needs to be exchanged between Siemens Teamcenter and SAP ERP.

The Meta Domain Model sets the foundation for traceability, federation, and linkage across system boundaries, focusing on processes and data transfer from product development to the SAP system. These are its main features:

- Creation of material masters in SAP based on business semantics
- Transfer of material classification information to enable a consistent information flow
- Creation of document info records in the SAP system
- Transfer of bill of materials to the SAP system
- Engineering change triggered in Siemens Teamcenter
- Data federation for product version and document version data within Siemens Teamcenter

5.1 Supported Business Scenarios

An integration between Siemens Teamcenter and SAP ERP, based on a joint installation of PLM system integration for SAP ERP (PLMSI) and T4ST supports a variety of business scenarios.

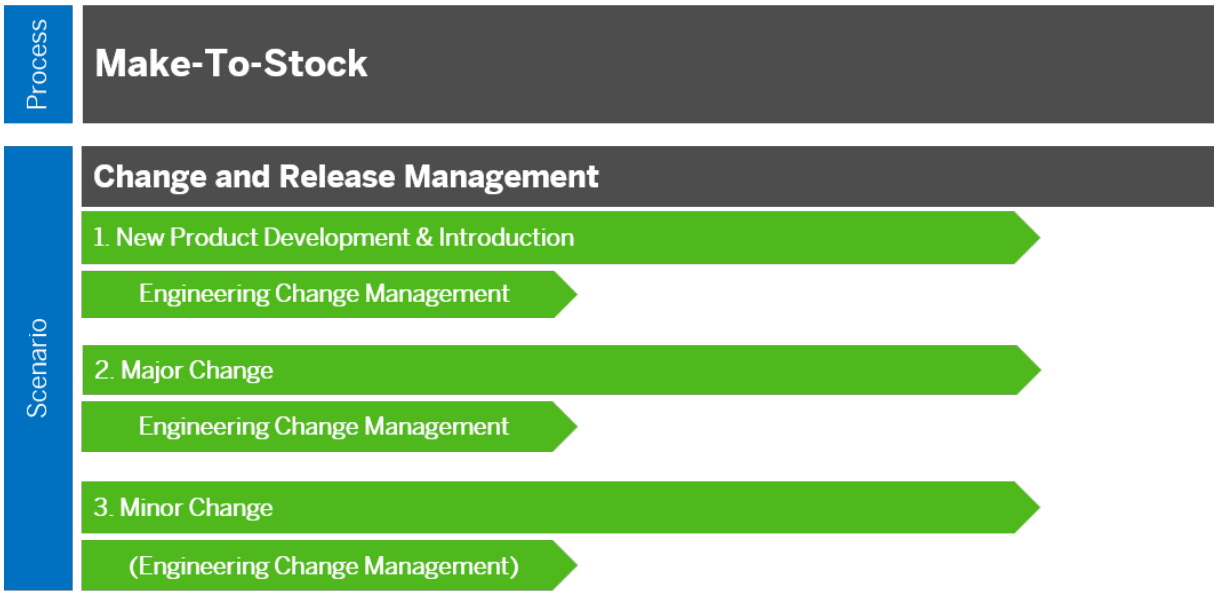
> **i** Note
>
> The outlined scenarios serve as an example. Processes can be configured depending on business needs.

In general, the integration supports the end-to-end business process **Make-to-Stock**.

The integration supports the following change management scenarios:

- New Product DevelopCDO:/content/authoring/Inp1614817176316.ditamapment & Introduction (NPDI)
- Major Change
- Minor Change
- Formal Change

Compared to the Major Change scenario, New Product Development & Introduction (NPDI) supports additional steps in the early development phase (such as developing high-level product structures, requirements, and others), depending on the corresponding roles and authorizations.



Supported Business Scenarios

All business scenarios comprise the following aspects:

Monitoring and Administration

- Common tools for error management, monitoring, and administration of the solution
- Secure system-to-system communication using standard means of authentication and authorization

Document Version Management

- Synchronized document management across the SAP system and Siemens Teamcenter
- Creation and update of document info records based on Siemens Teamcenter objects and storage in the SAP content management system

Product Version Management

- Creation and update of product (material) versions in the SAP system, triggered by corresponding events on item revisions in the Siemens Teamcenter system
- Effectivity and validity management from the Siemens Teamcenter system to the SAP system

Structure Version Management

- Transfer of product structures (Bill of Materials) from the Siemens Teamcenter system to the SAP system, including updates
- Support of all engineering disciplines (mechanical, electrical, software, piping, hydraulics, and so on)

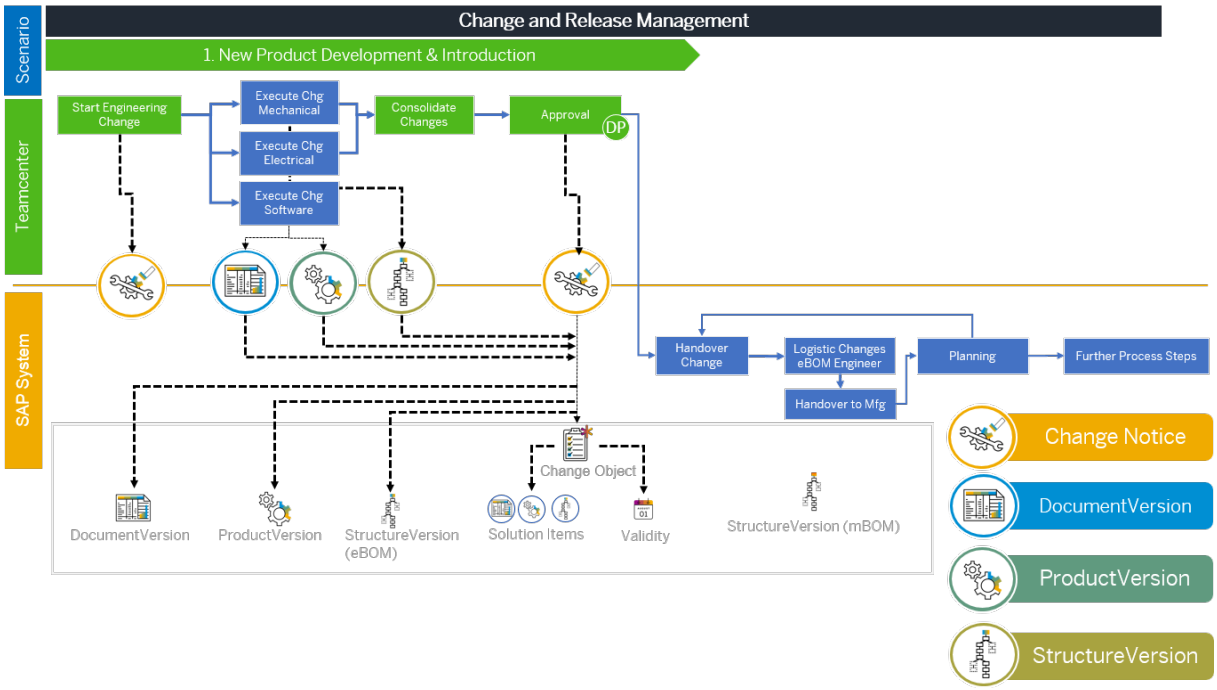
> **i** Note
>
> PLM system integration for SAP S/4HANA comprises two product version instances: *PLMSI Foundation (PLMSIFND 100)* and *PLMSI S/4 Extension (PLMSI 100)*. While you can install *PLMSI Foundation (PLMSIFND 100)* as an add-on to SAP S/4HANA 1809 or higher, *PLMSI S/4 Extension (PLMSI 100)* can only be installed as an add-on to SAP S/4HANA 2020 or higher. Long material numbers and long characteristic values are only available via *PLMSI S/4 Extension (PLMSI 100)*. We recommend to install *PLMSI S/4 Extension (PLMSI 100)* only if you need these features.

Related Information

Supported Business Scenarios [page 16]

5.1.1 New Product Development & Introduction (NPDI)

As an engineer working in Siemens Teamcenter, your data for a completely new product has reached a certain maturity level. You have gathered requirements, modular and functional structure data for a new product and the implantation is planned and distributed across the engineering teams.



NPDI Scenario - Change-Management-Driven

Compared to the Major Change scenario, New Product Development & Introduction (NPDI) supports additional steps in the early development phase (such as develop high-level product structure, develop requirements, and others). This depends on the corresponding roles and authorizations.

Detailed Process

1. In the Siemens Teamcenter system, a change notice is created to cluster all dependent changes together.
2. The R&D department implements the following mechanical, electrical, and software requirements:
   - Manage the transfer of products (parts) and product templates
   - Design new components, circuit boards, controllers, software
   - Release components, assemblies, and documents

3. The change notice is completed and approved in the Siemens Teamcenter system. This triggers the actual change on the business entities.
4. These business entities are transferred to the SAP system.
5. As a result, all related business entities of the type *Solution Item* are created, updated within the SAP system, and linked to the respective change number.

> **i Note**
>
> Within the EBOM scenario, the release date of the change notice is taken as the valid-from date of the SAP engineering change master.

6. The engineering artifacts are handed over to various departments to drive the Preproduction Approval Process (PPAP).
7. The product is handed over to manufacturing.

Technical Background

In the SAP system, the part revision from the Siemens Teamcenter system is created as a material master record as the leading object. Depending on the maintained settings, you may have to create additional SAP objects to represent the part revision. A change entity is used to inform downstream processes, for example purchasing, about this new engineering information.

> **i Note**
>
> Configure the interface properly for Engineering Change Management. Import content from the BC Set */PLMF/BCS_OVERALL* as required (see Installation Flow PLM System Integration for SAP ERP PLM system integration for SAP ERP [page 35]).

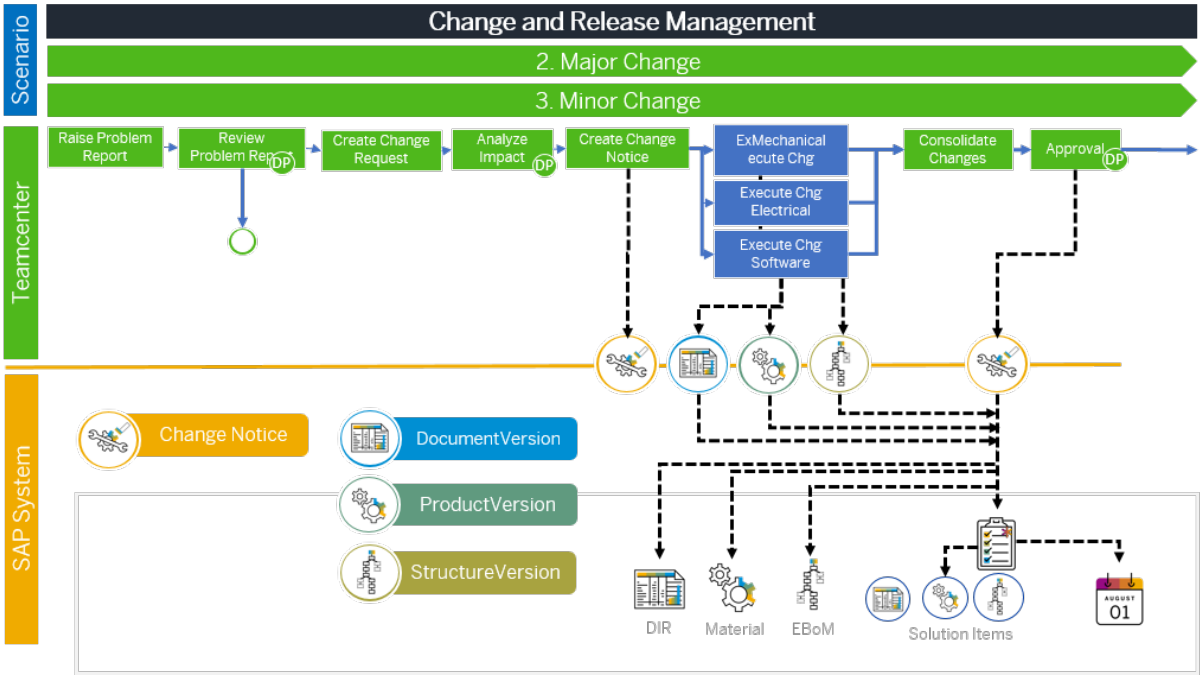
Related Information

Supported Business Scenarios [page 16]
Error Handling [page 53]

5.1.2 Major or Minor Change Triggered by Engineering

This chapter gives an overview of a major or minor change triggered by engineering.

This diagram shows the first steps in the process:



Major / Minor Change Triggered by Engineering - Part 1

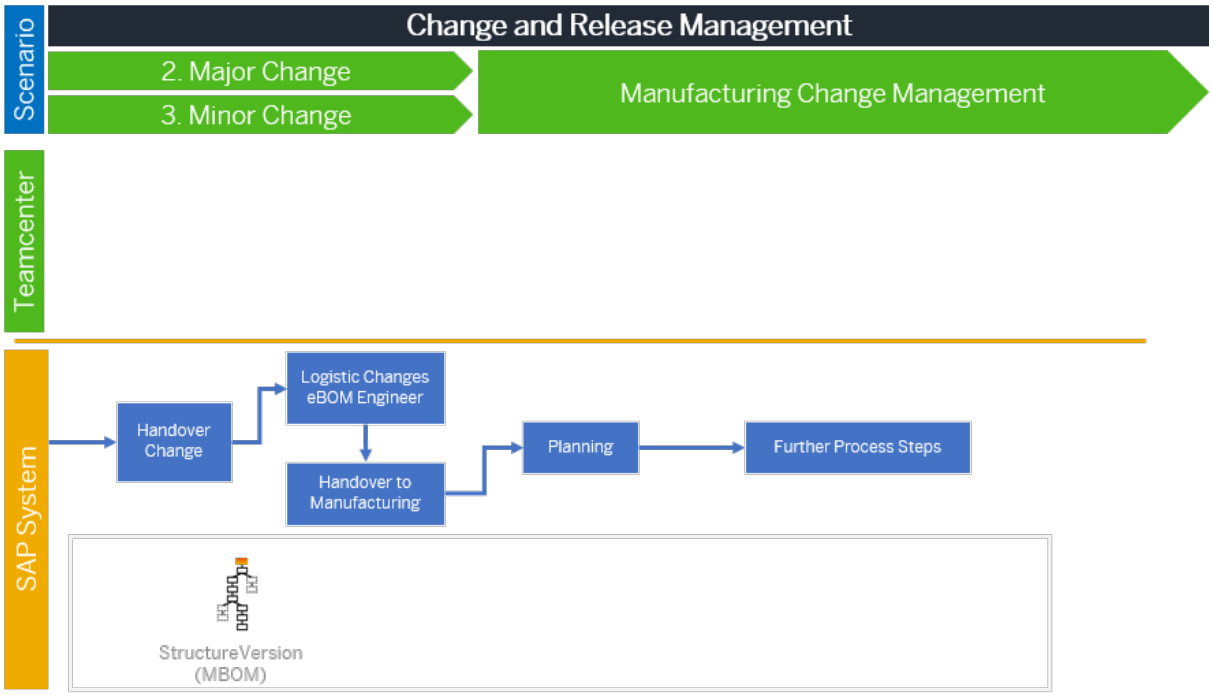
High-Level Process

1. A problem report is created to raise an issue with any business entity. The problem report is analyzed and as a result, the problem report is either closed or a change request is opened.
2. A change request is created; it refers to one or several problem reports. In the change request, the problem is analyzed in detail and the impact of various solution alternatives is accessed. This can include the following, exemplary assessments:
   - Alternative and proposed solution
   - Recurring cost
   - Nonrecurring cost
   - Technical recommendation
   - Test results attached
   - Technical recommendation date
   - Timing factors

   Based on the assessment, a decision is made whether to implement a solution and what that solution is.
3. The creation of a change notice triggers the actual change to the business entities.
4. After completion and approval of the change notice in Siemens Teamcenter, the integration transfers the business entities to the SAP System.

This diagram shows the remaining steps of the process:

Major / Minor Change Triggered by Engineering - Part 2



5. The engineering artifacts are handed over to various departments to drive the Production Part Approval Process (PPAP) and the product is handed over to manufacturing.

Result

All related business entities of type solution items are created, updated within the SAP system, and linked to the respective change number.

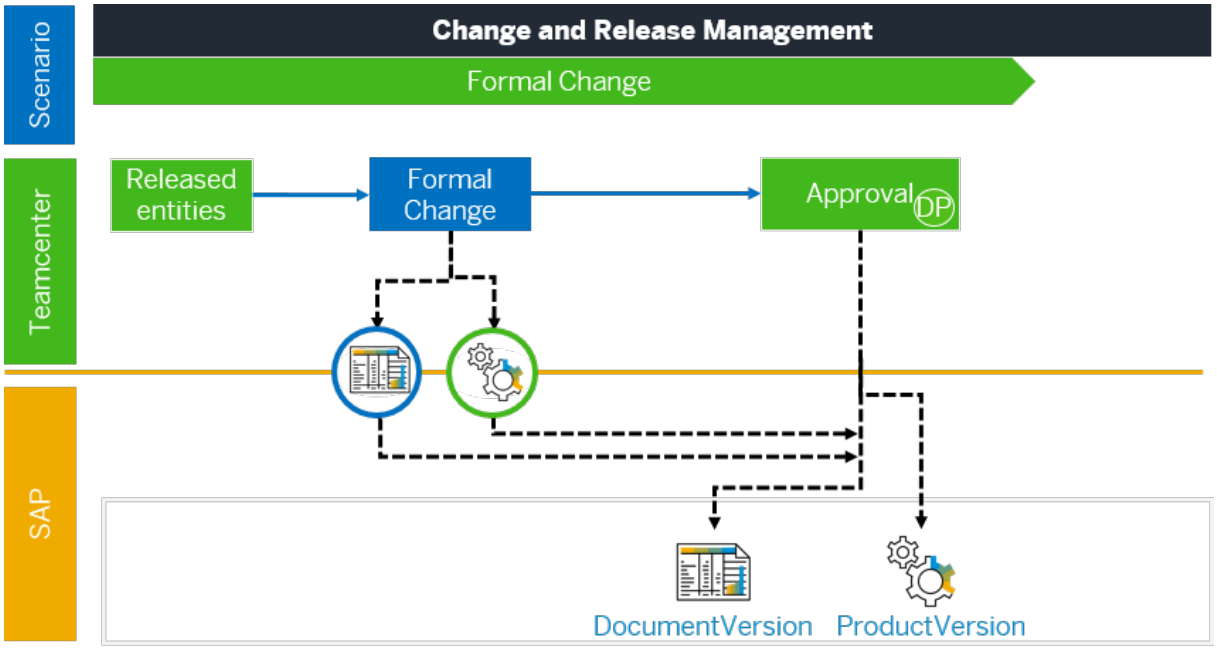
> **i** Note
>
> Within the EBOM scenario, the release date of the change notice is taken as the valid-from date of the SAP engineering change master.

5.1.3 Formal Change

A formal change allows to update already released ProductVersions and DocumentVersions. The integration allows meta data changes on already released and locked entities to make possible updates, for example, typos or missing annotations in a drawing.

Structure version transfers aren't included as structure changes aren't considered as formal changes.

> **i** Note
>
> In general, all product changes must follow a standardized major / minor changes process at respective gates and milestones.



Formal Change

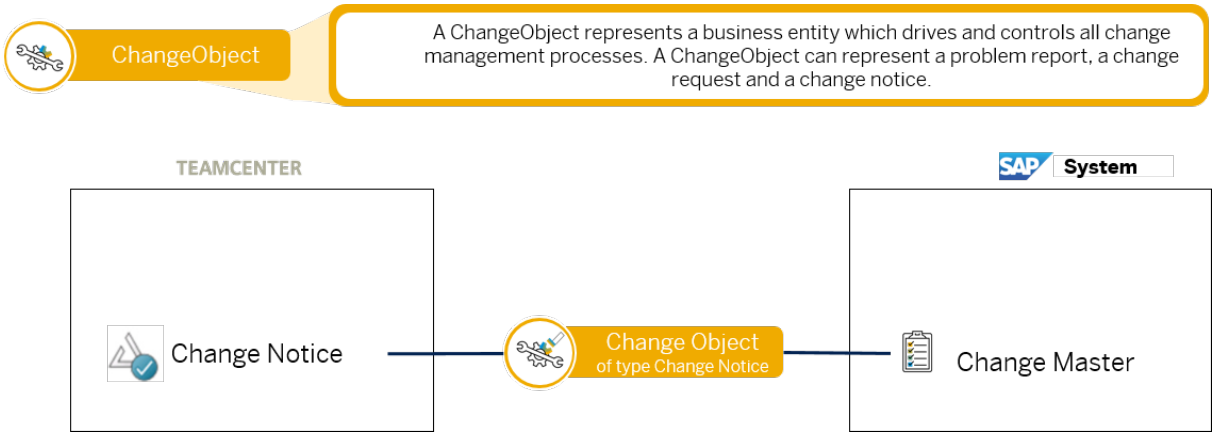
5.1.4 Siemens Teamcenter as Enterprise PLM System

As part of this solution architecture, Siemens Teamcenter acts as the central enterprise PLM system where all product data is specified.

In this scenario, all relevant product-related assets are transferred from Siemens Teamcenter to the SAP system.

5.1.4.1 Transferring Change Object to SAP

> **i Note**
>
> The engineering change master only supports one valid-from date. Alternative dates aren't supported. All attached business entities receive the same validity. This scenario supports the transfer of solution items from the Siemens Teamcenter system to the SAP system.



Domain Model Entity: ChangeObject

High-Level Process

1. A problem report is created to raise an issue with any business entity.
2. The problem report gets analyzed and as a result, it's either closed or a change request is opened.
3. The change request can refer to one or several problem reports. Within the change request, the problem gets analyzed in detail and the impact of various solution alternatives is accessed. Assessments can include the following:
   - Alternative and proposed solution
   - Recurring cost
   - Nonrecurring cost
   - Technical recommendation
   - Test results attached
   - Technical recommendation date
   - Timing factors

   Based on the assessment, a solution is chosen for implementation.
4. The creation of a change notice triggers the actual change on the business entities.

Related Information

Meta Domain Model - Core Concept [page 8]
Supported Business Entities [page 12]

5.1.4.2 Transferring Document Version to SAP

Document Management allows product development to create document info records in the SAP system based on business semantics.

This improves transparency across different domains by sharing information between the engineering department and the extended supply chain.

Prerequisites

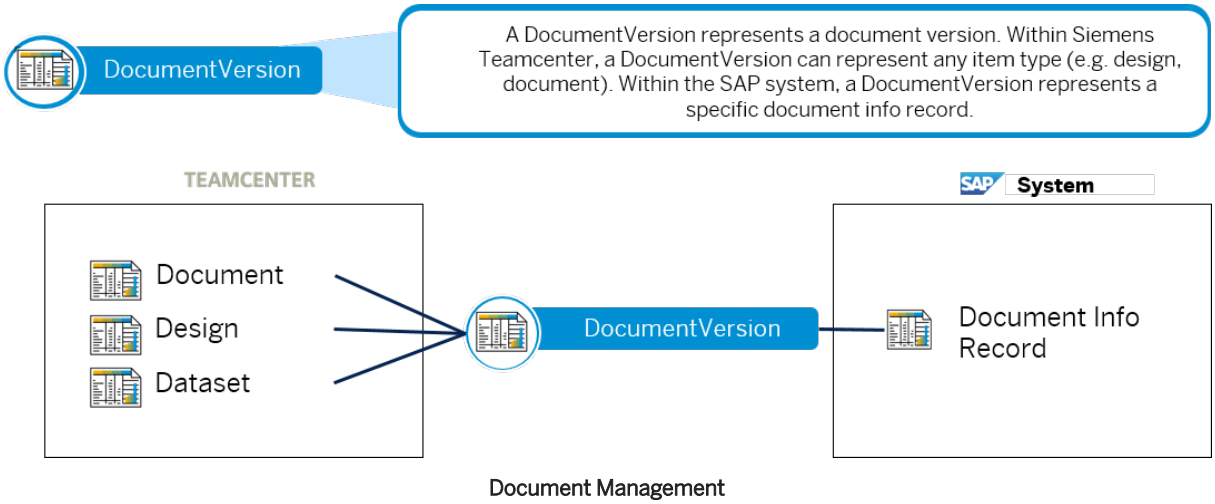
Make sure that the SAP Content Server is set up. For more details, see Installing the SAP Content Server [page 37].

Use

You can do the following:

- Create and update document info records based on Siemens Teamcenter objects and their business semantics
- Access and use 3D visual data
- To drive subsequent logistic processes, create engineering documents

> **i Note**
>
> Documents that were created in the Siemens Teamcenter system can be created in the SAP system directly in the *Released* status, even if this possibility isn't enabled in the status network of the document type. The following checks are disabled:
>
> - Status network checks
> - Check for digital signature
> - Check for mandatory fields



Document Management

When sending a document version from the Teamcenter system to the SAP system, the respective files are uploaded directly to the SAP Content Server. The system generates a URL whenever a document version is created or updated, and when new or existing files are transferred.

Relation of Document Version and Product Version

You can model a reliable and consistent relation between a product version and a design document. You can configure the following option:

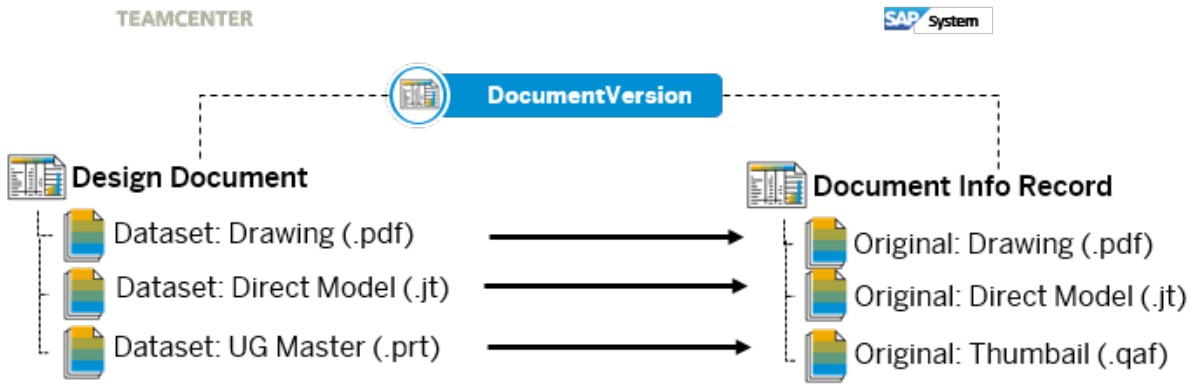
- **Independent lifecycle:** Document assignments for documents with their own lifecycle. Such documents can be assigned to several SAP products and objects. Their validity in terms of time and version is regulated independently of the product. There are no dependencies or checks in the integration.

For more information on Document Management, browse for *Document Management* and *SAP Content Server* on the SAP Help Portal

5.1.4.2.1 Document Management - Original Handling

An integration between Siemens Teamcenter and SAP ERP allows you to transfer datasets to SAP Document Management System.

You can configure the transfer-relevant dataset types.



Document Management - Original Handling

Prerequisites

The SAP Visual Enterprise Generator has been set up correctly. For installation and setup information, refer to the implementation documentation of the SAP Visual Enterprise Generator.

There's a 1:1 relationship between a transferred design document and the SAP document info record.

Configure transferred datasets as the systems generally only exchange neutral formats.

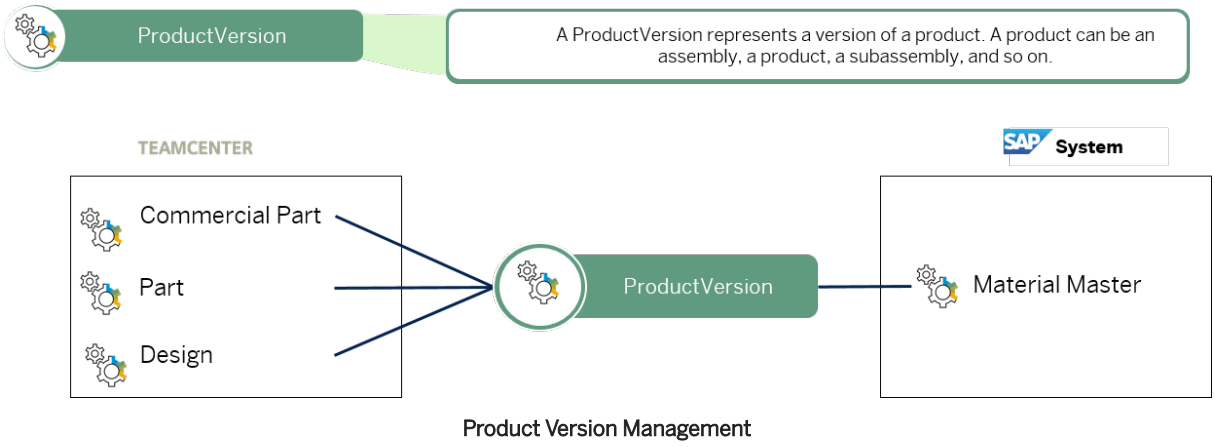
The creation of SAP viewing formats is handled by the standard *DMS Integration with SAP 3D Visual Enterprise Generator*. (This requires an additional product / license.) For more information, browse for *Document Management* in the SAP Help Portal.

5.1.5 Transferring Product Version to SAP

This chapter outlines the details of product version (material) management.

Advanced material management allows product development to create material masters in the SAP system, based on business semantics. This improves transparency across different domains by sharing information between the engineering department and the extended supply chain. The integration allows to link Teamcenter item revisions semantically to one or multiple SAP material masters.

> **i Note**
>
> The integration doesn't introduce an SAP material version in SAP. Please refer to chapter Version Management – Revision Level Scenario [page 26] to get an overview of how item revisions are represented.



Product Version Management

5.1.5.1 Version Management – Revision Level Scenario

This chapter gives a detailed view of version management and the revision level scenario.



Version Management - Revision Level Scenario

The integration doesn't introduce an SAP material version in SAP.

By default an item master in the Siemens Teamcenter system is represented by one SAP material master. However, this can be changed based on the configuration of the integration. Example: The integration also allows for the creation of a dedicated SAP material master for each item revision in Siemens Teamcenter.

You can create several SAP material revisions per ProductVersion Meta Domain Model entity. This setting can be changed based on the ProductVersion type.

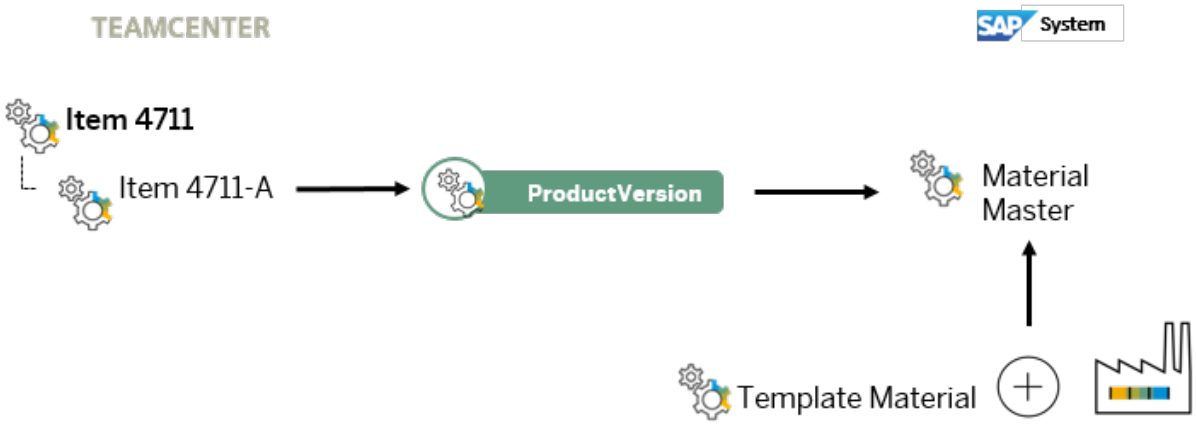
If revision level creation is activated, you can use the following two methods to create the required SAP ECM:

- The ProductVersion is sent as a solution item of a ChangeObject: the system uses the SAP ECM that is linked to the ChangeObject in order to create the SAP material master revision level.
- The ProductVersion is sent without reference to a ChangeObject: The integration creates a dedicated SAP ECM as the respective ECM change profile is used to create the SAP ECM.

.

5.1.5.2 Creating a Product Version Based on a Customized Template Product Version

This chapter outlines the creation of a product version based on a product version template derived from Customizing.



Creating a Product Version Based on a Customized Template Product Version

In the SAP system, you can define a reference product as a template for a certain product type, for example *Finished Product*. This template will be used during product creation in the SAP system.

You can customize product version templates in Customizing. For more information, see Define Product Version.

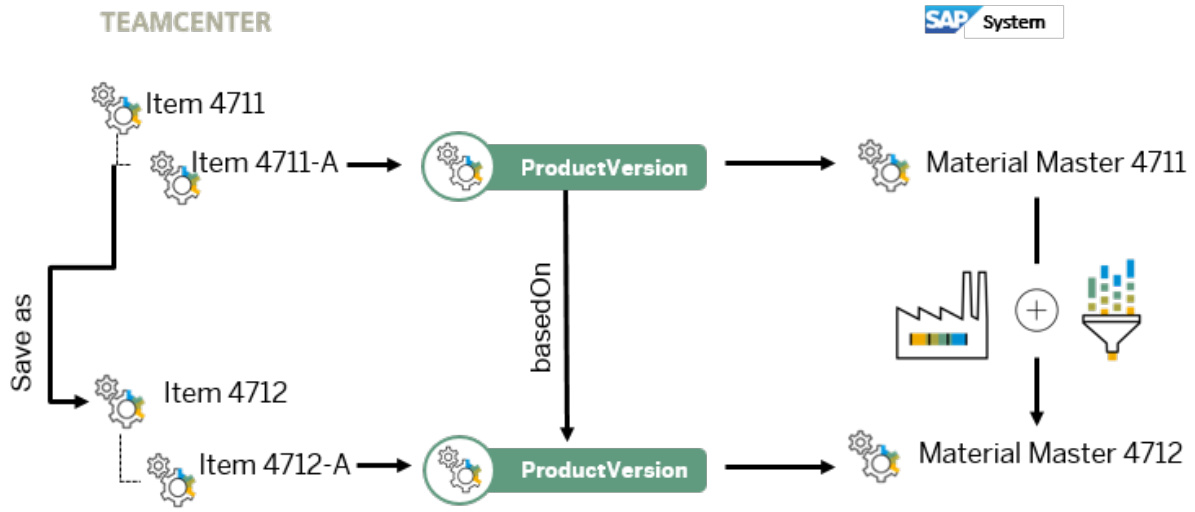
Process Flow

1. Releasing a product version in the Siemens Teamcenter system and sending it to the SAP system creates a corresponding material master in the SAP system.
2. If a template product (material) has been maintained for this specific product version type, this template product (material) is used as a reference product (material):
   - If the following data hasn't been created in the Siemens Teamcenter system, the SAP system will use the data from the following views from the template: basic, material requirements planning (MRP), purchasing, storage, costing, quality management, and work scheduling.
   - If this data is sent as part of the incoming product data from the Siemens Teamcenter system, the sent data will replace the template data. Only data from the basic view can be sent to the SAP system.

   You can overwrite the template material ID in the client.
3. If the data is updated later in the Siemens Teamcenter system, newly transferred information from the Siemens Teamcenter system overrules the information present in the SAP system.

5.1.5.3 Creating a Product Version Based on an Existing Product Version from the Meta Domain Model

This chapter outlines the creation of a product version based on a product version template derived from the Meta Domain Model (DM product version).



ProductVersion Based on Existing Product Version from the Meta Domain Model

As an alternative to using a customized product version template, you can also use an existing product version from the Meta Domain Model as a template in the SAP system.

Prerequisites

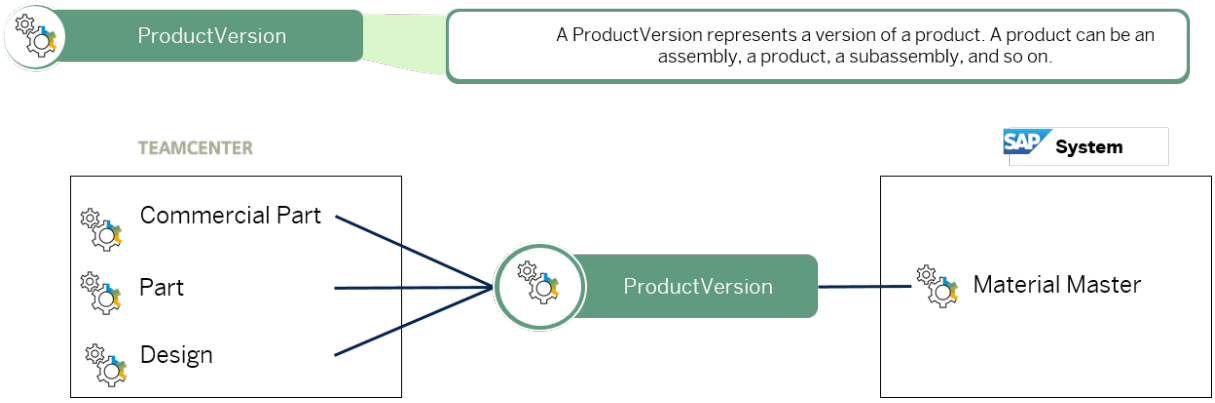
The product version that is used as a template (based-on material) has been created in Siemens Teamcenter and sent to the SAP system.

Process Flow

1. When a product version is released in the Siemens Teamcenter system and sent to the SAP system for creation, a corresponding material master is created in the SAP system.
2. If the product version is created based on a previously transferred product version, the corresponding product (material) is used as a reference product:
   - If the following data hasn't been created in the Siemens Teamcenter system, the SAP system will use the data from the following views from the template: basic, material requirements planning (MRP), purchasing, storage, costing, quality management, and work scheduling.
   - If this data is sent as part of the incoming product data from the Siemens Teamcenter system, the sent data will replace the data from the reference product. Only data from the basic view can be sent to the SAP system.
3. If you would like to use additional data, for example from the costing view, you need to enhance this data in the SAP system, using transaction `MM01`.
4. The based-on relation is derived from the save-as operations in the Siemens Teamcenter system. If the data is updated later in the Siemens Teamcenter system, newly transferred information from the Siemens Teamcenter system overrules the information present in the SAP system.

5.1.6 Transferring Structure Version to SAP

Advanced Structure Version (Bill of Materials) Management allows you to maintain bills of materials in the SAP system based on business semantics.



Domain Model - Structure Version

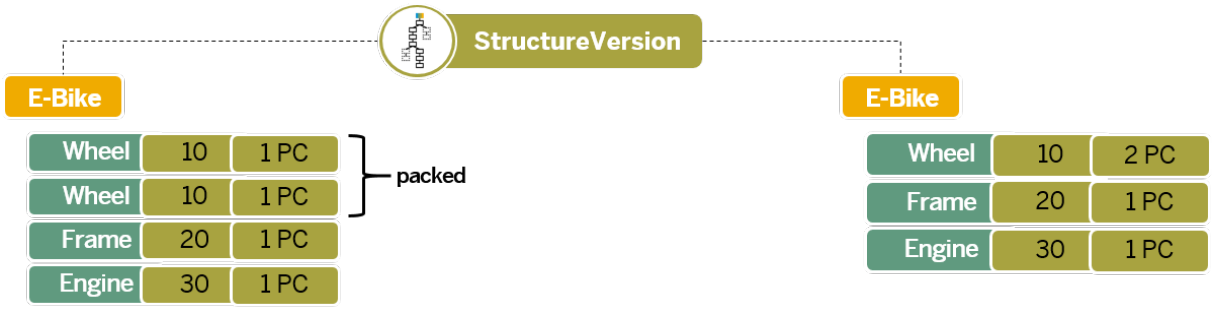
An integration between Siemens Teamcenter and SAP ERP enables you to maintain bills of material within the SAP system, based on business semantics. This improves transparency across different domains by sharing information between engineering and the extended supply chain.

With structure version management, you can do the following:

- Maintain bills of material based on the classic SAP enterprise-level Bill of Material
- Use date effectivity

5.1.6.1 Structure Version - Quantity-Based

This chapter outlines the quantity-based structure version.



Structure Version - Quantity-Based

The integration can control how a BOM is transferred from Siemens Teamcenter to the SAP system. Depending on your process needs, you can decide if you want to transfer distinct occurrences with all related attributes or if you want to group components with the same ID and same find number.

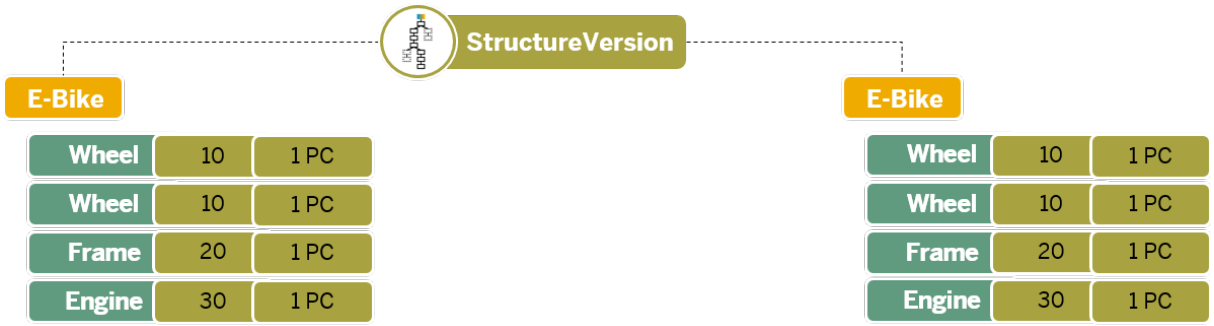
Example

The same component (wheel) has two occurrences with the same position number in the BOM. Each occurrence has a quantity of 1 piece. By using the quantity or packed transfer approach, the Meta Domain Model of the StructureVersion contains only one line for the component (wheel). The quantity of all occurrences is aggregated and therefore results in a quantity of 2 in the outlined example.

As multiple occurrences are reduced to one combined BOM line, there's a risk that occurrence-specific information are lost, for example, if different reference designators are assigned.

5.1.6.2 Structure Version - Instance-Based Without Grouping

This chapter outlines the instance-based structure version without grouping.



Structure Version - Instance-Based Without Grouping

The integration can control how a BOM is transferred from Siemens Teamcenter to the SAP system. Depending on your process needs, you can decide if you want to transfer distinct occurrences with all related attributes or if you want to group components with the same ID and same find number.

Example

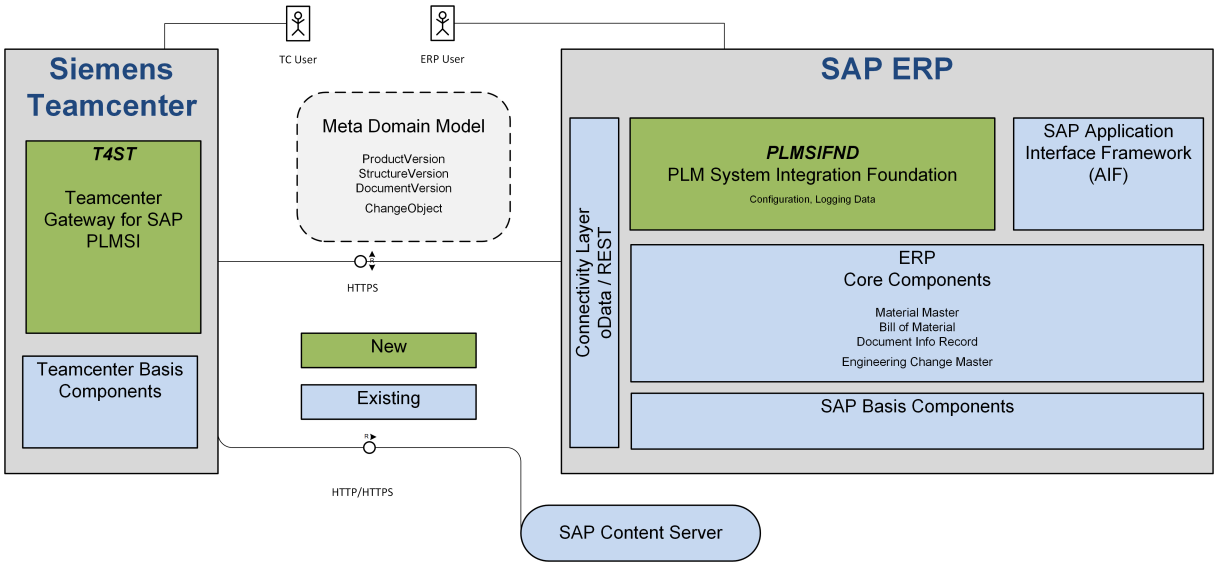
The same component (wheel) has two occurrences with the same position number in the BOM. Each occurrence has a quantity of 1 piece. By using the instance-based or packed transfer approach, the Meta Domain Model of the StructureVersion contains only one line for the component (wheel). The quantity of all occurrences corresponds to the maintained quantity in the Siemens Teamcenter system.

6 Possible System Architecture

This section outlines a possible system architecture for an integration between Siemens Teamcenter and SAP ERP. It outlines the technical system landscape, the software components, the interfaces, and the objects involved.

The architecture consists of two parts: the external PLM system side and the SAP side, with the corresponding integration components. This chapter describes the architecture on a high level.

High-Level System Architecture



The integration between SAP ERP and the external PLM system Siemens Teamcenter is based on a common data model: the *Meta Domain Model*. The solution offers full flexibility to implement the desired digital processes, facilitates migration, and enables the creation of a Digital Thread. It offers an easier setup and configuration of the integration for various Supported Business Scenarios [page 16].

- Support of synchronous calls
- Direct feedback communication between the systems (for example, confirmation of database entries)
- Ability to connect an external PLM system to SAP systems

The configuration controls which scenario is selected (based on a list of pre-defined scenarios), which key and value mappings are to be used on which fields, and which fixed values (for example, material industry sector, default document type, default class for documents, and so on) are used. A scenario defines the semantic model on the SAP side, as well as how the Meta Domain Model and the business processes are implemented in the SAP system. A default mapping of standard attributes is done automatically (defined by the scenario), other attributes can be mapped to characteristics of the assigned document (configurable), and user-defined mappings can be created.

Related Information

Meta Domain Model - Core Concept [page 8]

7 Installing PLM System Integration for SAP ERP

This section provides information about how to prepare for installation and what to do before and after the installation of the ABAP component PLM system integration for SAP ERP.

Target Audience

- Technology consultants
- System administrators

> ! Restriction
>
> This guide provides you with the main application-specific installation and configuration steps. The installation and configuration of underlying platforms, including software components contained there, aren't described here. Also, if you want to use this component jointly with other components to enable certain integration scenarios, you'll need to install those components, too, as required.

Prerequisites

You have an SAP ERP system as well as the external PLM system in place.

> i Note
>
> Make sure that the SAP Content Server is up and running for your SAP ERP system. You can check this using transaction `CSADMIN`. For installation information, see Installing the SAP Content Server [page 37]. For Content Server security, see SAP Content Server Security [page 45].

Use Case: Joint Installation of the Integration Components for Siemens Teamcenter and SAP ERP

Installation of Technical Components

PLM system integration for SAP ERP comprises several software components that you need to install (see Installation Flow PLM System Integration for SAP ERP PLM system integration for SAP ERP [page 35]).

> i Note
>
> If you install these components jointly with other systems and components, you need to make sure to install a valid combination of system and component versions. For information on compatible component

versions of PLM system integration for SAP ERP and SAP systems, browse for PLM system integration for SAP ERP in the SAP Product Availability Matrix.

For comprehensive information on the compatibility of Siemens Teamcenter with other solutions, refer to the Siemens Teamcenter Compatibility Matrix, available via the Siemens Support Center website.

All components must have the version as indicated here, including support package and hotfix versions, in order for SAP Teamcenter integration to install and run.

Unless specified otherwise, always install the latest support package (SP) of the components.

To install the components, please make sure that you have read the sizing and knowledge requirements and that you meet the system prerequisites. Then follow the steps outlined **in the given order**.

> **i** Note
>
> If you install PLM system integration for SAP ERP for the first time, you do not need to install any prior versions.

PLM system integration for SAP ERP integrates data from a Siemens Teamcenter system into an SAP system. The Teamcenter Gateway for PLM system integration by SAP (T4ST) reads data from Siemens Teamcenter and processes the transmitted data, ensures persistence and monitoring, and creates or updates SAP objects.

Installation of the ABAP Component of PLM system integration for SAP ERP in the SAP System

The following SAP notes contain all necessary information to install the PLM system integration for SAP ERP add-on:

3077764: Release Strategy and Maintenance Information for the ABAP add-on PLMSIFND 100

Installation of Teamcenter Gateway for PLM system integration by SAP (T4ST) in the Siemens Teamcenter System

The installation documentation for T4ST is accessible via the Siemens Support Portal. For detailed information on the installation requirements and process within Siemens, browse for *T4ST*.

Related Information

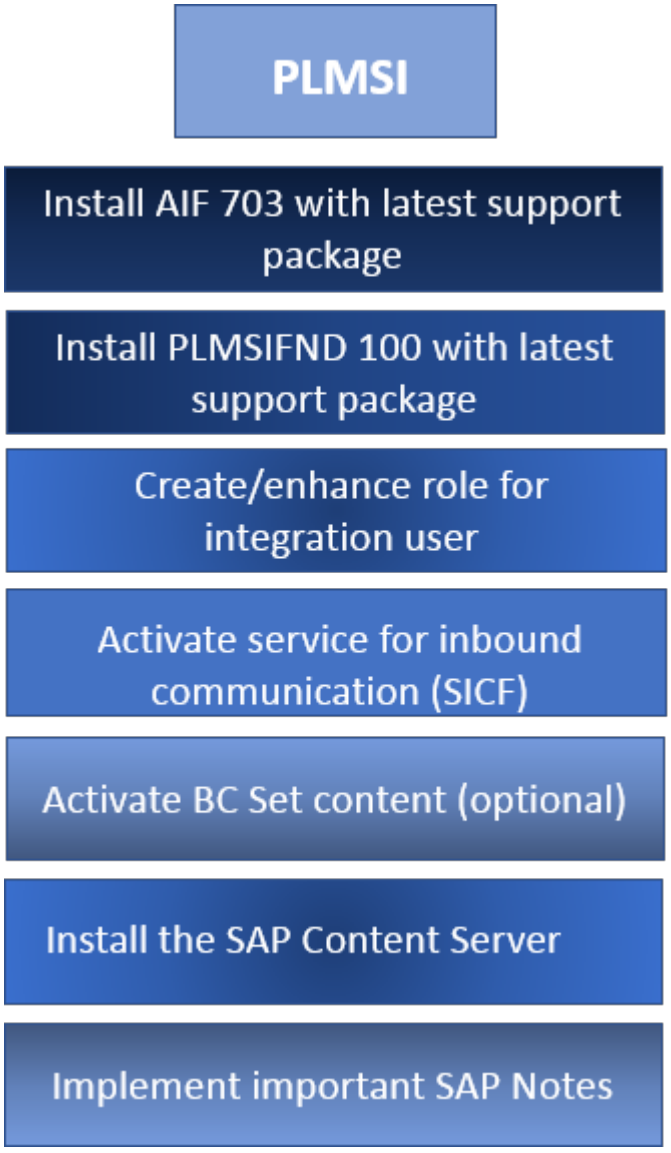
Overview of Required SAP Notes [page 7]

7.1 Installation Flow PLM System Integration for SAP ERP PLM system integration for SAP ERP

This chapter outlines the order in which to carry out the various installation steps for the integration of the external PLM system with your SAP system.

Installation and Initial Setup

To ensure proper data flow, authorization setup, and security, carry out the steps *in the following order*:



Installation Flow

Installing PLMSI
1. Install AIF 703 with the latest support package: See the *Master and Upgrade Guide for SAP Application Interface Framework* in the SAP Help Portal. The following interfaces are specific for the integration: • `PLMF CO Interface (Change Object)` • `PLMF DV Interface (Document Version)` • `PLMF FC Interface (File Confirmation)` • `PLMF PV Interface (Document Version)` • `PLMF SV Interface (Structure Version)`
2. Install PLMSIFND 100 with latest support package. Make sure that the latest support package is installed for AIF 703 as well as PLMSIFND 100. See SAP Note 3077764: *Release Strategy and Maintenance Information for the ABAP add-on PLMSIFND 100*. Also, read the essential SAP Notes as outlined in Overview of Required SAP Notes [page 7] before you start the installation or upgrade.
3. Verify if the service for inbound communication from the external PLM system to the SAP system is active: In Customizing, use transaction *SICF* and navigate to *default_host/sap/bc/rest/plmf/plmsi/0001*. If the service isn't active, activate it via right-click.
4. Create/enhance the necessary user roles: In your SAP system, use transaction `PFCG` to create and enhance the necessary roles, based on the role templates provided for the integration. Then, use transaction `SU01` to create the technical users with the appropriate roles. For more information, see the chapters User Management [page 42] and Standard Role Templates [page 43] in this guide. Moreover, you need to configure the system for data transfer (inbound) and data federation (outbound). For more information, see the information on outbound field mapping in the chapter *PLMSI configuration* in the *Configuration Guide* for this product.
5. If necessary, activate the provided BC sets via transaction `SCPR20`. For more information, see the chapter *Initial Configuration* in the *Configuration Guide* for this product. We recommend that you either activate the complete default configuration (*BC-Set /PLMF/BCS_OVERALL*), or minimal configuration (*BC-Set /PLMF/BCS_GS* and */PLMF/BCS_AIF*).
6. Install the SAP Content Server (if not yet installed) or use the integrated repository (for testing only). Enter the content repository in the Customizing activity *Define Document Version*. For more information, see the chapter *Initial Configuration* in the *Configuration Guide* for this product. For more information on installing the SAP Content Server, see Installing the SAP Content Server [page 37].
7. Implement all important SAP Notes for the integration, as listed in chapter Overview of Required SAP Notes [page 7].

Use Case: Joint Installation of the Integration Components for Siemens Teamcenter and SAP ERP

> **i Note**
>
> If you install the components above jointly with *Teamcenter Gateway for PLM system integration by SAP (T4ST)*, you need to make sure to install a valid combination of component versions. All components must have the version as indicated here, including support package and hotfix versions, in order for SAP Teamcenter integration to install and run. Verify that you have read all important SAP Notes and implement them as required (see Overview of Required SAP Notes [page 7]).

Connection Test for the joint Installation of the Integration Components for Siemens Teamcenter and SAP ERP

Once you've completed the steps outlined earlier, as well as in the respective documentation for Siemens Teamcenter, verify if the installation and setup has been successful.

> **i Note**
>
> Before you can test the installation, you need to configure your SAP system as well as the external PLM system. For detailed configuration information, see the *Configuration Guide* for PLM system integration for SAP ERP as well as the *Teamcenter Gateway for PLM system integration by SAP - Generic Configuration Guide*, available on the Siemens Support Center website.

1. Transfer a specific business object (for example, a product) from Siemens Teamcenter in SAP ERP.
2. Confirm the transfer using the available monitoring functions. For more information, see Logging and Monitoring [page 50].

> **i Note**
>
> Don't enter any personal data in any text fields or in any files uploaded to SAP ERP.

Related Information

Standard Role Templates [page 43]
User Management [page 42]

7.2 Installing the SAP Content Server

For the general setup of the SAP Content Server, go to the SAP Help Portal and browse for *SAP Content Server* for SAP ERP. Make sure you call up the latest version of the documentation.

For security-relevant aspects and necessary actions for PLM system integration for SAP ERP, see the chapter SAP Content Server Security [page 45] in this guide.

Set up the content server for file transfer and follow the security guides of the *SAP Content Server* to establish a secure communication between the external PLM system and the SAP system:

1. Ensure that virus scan is active for the *SAP Content Server*.
2. Ensure that the signature is active (OACT).
3. Ensure that the URL is generated in HTTPS (OACT).
4. Ensure that the generated URL supports expiry setting (CSADMIN).
5. Test the setup. For testing, you can also use the built-in content repository *DMS_C1_ST*. To use it, you have to perform the following steps:
   - Activate the ICF node */sap/bc/contentserver* in transaction *SICF*
   - In transaction *OAC0*, select *Full Administration* and set the checkbox *No signature* for content repository *DMS_C1*.

> ⚠ Caution
>
> Don't use this built-in repository for high volume or productive usage, as it will store all files directly in the database.

8 Security Information

This section deals with security topics relevant for PLM system integration for SAP ERP. Therefore, the general security information that is covered in the related Security Guides for SAP ERP applies.

The security concept offers secure system-to-system communication using state-of-the-art authentication and authorization technologies.

For more information, see the Security Guide for SAP ERP, provided on the *Implement* tab in the SAP Help Portal.

The following information in this guide specifically applies to PLM system integration for SAP ERP.

8.1 Before You Start

PLM system integration for SAP ERP is based on SAP ERP . Therefore, the related security guides also apply to PLM system integration for SAP ERP .

You can find Security Guides for SAP ERP in the SAP Help Portal.

A list of additional security relevant SAP HotNews and SAP Notes is also available at the SAP Support Portal.

Use Case: Joint Installation with Siemens Teamcenter

Please get familiar with the general Security Considerations for using **Active Integration**. Make sure to call up the latest version for the product you're using.

8.2 User Authentication and Authorization

This section provides an overview of how you manage and authenticate users for an integration between an external PLM system and SAP ERP. For the external PLM system, a service user must be created in your SAP ERP instance. The external system must use this service user to communicate with the SAP ERP system.

All other users are independently created and managed in the SAP system and in the external system respectively.

User Types and Authorization

When calling an HTTP endpoint at SAP, the user who is triggering the call has to be authenticated. Authentication can be done via a:

- Technical user for data transfer: Technical users are maintained by an administrator. Name and password/ certificate for all technical users have to be provided during the installation and configuration of the integration.
- Technical user for data federation (only display): This special technical user provides the authorizations to use data federation. It is configured in the SAP system. In the external PLM system, the respective user credentials need to be entered to receive authorization to use the data federation functionality.

Create both user types in the SAP system. You can use standard role templates to create these users.

> **i Note**
>
> We recommend using a speaking name, including the name of the external PLM system, for example *TEAMCENTER* (technical user for data transfer) and *TEAMCENTER_D* (technical user for data federation).

For more information on user management in the SAP system, browse for *User Management* in the SAP Help Portal.

Authentication Methods

The following authentication methods are supported for a session's first HTTPS:

- Basic authentication: Can be used for both types of technical users.

  > **i Note**
  >
  > We strongly recommend using HTTPS only, to ensure password encryption. Password changes aren't supported.

- X.509 client certificate: A client certificate can be used to log on a user with a certificate (rule-based or explicit user mapping). For more information, browse for the chapter *Using X.509 Client Certificates on the AS ABAP* on the SAP Help Portal.
  After the first logon, the SAP system sends back the HTTP cookies `SAP_SESSIONID_<sys>_<client>` in all variants. These can be used in subsequent calls to authenticate without sending user and password again, unless an HTTP timeout occurs, as defined in the SAP profile parameters.

Use Case: Joint Installation of the Integration Components for Siemens Teamcenter and SAP ERP

> **i Note**
>
> In the Siemens Teamcenter system, data federation is used within the Active Workspace UI. Users are logged on via their Siemens Teamcenter user credentials. No further authorization is needed on Siemens Teamcenter side to access the available data. Users who need to transfer data to the SAP system from the Siemens Teamcenter system require the technical users mentioned above.
>
> For more information on user management in Siemens Teamcenter, see the documentation on the Siemens Software Center website.

Related Information

Authorization Concept Overview [page 41]
User Management [page 42]
Standard Role Templates [page 43]

8.2.1 Authorization Concept Overview

This section outlines the general authorization concept for PLM system integration for SAP ERP.

PLM system integration for SAP ERP relies on the standard SAP authorization concept for the following business entities for read, create, update, and delete actions:

- Material Master
- Document Info Record
- Bill of Materials (Classic, Order, WBS)
- Classification
- Change Master

The standard SAP authorization concept is also reused for the following reuse components:

- AIF (for monitoring and logging)
- SLG1 (for monitoring)

The required authorizations to access AIF monitoring are already part of the standard role templates, there's no need to provide AIF authorization separately (see Standard Role Templates [page 43]).

For more information, browse for *User and Role Administration of Application Server ABAP* in the SAP Help Portal.

Use Case: Authorization Object for Siemens Teamcenter - SAP System Integration

Each endpoint for the Siemens Teamcenter - SAP system integration is checked for every access. For this purpose, the authorization object /PLMF/ACC is used. This authorization object has the following parameters:

Siemens Teamcenter - SAP System Integration Authorization Object

Field Name	Text	Authorization Values	Remarks
ACTVT	Authorization to POST business entity changes to SAP	01	For example, Create, Change
ACTVT	Authorization to GET business entities from SAP	03	For example, Data Federation

Field Name	Text	Authorization Values	Remarks
/PLMF/TYPE	Authorization on metadata entity level	PV (ProductVersion) DV (DocumentVersion) SV (StructureVersion) CO (ChangeObject) FU (FileUploadConfirmation)	
/PLMF/LOGI	Authorization of source logical system		CHAR20, part of payload, message header

In addition to the general concept mentioned above, all PLM System Integration (PLMSI)-specific customizing views have a dedicated authorization group *PLMF* assigned.

Related Information

Standard Role Templates [page 43]

8.2.2 User Management

PLM system integration for SAP ERP uses the authorization concept provided by SAP ERP.

This means that the recommendations and guidelines for authorizations as described in the Security Guide for SAP ERP also apply.

For more information, see the Security Guide for SAP ERP, provided on the *Implement* tab in the SAP Help Portal.

Users for PLM system integration for SAP ERP

PLM system integration for SAP ERP connects an external PLM system, for example Siemens Teamcenter, with SAP ERP using two users:

- Technical user for data transfer (for example, *PLMSYSTEM* or *TEAMCENTER*) to create and update materials
- Technical user for data federation (for example, *PLMSYSTEM_D* or *TEAMCENTER_D*) to read materials, documents, BOMs, and so on, display rights only)

Create these users in the SAP system (see also the chapters on the installation flow). You can use the role template *SAP_PLMF_INTEG_USER* to create the roles for these users. For the technical user for data federation, remove create and update rights, and only grant display rights.

You can create these users via the standard tools (transaction `SU01`).

Related Information

Installation Flow PLM System Integration for SAP ERP PLM system integration for SAP ERP [page 35]

8.2.3 Standard Role Templates

This section gives a detailed outline of the authorization concept for PLM system integration for SAP ERP.

Role Templates

Role Templates for Users and Business Administrators

Role Template	Description	Role Type	System	Target Group	Comments
SAP_PLMF_INTEG_USER	PLMSI: General role for every integration user with basic functionality	Role template		General user role, needed for transferring data from PLM to the SAP system; can be assigned to technical or named users.	Includes all authorizations for create and update of SAP PLMSI objects
SAP_PLMF_ADMIN_USER	PLMSI: Administrator Role for configuring and monitoring	Role template			Includes all authorizations for maintaining SAP PLMSI configuration, display of AIF logging and SLG1 log

Role Template for Support Users

Role Template	Description	Role Type	System	Target Group	Comments
SAP_PLMF_SUPPRT_USER	PLMSI: Support role for monitoring (display only)	Role template			Includes all authorizations for display of SAP PLMSI objects and display of SAP PLMSI configuration display of AIF logging and SLG1 log

The system offers pre-defined authorization objects for each role template.

8.3 Session Security Protection

To increase security and prevent access to the SAP logon ticket and security session cookies, we recommend activating secure session management.

We also highly recommend using SSL to protect the network communications where these security-relevant cookies are transferred.

Session Security Protection on the AS ABAP

To activate session security on the AS ABAP, set the corresponding profile parameters and activate the session security for the clients using the transaction *SICF_SESSIONS*.

For more information, a list of the relevant profile parameters, and detailed instructions, browse for *Activating HTTP Security Session Management on AS ABAP* in the .

8.4 Network and Communication Security

This section provides an overview of the security-relevant information for PLM system integration for SAP ERP, including the network topology and communication protocols used.

Target Group

- Technology consultants
- Security consultants
- System administrators

The internal network topology for the PLM system integration for SAP ERP is based on the topology used by the SAP HANA Platform. The security guidelines and recommendations described in the security guide for SAP HANA Platform also apply. In particular, see SAP HANA Network and Communication Security in this security guide, available on .

We don't deliver pre-defined communication destinations with the PLM system integration for SAP ERP. An administrator at the customer needs to create the required destinations during the configuration process.

For more information, see the chapter *PLMSI Configuration* in the *Configuration Guide* for PLM system integration for SAP ERP.

Related Information

Before You Start [page 39]
SAP Content Server Security [page 45]

8.4.1 SAP Content Server Security

The SAP Content Server enables the storage of documents coming from the external PLM system.

The SAP Content Server is designed to manage large quantities of documents efficiently in diverse locations. These documents usually contain confidential information of considerable value to the company. To protect these documents, a number of security measures must be taken. You find detailed information in the *SAP Content Server Security Guide*.

Generally, the security procedure and settings for the SAP Content Server are independent from the operating system. Security measures that require different settings for Windows and Unix are described separately.

Make sure that you follow the instructions in this guide to set up the SAP Content Server securely (see also Installing the SAP Content Server [page 37]).

Specifically, make sure to verify the following settings:

- Ensure that virus scan is active for the content server
- Ensure that the signature is active (*OACT*)
- Ensure that the URL is generated in HTTPS (*OACT*) and that it supports expiry setting (*CSADMIN*)

To access the *SAP Content Server Security Guide*, go to the SAP Help Portal and browse for *SAP Content Server Security Guide* for SAP ERP. Make sure you call up the latest version of the documentation.

> **i Note**
>
> We strongly recommend using HTTPS only.

8.5 Data Protection and Privacy

This section provides information about how PLM system integration for SAP ERP complies with data protection requirements.

Data protection is associated with numerous legal requirements and privacy concerns. In addition to compliance with general data protection and privacy acts, it's necessary to consider compliance with industry-specific legislation in different countries/regions. SAP provides specific features and functions to support compliance with regard to relevant legal requirements, including data protection. SAP doesn't give any advice on whether these features and functions are the best method to support company, industry, regional, or country/region-specific requirements. Furthermore, this information shouldn't be taken as advice or a recommendation regarding additional features that would be required in specific IT environments. Decisions related to data protection must be made on a case-by-case basis, taking into consideration the given system landscape and the applicable legal requirements.

> **i Note**
>
> SAP does not provide legal advice in any form. SAP software supports data protection compliance by providing security features and specific data protection-relevant functions, such as simplified blocking and deletion of personal data. In many cases, compliance with applicable data protection and privacy laws are not covered by a product feature. Definitions and other terms used in this document aren't taken from a particular legal source.

> ⚠ Caution
>
> The extent to which data protection is supported by technical means depends on secure system operation. Network security, security note implementation, adequate logging of system changes, and appropriate usage of the system are the basic technical requirements for compliance with data privacy legislation and other legislation.

> ⚠ Caution
>
> **Master Data Replication**
>
> In compliance with GDPR regulations, PLM system integration for SAP ERP provides customer and vendor tables to retrieve and delete personal data for these entities. When using the Master Data Replication Tool, you're responsible for using these tables when replicating customer and vendor data.

Extension Fields

Make sure that no personal data enters the system in an uncontrolled or nonpurpose related way, for example, in free-text fields, through APIs, or customer extensions.

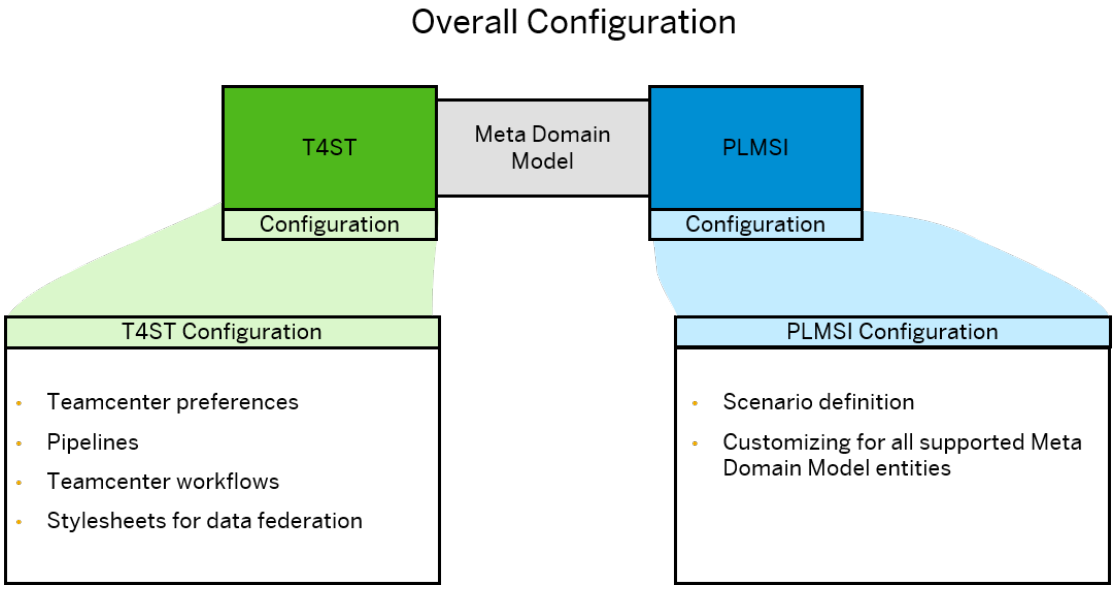
The add-on doesn't store any sensitive data nor personal data.

9 Use Case: Cross-System Configuration Flow

This is an overview of the necessary configuration activities if you jointly install the installation components from SAP (PLMSI) and Siemens (T4ST) to make full use of the integration.

The integration is based on a shared metadata model, the Meta Domain Model, as outlined in previous chapters. Therefore, this integration solution requires the configuration of the technical component *T4ST* in the Siemens Teamcenter system, as well as of the technical component *PLMSI* in the SAP system.

> **i Note**
>
> Before you can start using the integration, you must fully configure all technical components in both the Siemens Teamcenter system and the SAP system.



High-Level Configuration Overview

T4ST	PLMSI
1. Teamcenter preferences: Define which data is transferred, which data is exported and available in the Pipeline Designer	1. Scenario definition: Define the rule collections for a dedicated source system
2. Pipelines: Define how the Siemens Teamcenter data model is linked to the Meta Domain Model	2. Customizing: Define how the metadata mode links to the SAP data model and processes
3. Teamcenter workflows: Define the data that is transferred to the SAP system and when it's transferred	

T4ST	PLMSI
4. Style sheets for data federation: Define the data to be shown in Siemens Teamcenter	
You can find detailed information in the *Teamcenter Gateway for PLM system integration by SAP - Installation Guide*, available via the Siemens Support Center website.	You can find detailed information in the chapter *PLMSI Configuration* in the *Configuration Guide* for PLM System Integration.

Teamcenter Preferences

The T4ST preferences in Teamcenter control:

- Relevant Teamcenter entities in the Meta Domain Model
- Relevant attributes in the Pipeline Designer
- Default rules, for example, revision rule for BVR explosion

For more information on the configuration of preferences, see the *Teamcenter Gateway for PLM system integration by SAP - Generic Configuration Guide*, available on the Siemens Support Center website.

Pipeline Designer

The Pipeline Designer allows you to map the Teamcenter data model into the Meta Domain Model schema. For every Domain Model entity, you can find a dedicated pipeline:

- ProductVersion: PVAddelementToPackage
- DocumentVersion: DVAddelementToPackage
- StructureVersion: SVAddelementToPackage
- ChangeObject: COAddelementToPackage

The name of the pipeline must be entered as a workflow parameter for the transfer workflow. For detailed information, see the *Teamcenter Gateway for PLM system integration by SAP - Pipeline Designer Guide*, available on the Siemens Support Center website.

Teamcenter Workflow

T4ST workflows are used to trigger the data transfer. Standard workflows are provided as part of the Teamcenter integration content. You can use these workflows as templates to tailor your own workflows depending on your needs. Workflow arguments:

- targetStatus: Anticipated status if transfer is successful
- usePipeline: Name of pipeline defined in the previous step

10 Operating PLM System Integration for SAP ERP

This section contains general information about how to operate PLM system integration for SAP ERP.

Use Case: Integration with Siemens Teamcenter

You can monitor the status of all synchronization workflows and jobs between Siemens Teamcenter and the SAP system using the Teamcenter Admin UI. Color-coded status displays help to identify issues easily. You can download log files and open support incidents. For more information on how to use Admin UI, see the documentation for Admin UI , available on the Siemens Support Center website.

For more information on overall business processes in SAP ERP, see the operations documentation on the following SAP Help Portal page:

http://help.sap.com/erp

11 Logging and Monitoring

This chapter describes the available logging and monitoring functions for PLM system integration for SAP ERP.

Use

The available functions allow you to

- Check the overall status of a business entity transfer
- Call up a detailed error description
- Call up all successful and failed data transfers for a specific timeframe and user

Logging and Monitoring in the SAP System

You can use the SAP Application Interface Framework (AIF) or the SAP Application Log (transaction `SLG1`):

SAP Application Interface Framework (AIF)

PLM system integration for SAP ERP uses the SAP Application Interface Framework (AIF) for monitoring. The AIF enables you to monitor the endpoints of the integration in a single framework residing in your SAP back end system.

Prerequisite

- You've implemented the SAP Application Interface Framework.
- You have activated AIF Logging in the activity Define Scenario and Version.
- The required interfaces are part of the BC Sets provided for Teamcenter integration so you don't need to configure them in Customizing. Use the transaction `SCPR20` to view and import the BC Set */PLMF/BCS_OVERALL* as required.

Using AIF Monitoring

1. Call up AIF Monitoring either by searching for *SAP Application Interface Framework* or via the transaction `AIF/ERR`.
2. Select the namespace */PLMSI*.
3. Browse for the required interface name.

You can select from the following interfaces:

- CO_MAINT (Change Object Maintenance)
- DV_MAINT (Document Version Maintenance)
- DV_READ (Document Version Read)
- FC (File Upload Confirmation)
- PV_MAINT (Product Version Maintenance)
- PV_READ (Product Version Read)
- SV_MAINT Interface (Structure Version Maintenance)

Result

The system shows all log messages that are relevant for this aspect of the integration with Siemens Teamcenter.

Detailed information on the SAP Application Interface Framework, including Security and Application Help, is available on the SAP Help Portal.

SAP Application Log

You can use the Application Log (transaction `SLG1`) to identify business and technical errors that occur during data transfer.

You can use the log object */PLMF/PLMSI* and the following subobjects for filtering:

Teamcenter Integration Subobjects

Subobject	Subobject Text
CO_MAINTAIN	Change Object Maintain Request
DV_MAINTAIN	Document Version Maintain Request
DV_READ	Document Version Read Request
FC	File Confirmation
PV_MAINTAIN	Product Version Maintain Request
PV_READ	Product Version Read Request
SV_MAINTAIN	Structure Version Maintain Request

Use Case: Logging and Monitoring in Siemens Teamcenter

You can use the Active Workspace Admin UI or the general monitoring possibilities of Siemens Teamcenter:

Admin UI

You can monitor the status of all synchronization workflows and jobs between Siemens Teamcenter and the SAP system using the Teamcenter Admin UI. Color-coded status displays help to identify issues easily. You can download log files and open support incidents. For more information on how to use Admin UI, see the *Active Integration Gateway - Administrative User Interface Guide* or the Admin UI online documentation.

> **Note**
>
> Please make sure to call up the correct version of the documentation for your version of Siemens Teamcenter.

General Logging for Siemens Teamcenter

You can use the standard logging functions available for Siemens Teamcenter. For detailed information, browse to the chapter *Transaction log* in the documentation for Siemens Teamcenter, available on the Siemens Support Center website. Please make sure to call up the correct version of the documentation for your version of Siemens Teamcenter.

> **Note**
>
> The documentation below is located on the Siemens Support Center website. For information on how to access this information, see SAP Note 3033979.

For detailed information on error handling, see Error Handling [page 53].

Related Information

Authorization Concept Overview [page 41]
SAP Application Interface Framework
Troubleshooting [page 56]
Authorization Concept Overview [page 41]

12 Error Handling

This chapter includes detailed error handling information for the integration.

Error Handling in the SAP System

Information/Error Type	Possible HTTP Status Codes	Possible Cause/Further Information
Status Code 201		
Application Error	HTTP status code *201*: error messages are returned in the section *Response* with status *Error*	Message will be persisted for monitoring purposes. You can view it using the AIF monitoring transactions (see Logging and Monitoring [page 50]). Object specific errors will be part of response section for each domain model object, for example, PV type is initial or wrong
HTTP Status Code 201: error	`"response": {"status": "Error","messages": [{"type": "Error","text": "Product version hasn't been created"}]}`	
Successful Creation/Update	HTTP status code *201: Created*. Information messages are returned in the section *Response* with status *Success*	One or more business objects have been created/updated successfully: In this case, appropriate information messages are returned, since the message itself could be logically processed. The system persists the message. You can view it using the AIF monitoring transactions (see Logging and Monitoring [page 50]).
HTTP Status Code 201: success	`"response": { "status": "Success", "messages": [ { "type": "Info", "text": "Product version has been created" } ] }`	
Technical Errors		
Authentication Failure	HTTP status code *401*	This is the standard response issued by the SAP Web Application Server (ICF/oData).

Information/Error Type	Possible HTTP Status Codes	Possible Cause/Further Information
Technical Error	HTTP error code *400: Bad Request*: message can't be persisted according to definition	Mandatory fields missing (message ID and message header fields) Maximum length exceeded of any type in the payload Type isn't valid, for example, not Edm.String, Edm.DateTime, and so on Scenario and scenario version couldn't be determined The message does not persist
HTTP Status Code 400	`{ "error": { "code": "/PLMF/MPO/029", "message": "Domain model attribute APIVersion must be provided", "target": "APIVersion", "details": [] } }`	
Technical Error	HTTP error code *403: Forbidden*: message couldn't be created/persisted because of a missing authorization	Authorization check failed Error response with message
Technical Error	HTTP error code *500: Internal Server Error*: for example, timeout	Save of inbound message not possible Any runtime error that couldn't be prevented Other issues, for example, an invalid JSON file, the system isn't reachable from the client, issues in the basis system (for example, syntax error), HTTP service not registered, CSRF token failure, JSON file isn't valid, for example, syntax error

System Messages

Domain Model requests are identified via a message ID. This ID is always created by the sender and is also used for the (direct) response. It must be globally unique. If a second message with same message ID is created, this message will not be processed.

Request and response message have the same message ID.

You can activate AIF Monitoring in Customizing for Define Scenario and Version.

Use Case: Error Handling in Siemens Teamcenter

For error handling, see the *Teamcenter Gateway for PLM system integration by SAP - Generic Configuration Guide*, available on the Siemens Support Center website.

Related Information

Logging and Monitoring [page 50]
Authorization Concept Overview [page 41]
Troubleshooting [page 56]

13 Troubleshooting

This chapter outlines possible issues and how to solve them in the SAP system.

Please refer to the Overview of Required SAP Notes [page 7] and make sure that you have implemented the latest version of each SAP Note.

Troubleshooting Overview

Issue	Detailed Information	Hints and Solution
The document info record isn't created correctly	When data is transferred from the external PLM system to the SAP system, the document info record is created based on the information sent by the external system (for example, document ID, version, description, and long text with given languages). If the configuration in the SAP system isn't fully maintained for the respective document type, this transfer will fail.	In the SAP system, use transaction `SPRO` to call up Customizing. Go to *Cross-Application Components* > *Document Management* > *Control Data* > *Define Document Types*. Verify if *Internal/External Numbering* and *Version Number* are maintained for the required document type.
I can't access or edit a document, product/material, BOM, or change number in the SAP system.	You need to be authorized to access or edit certain documents.	Check your user authorizations: you must have an appropriate support user assigned to you. You can use the role template *SAP_PLMF_SUPPRT_USER* as a basis (see also Standard Role Templates [page 43]).
Linked products are missing for a certain document version.	When you call up a document in the SAP system and want to view the linked objects at *Object Links* > *Material Master*, you can't see all expected products.	Use Case: Integration with Siemens Teamcenter: When you update a document version in Siemens Teamcenter, you can select if you want to *Keep existing linked product versions*. If this flag isn't set in Siemens Teamcenter, the system links those products that are sent with the latest payload to the document version and deletes all other product links. The products remain in the SAP system but they aren't linked to this document version anymore. You can call them up directly using the product number.

Issue	Detailed Information	Hints and Solution
Linked documents are missing for a certain material (product version).	When you call up a material (product version) in the SAP system and want to view the linked documents on the *Document Data* tab, you can't see all expected documents.	Use Case: Integration with Siemens Teamcenter: When you update a material (product version) in Siemens Teamcenter, you can select if you want to *Keep existing linked document versions*. If this flag isn't set in Siemens Teamcenter, the system links those documents that are sent with the latest payload to the material (product version) and deletes all other document links. The documents remain in the SAP system but they aren't linked to this material (product version) anymore. You can call them up directly using the document number.
HTTP error code "400: Bad Request" (message can't be persisted according to definition), "403: Forbidden" or "500: Internal Server Error" (a timeout may occur)	This is a technical error because of an invalid JSON file. The receiving component can't start to process any logic. Check for the following errors: the system isn't reachable from the client, there are issues in the basis system, for example a syntax error, the HTTP service not registered, there is a CSRF-Token failure	See Error Handling [page 53].
I can't see any logging information for the integration in AIF.	When opening AIF for monitoring and logging information, you can't see any messages related to the integration with the external PLM system. You have to actively set AIF logging to *On* in Customizing for *Scenario and Version*.	Verify if you have activated *AIF Logging*: Call up Customizing under *Cross-Application Components* > *PLM System Integration* > *Define Scenario and Version*. Choose the scenario and version and verify that *AIF Logging* is set to *On* (see also Define Scenario and Version).
ID, type, and version of a change object don't match the entries in the key mapping.	The valid-from date of the change object related to this item has to match the valid-from date in the key mapping.	Open the Change Master (transaction `MM03`) and verify if the valid-from date is the same as the valid-from date of the change objects of the document version. For more information on key mapping, see Define Scenario and Version.
I tried to send a product version, structure version, or document version from the external PLM system to the SAP system, and receive an error.	Refer to the technical error message for details. Call up transaction */SLG1* and check the respective log file.	The following errors can occur: the change number couldn't be created, Verify if the sent information corresponds to the required format in the SAP system, for example, the base UoM can't exceed three characters.
I can't call up material master and document info record data in the external PLM system (data federation).	Data federation can only be supported when users have the appropriate system users assigned in both systems.	Verify if users are set up correctly and if you have all required users assigned (see User Authentication and Authorization [page 39]).

Issue	Detailed Information	Hints and Solution
There is an error during BOM update about the ECN (*SLG1*).	An engineering change number needs to be maintained for the respective object type, for example, *Material BOM*.	Verify if an engineering change number is maintained in Define Structure Version.
I can't find all documents attached to a certain product.	Use Case: Integration with Siemens Teamcenter: You can attach several documents to a product in Siemens Teamcenter. When you update these assignments, including the removal of certain document links, these changes may be updated in the SAP system as well. This depends on the configuration in Siemens Teamcenter or the settings sent to the SAP system.	Check the settings for document management in the Siemens Teamcenter system.

Use Case: Integration with Siemens Teamcenter

You can find additional troubleshooting information for your Siemens Teamcenter system on the Siemens Support Center website. Choose your product and go to *Troubleshooting*. Always select the correct product version (for example *Teamcenter 13.1*) to find specific troubleshooting information. Moreover, the following guides provide specific troubleshooting information:

- Teamcenter Gateway for PLM system integration by SAP - Installation Guide
- Teamcenter Gateway for PLM system integration by SAP - Active Workspace Add-ons Installation and Setup Guide

14 Glossary for the Integration with Siemens Teamcenter

This glossary provides definitions for terms related to PLM system integration for SAP ERP and Siemens Teamcenter.

> **i Note**
>
> You can find a comprehensive glossary for Siemens Teamcenter on the Siemens Support Center website: Browse for your version of Siemens Teamcenter: *Teamcenter* > *Teamcenter Glossary*. Also, several technical guides provided by Siemens include a glossary section, for example:
>
> - Teamcenter Gateway for PLM system integration by SAP - Active Workspace Add-ons Installation and Setup Guide
> - Teamcenter Gateway for PLM system integration by SAP - Installation Guide
> - Teamcenter Gateway for PLM system integration by SAP - Generic Configuration Guide

Term Mapping SAP System to SAP Teamcenter by Siemens

SAP Term	SAP Definition	References in Siemens Teamcenter System
aligned attribute	A defined set of attributes that are common between the SAP and the external PLM system for a certain business entity and independent of system, domain, and process.	-
bill of material (BOM)	A complete, structured list of the components that make up an object. The list contains the description, the quantity, and unit of measure. The components are referred to as items.	bill of material (BOM)
CAD indicator	An indicator that shows that an object (for example a document) was created or changed in a CAD system.	-
change notice	A business entity that tracks the status and maturity of a change process	change notice
change object	A business entity of the Meta Domain Model that represents a version of a change entity.	-
component ID	Identifier that controls the update logic within the target system, for example for a structure version.	-

SAP Term	SAP Definition	References in Siemens Teamcenter System
configuration scenario	Set of business configurations for PLM System Integration which are used for different integration scenarios, for example different source systems or releases	-
consistency check	A subobject that is used to identify environment errors that occur during data transfer.	-
content type	A type of content, examples include component specification, assembly specification, general drawing, work instruction, and so on	-
data federation	A functionality that enables an external PLM system to show data of the integrated SAP system for certain business objects in order to access business-critical data in the context of a leading object.	data federation
document version	A business entity of the Meta Domain Model that represents an SAP document info record version.	for example, item revision
effectivity	Date (valid from) or unit (serial number, solution) effectivity to define the precise conditions under which a business entity is valid	-
engineering bill of materials (EBOM)	Defines how the product is designed. It reflects the engineering view of a bill of material.	engineering bill of materials (EBOM)
engineering change notice	Provides a detailed work plan to resolve one or more enterprise change requests (ECRs) or a portion of one ECR	engineering change notice
engineering change request (ECR)	Initiates proposals that recommend changes and capture business decisions associated with the change	engineering change request (ECR)
extension field	A field that allows the exchange of additional information from one domain to another and supports exchanging additional sets of information ?	-
logical instance	An ID that identifies a Siemens Teamcenter (or SAP) instance in the system landscape in a unique way.	logical instance
maturity	Describes a specific phase, milestone or stage within a product/assembly/component lifecycle	-

SAP Term	SAP Definition	References in Siemens Teamcenter System
Meta Domain Model	The data model of the SAP ERP. It helps to reduce the level of complexity when integrating an SAP system with an external PLM system and translates and standardizes the integration between the two systems.	-
occurrence-/instance-based structure version	A BOM version where the Meta Domain Model of the StructureVersion contains only one line for the component and the quantity of all occurrences corresponds to the maintained quantity in the Siemens Teamcenter system.	unpacked BOM
product version	A business entity of the Meta Domain Model that represents a version of a product/material	for example, item/part revision
quantity-based structure version	A BOM version where the Meta Domain Model of the StructureVersion contains only one line for the component and the quantity of all occurrences is aggregated	packed BOM
scenario version	Data set that outlines evolutionary increments of a scenario. There are no dependencies between the different scenario versions.	-
status	Describes the state of a business entity. The status controls if a business entity is released, in work, obsolete.	-
structure version	A business entity of the Meta Domain Model that represents a version of a structure	for example, item revision
structure version management	The management of a version of a structure, for example EBOM	-

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