This sample chapter provides an introduction to the SAP MDG data modeling concepts, including entities, attributes, hierarchies, and the relationships between entities. It also describes the standard data models: material master, financial, and business partner.
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Chapter 3
Data Modeling

This chapter provides a view into the SAP MDG data modeling concepts, including different storage areas and storage types, as well as insights into delivered data models. We’ll also discuss entities, attributes, and the relationships between entities.

In the previous two chapters, we introduced the concept of master data management and SAP’s master data management product—SAP MDG—and how it fits into the overall portfolio of enterprise information management (EIM) products. This chapter introduces the concept of data modeling in SAP MDG and provides an overview of SAP-delivered data models.

The following data models are delivered by SAP as part of SAP MDG:

- Material master
- Business partner, customer, and supplier
- Financials

Let’s begin by exploring the data modeling process in SAP MDG.

3.1 Introduction to Data Modeling in SAP MDG

A key aspect of governing master data is the ability for all roles involved in the end-to-end governance process to manipulate data collaboratively in a staging environment. Hence, a separation is required between data that are currently being used or ready to be used in transactions and data that are involved in a governance process.

There are two storage areas in the context of SAP MDG as follows:

- **Staging area**
  Contains data currently in a governance process and has an associated change request.
3.1.1 Master Data Create/Change Process

Figure 3.1 illustrates a simple master data create/change process.

First, the requester initiates a change request for creating or changing a master data record. We’ll discuss the concept of change request in detail in the next chapter. There are two main scenarios that we’ll explore, as follows:

- Create scenario
  In a create scenario, request details along with data entered by the requester are stored in the staging area after the requester submits the change request.

- Change scenario
  In a change scenario, the master data record is copied from the active area into the staging area, and changes made by the requester, along with change request details, are stored in the staging area.

Master data experts further maintain, enrich, and validate the record to ensure that the master data record submitted by the requester follows data quality rules. During this process, data are read from the staging area and saved back into the staging area if any changes to data were made.

The master data steward processes the change request and does the final approval. In this process, the master data record is read from the staging area and is updated into the active area after the final approval step. This process is also known as activation. At this point, the master data record is ready to be consumed by any other applications if SAP MDG is installed in a co-deployment scenario. If SAP MDG is installed as a hub, once activated, data are ready for replication to other SAP or non-SAP systems.

The active areas in SAP MDG can be in either the flex mode or the reuse active area, as described here:

- Flex mode
  In this mode, a new set of database tables are generated when the data model is defined. This mode is used when there are no corresponding SAP ERP tables or when the activated data in SAP MDG are intended to be isolated from SAP ERP tables. If required, data can be replicated to SAP ERP master data tables. An example of such a scenario is standard SAP MDG, Financials objects. All SAP MDG, Financials objects are delivered in flex mode to isolate them from SAP ERP Financials (SAP ERP FI) tables and only replicate when needed to SAP ERP master data tables or to transactional SAP ERP systems if SAP MDG is deployed as a hub.

- Reuse active area
  In this mode, existing SAP ERP tables are used. As an example, for a material master, these are reuse active area tables MARA, MARC, MARD, and so on. Figure 3.2 shows the difference between the flex and reuse modes of a data model. Data models for material masters and business partners are delivered in the reuse active area mode, which means that after a change request is activated, the corresponding SAP ERP master data tables are updated.

Data modeling in SAP MDG involves various elements such as entity types, attributes, and relationships. Every master data object that needs to be governed using SAP MDG requires a data model and user interface (UI) built on top of it. Every data model in SAP MDG has several generated database tables that store data during the governance process.
Different types of master data in a data model are represented by different entity types. SAP MDG automatically generates required database tables needed for master data processing. Every data model has at least one entity type. An important property of an entity type is **Storage/Usage Type**, which determines whether entities belonging to an entity type are changeable via a change request or via entities belonging to other entity types, the type of information stored, and whether database tables are generated or reused from the active area. The following four storage or usage types are available:

- **Type 1: Changeable via Change Request; Generated Database Tables**
  This storage and usage type is used for main entities in the data model that are under governance. These entities are linked to change request types (Chapter 5 describes change request types in detail), and data stored in these can be changed via change requests. These entities have persistence, and SAP MDG automatically generates all necessary database tables, including check tables, text tables, and additional tables needed to store attachments and sets, for example. Key fields of this storage/usage type include the entity type itself, edition (if relevant), and other entity types linked to this entity type via relationships. The **MATERIAL** entity in the material master data model is an example of a type 1 entity, as shown in Figure 3.3.

- **Type 2: Changeable w/o Change Request; Generated Check/Text Tables**
  This storage and usage type is used for check tables that have persistence in SAP MDG. Data stored in this storage or usage type can be changed without a change request. SAP MDG generates only the check tables and text tables with the entity type, as well as with the entity types assigned to the entity type, through leading relationships as fixed key fields.

- **Type 3: Not Changeable via MDG; No Generated Tables**
  This storage and usage type is used for check tables that have no persistence in SAP MDG. Data stored in this storage or usage type can’t be changed in SAP MDG.
Type 4: Changeable via Other Entity Type; Generated Database Tables

This storage and usage type is used for maintaining dependent data (e.g., plant data for material master and company code, sales data for customer master) and can only be maintained together with an entity of type 1. This entity type needs to be in a relationship with the relationship type leading and assigned as the To-entity type to an entity type with storage and usage type 1. The system generates the check table as described for storage and usage type 1 but also generates the entity types that are assigned through qualifying relationships as key fields. The MARCBASIC entity in the material master data model is an example of a type 4 entity type.

An entity type can have the properties listed in Table 3.1.

<table>
<thead>
<tr>
<th>Property</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity Type</td>
<td>Represents the name of entity type.</td>
</tr>
<tr>
<td>Description</td>
<td>Language-dependent description of the entity type.</td>
</tr>
<tr>
<td>SU Type</td>
<td>Decides the generation of database tables for storage of master data.</td>
</tr>
<tr>
<td>Data Element</td>
<td>Determines properties such as Data Type and Length for the entity type to</td>
</tr>
<tr>
<td></td>
<td>which it’s assigned. Data types are restricted to CHAR, NUMC, or CUKY,</td>
</tr>
<tr>
<td></td>
<td>and length is restricted to 45 characters. Data elements can’t be assigned</td>
</tr>
<tr>
<td></td>
<td>to entity types of storage/usage type 4. Storage/usage types also decide</td>
</tr>
<tr>
<td></td>
<td>how to represent values if a value table or domain fixed values exist.</td>
</tr>
<tr>
<td>Validity of Entity Type</td>
<td>Determines whether or not the entity type is edition dependent.</td>
</tr>
<tr>
<td>Deletion</td>
<td>Determines whether or not deletion is allowed for the entities of this</td>
</tr>
<tr>
<td></td>
<td>entity type via the change request process.</td>
</tr>
<tr>
<td>Attachments</td>
<td>When selected, attachments can be stored to entities of this entity type,</td>
</tr>
<tr>
<td></td>
<td>and the system automatically provides a data store for storing these</td>
</tr>
<tr>
<td></td>
<td>attachments. This can only be selected for entities with storage/usage</td>
</tr>
<tr>
<td></td>
<td>type 1.</td>
</tr>
</tbody>
</table>

Table 3.1 Properties of an Entity Type

<table>
<thead>
<tr>
<th>Property</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sets</td>
<td>When selected, sets can be stored to entities of this entity type, and the</td>
</tr>
<tr>
<td></td>
<td>system automatically provides a data store for this purpose.</td>
</tr>
<tr>
<td>Search Help</td>
<td>When a search help is assigned to a field, the input help executes the</td>
</tr>
<tr>
<td></td>
<td>search help instead of reading the data in the check table or the fixed</td>
</tr>
<tr>
<td></td>
<td>values of the domain of the data element. You should only use search helps</td>
</tr>
<tr>
<td></td>
<td>as an exception.</td>
</tr>
<tr>
<td>Generated</td>
<td>Specifies whether entity types were generated or manually created, and</td>
</tr>
<tr>
<td></td>
<td>those entity types that are generated can’t be changed or deleted via the</td>
</tr>
<tr>
<td></td>
<td>Edit Data Model Customizing activity.</td>
</tr>
<tr>
<td>Is Hierarchy Type?</td>
<td>Determines whether an entity type defines a hierarchy. This setting also</td>
</tr>
<tr>
<td></td>
<td>determines whether hierarchies have versions and are synchronized.</td>
</tr>
<tr>
<td>Validity of Hierarchy</td>
<td>If the Is Hierarchy Type? option is set to have a version, then this</td>
</tr>
<tr>
<td></td>
<td>property determines the validity of the hierarchy.</td>
</tr>
<tr>
<td>Reuse</td>
<td>When a reuse active area is specified, the system stores active data only</td>
</tr>
<tr>
<td></td>
<td>in this reuse active area. The reuse active area can be assigned either at</td>
</tr>
<tr>
<td></td>
<td>the data model level or at the entity type. When defined at the data model</td>
</tr>
<tr>
<td></td>
<td>level, all entity types defined in that data model inherit the reuse active</td>
</tr>
<tr>
<td></td>
<td>area. However, if a separate reuse active area for an entity type is</td>
</tr>
<tr>
<td></td>
<td>specified at the entity type level, then it overrides the setting inherited</td>
</tr>
<tr>
<td></td>
<td>from the data model.</td>
</tr>
<tr>
<td>Structure/Table</td>
<td>Used to establish the link between an entity type, attribute, or relationship, and a structure or database table defined in the ABAP Dictionary.</td>
</tr>
<tr>
<td>Field</td>
<td>Used to establish the link between an attribute or relationship and a field defined in the ABAP Dictionary that is part of a structure or a database table.</td>
</tr>
</tbody>
</table>

Table 3.1 Properties of an Entity Type (Cont.)
### Struct. for X-Fields

Used to establish the link between an entity type and an associated structure defined in the ABAP Dictionary that contains a checkbox with type CHAR and Length 1, with values space and X for each resolved attribute.

### Key Assignment

#### Type of Key Assignment

- **Key Cannot Be Changed; No Internal Key Assignment**: In this case, there is no internal key generation possible, and the user needs to maintain the key manually. After it’s maintained, the key can’t be changed.
- **Internal Key Assignment Only**: SAP MDG automatically assigns an internal number upon activation of the change request. During the change request process, SAP MDG assigns a temporary key.
- **Key Can Be Changed; No Internal Key Assignment**: The key of the entity needs to be explicitly defined. However, it can be changed as long as the change request isn’t activated.
- **Key Can Be Changed; Internal Key Assignment Possible**: In this option, either the system can automatically generate a number during the change request activation or the user can define his or her own key.

#### Number Range Object for Temporary Keys

Number range object for specifying temporary keys. For example, the MDG_BS_MAT number range object is specified for the MATERIAL entity type.

#### Entity Texts

##### Language-Dependent Texts

Indicates whether the entity type can have language-dependent texts. Based on this selection, the system automatically includes Language as a key field when the database tables are generated for this entity type.

### Property Explanation

<table>
<thead>
<tr>
<th>Property</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Struct. for X-Fields</td>
<td>Used to establish the link between an entity type and an associated structure defined in the ABAP Dictionary that contains a checkbox with type CHAR and Length 1, with values space and X for each resolved attribute.</td>
</tr>
</tbody>
</table>
| Key Assignment | Following options are available and determine how the key of the entity will be entered during the change request process:  
  - **Key Cannot Be Changed; No Internal Key Assignment**: In this case, there is no internal key generation possible, and the user needs to maintain the key manually. After it’s maintained, the key can’t be changed.  
  - **Internal Key Assignment Only**: SAP MDG automatically assigns an internal number upon activation of the change request. During the change request process, SAP MDG assigns a temporary key.  
  - **Key Can Be Changed; No Internal Key Assignment**: The key of the entity needs to be explicitly defined. However, it can be changed as long as the change request isn’t activated.  
  - **Key Can Be Changed; Internal Key Assignment Possible**: In this option, either the system can automatically generate a number during the change request activation or the user can define his or her own key. |
| Number Range Object for Temporary Keys | Number range object for specifying temporary keys. For example, the MDG_BS_MAT number range object is specified for the MATERIAL entity type. |
| Language-Dependent Texts | Indicates whether the entity type can have language-dependent texts. Based on this selection, the system automatically includes Language as a key field when the database tables are generated for this entity type. |

### Source Fields for Texts

- **Source Field Long Text**: Applicable to storage/usage type 3 entity types. Determines the check table field that contains long text.
- **Source Field Medium Text**: Applicable to storage/usage type 3 entity types. Determines the check table field that contains medium text.
- **Source Field Short Text**: Applicable to storage/usage type 3 entity types. Determines the check table field that contains short text.

### Table 3.1 Properties of an Entity Type (Cont.)

The following is a summary of all storage/usage types:

- **Storage type 1**:  
  - This storage type is used for entity types that are maintained in SAP MDG.  
  - Maintenance is performed via change requests, and these entity types act as entry points for change requests.  
  - Data storage is generated.  
  - Additional data modeling is possible and can have attributes and references.  
  - Data elements such as data type, length, field label, and so on can be assigned.  
  - Check that table and domain fixed values associated with the data element are ignored.  
  - ﬁ is determined based on entries in generated check tables.

- **Storage type 2**:  
  - This storage type is used for entity types that shouldn’t be maintained in SAP MDG and aren’t available in the system.  
  - Data storage is generated.
Additional data modeling isn’t possible; associated check and text tables are generated.
- No maintenance occurs via change requests.
- Mandatory data element assignment occurs for data type, length, field label, and so on.
- Check that tables and domain fixed values associated with the data elements are ignored.
- \( F_4 \) is determined based on entries in the generated check tables.

Storage type 3:
- This storage type is used for entity types that should not be maintained in SAP MDG and that are available in the system.
- No data storage is generated.
- Additional data modeling isn’t possible.
- No maintenance occurs in SAP MDG.
- Mandatory data element assignment occurs for data type, length, field label, and so on.
- Check that the table and domain fixed values associated with the data element are used.
- \( F_4 \) is determined based on entries in associated check/text tables and/or domain fixed values associated with the data element. Nonkey fields in check tables are ignored.

Storage type 4:
- This storage type is used for entity types that are maintained in SAP MDG in the context of another entity type.
- Maintenance is performed via change requests, but these entity types can’t act as entry points for the change request. Maintenance is possible via owning the storage type 1 entity type.
- Data storage is generated.
- Additional data modeling is possible and can have attributes and references.

### 3.1.3 Attributes

An attribute defines a property of an entity type, and an attribute is defined for each property. Alternatively, an attribute can be defined as a storage/usage type 3 entity and linked to the entity type via a relationship (see the next section for details on relationships). An attribute can be defined only for storage/usage type 1 or 4 entity types. Every attribute can have the properties listed in Table 3.2.

<table>
<thead>
<tr>
<th>Property</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attribute</td>
<td>Name of attribute.</td>
</tr>
<tr>
<td>Key Field</td>
<td>Indicator to identify attribute as a key field.</td>
</tr>
<tr>
<td>Data Element</td>
<td>Determines properties such as data type, length, and field label displayed on the UI and field help for input fields for the attribute to which it’s assigned. The domain assigned to the data element determines the allowed values for the value help and the validation of values, either from the domain fixed values or from the assigned check table or text table. If there is no check table or fixed values assigned to the domain, then no input help is available, and no validation is carried out.</td>
</tr>
<tr>
<td>Required Entry</td>
<td>Indicator to identify whether the attribute is required for data entry.</td>
</tr>
<tr>
<td>Currency/UoM</td>
<td>Currency or unit of measure field if the attribute requires a currency or unit of measure.</td>
</tr>
<tr>
<td>Search Help</td>
<td>When a search help is assigned to a field, the input help executes the search help instead of reading the data in the check table or the fixed values of the domain of the data element. Search helps should only be used as an exception.</td>
</tr>
<tr>
<td>No Existence Check</td>
<td>Used for deactivating the existence check for attribute values. However, existence checks can’t be suppressed for values that are derived from domain fixed values.</td>
</tr>
<tr>
<td>Description</td>
<td>Description of attribute.</td>
</tr>
<tr>
<td>Structure/Table</td>
<td>Used to establish the link between an entity type, attribute, or relationship, and a structure or database table defined in the ABAP Dictionary.</td>
</tr>
<tr>
<td>Field</td>
<td>Used to establish the link between an attribute or relationship and a field defined in the ABAP Dictionary that is part of a structure or a database table.</td>
</tr>
</tbody>
</table>

Table 3.2 Properties of an Attribute
3.1.4  Relationships

If more than one entity type is defined in a data model, a relationship between entity types can be established. A relationship represents a link between entity types. Every relationship has a relationship type and cardinality. Relationship types determine whether one entity type (from-entity type) is at a higher level than another entity type (to-entity type) or whether it is to be copied as an attribute of the other entity type in the check table.

The following relationship types are available:

- **Referencing**
  This relationship type is used to specify from-entity type as an attribute of the to-entity type.

- **Leading**
  If this relationship type is used, then the from-entity type is on a higher level than the to-entity type.

- **Qualifying**
  This relationship type is similar to the leading relationship type with the exception that the qualifying relationship is possible when the to-entity type is of storage/usage type 4.

- **Foreign key relationship**
  This relationship type is used if certain attributes or key fields of the to-entity type use the from-entity type as a foreign key.

Figure 3.4 provides a summary of leading, qualifying, and referencing relationship types.

### Table 3.2 Properties of an Attribute (Cont.)

<table>
<thead>
<tr>
<th>Property</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generated</td>
<td>Specifies whether the attribute was generated or manually created, and those attributes that are generated can’t be changed or deleted via the Edit Data Model Customizing activity.</td>
</tr>
</tbody>
</table>

### 3.1.5 Hierarchies

SAP MDG offers modeling hierarchies based on configurations of the entity types. The definition of hierarchies includes setting the hierarchies as edition dependent and synchronous. If a hierarchy is set up for an entity type, the system automatically generates database tables for storing hierarchies. Refer to the hierarchy-related properties explained in Table 3.1. The following sections explain each of these hierarchy-related properties in detail.

#### Is Hierarchy Type?

The Is Hierarchy Type? property of an entity type determines whether the entity type defines a hierarchy. If used, it also determines whether the property is version dependent or synchronized:

- **Version dependent**
  Version dependency enables a hierarchy to have multiple versions. Hierarchy versions can be defined under Customizing by following the IMG path, `MDGIMG • Process Modeling • Hierarchies • Create Hierarchy Versions`.

- **Synchronized**
  In a synchronized hierarchy, the substructure defined will remain the same throughout. A different structure can’t be defined within the same hierarchy or in a different hierarchy for the same entity.
This property Is Hierarchy Type? allows for a combination of version dependent and synchronous. Following are the available options:

- **No** (hierarchy can’t be set up for the entity type)
- **Yes – Version-Dependent/Synchronized**
- **Yes – Not Version-Dependent/Synchronized**
- **Yes – Version-Dependent/Not Synchronized**

**Validity of Hierarchies**

This property is applicable in scenarios where the Is Hierarchy Type? property is set to have version-dependent hierarchies. Using the property, an entity type can be set to have Edition or No Edition, and the system uses the edition to delimit the validity of the hierarchy. In such scenarios, an edition needs to be assigned to the hierarchy defining entity type during hierarchy processing.

Apart from the preceding two properties available at the entity type level, there are additional configurations that complete the entire hierarchy setup.

**Entity Types for Hierarchies**

Using this configuration, you can model the role of additional entity types that are part of a hierarchy setup for a selected entity type. This configuration can be maintained using the IMG path, MDGIMG • General Settings • Data Modeling • Edit Data Model, and then selecting the Entity Types for Hierarchies view under Entity Types.

The following options are available for each entity type in the hierarchy setup:

- **Hierarchy Name**
  If this usage is selected for an entity type, then such entities act as root nodes for a hierarchy and hence define the hierarchy name. For any entity type, to complete a hierarchy setup, an additional entity type needs to be defined with this usage. Such an entity type can’t be used as a to-entity type in a leading relationship.

- **No Special Use**
  If entity types are defined with this usage, then they can be used as actual nodes and as lower-level hierarchy nodes in a hierarchy.

- **Ranges Permitted on End Nodes**
  An entity type that is used as a lower node in a hierarchy can have a range of values.

**Hierarchy Attribute and Hierarchy Attribute from Reference**

Hierarchy attributes can be defined for each relationship between nodes in a hierarchy. These hierarchy attributes are available during hierarchy processing:

- **Hierarchy Attribute**
  Hierarchy attribute for a relationship between nodes is set using data elements.

- **Hierarchy Attribute from Reference**
  Hierarchy attribute for a relationship between nodes is set using a reference to an entity type.

Figure 3.5 shows an example of hierarchy attributes defined for entity type consolidation group with an entity type of node consolidation unit from data model 0G.

**Display View “Hierarchy Attributes”: Overview**

<table>
<thead>
<tr>
<th>Display Structure</th>
<th>Visual Data Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity Types</td>
<td>Hierarchy Attributes</td>
</tr>
<tr>
<td></td>
<td>Hierarchy Attribute</td>
</tr>
<tr>
<td></td>
<td>Hierarchy Attribute from Reference</td>
</tr>
</tbody>
</table>

See Section 3.2.2 to understand how the business partner hierarchy is set up in business partner data model. Chapter 5, Section 5.4.4, provides details on how to create a hierarchy using an example.

**3.1.6 Entity Relationship Model Diagram**

As basic data model building blocks were explained in previous sections, this section explains how each of the building blocks come together to form a data model. This is
explained using an entity relationship model (ERM) diagram, as shown in Figure 3.6. The following are some important aspects of a data model and its associated building blocks:

- A data model can have more than one entity type.
- A data model can have many relationships defined.
- An entity type can have one or more attributes.
- Many attributes can have the same data element.
- An entity type can occur in multiple hierarchies.
- Two entity types can have many relationships.

Figure 3.6 ERM Diagram of a Data Model

3.1.7 Data Model-Related Configurations

SAP MDG offers all data modeling-related Customizing activities grouped under Transaction MDGIMG. In this section, we’ll review all available Customizing nodes under the Data Modeling section of Transaction MDGIMG.

Define Business Type Object Codes

In this Customizing activity, new business object type codes can be added for custom data models. For all standard data models, there is no need to add any new business type object codes because SAP has already delivered these. The IMG path for accessing this activity is MDGIMG • Data Modeling • Define Business Object Type Codes.

Figure 3.7 shows business object type codes.

Figure 3.7  Business Object Type Codes

Now let’s move on to define the entity type to be used by the business object type.

Define Entity Type to Be Used by Business Object Type

If two or more entity types are assigned to the same business object type code, this Customizing activity is used to specify which entity types should be used. The IMG path for accessing this activity is MDGIMG • Data Modeling • Define Entity Type to Be Used by Business Object Type.

Define Prefixes for Internal Key Assignment

In a data model, when an entity type with internal number assignment is used, a temporary key number range assignment is required (refer to the “Key Assignment” in Table 3.1). For example, the MATERIAL entity in the material master data model uses the MDG_BS_MAT number range object for temporary keys. Similarly, the BP_HEADER entity type in the business partner data model uses the MDG_BP number range object.

Using this Customizing activity, a prefix can be assigned to the temporary number generated for internal number assignment scenarios to indicate that the generated number is a temporary number (as shown in Figure 3.8). SAP MDG has $ as the default Prefix, which can be changed if needed. The menu path for accessing this is MDGIMG • Data Modeling • Define Prefixes for Internal Key Assignment.
Edit Data Model

This Customizing activity provides an entry point for the entire list of data models available in the system and also the list of entities, attributes, and relationships. Various views available in this Customizing activity enable you to extend or create new data models and activate them. The system uses the data model to generate database tables.

This activity can be accessed using two different IMG paths, and each path offers a different way to define or edit data models. Both options provide a way to access the list of assigned active areas and associated access classes at the data model level. The two options are as follows:

- **Edit data model functionality using SAP GUI**
  
  Figure 3.9 shows the business partner data model as an example using this IMG path. This Customizing activity also provides additional functionalities such as **Visualize Data Model** and **Adjust Staging Area of Linked Change Requests**. See the list of reports provided later in this section for additional details.

  The menu path for accessing this is **MDGIMG • Data Modeling • Edit Data Model**.

- **Configuration Workbench**

  The Configuration Workbench is a Web Dynpro application that acts as an alternative to the **Edit Data Model** Customizing activity. The Configuration Workbench includes all the functions that the **Edit Data Model** Customizing activity provides, presents data model details in a tabular format per entity type, and distinguishes relationship information into outgoing and incoming relationships for each entity.

  Figure 3.10 shows the business partner data model using the Configuration Workbench.
SAP MDG offers several reports related to data models; the most commonly used are as follows:

- **Visualize Data Model (report USMD_DISPLAY_DATAMODEL)**
  This report offers a hierarchical view of entity types and attributes in a data model. This report also offers overview, detail view, and graphical display modes as well. Figure 3.11 shows the output of this report for the business partner data model as an example.

  ![Active Data Model BP](image)

  **Figure 3.11** Output of Report USMD_DISPLAY_DATA_MODEL for the Business Partner Data Model

- **Data Model Generated Tables (report USMD_DATA_MODEL)**
  This report displays data model entity types and generated database tables. It’s also possible to display counts of active and inactive records for each of these tables.

- **Compare Data Model (report USMD_COMPARE_DATA_MODEL)**
  This report compares active and inactive versions of a data model and provides a list of comparison results.

- **Delete Data Model (report USMD_DELETE_DATA_MODEL)**
  This report can be used to delete a data model. This functionality can also be triggered from the Edit Data Model IMG node or the Configuration Workbench. However, you should exercise caution because this report deletes the entire data model.

- **Adjust Staging Area of Linked Change Requests (report USMD_ADJUST_STAGING)**
  For the selected data model, this report verifies whether there were any changes made to the data model, and, if yes, it adjusts the change requests that are in process per the changes made in the data model. This report needs to be run in all relevant clients and target systems after data model changes.

**Define Authorization Relevance per Entity Type**

This Customizing activity (as shown in Figure 3.12) is used to determine whether the system uses predefined authorizations from the reuse active area or SAP MDG-specific authorizations using authorization object USMD_MDAT. By default, the system always uses predefined authorizations from the reuse active area. If the option to select SAP MDG-specific attributes is chosen, then configurations for entity type level authorizations and authorization-relevant attributes need to be set up. Note the following:

- If the reuse active area is used, then settings made under Authorization for Entity Types and Authorization-Relevant Attributes views will be ignored.

- For data models business partner and material master, standard SAP ERP authorization checks are always performed, and any additional settings performed under this Customizing activity aren’t supported.

The menu path for accessing this activity is MDGIMG • Data Modeling • Define Authorization Relevance per Entity Type.
Figure 3.12 Define Authorizations per Entity Type and Attributes

Generate Data Model-Specific Structures

Each data model and entity type can have the following structures in the Data Dictionary:

- PDF-based forms
- Service Mapping Tool (SMT) with structures used for the configuration of enterprise services
- Mapping between staging area and reuse active area
- Data replication framework
- SAP Enterprise Search
- Field control of attributes
- Field properties of attributes and key fields
- Key fields

This Customizing activity is used to generate the preceding data model-specific structures. These structures need to be regenerated whenever a data model is changed. For all standard data models, these structures are delivered as well. The IMG path for accessing this activity is MDGIMG • Data Modeling • Generate Data Model-Specific Structures.

Assign Package for Customizing Include

When an entity type delivered by SAP is enhanced to include additional attributes, the system automatically writes these attributes to Customizing includes during the generation of data model-specific structures explained in the previous section. In this Customizing activity, a package can be assigned for the customizing includes used during data model enhancements. The IMG path for accessing this activity is MDGIMG • Data Modeling • Assign Package for Customizing Include.

This Customizing activity has views for structures as well as mapping for each data model. Figure 3.13 shows the material master data model structures as an example.

Figure 3.13 Data Model Structures for the Material Master Data Model

Figure 3.14 shows SMT Mapping from Active Area and SMT Mapping to Active Area for the material master data model as an example.
Define Package Groups

Using this Customizing activity, you can define package groups that consist of one or more packages. A package group can be assigned to a mapping (see the next section). The (F4) help of the transformation tool displays only classes that are contained in one of the specified packages.

Figure 3.15 shows an example of a package assignment to a master package group MDG_BS_MM. The IMG path for accessing this activity is MDGIMG/L54263 Data Modeling/L54263 Create and Edit Mappings/L54263 Define Package Groups.

Service Mapping Tool

You need to understand a bit more about SMT before moving on to the following sections. SMT is a program that enables you to fill target structures using sets of source structures. SMT supports simple and complex mappings, mappings with field transformations, and field checks. The main uses of SMT are to transform SAP internal format to enterprise services format and vice versa.

Figure 3.16 shows an example of mapping for the MDG_BS_MAT_MAP_2STA structure and associated mapping steps. Refer to the earlier “Generate Data Model-Specific Structures” section for details on data model-specific structures and “Define Package Groups” section for details on package groups.
Figure 3.17 shows mapping step MDG_BS_MAT_MARA as an example along with transformations and field mappings.

Following are the configurations available for either create and edit mappings or extend mappings:

- **Create and Edit Mappings**
  This Customizing activity is used for creating new mappings and mapping steps, and creating or editing transformations and field checks. The IMG path for accessing this activity is **MDGIMG**.

- **Extend Mappings**
  This Customizing activity is used for extending existing and delivered mappings, but it can't be used to create new mappings or mapping steps. The IMG path for accessing this activity is **MDGIMG**.

---

**Check Customizing**
This Customizing activity triggers the execution of report RSMT_CHECK, which can be executed for a specific mapping or for the entire configuration and checks the entire mapping Customizing. The IMG path for accessing this activity is **MDGIMG**.

Now, let’s explore the standard data models provided by SAP.

### 3.2 Standard Data Models

In this section, we’ll go through standard data models (material master; supplier, customer, and business partner; and financial) delivered by SAP at a high level and understand how entities are structured in each data model. This section also covers the scope of each data model.

#### 3.2.1 Material Master Data Model

With the generally available SAP MDG 9.0 release, the material master data model in SAP MDG covers most of the material master attributes that are commonly used across industries. Figure 3.18 shows an overview of the material master data model.
The following are some of the highlights of the material master data model:

- Four storage/usage type 1 entity types
- Several type 2 and type 3 entity types acting as check tables
- Several type 4 entity types representing plant data, storage location, valuation, and warehouse data
- No defined hierarchies

Table 3.3 lists SU type 1 and 4 entity types of the material master data model.

<table>
<thead>
<tr>
<th>Entity Type</th>
<th>SU Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATERIAL</td>
<td>1</td>
<td>Basic Data</td>
</tr>
<tr>
<td>DRADBASIC</td>
<td>1</td>
<td>Basic Data for Document Link</td>
</tr>
<tr>
<td>MATCHMNG</td>
<td>1</td>
<td>Material Change Management</td>
</tr>
<tr>
<td>MKALBASIC</td>
<td>1</td>
<td>Production Version</td>
</tr>
<tr>
<td>BSCDATTXT</td>
<td>4</td>
<td>Basic Data Text</td>
</tr>
<tr>
<td>CLASSASGN</td>
<td>4</td>
<td>Class Assignment (Classification)</td>
</tr>
<tr>
<td>DRADTXT</td>
<td>4</td>
<td>Document Link Text</td>
</tr>
<tr>
<td>INTCMNT</td>
<td>4</td>
<td>Internal Comment</td>
</tr>
<tr>
<td>MARAPURCH</td>
<td>4</td>
<td>Material Purchasing Data</td>
</tr>
<tr>
<td>MARAQTMNG</td>
<td>4</td>
<td>Material Quality Data</td>
</tr>
<tr>
<td>MARASALES</td>
<td>4</td>
<td>Material Sales Data</td>
</tr>
<tr>
<td>MARCATP</td>
<td>4</td>
<td>Plant Data ATP</td>
</tr>
<tr>
<td>MARCBASIC</td>
<td>4</td>
<td>Plant Data Basic Data</td>
</tr>
<tr>
<td>MARCCSTNG</td>
<td>4</td>
<td>Plant Data Costing</td>
</tr>
<tr>
<td>MARCFRCST</td>
<td>4</td>
<td>Plant Data Forecasting</td>
</tr>
<tr>
<td>MARCFRPAR</td>
<td>4</td>
<td>Plant Data Forecast Parameters</td>
</tr>
</tbody>
</table>

Table 3.3 Material Master Data Model SU Type 1 and 4 Entity Types
Table 3.4 lists the reuse active areas and associated access classes assigned to the material master data model.

Table 3.4 Material Master Data Model: Reuse Active Areas

<table>
<thead>
<tr>
<th>Active Area</th>
<th>Description</th>
<th>Access Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRAD</td>
<td>Document-object link</td>
<td>CL_MDG_BS_MAT_DRAD_ACCESS</td>
</tr>
<tr>
<td>DRATYP2CHK</td>
<td>Type 2 entities (attributes) for document-object link (DRAD)</td>
<td>CL_MDG_BS_MAT_DRAD_TYP2CHK_ACC</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>Material master (MM01 – MM03 in active area)</td>
<td>CL_MDG_BS_MAT_ACCESS</td>
</tr>
<tr>
<td>MM_TYP2CHK</td>
<td>Type 2 entities (attributes) for material master</td>
<td>CL_MDG_BS_MAT_TYP2CHK_ACCESS</td>
</tr>
</tbody>
</table>

Table 3.3 Material Master Data Model SU Type 1 and 4 Entity Types (Cont.)

Table 3.4 Material Master Data Model: Reuse Active Areas

Now that you understand all the data model building blocks from Section 3.1, we can focus on the material master data model and understand how some of the entities and relationships are modeled. Figure 3.19 shows the MARCBASIC entity type and its associated relationships as an example. Some of the highlights of this example are as follows:

- The MATERIAL entity has a leading relationship of cardinality 1:N to entity type MARCBASIC.
- The PRCTR entity type has a referencing relationship of cardinality 0:N to entity type MARCBASIC.
- The WERKS entity type has a qualifying relationship of cardinality 1:N to entity type MARCBASIC.

Figure 3.19 Material Master Data Model Example

3.2 Standard Data Models

3.2.2 Supplier, Customer, and Business Partner Data Models

The business partner data model caters to business partner, customer master, and supplier domains in SAP MDG. This helps in having all common attributes in the appropriate business partner-related entity types. As discussed in Section 2.4.3 in Chapter 2, customer vendor integration (CVI) plays an important role in creating business partner and associated customer/vendor records. Business partner relationships are used for creating customer and supplier contacts in SAP MDG. Figure 3.20 shows an overview of the business partner data model and how business partner data and corresponding SAP ERP customer and SAP ERP vendor data are linked.
Some of the highlights of the business partner data model are as follows:

- Multiple storage/usage type 1 entity types are available.
- Multiple type 4 entity types are available.
- Business partner hierarchy is possible.
- Business partner and corresponding SAP ERP customer/SAP ERP vendor are linked via the multiple assignments entity type.

Table 3.5 lists SU type 1 and 4 entity types of the business partner data model.
### Business Partner Data Model SU Type 1 and 4 Entity Types (Cont.)

<table>
<thead>
<tr>
<th>Entity Type</th>
<th>SU Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP_CUSTAX</td>
<td>4</td>
<td>Tax Classification for Customer</td>
</tr>
<tr>
<td>BP_CUSWHT</td>
<td>4</td>
<td>Customer: Extended Witholding Tax</td>
</tr>
<tr>
<td>BP_CUS_CC</td>
<td>4</td>
<td>Customer Company Code Data</td>
</tr>
<tr>
<td>BP_DUNN</td>
<td>4</td>
<td>Dunning Data</td>
</tr>
<tr>
<td>BP_IDNUM</td>
<td>4</td>
<td>Identification Numbers</td>
</tr>
<tr>
<td>BP_INDSTR</td>
<td>4</td>
<td>Industry</td>
</tr>
<tr>
<td>BP_MLT_AS</td>
<td>4</td>
<td>Multiple Assignment of Customer/Supplier</td>
</tr>
<tr>
<td>BP_PORG</td>
<td>4</td>
<td>Purchasing Organization</td>
</tr>
<tr>
<td>BP_PORG2</td>
<td>4</td>
<td>Purchasing Data</td>
</tr>
<tr>
<td>BP_ROLE</td>
<td>4</td>
<td>Role</td>
</tr>
<tr>
<td>BP_SALES</td>
<td>4</td>
<td>Sales Data (Customer)</td>
</tr>
<tr>
<td>BP_TAXGRP</td>
<td>4</td>
<td>Tax Groupings (Suppliers)</td>
</tr>
<tr>
<td>BP_TXNUM</td>
<td>4</td>
<td>Tax Numbers</td>
</tr>
<tr>
<td>BP_VENFCN</td>
<td>4</td>
<td>Supplier: Partner Functions</td>
</tr>
<tr>
<td>BP_VENGEN</td>
<td>4</td>
<td>General Data (Supplier)</td>
</tr>
<tr>
<td>BP_VENSUB</td>
<td>4</td>
<td>Supplier Subrange</td>
</tr>
<tr>
<td>BP_WHTAX</td>
<td>4</td>
<td>Extended Withholding Tax</td>
</tr>
<tr>
<td>BP_WPAD</td>
<td>4</td>
<td>BP Contact Person Workplace Address</td>
</tr>
<tr>
<td>CUSCCTXT</td>
<td>4</td>
<td>Texts (Customer Company Code Data)</td>
</tr>
<tr>
<td>CUSGENTXT</td>
<td>4</td>
<td>Texts (Customer General Data)</td>
</tr>
<tr>
<td>CUSSALTXT</td>
<td>4</td>
<td>Texts (Customer Sales Data)</td>
</tr>
</tbody>
</table>

### Table 3.6 Business Partner Data Model: Reuse Active Areas

<table>
<thead>
<tr>
<th>Active Area</th>
<th>Description</th>
<th>Access Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUS_TYP2CH</td>
<td>Type 2 entities (e.g., tax classification) (Customer)</td>
<td>CL_MDG_BS_CUST_TYP2CHK_ACCESS</td>
</tr>
<tr>
<td>PARTNER</td>
<td>N/A</td>
<td>CL_MDG_BS_BP_ACCESS_MASTER</td>
</tr>
<tr>
<td>SUP_TYP2CH</td>
<td>Type 2 entities (e.g., plant) (Vendor)</td>
<td>CL_MDG_BS_SUPPL_TYP2CHK_ACCESS</td>
</tr>
</tbody>
</table>

Next let’s focus on the business partner data model and understand how some of the entities and relationships are modeled. Figure 3.21 shows how some of the important entity types are related to each other in the business partner data model.
The business partner data model also can model hierarchies for business partners. From the persistence perspective, entity types BP_HRCHY and BP_SUBHRY are modeled to be flex entity types (the active area is defined as "MDG" at the entity type level). It is important to note that business partner hierarchy is not related to the SAP ERP customer or vendor hierarchies. Figure 3.22 shows how entity types BP_HRCHY, BP_SUBHRY, and BP_HEADER are modeled to facilitate hierarchy creation for business partner records. The following are some important aspects of modeling these three entity types:

- **Entity types BP_HRCHY and BP_SUBHRY aren’t modeled as hierarchies; Is Hierarchy Type? is set to No (as shown Figure 3.22).**
- **Entity type BP_HEADER is modeled as a hierarchy; Is Hierarchy Type? is set to Yes – Not Version-Dependent/Not Synchronized.**

![Figure 3.21 Business Partner Data Model: Entity Types](image)

![Figure 3.22 Business Partner Data Model: Hierarchy](image)

For BP_HEADER, the Entity Types for Hierarchies customization is maintained as the following:
- **BP_HRCHY is defined as Hierarchy Name.**
- **BP_SUBHRY is defined as No Special Use.**
- **BP_HEADER is defined as No Special Use.**

Now, let's move on to discuss the final data model delivered by SAP.

### 3.2.3 Financial Data Model

The SAP standard financial (CO) data model caters to the data governance of various SAP ERP FI objects such as cost center, profit center, cost element, G/L account, and so on. Refer to the previous chapter for a complete list of SAP ERP FI objects.
Table 3.7 shows a list of all SU type 1 and 4 entity types of the financial data model.

<table>
<thead>
<tr>
<th>Entity Type</th>
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Table 3.7 SU Type 1 and 4 Entity Types of the Financial Data Model (Cont.)

3.2 Standard Data Models

Figure 3.23 shows type 1 entity types of the financial data model grouped under three main areas. Note that the financial area also uses profit center, profit center group, and profit center hierarchy.
This chapter covered the building blocks of SAP MDG data modeling, including entity types, attributes, and relationships. After introducing the building blocks of data modeling, this chapter covered the customization aspects of data modeling. We covered the standard data models for material master, business partner, and financials, as well as how standard data models are modeled.

Figure 3.23  Financial Data Model: Type 1 Entity Types

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