“Transportation Requirements and Order Management,” begins with where it all starts: the different approaches for requesting a transportation service. As it explores transportation requirements and order management, this chapter covers integrating SAP ERP documents and using forwarding orders and forwarding quotations.

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Transportation Management with SAP TM
970 Pages, 2016, $79.95/€79.95
ISBN 978-1-4932-1224-8

www.sap-press.com/3850
Regardless of whether you’re looking from the perspective of a shipper, an LSP, or a carrier, the transportation process starts with a request for transportation services. This chapter covers the different ways to start the process in SAP TM and how to record the requests in the system.

4 Transportation Requirements and Order Management

When we look at a very simplified, document-driven process flow in SAP TM, we see that not many documents are used to cover the transportation process. In fact, there are only three process steps (leaving out transportation charge management for the moment) that cover the transportation planning process, as you can see in Figure 4.1. In SAP TM, the starting point of the process is always a transportation request (TRQ), followed by freight unit and transportation order.

SAP TM can be used to monitor and execute the transportation processes of many different industries, which indicates that transportation process approaches can vary significantly.

These approaches require different ways of starting the transportation process in the system. For example, for a shipper, transportation is not the core business, so the main focus is laid not on the ordering and execution of transportation services, but on manufacturing, materials management, and so on. The shipper will most likely use an ERP system to cover these processes. Since the transportation process is not the core business, the leading system in the entire value-generating process should be the ERP system because it handles processes that produce...
the competitive advantage. The SAP TM system therefore receives information; it is not allowed to alter any information that is important for the manufacturing process.

To work within this scenario, SAP TM provides built-in ERP integration features from which you can integrate transactional data from SAP ERP to SAP TM to continue the process with regard to transportation services. We cover these in Section 4.1.

However, if we look at the transportation process from a logistics service provider (LSP) or carrier’s perspective, the transportation process is the core process. Therefore, more emphasis needs to be laid on the information generated by the transportation process. Since the ERP functionality does not provide information that is detailed enough for the LSP and carrier’s needs, the information needs to be generated in the SAP TM system, which is now the leading information (that is, process-driving) system.

So since the ERP integration does not deliver sufficient information for transportation as a core business, the transportation request needs to be created in SAP TM itself. So how can these different requirements be covered with only one document, as shown in Figure 4.1? The answer is that they cannot. Although the main process flow remains the same, we need to take a closer look at the transportation request process step. When zooming in on this step in Figure 4.2, we can see that several documents are necessary. However, it is important to remember that all documents and the respective process variants lead to the common next step: freight unit building (to be covered in Chapter 6).

Figure 4.2 shows the different transportation request documents. While the ERP order-based transportation request (OTR) and the ERP delivery-based transportation requirements (DTR) cater to the shipper’s transportation process variant, the forwarding quotation and forwarding order cover the LSP and carrier’s requirements.

So let’s delve deeper into both process variants and focus on how these documents support the start of the transportation process.

4.1 Integration of SAP ERP Documents

In Chapter 1, we introduced SAP ERP integration as a major component of SAP TM. In this section we take an in-depth look at how that SAP ERP integration can be established. First, it must be said that you do not need to be a Sales and Distribution (SD) component expert to establish the integration into SAP TM, but it is advantageous to know a little bit about the standard SD and Materials Management (MM) document flow.

SAP TM can integrate the following SD and MM documents:

- Sales orders
- Purchase orders
- Stock transfer orders
- Inbound deliveries
- Outbound deliveries
- Scheduling agreements
As always, you cannot immediately begin with integrating orders or deliveries from SAP ERP into SAP TM. First, you need to make sure the prerequisites for the SAP ERP integration are fulfilled. In general, there is only one major prerequisite: the master data. The master data needs to be integrated into SAP TM from the SAP ERP system using the Core Interface Framework (CIF) that we introduced in Chapter 3. For a seamless SAP ERP integration, make sure the following master data is integrated:

- **Locations and business partners**
  Since SAP ERP does not have an entity called location, there is no 1:1 copy of the SAP ERP master data. Debtors and creditors, as well as shipping points and plants, can be integrated. Make sure you have set the integration model correctly—that is, for the debtors and creditors, both locations and business partners are created. For shipping points and plants, only create locations, and link those locations to a business partner representing your organizational unit.

- **Products**
  Again, we need to take a look at different vocabulary between SAP ERP and SAP TM. In the SAP SCM environment, we talk about “products.” However, the master data copied from SAP ERP is referred to as the “material master data.”

- **Organizational data**
  In the transportation process with SAP ERP integration, it is optional to assign a sales organization to a transportation request. However, if you want to represent the sales organization from the sales order in the SAP TM transportation request, you need to transfer the organizational model from SAP ERP to SAP TM.

### Integration of Master Data with the Same Names

If you plan to link your SAP TM system to more than one SAP ERP system, make sure you do not run into trouble with duplicate names. Because the SAP ERP systems run independently, they use number range intervals that often overlap. When integrating this master data, for example, the SAP TM system will encounter a problem because it can only create one location with the same name.

The most common use case is the integration of shipping points and plants, which usually start with the same number.

Even if you are working with only one SAP ERP system, you will notice that shipping points and plants may have the same number. This also needs to be resolved in the SAP TM system upon master data creation.

SAP TM delivers some Business Add-in (BAdI) implementations that cover exactly this case. In Customizing, you can get to these BAdI implementations by following the IMG menu path SAP Transportation Management > SCM Basis > Integration > BAdIs for Specific Applications > Location and Business Partner > BAdI: Inbound Processing for Location. Here you will find three sample implementations ready to use:

- The implementation APOCF001_SYSDIF adds a suffix to the location name, identifying the logical system name of the SAP ERP system where this location was created.
- The implementation APOCF001_TYPEDIF adds a prefix telling you whether the SAP ERP counterpart is a customer, creditor, shipping point, and so on.
- The third implementation, APOCF001_TYPESYSDIF, adds both.

The other prerequisite for the SAP ERP integration is the system landscape. In general, the SAP ERP integration uses web services for communication among SAP ERP, SAP PI, and SAP TM.

For the most part, the integration of transactional data between SAP ERP and SAP TM can be done with SAP PI as middleware or without, using direct communication. However, we recommend that you use SAP PI as middleware in order to have better monitoring capabilities.

Having briefly mentioned web services communication, we have to keep one thing in mind: while this chapter explains the technical integration with web services, this integration is possible only if you are using SAP ERP 6.04 SP 9 or higher. For SAP ERP releases older (lower) than this, it is mandatory to establish the integration via SAP PI using iDocs. (For details about SAP ERP integration in terms of architecture, please refer to Chapter 2, Section 2.4.)

Before we get too far into talking about SAP TM, we should take some time to examine the general setup steps in SAP ERP; these are necessary to enable the integration into SAP TM. Some of the activities are standard Basis activities that are not specific to the SAP TM integration (such as creation of RFC users or RFC connections), so we’ll only look at activities specific to the SAP TM integration here.

Some **business functions** need to be activated for the SAP TM integration. The following business functions are required; some of them are specifically designed for the SAP TM integration:

- LOG_TM_ORD_INT
- LOG_TM_ORD_INT_II
Again, some of these business functions are available only as of SAP ERP 6.04 SP 9.

4.1.1 Sales Order Integration

The most commonly used type of integration between SAP ERP and SAP TM is sales order integration. With sales order integration, shippers use SAP TM to organize the transport of sold goods to the customer. In this section we focus on how to create an OTR and what to do with it.

In the previous section, we started with the setup in SAP ERP that is standard for all other SAP ERP SD and MM documents, too. Now we take a look at the settings that are specific to the integration of sales orders.

SAP ERP has a feature called output determination. Output determination in SD is used to control the output—meaning follow-up activities, messages, and documents—for sales, shipping, transportation, and billing. It is used to exchange information with external and internal systems that represent business partners when looking at it from a process perspective.

Output determination can automatically propose output for an SD document using the SAP ERP condition technique. Though the terminology is similar, condition technique in SAP ERP and conditions in SAP TM are two completely different things.

As you can see in Figure 4.3, the core of the SAP ERP output determination is the output determination procedure, which consists of steps that are supposed to be executed in the given order. Each step represents a condition of a defined condition type; this condition determines whether an output of the defined output type should be triggered.

The condition type is linked to the output type and can then contain condition records that define when an output should be triggered. In terms of structure, a condition record is a table (like the decision table in SAP TM conditions) that is used to find a value. However, in the SAP ERP condition technique, a condition type can contain several condition records of different structures (e.g., one condition record where the input data is sales organization and customer, and a second condition record where the input data is order type).

With the access sequence, you can define in which order the condition records should be processed. Since the condition type is linked to the output type, you do not need to define which output needs to be triggered. This is implicitly done in the output determination procedure, where you define a condition type.

So recall that the output type is linked to the condition type, meaning that once the condition type finds a suitable result, the output of this output type is triggered. In SAP ERP, several output types are available that represent print output, EDI messages, A2A messages, email, and so on. Some of these are shown in Figure 4.4.

For the integration of the sales order, you need to create a new output type (output type TRS0). To do this in your SAP ERP system, follow the IMG menu path Sales and Distribution • Basic Functions • Output Control • Output Determination • Output Determination using the Condition Technique • Maintain Output Determination for Sales Documents • Maintain Output Types.
To maintain the output type TRS0, you need to define general data, processing routines, and partner functions, as shown on Figure 4.5.

Once the output type is configured, you can add it to the output determination procedure by following the IMG menu path SALES AND DISTRIBUTION • BASIC FUNCTIONS • OUTPUT CONTROL • OUTPUT DETERMINATION • OUTPUT DETERMINATION USING THE CONDITION TECHNIQUE • MAINTAIN OUTPUT DETERMINATION FOR SALES DOCUMENTS • MAINTAIN OUTPUT DETERMINATION PROCEDURE. Simply add a new step with condition type TRS0 and requirement 27 to procedure V10000.

**Assignment of Output Determination Procedures**

This chapter assumes use of the standard output determination procedure and the standard sales order type for integration. However, it is clear that this might not always be the case. If you are using a different sales order type, you can assign an output determination procedure to the order type by following the IMG menu path SALES AND DISTRIBUTION • BASIC FUNCTIONS • OUTPUT CONTROL • OUTPUT DETERMINATION • OUTPUT DETERMINATION USING THE CONDITION TECHNIQUE • MAINTAIN OUTPUT DETERMINATION FOR SALES DOCUMENTS • ASSIGN OUTPUT DETERMINATION PROCEDURES.

Once the output determination is configured, we can activate the transfer of sales orders by following the IMG menu path INTEGRATION WITH OTHER SAP COMPONENTS • TRANSPORTATION MANAGEMENT • LOGISTICS INTEGRATION • ACTIVATE TRANSFER OF SALES DOCUMENTS IN THE SAP ERP SYSTEM.

As you can see in Figure 4.6, the activation of a sales document always depends on three things:
- Sales organization plus distribution channel and division
- Sales order type
- Shipping condition (if not relevant, you can leave this entry empty)

The activation of the sales document is done via a *control key*, which defines which document types should be transferred to SAP TM. Figure 4.7 shows the standard control keys.
In addition, you can see in Figure 4.6 that you can define an SAP TM number when you activate the transfer of sales documents. However, you will notice when you fill this field that no F4 help is available. The purpose of this field is to link one SAP ERP system to several SAP TM systems. If several SAP TM systems are linked to one SAP ERP system and the SAP TM number is filled, SAP ERP decides to which SAP TM system the order should be sent, based on the entries made in the table shown in Figure 4.6. However, you can enter anything you like here. The “navigation” of which logical system the message is routed to is done entirely in SAP PI, where the string sent from SAP ERP is interpreted and translated into a logical system. If you encounter such a situation, consult an SAP PI expert to ensure that the routing is performed correctly.

Once you have configured these SAP ERP settings (for more details on the configuration steps, please also consult the standard SAP Solution Manager content for SAP TM), a message according to output type TRS0 is always sent when a sales order has been created, updated, or deleted.

If you cannot see any document being created or updated in the SAP TM system, you can check on the SAP ERP side to see if an output was triggered. Access the sales order you have just saved and then go to the output overview by following the menu path Extras • Output • Header.

If you see an output of type TRS0 with a green traffic light, the output message was successfully created.

### 4.1.2 Integration of Materials Management Orders

The integration of MM orders is, in many regards, similar to the integration of SD documents. The most important Customizing activity in SAP ERP for the transfer of MM documents is the specification of the control keys, as just described.

However, in contrast to SD documents, MM documents use the SAP ERP workflow technology for processing the output. Therefore, error handling as described for the sales order is not possible for purchase orders, stock transfer orders, or inbound deliveries.

#### 4.1.3 Integration of Scheduling Agreements

Scheduling agreements describe recurring deliveries to a customer or to an own plant. We can therefore also differentiate between SD scheduling agreements, which represent recurring deliveries to customers, and MM scheduling agreements, which describe recurring deliveries to our plants.

Scheduling agreements can be integrated to SAP TM using the same settings as already described. The activation of scheduling agreement transfer is done using the activation table for sales documents depicted in Figure 4.7, for both MM scheduling agreements and SD scheduling agreements.

When a scheduling agreement is sent to SAP TM, it creates one OTR—not per delivery of the scheduling agreement, but for the entire scheduling agreement. The different deliveries are represented as different items or schedule lines of the OTR.

Since the scheduling agreement can be updated or extended in SAP ERP or is valid for a very long time, we can consider transferring not all deliveries of the scheduling agreement to SAP TM, but only the ones in the near future. To do so, you can use IMG path Integration with Other SAP Components • Transportation Management • Logistics Integration • Define Settings for Sales Scheduling Agreements Integration (or Define Settings for MM Scheduling Agreements Integration) in SAP ERP. In this Customizing activity, you can define the time horizon that should be transferred to SAP TM. For MM scheduling agreements, you can also define whether just-in-time or forecast delivery schedules should be transferred. (It can only be either just-in-time or forecast, never both). Since this Customizing activity is optional, just-in-time delivery schedules will be transferred only if nothing was defined.

If you decide to transfer only a certain time horizon to SAP TM, you need to make sure to schedule batch jobs in SAP ERP that transfer the new delivery lines to SAP TM that become relevant in the course of time. There are two batch jobs available:

- `TMINT_SAGSD_TRANSFER` (for SD scheduling agreements)
- `TMINT_SAGMM_TRANSFER` (for MM scheduling agreements)
4.1.4 Order-Based Transportation Requirement

Let’s shift our attention back to SAP TM. Once a sales order is created and the web services have successfully been executed, a document is created in the SAP TM system; this is the OTR, which represents the sales order data generated in SAP ERP and carries all information relevant for the transportation process.

The OTR is the corresponding SAP TM document that contains all transportation-relevant information from the SAP ERP orders. It can represent four things:

- Sales orders
- Purchase orders
- Stock transfer orders
- Scheduling agreements

For SAP TM, it doesn’t matter whether the predecessor document was a sales order, stock transfer order, purchase order, or scheduling agreement. The OTR represents all of these SAP ERP document types.

Remember from Chapter 2, Section 2.3.1, that there is a singleton condition that is used to define the OTR type of integration SAP ERP orders. You can create and define a condition of the condition type /SCMTMS/OTR_TYPE to differentiate OTRs by type. Among other information, you can also use the sales order type used in SAP ERP for the condition definition. There is a predefined data access definition that you can use for this. If the condition does not find a result, the default type is used. The default type is defined in Customizing for OTR types with a corresponding flag.

Let’s take a close look at the OTR document itself. You will notice that, compared to other SAP TM documents, the amount of information is relatively low. This is because the only information stored on the OTR is transferred from SAP ERP and is crucial for the transportation process.

The most important difference from other documents in SAP TM is that there are no action buttons on the OTR, so the document is read only, with no changes allowed. This is because in this scenario, the SAP ERP system is the information leading system, so any updates should come from SAP ERP.

On the General Data tab, you will see the most important information, such as the OTR document type and the total weight and volume of the freight. There is also a field for a sales organization. Recall that you can integrate your sales organization from SAP ERP and put it on the OTR, but it might not serve for the purposes of SAP TM.

**Sales Organization in SAP ERP and SAP TM**

When first looking at the empty Sales Organization field on the OTR document, you might find it strange that the sales organization used in the SAP ERP sales order was not moved over to the OTR.

However, in most cases, this is correct. Since SAP TM covers the transportation process, the sales organization in this case is not the organizational unit selling the products anymore; the sales organization in the OTR is the organizational unit selling the transportation services. In most cases, these are different organizational units, if the shipper even sells the transportation of products at all.

On the bottom of the screen displaying the OTR document, you can see the information area for the items. Since one OTR represents one sales order, all items of the sales order are displayed and listed here. Here you can also find the delivery date that was assigned to the items on the SAP ERP sales order. The delivery date in SAP ERP can be defined in many different ways, such as using a connected available-to-promise (ATP) check, simple route determination in SAP ERP, or sales order scheduling using SAP TM. No matter which way you determine the delivery date in SAP ERP, it is a date the SAP TM system will work with.

On the Locations and Dates/Time tab, you can see the locations of the entire transportation. The source location is the shipping point or plant for which the destination location is the location that was created from the customer transferred from SAP ERP via CIF. Note that the destination location is not for the sold-to party maintained in the sales order, but for the ship-to party.

You will notice that in many cases the source and/or destination locations are empty. This is because the source and destination location can vary from item to item, depending on the storage location or shipping point assigned to the items of the SAP ERP order. During freight unit building, several freight units are created for the OTR because the transportation locations of the items differ. If the source location on the header level of the OTR document is empty, you can assume that it is created for an ERP sales order; if the destination location is empty, you can assume it is created for an ERP purchase order.
In Section 4.2 we describe how the transportation order clerk can manually pre-
define the routing of the transportation requirements by adding stages to the for-
warding order. With OTRs, there is no such functionality. The transportation
path is simply defined from shipping point to customer for an SAP ERP sales
order, meaning that the OTR contains only one stage. (We describe one exception
concerning incoterm locations later.)

After freight unit building, the freight unit stage can be split into several stages if
the transportation process requires this. This process represents the difference
between the ordered route and the actual route. As its name suggests, the ordered
route is the routing that was ordered by the customer (for an integrated SAP ERP
order, simply a direct transportation path). The actual route, on the other hand, is
the route that was actually used. If the SAP ERP sales order was defined from a
shipping point in Germany to a customer in the United States, the ordered route
is simply from Germany to the United States. However, the actual route looks dif-
ferent—for example, one stage is from Germany to a port in the Netherlands, one
stage is from the Dutch port to an American port, and one stage is from the Amer-
ican port to the customer.

So although the ordered route differs from the actual route, the actual route is not
reflected on the OTR; the OTR represents only the transportation requirement and
therefore the ordered route.

When looking at the Customizing of OTR types as depicted in Figure 4.8, you will
see that, compared to other document types in SAP TM, there is not much to cus-
tomize here. You can access the OTR type Customizing by following the IMG
menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT •
INTEGRATION • ERP LOGISTICS INTEGRATION • ORDER-BASED TRANSPORTATION
REQUIREMENT • DEFINE ORDER-BASED TRANSPORTATION REQUIREMENT TYPES.

Rather than going into every detail of the type Customizing, we mention only the
most important topics here. Since you cannot do anything with the OTR itself, it
is mandatory to create freight units in order to start planning. While we go into
detail of freight unit building later in this book, it is still worth mentioning that
we have some options in this area.

The AUTOMATIC FREIGHT UNIT BUILDING checkbox defines whether a freight unit
should be built automatically after the OTR is created. This makes sense in many
use cases. If you consider consolidation of sales orders, however, you might not
want to create freight units directly after creation, but instead only trigger freight
unit building via a batch job. This way you can consolidate several OTRs to one
freight unit.

Regardless of whether you want to create freight units automatically or using a
batch job, you need to define how the freight units should be created. To do so,
you define a FREIGHT UNIT BUILDING RULE (FUBR) in Customizing. If the method of cre-
ating freight units depends on some values of the OTR, you might even want to
use a condition to find the right FUBR.

The default units of measurement can be used to have consistent units of mea-
surement in the SAP TM system. If the integrated material master contains unit of
measurement conversions, the default units are used on the OTR’s header infor-
mation. The item information will keep the units of measurement from the orig-
inal SAP ERP order.
Charge Calculation on OTRs

Recall that there are no buttons or actions a user can use on the OTR, which means that no charge calculation can be executed for the OTR.

The reason for this lies in the intended process. Since OTRs are used in the shipper’s process, the SAP ERP system is the leading system—for potential surcharges for transportation services, too. Charge calculation in SAP TM is used to calculate selling rates for transportation services and is therefore used only on forwarding orders that are used in LSP or the carrier’s processes.

Therefore, the surcharges for transportation must already be imposed on the SAP ERP sales order.

The General Data tab includes a UI section about the incoterms and incoterm location. The incoterm and the corresponding location are assigned to the order in SAP ERP, and that information is transferred to the SAP TM system.

In most releases of SAP TM, the incoterms and incoterm location are for information only, and the information does not have any direct impact on routing or charge calculation. However, the incoterm location defined in SAP ERP can have an impact on the routing of the freight unit in SAP TM.

In Figure 4.8 the Incoterm Loc. Stage Bldng field defines how the incoterm location of the SAP ERP order should be interpreted.

Depending on the Customizing entry you have chosen, the SAP TM system creates two stages. As shown in Figure 4.9, the first stage, represented by the bold line, leads from the source location to the incoterm location. Stage 2, shown as the dashed line, leads from the incoterm location to the destination location.

Depending on the scenario, the stage that is relevant for the shipper’s planning can be stage 1 or stage 2. Remember, an OTR represents an SAP ERP sales order as well as an SAP ERP purchase order and a stock transfer order. This means that OTRs can be used for both outbound transportation processes and inbound transportation processes.

Therefore, the Customizing entries apply to both outbound and inbound processes. With this Customizing entry, you can define whether stage 1 or stage 2 is the stage the shipper using SAP TM is responsible for. The Customizing entry also defines whether the stage the shipper is not responsible for should be created at all. If it should be created, it will be created as a statistical stage, meaning it has no influence on the freight unit and therefore on the planning process steps.

If you have integrated an order that represents an internal transfer of goods, such as with a stock transfer order, and the shipper is nevertheless responsible for the entire transportation, you can also choose to create two relevant stages.

If no incoterm location is entered in the SAP ERP order, no stage splitting is done in SAP TM.

Recall that there is no entity representing locations in SAP ERP. In SAP TM, locations are an essential part of the entire master data framework. The incoterm location entered in SAP ERP is therefore only a free text entry that can be entered when creating the order. However, to execute a stage splitting, a location master data must exist in SAP TM.

The incoterm location is still transferred to SAP TM as a free text. In SAP TM, the text is then mapped to a location master data. To do this, you need to assign a location master data to a text by following the SAP NWBC menu path Master Data • Transportation Network • Locations • Assign Location to Incoterm Location.

To recognize the incoterms in SAP TM, you need to maintain them in SAP SCM Basis Customizing via the IMG menu path SAP Transportation Management • SCM Basis • Master Data • Define Incoterms. In this Customizing activity, you can also define whether the incoterm requires an incoterm location.

This approach is of course subject to many pitfalls, such as mistyping the incoterm location on the SAP ERP order. Therefore, the SAP ERP orders also offer the possibility to define a handover location. A handover location is defined in SAP ERP as a vendor master data of a special account group. This master data can be assigned to the SAP ERP order as handover location. Since the vendor was transferred to SAP TM to create a corresponding location, the same stage split as with incoterm locations can be done on the OTR.
Together with the handover location, a **handover date** can also be defined on the SAP ERP order. This handover date defines the date when the goods should be handed over at the handover location.

In SAP ERP orders, you can assign multiple customers and creditors to the order using different partner functions. In SAP TM you can see on the **BUSINESS PARTNERS** tab that the OTR also applies to the participation of different business partners in the transportation process.

However, you need to map the defined partner functions of the SAP ERP order to the **party roles** in SAP TM. You can define the party roles in Customizing by following the IMG menu path **SAP TRANSPORTATION MANAGEMENT** • **TRANSPORTATION MANAGEMENT** • **MASTER DATA** • **BUSINESS PARTNERS** • **Define Party Roles**. In a standard SAP TM system, the most common party roles are already predefined.

The mapping between the partner function and the party role defined in SAP TM is done using a **BAdI**. You can find a standard BAdI implementation for the mapping in your SAP TM system by following the IMG menu path **SAP TRANSPORTATION MANAGEMENT** • **SCM BASIS** • **INTEGRATION** • **BAdIs for Specific Applications** • **BAdI: Mapping Partner Function into Party Role Code**. Please make sure you have previously integrated SAP ERP customers and creditors into SAP TM using the CIF integration.

Service levels can have an impact on the way the transport is planned. If you are familiar with SD, you will know that in SAP ERP the **shipping conditions** are used to assign certain service-level agreements regarding the delivery of goods to a sales or purchase order.

If SAP TM is used for transportation planning, this information is crucial and therefore needs to be transferred to the OTR. On the **GENERAL DATA** tab, you can see the **SERVICE LEVEL** field, which is the corresponding field in SAP TM. You can define service levels in SAP TM via the IMG menu path **SAP TRANSPORTATION MANAGEMENT** • **SCM BASIS** • **MASTER DATA** • **BUSINESS PARTNER** • **Define Transportation Service Level Codes**. The mapping between the ERP shipping conditions and the SAP TM service-level codes is done exclusively by name, so make sure that you use the same codes as in the SAP ERP system when defining service-level codes in SAP TM.

In SAP TM, no program logic is directly attached to the service-level codes, but the information is propagated into the freight unit, where you can use this information using conditions, incompatibilities, or other means to influence the planning. In addition, the charge calculation on the freight order can be influenced using the service-level code that originated in the SAP ERP order.

On the OTR, you will find three important statuses: the planning status, the execution status, and the consumption status. The planning status shows whether freight units have been created (if so, the planning status is in **planning**; if not, the planning status is **new**). If the freight units are not only created but also already planned on freight orders, then the planning status changes to **planned**. If the freight unit is planned on freight orders, the execution status of the OTR shows whether the freight order is already executed, in execution, or not yet executed.

The consumption status of the OTR shows whether DTRs were already created and have consumed the freight units of the OTR. (We talk about freight unit consumption later in this chapter.) If the OTR is only partially consumed, this means that not all of the OTR’s freight units have been moved to DTRs; some still remain linked to the OTR.

Not only statuses but also blocks are kept in sync between the SAP ERP order and the OTR in SAP TM. The mapping of block reasons is done purely on the ID of the block reason codes, meaning that the reason codes in SAP ERP and SAP TM need to be the same.

The OTR document can define two kinds of blocks: a planning block and an execution block. While the planning is still able to plan a freight unit of an OTR that has an execution block defined, the planning block does not even allow the planning of the freight unit. When you use the Customizing path **SAP TRANSPORTATION MANAGEMENT** • **TRANSPORTATION MANAGEMENT** • **INTEGRATION** • **ERP LOGISTICS INTEGRATION** • **Define Enhanced Blocking of Transportation Requirements** • **Define Blocks Based on ERP Del. Blocks**, you can define whether a block set on the ERP order should automatically set a planning and/or execution block on the corresponding OTR document.

The block can be defined on the ERP order, on the header level or each schedule line. Therefore, the blocks on the OTR document are also set on either the header level (i.e., for all items of the OTR) or only a particular item.

If you want to propagate more information from the SAP ERP order to the OTR in SAP TM, you can do this in the **NOTES** tab on the OTR document. Because the OTR cannot be edited, the notes of the OTR need to come from the SAP ERP order.
In the SAP ERP order, you can assign information using text types. Map the SAP ERP text types to the SAP TM text types by following the IMG menu path SAP Transportation Management › Transportation Management › Integration › ERP Logistics Integration › Order-based Transportation Requirement › Assign ERP Text Types to TM Text Types for OTRs. Make sure you have previously defined SAP TM text types; many of these are predefined in a standard SAP TM system. If the mapping has been done, you can see the SAP ERP text information on the Notes tab of the OTR document.

### Defining SAP TM Text Types

You can define SAP TM text types via the IMG menu path Cross-Application Components › Processes and Tools for Enterprise Applications › Reusable Objects and Functions for BOPF Environment › Dependent Object Text Collection › Maintain Text Schema.

### 4.1.5 Integration of Deliveries

Recall that both SAP ERP orders and SAP ERP deliveries can be integrated into SAP TM. The integration setup on the SAP ERP side is very close to the integration setup of SAP ERP orders, so we will not go into details about the deliveries again. Please make sure you activate the transfer of the delivery documents in the SAP ERP IMG menu path Integration with Other mySAP.com Components › Transportation Management › Order Integration › Activate Transfer of Delivery Documents. Notice that this IMG activity looks very similar to what we have seen when activating the transfer of SAP ERP orders.

Also on the SAP TM side, the technical integration is almost the same as with SAP ERP orders. Another transportation request document is created: this one is the DTR. Technically, there is no difference between the OTR and the DTR; they are both instances of the business object /SCMTMS/TRQ and are differentiated only by different document names.

You can also see the similarity between the OTR and DTR when you compare the document type Customizing activities of both business objects. The DTR type Customizing contains exactly the same settings as the OTR, including settings concerning freight unit building, stage splits based on incoterm locations, and so on.

The DTR is the business document representation of the SAP ERP deliveries, as the OTR was for SAP ERP orders. When you are setting up the integration scenario between SAP ERP and SAP TM, you have different options for which documents you want to integrate and how the interaction of SAP ERP and SAP TM documents should work. The main question to answer is “What system should be the leading system for the transportation process?” The right answer to this question depends on what you want to achieve with the SAP ERP integration, as we will see next.

### 4.1.6 Integration Scenarios

If the SAP TM system is the dedicated system leading the transportation process, you would probably set up the integration scenario as shown in Figure 4.10.

![Figure 4.10 Integration Scenario with Delivery Proposals](image)

The SAP ERP order is created in SAP ERP and then integrated into the SAP TM system. In the SAP TM system, the OTR document creates freight units automatically. Now the process continues in SAP TM. The freight units are planned on freight orders according to the delivery dates, service levels, incoterms, and so on.

The rationale for doing the planning in SAP TM is that SAP TM offers a more sophisticated means of transportation planning, such as ocean and air schedules, connectivity to carriers, distance and duration information based on geographical information systems, and so on.

Once the planning of the freight unit is done, we know a more precise delivery date of the goods that were ordered in the SAP ERP order. This information can
then be played back to the SAP ERP system, where delivery documents are created accordingly. This process step is called the delivery proposal.

Delivery proposals are used to propagate planning information from SAP TM to SAP ERP, where deliveries are then created. The process is called delivery proposal and not delivery creation because, in the end, SAP ERP decides how deliveries should be created. The information for the delivery proposal derives from the freight units.

Once you’ve finished planning the freight units in SAP NWBC, follow the menu path ERP Logistics Integration • Delivery Creation • Create Deliveries in ERP. When you enter a selection profile (preferably the same one you have used for planning), your freight units are displayed. Select the freight units you want to create delivery proposals for and choose Create Delivery Proposals. You can review the proposals at the bottom of the screen and then send the proposals to SAP ERP by clicking Send Delivery Proposals to ERP.

The delivery proposals are created using settings and information from both freight units and OTRs. While the delivery dates are collected from the freight order that is now assigned to the freight units, the quantities are taken from the freight units themselves. SAP TM also tries to consolidate several freight units into one delivery proposal. If one OTR creates several freight units, which are then planned on the same freight order, SAP TM consolidates these freight units to one delivery proposal. SAP TM also tries to consolidate several freight units of multiple OTRs if they are planned on the same freight order. However, the consolidation is done only if the SAP ERP order allows order consolidation. You can check this setting on the General Data tab of the OTR, where there is a flag telling you whether order consolidation is allowed.

Speaking of quantities, it is also possible to create delivery proposals based on the quantities actually picked up by the carrier. This scenario is especially important for bulk transportation and only applicable if delivery creation can be done only after execution has already started. In this scenario, the freight orders are created based on the freight units built by the OTR documents and sent to the carrier, and the carrier picks up the goods. As part of the execution process, which we delve deeper into in Chapter 8, Section 8.1, the carrier now reports the actual weight and volume of the goods picked up.

When the checkmark Actual Quantity in the OTR document Customizing is selected, the delivery proposal is created based on the actual quantity reported by the carrier and not based on the planned quantity of the freight unit.

Once the delivery proposals are sent to SAP ERP, delivery documents are created. SAP ERP might split one SAP TM-based delivery proposal by creating several deliveries, possibly due to additional split criteria in SAP ERP. However, SAP ERP does not change data such as dates or quantities sent from SAP TM or consolidate several delivery proposals into one delivery.

The delivery proposal in SAP TM also takes into account that SAP ERP consumes order schedule lines in chronological order. Therefore, SAP TM proposes a delivery for a schedule line of an order item only if all schedule lines of the same order item with earlier delivery dates already have an assigned delivery.

In SAP TM, you can also define how delivery proposals should be created. These settings are consolidated in a delivery profile. Although the delivery profile is optional, it makes sense to create a profile to reuse the same settings every time you want to create delivery proposals. You can define delivery profiles via the SAP NWBC menu path Application Administration • Planning • General Settings • Delivery Profile. The settings you can define here concern how and if freight units can be consolidated into one delivery proposal and which freight units may not be consolidated.

One option of the delivery profile is to “fix” the planning result for freight units and freight orders by selecting the Fix Planning Results checkbox, which is shown in Figure 4.11. Fixing the planning means once the planning results are transferred to SAP ERP, they can no longer be changed in SAP TM. This is a good strategy because you might continue processing the transferred data in SAP ERP, as well. You will learn more about fixing freight orders in Chapter 6. You can define how the delivery proposals should be created (e.g., one proposal per item, one proposal per OTR, and so on).

The last feature of delivery profiles that we want to mention is incompatibilities, which we introduced in Chapter 2. Incompatibilities in delivery profiles can be used to prevent certain freight units or items from being consolidated into one delivery proposal.
Delivery profiles are optional and especially unnecessary if you’ve already planned the freight units; in this case, SAP TM considers the freight units consolidated on freight orders. Settings like incompatibilities are already taken into consideration during the planning process. However, if you want to create delivery proposals before the freight units are planned, you can do this, as well. In this case, the settings in the delivery profile are crucial to help SAP TM decide which freight units should be consolidated.

In a daily business, you probably will not manually create delivery proposals every time you have finished planning some freight units. Therefore, background report /SCMTMS/DFLV_BATCH was created for you to run as a batch job. You need to define a selection profile by selecting your freight units or freight orders; the background report does exactly what you can do interactively in SAP NWBC (skipping your review, of course).

After the delivery proposals have been sent to SAP ERP, deliveries are created. SAP TM gets information about the status of the delivery creation. The delivery type being used for the delivery creation is the one defined in the SD or MM setup. If you have activated the transfer of this delivery type to SAP TM as well, then not only is a short message about the delivery creation transferred to SAP TM, but even more happens.

The delivery is integrated, and a DTR is created for the delivery, as already described in Section 4.1.5. You might be wondering what we can do with the delivery now, since the planning process has already happened. Recall that SAP ERP might create deliveries slightly differently from the SAP TM proposal; this information is then represented in the DTR.

If you have looked at the Customizing of DTR types, you will see that you can also define whether freight units should be created automatically in the DTR type. In the process shown in Figure 4.10, the creation of freight units would be counterproductive because not only were freight units already created with the OTR, but they were also already planned. The DTR does not, in this case, create new freight units. However, the freight units are unassigned from the OTR and moved to the DTR. We call this process OTR consumption or freight unit consumption.

If you look into the document flow of the DTR now, you can see not only the SAP TM documents, but also the SAP ERP documents. What you will also notice is that the OTR is now a predecessor document of the DTR, and the DTR is again a predecessor document of the freight unit (even though the freight unit was created before the DTR).

There is only one difference in the DTR type Customizing: the setting concerning the delivery split/update types that can be assigned to the DTR type. A delivery split/update type determines how SAP TM handles updates or splits of freight units if SAP ERP deliveries are linked to these freight units. In general, we can differentiate between two scenarios of a delivery split or update: one triggered by SAP TM and the other triggered by SAP ERP or SAP EWM. Please note that the delivery split or delivery update process works only for outbound deliveries, not for inbound deliveries.

A delivery split or update triggered by SAP TM is caused by a planning being done in the SAP TM system. This means that the freight unit was planned on a freight order, which caused an update of one of the following dates that are linked to dates in the SAP ERP delivery:

- Goods issue date
- Loading date
- Transportation start date
- Delivery date

Alternatively, the planner may have decided to split a freight unit that was integrated from an SAP ERP delivery and planned the two freight units on different freight orders. In this case, the original SAP ERP delivery has to be split. The new delivery is then integrated into SAP TM again, and the freight unit is reassigned to the new DTR.

With the delivery split/update type, you can define whether corresponding information should be sent to SAP ERP to make changes about the SAP ERP delivery. In addition, you can influence the planning behavior in SAP TM. You can find the Customizing activity for delivery split/update types via the IMG menu path SAP
Transportation Requirements and Order Management

As you can see in Figure 4.12, you can first define whether an update or split should be sent to SAP ERP at all. You can also define if late planning changes are allowed. This means that if the delivery cannot be changed any more (e.g., because the goods movement status is already partially completed or completed), then you can prevent planning changes of the corresponding freight unit in SAP TM by issuing an error message. Alternatively, you can warn the planner by issuing a warning or error message that allows late planning changes.

Figure 4.12  Delivery Split/Update

With the delivery split reason, you can propagate a split reason code from SAP TM to SAP ERP with which the SAP ERP delivery split is executed. Please note that the reason code defined in the SAP TM system needs to have the exact numeric value as in SAP ERP because the mapping is done purely by numeric values.

The last setting in Figure 4.12 concerns the second scenario—the delivery update triggered by SAP ERP or SAP EWM.

Delivery Update Triggered by SAP EWM

SAP TM can integrate with SAP EWM. However, the integration is usually done via the SAP ERP document’s delivery or shipment. Also, in this scenario, a delivery update triggered by SAP EWM triggers the update of the delivery only in SAP ERP. The update message to SAP TM is then done by SAP ERP.

Technically, there is no difference between the update triggered by SAP ERP and the update triggered by SAP EWM. Concerning SAP TM, the update message is, in both cases, created only after the SAP ERP delivery has been updated.

If the SAP ERP delivery was split, a new DTR is created, and the freight unit that was assigned to the original DTR is also split and reassigned accordingly. If the freight unit was already planned, you now need to decide what you want to do with the planning you have already performed. You can discard the planning of the new DTR’s freight unit, discard the planning of the original DTR’s freight unit, or discard any planning that was performed with freight units connected to the updated delivery.

After you have defined the delivery split/update type, you can assign this type to the DTR type in Customizing.

In the integration scenario described previously, SAP TM was the leading system; it decided not only how the planning should be done, but also whether and how the items of the order were split or consolidated. In some cases, it makes sense to leave that decision in SAP ERP. Since OTR and DTR can work without each other in SAP TM, you can decide whether to leave out the integration of either one.

Figure 4.13 shows how the integration scenario works if SAP ERP is still the leading system for delivery creation and item order consolidation. In this case, the integration of the order is optional, represented by the dashed line on the figure. If an OTR is created, no freight units should be created for it. Only after the delivery is created for the order and the DTR is created in SAP TM should freight units be created.

Those freight units now better represent the splits and consolidations that have been done previously in SAP ERP. Planning can now start, although the planning results do not affect the delivery dates of the DTR anymore. Therefore, make sure the dates in the freight unit are considered as hard constraints during planning. (Refer to Chapter 6 for more information about soft and hard constraints in planning.)
4.1.7 Sales Order Scheduling

In addition to the creation of individual documents in SAP TM to process the transportation planning in a company, it is also possible to use SAP TM to schedule transports without creating any documents.

This functionality is called sales order scheduling and is, as the name suggests, provided only for SAP ERP sales orders. When creating an SAP ERP sales order, you have to provide some mandatory fields, such as the sold-to and ship-to party, material, plant where the material is provided, and delivery date requested by the customer.

At the top of the sales order screen, you will find a new, SAP TM-specific button called Document. When you click this button, the sales order scheduling is executed. Sales order scheduling is supposed to define the exact dates for the sales order, meaning not only the delivery date but also the material availability date, loading date, and goods issue date.

Once the sales order scheduling is triggered, the sales order is transferred to SAP TM, where an OTR is created. Basically, the process is exactly like the actual creation of OTRs and freight units; the only difference is that this OTR and all subsequent documents are not saved in the SAP TM system. The OTR type used for the sales order scheduling has to trigger freight unit building automatically and has to have a planning profile assigned. For the freight unit(s) created, a transportation proposal is started. You will find out more about transportation proposals in Chapter 6, Section 6.3.6. The first result of the transportation proposal is then transferred back to SAP ERP and the OTR, and freight units no longer exist in the SAP TM system.

When the sales order is transferred to SAP TM, the requested delivery date entered on the item line is considered the requested delivery start date in the freight unit. The transportation proposal therefore tries to take this date into consideration and determine the start date of the transport, including the loading date. The loading date, transportation start date, and delivery date are then sent to the sales order in SAP ERP, where they are considered in the following way:

- The delivery date is the delivery date in the sales order.
- The loading date is the basis to calculate the material availability date in the sales order.
- The loading date is the loading date in the sales order.

Once the dates of the schedule lines in the SAP ERP sales order are defined, an available-to-promise (ATP) check can be triggered to find out whether the material can be provided in the plant requested on the calculated material availability date. If the ATP check fails to provide the material on the calculated date, it provides the next possible date. With this new date from ATP, the sales order scheduling is triggered again, now with the newly determined material availability check as the basis for the transportation proposal, which is now doing a forward scheduling from the material availability date to determine a new delivery date.

The advantage of the sales order scheduling interaction between SAP ERP and SAP TM compared to the route-based scheduling in SAP ERP is that it can take the more sophisticated SAP TM planning constraints in transportation planning into consideration. For example, if resources are not available or ocean schedules run infrequently, this can be taken into consideration in sales order scheduling but not in the route-based scheduling in SAP ERP.

Sales order scheduling is the only standard communication between SAP TM and SAP ERP that is done synchronously. This means that when you click the Document button in the SAP ERP sales order, you have to wait until the transportation proposal returns the results to the sales order. This is because the SAP TM system does not save any documents for this process, so there is no possibility of getting the documents in SAP TM other than right at the processing time.

4.2 Forwarding Orders and Forwarding Quotations

In Section 4.1 we talked extensively about the integration of transportation requests from SAP ERP. The integration of SAP ERP documents was introduced to SAP TM with release 8.0, which was meant to be the release focusing on the shipper’s business.

As you have learned so far in this chapter, integrated transportation requests only serve the purpose of transferring the transportation-relevant information of SAP ERP orders to SAP TM to execute the transportation process there. OTRs and
DTRs are not sophisticated enough to serve as the transportation request document for LSPs or carriers. In these businesses, more information is required than simply what goods need to be transported from where to where on what date. These businesses often add much more information to the transportation request when transportation service-level codes, transportation charge management, and consolidation come into play. Simply stated, transportation is the core business of LSPs and carriers, which explains why more emphasis is put on the transportation information.

Like OTRs and DTRs, the forwarding orders and quotations generally act as the beginning of the operational process in transportation management. The issuing of a forwarding order creates a contract between two companies.

The forwarding order is often called the “typewriter” of SAP TM because the document needs to be created mostly manually. But this term undervalues the forwarding order for the transportation process. The forwarding order is the only document in which you can manually define the data that is used for the entire transportation process of planning, charge management, execution, and so on.

The central business object behind the forwarding order is the transportation request object, which we first discussed in the context of OTRs and DTRs. The forwarding order makes use of the same object as is used by OTRs and DTRs, which means that comparable data is written into the same database areas.

The forwarding order is the central order business object in SAP TM, and it helps you perform all of the important order-taking processing steps in order management. A forwarding order can be created in different ways:

- **Manual creation**
  This is the most common way of creating transportation requests in SAP TM. A customer relations manager of the LSP or carrier talks to the customer and enters all data manually in SAP NWBC.

- **Incoming EDI message**
  Many big LSPs and carrier companies have been using EDI communication for a long time. Therefore, it is only logical that they also prefer EDI communication for the creation of forwarding orders in their systems. SAP TM makes this functionality possible by providing B2B web services that automatically create a forwarding order. This web service integration can be compared to the integration of SAP ERP orders, but more information can be transferred, such as transportation stages, dates concerning the transportation, and so on.

- **Use of a template**
  In many cases, customers order the same type of transport on a regular basis. To avoid having to type in the same data every time, the order clerks of the LSP or carrier use templates. A new forwarding order can then be created as a copy from the template. We talk about templates later in this chapter.

A fundamental feature of the forwarding order is that the document can be saved at practically any time in the order-taking process. If you want to automatically create freight units from the forwarding order, a few prerequisites need to be met. However, the forwarding order can still be saved in any incomplete state. Once the forwarding order contains sufficient information for freight unit building, the freight units are created. This helps customers and LSPs to enter orders even if some information is missing. At LSPs or carriers it is also often the case that multiple employees are involved with the order-taking process. For instance, the customer’s contact person enters all the customer’s information, but the forwarding order is complete only once a transportation clerk has added data that is relevant for planning and execution.

When you browse the SAP TM system in SAP NWBC, you will notice that like the SAP ERP integration, forwarding orders have a dedicated work area, called Forwarding Order Management. When you access this work area, you can see that the menu path WORKLISTS • OVERVIEW FORWARDING ORDER provides a POWL with all existing forwarding order documents and their related documents.

As you can see in Figure 4.14, SAP TM provides you with many preconfigured queries categorizing forwarding orders into the different transportation modes.

![Figure 4.14 POWL for Forwarding Orders](image-url)
At the top of each POWL query are some buttons that you can use to perform actions on the forwarding order documents without opening the documents themselves. For process steps like collective invoicing and consolidated freight unit building (explained in detail in other chapters), this feature comes in very handy because the actions can be executed on several documents together.

By clicking **Show Quick Criteria Maintenance**, you can set more filters on the predefined queries. A screen area opens where all possible filter values can be defined. The quick criteria are saved for the user so that every time you enter the POWL query again, your last entries are remembered. If you want to avoid this, you can alternatively use the filter of the POWL table itself by clicking a column’s header.

If you have some selections you want to permanently display in the forwarding order POWL, you can use the **Create New Query** link on the top-right corner of the POWL table. In a guided procedure, you can enter your selection criteria, name the POWL query, and assign the query to one of the query categories (the lines on top of the table). Note that this newly created query is available only for your user and cannot be used by other users.

### 4.2.1 Forwarding Orders

Since the forwarding order is a very large and complex business object, this section is the longest section of the chapter. But you will not find pages explicitly dedicated to the Customizing of the forwarding order type. Instead, we go through the forwarding order document tab by tab and delve deeper into the functionality of the different fields. When Customizing influences the process flow of the fields, we mention this while covering the corresponding section of the forwarding order document. You can find the forwarding order type Customizing via the IMG menu path `SAP Transportation Management /L54263 Transportation Management /L54263 Forwarding Order Management /L54263 Define Forwarding Order Types`. If other Customizing activities are involved in the forwarding order, they are mentioned when they become relevant.

When starting to create a forwarding order, you will notice that one piece of information is very crucial to the system: the transportation mode. You can predefine the transportation mode of a forwarding order in the forwarding order type. However, if you want to use one forwarding order type for several transportation modes, you can leave this setting empty. When you follow the SAP NWBC menu path `Forwarding Order Management • Forwarding Order • Create Forwarding Order`, you will see that you can enter not only a forwarding order type, but also data such as the transportation mode, a template number, or a forwarding agreement to which the forwarding order is related. You will learn more about charge management for forwarding orders later in this chapter. If you haven’t defined a transportation mode in the forwarding order document type, then you have to decide on a mode here. Please note that defining the transportation mode as air, for example, does not mean you cannot create transportation stages of other transportation modes such as road or rail. The transportation mode decision is relevant only for the naming of fields in the forwarding order and for which fields are displayed or hidden. In fact, you can also change the transportation mode of the forwarding order while creating it (i.e., after you have already entered some data). When doing so, you will notice that the screen changes, and the availability of tabs and the naming of fields change.

#### General Data

Once you have defined a document type, you are directed to the forwarding order document. If you haven’t defined a template, you will see that the document is almost empty; only some fields are pre-populated. The **General Data** tab shown in Figure 4.15 displays the most important information that is globally relevant for the transportation contract between a customer and an LSP or a carrier.

![Figure 4.15 General Data of a Forwarding Order](image-url)
The topmost field (apart from the document type) is Order Date. This field is pre-populated with the current date, but you can alter it as necessary. The order date is important not only for reference, but also for charge management. Rate tables that are used in charge management can have different validity dates. Depending on the settings you have made for charge calculation, you can calculate charges based on either the actual transportation date or the order date.

In the top-right corner of the General Data tab, you can find the fields for the organizational data—the sales organization, office, and group responsible for the forwarding order. In Chapter 3 we discussed the importance of organizational units in SAP TM, so we do not go into detail here again. However, it is important to note that entering a sales organization is one of the prerequisites of creating a freight unit. If no sales organization is entered, neither automatic freight unit building nor manual freight unit building will succeed.

Like with integrated SAP ERP orders, the incoterm is a very important piece of information about the transportation responsibilities. You can enter the same incoterms here that you already defined in Customizing. The incoterm location here is free text because it is agreed upon with the customer. Since you can define your stages in a forwarding order manually, no mapping or stage splitting is done based on the incoterm location entered.

However, the incoterm is considered in charge calculation and settlement. Depending on the incoterm you use, the stages are charged against different party roles of the forwarding order. You can assign a payer party role (that is, which party role should pay for which stage types) in Customizing by following the IMG menu path SAP Transportation Management • Forwarding Order Management • Define Default Agreement Party Roles for Stages. We look at stage types later in this section.

The Controlled checkbox in the Forwarding Order Data section on the General Data tab (shown in Figure 4.15) defines whether the ordered transportation is a controlled or uncontrolled transport. With uncontrolled transports, the LSP organizes the entire transportation chain, including the main stage; however, the main stage is charged not from the carrier to the LSP, but directly to the ordering party of the entire transport. You can define an uncontrolled transport by deselecting the checkbox. If you deselect the checkbox, the External Freight Agreement field becomes editable. You can then enter the freight agreement that exists between the carrier and the ordering party.

When doing further planning of the freight units belonging to a forwarding order that have been declared uncontrolled transports, you can find the Controlled checkbox and the external freight agreement on the Terms and Conditions tab of the freight booking that covers the main stage of the freight units. Note that you can consolidate uncontrolled freight units on one freight booking only if they all have been assigned the same external freight agreement. The pre-carriage and on-carriage of an uncontrolled transport are still charged from the carrier to the ordering party via the LSP. Figure 4.16 illustrates the difference between controlled and uncontrolled transports, which is a scenario that often takes place in sea and air transportation and is the main carriage process.

We cover further details of the different transportation modes and their impact on the forwarding order later in this chapter.

Two more very important pieces of information are the movement type and the shipping type. These settings are crucial for the air and sea transportation processes; they influence the data entry and validation of the forwarding order.
Shipping type and movement type are also prerequisites for the creation of freight units from a forwarding order.

The **shipping type** defines what kind of transportation the customer has ordered. In the transportation business, the differentiation is, roughly speaking, between a full container load (FCL) and a less than container load (LCL). In SAP TM these processes are shipping types. Considering that the terms FCL and LCL are mainly used in sea transportation, the shipping types may depend also on the transportation mode.

You can define shipping types in Customizing by following the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • FORWARDING ORDER MANAGEMENT • DEFINE SHIPPING TYPES. In this Customizing activity, you define all the shipping types you need. The shipping type entered in the forwarding order document determines what items may be defined on the item area of the forwarding order. In Customizing, you therefore need to define your shipping type, whether all cargo items need to be assigned to an equipment item (e.g., a unit load device in air, a container in sea, or a railcar in rail), or whether such equipment items are allowed at all.

**Unit Load Device**

When talking about packaging units in air transportation processes, we use the term **unit load device (ULD)** to represent special types of pallets or containers used in air transportation.

If you enter the shipping type ULD, depicted in Figure 4.17, you get an error message in the forwarding order if not all of your items are assigned to equipment items. We take a look at the definition of items later in this chapter.

The shipping type can be entered manually on the forwarding order or be preset in the forwarding order document type Customizing.

The second important feature is the **movement type**. The movement type in the forwarding order determines its routing. It is worth taking a detailed look at the impact of the movement type, since you have to deal with it when creating forwarding orders.

In general, movement types can be defined in Customizing in the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • FORWARDING ORDER MANAGEMENT • DEFINE MOVEMENT TYPES. Here, you can simply define your movement type and whether the location assigned to the shipper should automatically be taken as the source location of the forwarding order. The same setting can be done with the consignee and the destination location.

By now we have only defined a movement type code. The influence on routing is determined in the Customizing activity that you can find by following the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • FORWARDING ORDER MANAGEMENT • DEFINE STAGE TYPE SEQUENCE FOR MOVEMENT TYPES.

Figure 4.18 shows the standard Customizing for the default movement type DD (door-to-door). As you can see, you can define a stage type sequence with sequence numbers. As with all sequence-related Customizing activities, the numbers do not have to be exactly sequential, at least in numerical order. For the movement type, you define the stage types that are being used. We talk about stage types later, in the section about the Stages tab. For now we can state that we bring different stage types into a sequential order. In addition, we define whether a stage of a certain type may occur or has to occur. For the movement type in our example, only the main carriage (stage type 03) must occur. The StageProp. checkbox defines whether some stages on the Stages tab should already be created when the corresponding movement type is selected on the General Data tab.
The next column defines whether the stage is relevant for planning or only statistical. On the Stages tab, you can manually assign a planning and execution organization to each stage. The decision about whether the stage is relevant for planning is based on the setting in this Customizing activity, which again considers the planning and execution organization. Some of the settings you can choose in this column compare the planning and execution organization with the sales organization of the forwarding order. If these two organizations belong to different companies or countries, the stage is not declared as relevant for planning. But you can also take the easier route here (if that applies to your business process) and simply state whether this stage is always or never relevant for planning.

The last column in Figure 4.18 (Set. Rule) specifies from what point in time an internal settlement of the stage can be created. You can choose different execution statuses here to define in what execution status the corresponding stage of the freight unit must be to start an internal settlement.

Another transportation process that is often used in air and sea transportation is the shipper’s consolidation in export transportation and the buyer’s consolidation in import transportation. If your forwarding order has a corresponding transportation mode assigned to it, you can set this information on the General Data tab of the forwarding order. The transportation for the LSP is considered like an FCL or ULD transportation because the shipper organizes the transportation to the port, but different house bills of lading need to be issued for each item of the forwarding order, even though only one freight unit was created.

In the transportation business, the house bill of lading (HBL) number—not the forwarding order number—is the relevant number for identifying the entire transportation. You can find the corresponding field on the General Data tab of the forwarding order.

You can manually enter a waybill number or HBL number in this field. This is then propagated to the freight units that belong to this forwarding order.

However, the assignment of waybill numbers can also be triggered automatically using waybill stocks. To do this, activate the use of waybill stocks in the Customizing of the forwarding order document type by selecting the Enable Waybill Stock checkbox and assigning an HBL or house air waybill (HAWB) strategy. The strategy defines how the HBL should be created: per forwarding order, per container, per shipper/consignee combination, and so on.

To draw HBL numbers, you need to define waybill stock types in Customizing. Follow the IMG menu path SAP Transportation Management • Transportation Management • Master Data • Waybill Stock • Define Waybill Stock Types.

The waybill stock type defines how the HBL number is put together. Figure 4.19 shows how a waybill stock type is assigned to a transportation mode.

You can further define whether the number resulting from this stock type should be used as a waybill number or a tracking number. On the bottom of this Customizing screen, you define how the number should be put together, whether a prefix is assigned, the length of the number, and how a potential check digit should look.

You can also define how long the number should be withheld after being returned.

After defining a number stock type, we can use it to create a waybill stock. In SAP NWBC, go to Master Data • General • Overview Waybill Stock to create a new waybill stock based on the number stock type. Here you can define a number range from which a number should be drawn. At the bottom of the screen, you can then define when this waybill stock should be taken into account by defining certain combinations of sales organizations and ordering parties. If the combination of ordering party and sales organization of the forwarding order matches one of the combinations defined in the waybill stock, a number is drawn from here.
If you choose to assign an HBL number automatically, the HBL field on the forwarding order is not editable. Instead you need to select HBL • DRAW HBL NUMBER from the action toolbar at the top of the forwarding order screen. This works only after the sales organization, ordering party, and cargo have been entered.

Waybill Stocks and Numbers
You can find further details about waybill stocks and waybill numbers in Chapter 8, Section 8.1.

On the GENERAL DATA tab of the forwarding order, you can also enter the value of the goods that need to be transported. This information may become relevant for charge calculation or customs. Please note that this information is only a manual entry. The values are not taken from product master data.

We talked about the transportation service-level codes when we discussed SAP ERP order integration. You can manually assign a service level code to the forwarding order. The service level might influence your planning and charge calculation if you have made corresponding entries.

If you want to define your own service-level codes, do this via the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • FORWARDING ORDER MANAGEMENT • DEFINE TRANSPORTATION SERVICE LEVEL CODES. If your service-level code applies only to certain transportation modes, then you can define this here, too.

Items
At the bottom of the forwarding order document, you will find the table of items that are ordered to transport in this forwarding order. You can define several items and create item hierarchies that represent how the packaging was done. Figure 4.20 shows a simple example of an item hierarchy. You can create an item hierarchy like this by choosing INSERT • CONTAINER to insert the first item. To create a subordinate item, select the superordinate item (in this case, the container) and again choose INSERT • PACKAGE. The new item is created as a subordinate item that is displayed in a hierarchical way. Alternatively, you can enter the data of the items directly into the table and then create a hierarchy by dragging and dropping a subordinate item onto a superordinate item.
You can assign text types that you have defined in Customizing (recall these from Section 4.1.4). The text is displayed on the Notes tab of the forwarding order, as well as on the freight unit representing this item.

If you want to define an item type that is relevant for dangerous goods processing, you can assign a dangerous goods UI profile to this item type. You will find further information about dangerous goods UI profiles and processing in Chapter 9.

If you have defined an item category as a container or passive vehicle, you can assign equipment groups and equipment types to the item type, and all relevant data from the equipment type is then automatically put on the item data in the forwarding order. You can define equipment types via the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • MASTER DATA • RESOURCES • DEFINE EQUIPMENT GROUPS AND EQUIPMENT TYPES. The physical properties of the equipment type are used as the tare weight in the forwarding order item. More information about equipment types can be found in Chapter 3, Section 3.3.

Recall that the shipping type you have defined on the forwarding order's general data defines what item categories you may use. If the shipping type defines that no equipment items are allowed, then you get a corresponding error message if you try to insert an equipment item. However, if you have defined a shipping type that requires equipment items, you cannot create freight units before all items have been packed into equipment items.

In addition, you can limit the number of item types you can use on a forwarding order by assigning item types to the forwarding order type. You can do this in Customizing by following the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • FORWARDING ORDER MANAGEMENT • FORWARDING ORDER • ASSIGN ITEM TYPES TO FORWARDING ORDER TYPES. Once you have assigned some item types to your forwarding order type, no other item types can be selected in your forwarding order. If you have assigned several item types of an item category, you can define a default item type. When you insert a certain item category in the forwarding order, the default item type is automatically used. The default item type is especially important when you are using the B2B integration for automatically creating forwarding orders. Because the web service does not carry the information of the item type, this information has to be taken from Customizing.

If you define containers as equipment items in the forwarding order's items, you are working with anonymous entities, if you wish. Containers can be (but do not have to be) defined as master data such as vehicle resources. If you define a forwarding order for rail or road transportation, however, you can assign a passive vehicle from master data (a railcar or truck trailer) to the forwarding order and use it as an equipment item.

When you define an item hierarchy, the weight of the products of the lowest items in the hierarchy is added up on the highest item level. On each level, the gross weight of the subordinate item is taken over as the net weight of the superordinate item and added with the tare weight to determine the gross weight. This again is taken over as the net weight of the next superordinate item, and so on.

If you have defined default units of measurement on the item level, the quantities of the lower item levels are converted to the default unit of measurement. Please note that if you have chosen a product item from product master data, no quantities are moved into the forwarding order item; the quantities need to be inserted manually.

In forwarding orders other than OTRs and DTRs, you do not need product master data for your product items. Even though you can choose product master data for your product items, you can also insert free text into the corresponding field. This is especially handy for LSPs and carriers that transport different materials every day because they do not need to create master data for each material.

If a customer orders the transportation of 300 cell phones, you can enter this in one item line defining a quantity of 300 pieces. However, your transportation process may require you to treat each cell phone individually to enable you to enter specific data for each phone or to simplify freight unit splitting. If so, you can still enter one item line and define pieces and weight for all 300 cell phones, select this line, and click the Split button at the top of the item table. The item line is automatically split into 300 individual lines. In addition, the gross weight entered is distributed equally among the new items.

When you select an item line, a new screen area appears below the item table. In this screen area, you can enter several pieces of information specific to the individual item. This information is also propagated to the corresponding freight unit in freight unit building. The item details contain several tabs.
The first tab is Product Details. You can enter item-specific details here. Some data, such as quantities, is moved from the item table. Other data, you can define only here in this screen area. If you enter a goods value for an individual item, this information is also moved to the corresponding field on the General Data tab of the forwarding order. The field is then not editable anymore, but the system expects you to enter this information on every item as necessary. On the General Data tab, the values of the individual items are then added up.

The Locations and Dates/Times and Business Partner tabs are visible in the item details only if, in the forwarding order type Customizing, it was defined that locations, dates, and business partners cannot be globally defined in the forwarding order. The same Locations and BPs flag in Customizing determines whether you are required to enter the transportation locations and business partners on the item level or if it is sufficient to define them globally on the forwarding order.

If the locations and business partners are defined on the item level, this differentiation is also taken into consideration by freight unit building as a split criterion. The tabs in the Item Details screen area are exactly the same as on the forwarding order, so we do not go into detail about defining business partners and locations here, but instead cover it later in this chapter.

You can add references to the item on the Document References tab. In many cases, this tab needs to be filled manually because the document references might be system independent. You can reference a specific item of the referenced document. To differentiate different document types, you need to use business transaction document types that you can define in Customizing via the IMG menu path SAP Transportation Management • Transportation Management • General Settings for Order Management • Define Business Transaction Document Type Codes. As already mentioned, the document type codes can be defined independently of the system if you want to reference to a photo on a server, a phone call protocol, and so on. You can also reference an item from the references document. You can also define type codes for items following the IMG menu path SAP Transportation Management • Transportation Management • General Settings for Order Management • Define Business Transaction Document Item Type Codes. Document type codes and item type codes are not linked to each other. For implementation projects, we recommend that you use these type codes as often as the document references are used (i.e., charge calculation or routing decisions).

On the Customs tab, you can define customs-relevant data. You will find more about customs declarations when we cover SAP Global Trade Services (GTS) integration in Chapter 9.

During freight unit building, the quantities of the forwarding order items are moved into the freight unit. However, if in the execution process it is discovered that the actual quantities of the freight unit differ from the quantity declared in the forwarding order, the quantities are changed in the freight unit. This results in a recorded discrepancy between the freight unit’s item and the forwarding order’s item. This discrepancy is displayed on the Discrepancies tab of the item details. The current status of the discrepancy handling is also recorded here. We will discuss more details about discrepancy handling in Chapter 8, Section 8.1.

You will notice that there is one more item category available in the forwarding order that we have not yet mentioned: the service item. A service item defines—as the name suggests—services that should be performed as part of the customer order. Services are anything except the physical movement of the goods or containers (which is handled already in detail with the freight units and subsequent processes like planning, subcontracting, etc.), such as container cleaning, customs clearance, documentation, etc.

You can assign instruction sets to a service item. By doing this, you can track the progress of the service in the forwarding order, which means you can make sure that the service ordered in the forwarding order is also performed.

Charge calculation can also consider service items by adding surcharges to the forwarding order’s charges.

Service items are not transferred into the freight unit, which means they cannot be seen during the planning phase on the freight unit directly. They can be assigned to any level of the item hierarchy, meaning they can be added to the forwarding order as an independent item or as a subordinate item of a resource item, container item, package item, or product item. They cannot, however, be a superordinate item to any other item.

Business Partners

Once you define all relevant data on the General Data tab and enter the items that need to be transported, you can assign business partners to the transportation contract.
To sketch a very simple example first, only two business partners are assigned to the forwarding order: the shipper, where the goods are picked up, and the consignee, where the goods are delivered.

In the forwarding order, the business partners take over different responsibilities. These responsibilities are reflected by party role codes that you can see on the BUSINESS PARTNERS tab. You can add party role codes in Customizing via the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • BUSINESS PARTNERS • DEFINE PARTY ROLES.

As you can see in Figure 4.22, the BUSINESS PARTNERS tab includes a table where you can assign business partners to the party roles. The party roles ORDERING PARTY, SHIPPER, and CONSIGNEE are mandatory in every forwarding order.

The business partners you assign to the party roles need to be maintained as master data either using the CIF integration from SAP ERP or by manual creation in SAP TM. As you can see in the figure, the addresses of the business partners are taken from master data. However, if you want to use a different address than the one defined in the master data, you can do so by selecting the DEVIATING ADDRESS checkbox. If you select the row of the party role whose address you want to change in the forwarding order, you can change it in the PRINTING ADDRESS field below the table. This field is pre-populated with the address from master data. The address defined here is used for document printing.

Only three party roles are mandatory in a forwarding order unless you define differently. Partner determination profiles define which additional party roles are mandatory on a forwarding order. You define partner determination profiles in

Customizing via the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • MASTER DATA • BUSINESS PARTNERS • DEFINE PARTNER DETERMINATION PROFILES. In a partner determination profile, you select the party roles that you want to define as mandatory in the forwarding order. You can also define how business partners are copied from one party role to another. In the example in Figure 4.22, the ordering party and the shipper are the same business partner. Therefore, in the partner determination profile, we could define that the business partner of the ordering party should be copied to the shipper, as shown in Figure 4.23.

Figure 4.23 Partner Determination Profile

With the NOT MODIFIABLE column in the partner determination profile, you can also specify whether to allow printing address changes.

The example depicted in Figure 4.23 shows, too, that you can not only use a partner determination profile for defining fixed relationships among the party roles of a forwarding order, but that you can also assign a discrete business partner to a particular party role. This is of course only recommended if the same business partner is relevant in all scenarios.

The partner determination profile can be assigned to the forwarding order type directly in Customizing. But depending on the transportation scenario, you might not be able to define the mandatory party roles with only one partner determination profile. Instead, the mandatory party roles can depend on the incoterms assigned to the forwarding order. Therefore, you can also define the partner determination profile depending on the incoterms and forwarding order type. To do so, follow the Customizing menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • MASTER DATA • BUSINESS PARTNERS • ASSIGN PARTNER DETERMINATION PROFILES BASED ON INCOTERMS.

Although entering business partners in the forwarding order is not really complicated, we cannot underestimate the importance of the entries. The assignment of a business partner to the ordering party is crucial for charge calculation, which we describe in Chapter 10.
Recall that business partners can be defined globally on the BUSINESS PARTNER tab of the forwarding order or individually for each item, depending on the Customizing of the forwarding order type. The definition is the same; it only has to be done on the item details.

**Locations and Dates/Times**

Some of the most important information for transportation planning is the definition of locations and times. On the LOCATIONS AND DATES/TIMES tab, you can define the source and destination location of the entire transportation. Note that the routing is not defined here, but on the STAGES tab. If you have defined that locations and business partners are not the same for every item, you can still define either a global source location or a global destination location and leave the other location empty on the global level to fill it in on the item level.

The location you choose on this tab needs to be maintained as location master data. If you have chosen a location master data, you will see that the corresponding fields in the address area of the screen are filled with that address.

In the global transportation business, locations are always assigned a global identifier, which depends on the transportation mode. Depending on the transportation mode defined for the forwarding order, the global identifiers are displayed on the LOCATIONS AND DATES/TIMES tab. Because air transportation uses IATA codes and sea transportation uses UN/LOCODES, if you use an air forwarding order, you will see a field IATA CODE and if you use an ocean forwarding order, you will see a field UN/LOCODE. The codes are assigned in the location master data and pre-populated in the forwarding order when a location master data is selected.

If you have followed along with our example, you have defined business partners in the forwarding order. If you go to the LOCATIONS AND DATES/TIMES tab, you will see that locations are already entered. If the business partner assigned as the shipper has been assigned a location, this location is automatically taken as the source location of the forwarding order. The same applies to the consignee and destination location. It also works the other way around, meaning that if you define locations first, the party roles of shipper and consignee are filled automatically. However, if both party roles and locations are filled and you change one of them, no changes are made to the other.

If a customer calls and wants to get a transportation service from a location that you haven’t used before, you do not have to define new master data for this location. Instead, you can just leave the LOCATION field in the forwarding order empty and type in the address directly, as shown on Figure 4.24. Entering the address creates a one-time location. The one-time location is no different from location master data—in fact, a new location master data item was created. The new location is represented by a number that you can use later to add more information in the location master data. Usually the number range for one-time locations starts with 1. If you want to change this, follow the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • MASTER DATA • TRANSPORTATION NETWORK • LOCATION • DEFINE NUMBER RANGE INTERVALS FOR ONE-TIME LOCATIONS.

![Figure 4.24 Locations with One-Time Locations](image)

**Take the Term “One-Time Location” Seriously**

If you’ve started thinking that you no longer need to create locations in master data, be aware that one time really should mean one time.

Therefore, we recommend that you use one-time locations in exceptional cases only. In other cases, take the time to create a location master first.

However, when entering an address that is already used in a location master data record, the location ID of this master data record is drawn into the forwarding order. With this functionality, we can avoid having several master data records for the same address in the system.

On the same tab as the locations, you can also define the ordered transportation dates for pickup and delivery. Please note that the dates entered on this tab are used for the entire cargo transport, meaning that the pickup date is the pickup date of the first stage, and the delivery date is the delivery date of the last stage of the transport. What you define here are the ordered dates; there is no validation...
of whether the time frame between pickup and delivery date is feasible (there is a validation of whether the delivery date is after the pickup date, in case of typing errors). Pickup and delivery dates are not both mandatory; one of the dates is sufficient for freight unit building.

The dates and times are defined in the forwarding order in the time zone that is used by the corresponding location. Transportation planning usually works not with a single time, but with a time frame for delivery or pickup. In freight unit building, the time defined in the forwarding order is rendered into a time frame, if this is required. You will find more information about pickup and delivery time windows in Chapter 6.

When you have defined the items of the forwarding order, you will probably come across some fields concerning confirmation. The LSP can confirm quantities and dates/times to the customer after order-taking. This process step can be automated with the AUTOMATIC CONFIRMATION flag in the forwarding order type Customizing. In addition, you can define on what data the confirmation should be done. This Customizing mainly concerns the dates to be confirmed. The confirmation can be done based on order data, meaning the ordered dates are simply confirmed. Another option in Customizing allows you to do planning first and then confirm to the ordering party the dates that result from planning. If you want to confirm manually, you need to enter dates in the corresponding fields of the confirmed dates.

If you don’t want automatic confirmation, you can fill in the confirmation fields by clicking the CONFIRM button in the action toolbar of the forwarding order document.

Routing

After creating source and destination locations and dates for the entire process, the LSP usually defines the exact routing, including any potential intermediate stops that are on the forwarding order. Note that in real life these activities are often done by different employees. The forwarding order can be saved in every state and passed on to the next team, so enriching the forwarding order with more data is not a problem.

The team responsible for routing the forwarding order uses the ACTUAL ROUTE tab to define the route. On that tab, you will find a table containing all stages that have been created for the forwarding order. In many cases, some stages are predefined here, thanks to the movement type entered on the general data of the forwarding order. Recall that the movement type can be assigned mandatory and optional stage types. In Customizing, you can decide whether some stages should be proposed on the forwarding order when a particular movement type is chosen.

However, there is a second way of automatically assigning stages to the forwarding order. In Customizing of the forwarding order type, you can specify whether stage determination of the forwarding order should be done using the movement type or using a stage profile. Stage profiles can be defined in Customizing via the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • FORWARDING ORDER MANAGEMENT • DEFINE STAGE PROFILES. This Customizing activity looks very similar to the Customizing activity of assigning stage types to the movement type, which was depicted in Figure 4.18. You can make the same settings here as in the movement type-related Customizing activity.

You might be wondering why there are two different ways of defining the same thing. With stage determination by movement type, you always get a fixed stage setup—the one you assigned to the movement type. With stage profiles, you can be more flexible.

Figure 4.25 shows an excerpt from Customizing of the forwarding order type. If you decide to use stage determination by stage profile, you can assign a stage profile directly to the forwarding order type. In this case, the stage setup is always the same for the forwarding order, no matter which movement type is chosen. You can also determine the stage profile using a condition. This offers the flexibility to determine the stage profile based on any data from the forwarding order, compared to a 1:1 assignment of a stage profile to a forwarding order type. We recommend that you fill in a stage profile even if you are using a condition. If the condition does not return a result, the assigned stage profile is considered as a fallback solution.

![Stage Determination by Stage Profile](image-url)
Stage Determination

Stage determination by movement type is independent of the forwarding order type. No matter which document type is used, the stage setup assigned to the movement type is always considered.

When you use stage determination by stage profile, the stage determination depends more on the forwarding order type.

We’ve talked a lot about how stage types are assigned to stage profiles or movement types. Now we should take a closer look at what stage types actually are.

Stage types define the characteristic of the transportation stage in the entire transportation. In Customizing, you can create stage types by following the IMG menu path SAP Transportation Management • Transportation Management • Forwarding Order Management • Define Stage Types.

In Customizing, you simply assign a description to the stage type, as shown on the left in Figure 4.26. You also need to determine the stage category for the stage type. Stage categories are standard categories in the SAP TM system that cannot be enhanced. Like item categories, stage types are clustered into six groups. Several process steps in SAP TM use the stage category rather than the stage type. For example, in transportation charge management, you can decide for which stage categories the rate table should be taken into consideration. In addition, the stage category main carriage has several validations, which we examine later.

Since instruction sets can be assigned to stage types, it might make sense to restrict stage types to certain transportation modes. You can do this with the Customizing activity found via the IMG menu path SAP Transportation Management • Transportation Management • Forwarding Order Management • Define Allowed Transportation Mode for Stage Type. Here you can decide which transportation modes are allowed for a certain stage type. You can also define a default transportation mode, which is used for the stage type once the stage type has been assigned to the forwarding order’s routing.

Now that we have talked a lot about Customizing and the prerequisites for the forwarding order’s routing, we return to the forwarding order document and start with a manual routing of the forwarding order.

When looking at the tabs available in the forwarding order document, we can see that SAP TM differentiates between the ordered route and the actual route. As the names suggest, the ordered route is the routing that the customer orders or that is agreed upon with the customer. Therefore, the routing of the orders route is also considered by charge management.

When you have linked a forwarding agreement item (i.e., an item of a long-term contract with a customer) to your forwarding order, you can also draw in the agreed routing from this item. In this case, the routing is defined as a default route in the agreement item and is pulled into the forwarding order. The stages of the forwarding order are then pre-populated with the stages of the default route.

However, if the LSP wants to do a different routing (to optimize costs, for example), he or she can insert a different actual route. The actual route is moved to the freight unit so that transportation planning works with the stages and dates defined in the actual route. You can see the actual route definition also on Figure 4.27.

If the movement type or stage profile has already proposed some stages, those stages will be in the ordered route. The actual route will also contain those stages.

The source location and pickup date of the first stage are taken from the Locations and Dates/Times tab, and so are the destination location and delivery date of the last stage. If more than one stage is proposed, you need to enter the other
locations and dates manually, except that the routing was drawn from a default route of the associated agreement item.

If you want to add stages, select a stage and insert another stage either before or after it. Alternatively, you can split the selected stage into two stages and enter new intermediate stops in the forwarding order.

If you have defined schedules in your transportation network, you can directly assign a schedule instance (meaning a voyage or flight) to a stage in the forwarding order. To do so, click the Schedule button at the top of the stage table and then click Select. A search help appears that looks for schedules that run between the locations of the stage. Once a schedule is selected, a booking for this schedule is created. The dates from the schedule are also propagated into the forwarding order’s stage. The delivery date of a stage is always the earliest pickup date of the next stage unless you define a different pickup date. When you select the stage that you have chosen a schedule for, more information from the schedule (e.g., cutoff dates) is available below the stage table.

If you do not want to assign schedules (e.g., because you are planning a road transport), you can create a freight document directly from the stage by choosing Freight Document • Create. The dates defined in the stage then serve as dates for the freight document. Alternatively, you can select an already-created freight booking for your stage.

To do all of this, you need to define in Customizing what document types should be used for the freight documents and whether the features described above should be available on the forwarding order type. You can find all of these settings by following the IMG menu path SAP Transportation Management • Transportation Management • Forwarding Order Management • Forwarding Order • Define Default Freight Document Types for Stages.

You can choose a freight document type based on the following information:
- Forwarding order type
- Shipping type
- Stage type
- Transportation mode
- Sales organization

The freight document type can be either a freight order type or a freight booking type.

It is also possible to create one freight document for several consecutive stages, but make sure that all stages for which you want to create a common freight document have been assigned the same freight document type.

As you learned earlier in this book, SAP TM comes with an optimizer engine that can be used for routing and scheduling. So instead of manually creating stages with locations and dates, you can create a routing using the optimizer’s capabilities. As a prerequisite, you need to assign a planning profile to your forwarding order type in Customizing; then select Define Route on the Actual Route tab to start the optimizer.

The optimizer returns one or several results that you can choose from. If you accept one of the results, it is moved into the routing of the forwarding order. In the Customizing of the forwarding order type, you can choose how the transportation proposal’s result should be considered in the forwarding order. If only the routing is supposed to be copied into the forwarding order, the stages are filled accordingly with dates and locations. Alternatively, freight documents may already have been created from the transportation proposal, and they are then assigned to the forwarding order’s stages.

In some cases, the actual routing differs from the ordered route. If the LSP has agreed with the customer that the actual route should be the basis for charge calculation, you can copy the actual route into the ordered route. To do so, navigate to the Ordered Route tab and choose Copy from Actual Route. When you look at the stage table on the Ordered Route tab, you can see that except for copying the actual route into the ordered route and splitting stages, there is not much you can do here. This is because all other functions for routing would affect the routing for planning and execution and are therefore available only on the actual route. You might also have noticed that it is not possible to copy the ordered route into the actual route. This is because the actual route is always kept in sync with the ordered route automatically until any changes are done to the actual route directly.

Let’s return to the Actual Route tab again. If the employee taking the order is also responsible for the transportation planning, he or she can directly access the transportation cockpit from the forwarding order. Select Follow-Up • Start Transportation Cockpit in the action toolbar at the top of the document. The
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The transportation cockpit is filled with the selection criteria that were assigned to the planning profile that is supposed to be used by the forwarding order (planning profiles can be assigned to forwarding order document types in Customizing).

Since a forwarding order can contain items with different source and destination locations, the stages displayed on the Actual Route tab (and on the ORDERED ROUTE tab, as well) sometimes need to be on the item level.

SAP TM offers an item view and a stage view for the stage table. You can switch between the stages by choosing the hierarchy in the dropdown list labeled CHANGE HIERARCHY at the top of the stage table.

In our example, two items in the forwarding order have the same destination location but different source locations. We want to define a routing that sends item 1 from its source location to the source location of item 2, from where both items are transported together to their common destination location.

Figure 4.28 shows the item view before the insertion of the additional stage for item 10. After we split the stage of item 10, item 10 contains two stages, whereas item 20 still contains only one stage.

When we switch to the stage view, we can clearly see which stages have to be planned separately for the two items and which stages can be planned together. Some validations are performed when you do the routing of the forwarding order. Most validations concern whether all mandatory stage types have been used and whether the transportation modes assigned to the stage types are allowed.

Validations also check whether the stage type representing the main carriage uses the transportation mode for which the forwarding order was created.

The sales organization is responsible for entering the order, for example, but is not allowed to create freight bookings for specific transportation stages or send them to a carrier. So it can propose how to transport the goods (by specifying a route and schedule and assigning a freight order or freight booking) and set the organization interaction status to to be checked in order to transfer the affected stages to the planning and execution. You can set the interaction status on the stage table by selecting Set OI Status /L54263 To Be Checked. The planning and execution organization checks the proposal and transportation stage details in the transportation cockpit. It can then confirm the data exactly as proposed in the forwarding order, change data such as the departure, and then confirm the proposal or reject it outright. The status for the stage in the forwarding order then changes to confirmed, confirmed with deviations, or rejected, respectively.

The prerequisite for this process step is that you have defined a planning and execution organization for the stage. You can directly assign an organizational unit in the stage table.

Charges and Internal Charges

The CHARGES and INTERNAL CHARGES tabs show the result of charge calculation. Even though charge calculation is a very important topic in forwarding order management, we do not go into great detail about charge management until Chapter 10. In general, these two tabs show the result of a performed charge calculation.

In the Customizing of the forwarding order type, you can enable both internal and external charge calculation. Whether internal or external charge calculation is
triggered depends on the combination of sales organization and ordering party in the forwarding order. The ordering party can also be an organizational unit from your own company.

In this Customizing activity, you can also specify whether charge calculation should be triggered manually or automatically when the document is saved. If you want to trigger charge calculation manually, select **Calculate Charges** from the action toolbar at the top of the document.

Profitability
The Profitability tab is read-only but contains valuable information for the LSP business. This tab compares the expected revenue as determined by the charge calculation performed on the forwarding order and the expected costs that derive from the charge calculation on the freight documents related to the forwarding order.

On this tab, you can differentiate between planned profitability and expected profitability. Although the two terms sound very similar, they are different because the data source for the profitability analysis is different. For planned profitability, the charges from the forwarding order’s charge calculation are compared to the charge calculation that is done on the related freight documents.

Cost Distribution
Often, several forwarding orders are consolidated on one freight document. However, when you perform a profitability analysis, the costs imposed on the freight document need to be distributed to the related forwarding order.

SAP TM offers cost distribution functionality, which we discuss in Chapter 11, Section 11.2. In order to calculate profitability on the forwarding order, you need to enable and configure cost distribution, no matter whether consolidation on freight orders took place.

Expected profitability, however, considers the data from the settlement documents, both the forwarding settlement document and the freight orders’ or freight bookings’ settlement documents.

Output Management
Like every business document in SAP TM, you can also trigger output for the forwarding order. We do not want to go into the details of setting up output here; we discuss only how to assign output-related Customizing to the forwarding order and how to see the output on the forwarding order document.

In Customizing, you assign output profiles to the forwarding order type. The output profile is defined in the Post Processing Framework (PPF) (see Chapter 2, Section 2.3.3).

Once an output profile is assigned or dynamically determined, you can go to the Output Management tab on the forwarding order document. You will see an empty table. When you select **Generate Actions Including Condition Checks**, all output actions that meet the schedule conditions defined in the PPF are triggered.

The table is filled with the actions that meet the schedule conditions. You can see whether the actions have been processed and what kind of actions they are.

As you can see in Figure 4.29, we have only print actions in our example. This means the forwarding order document is supposed to be printed. When you select a line, more details about the action are listed below the table. When you select the Document Preview tab in the actions details view, you get a print preview of the document, filled with all the information that we filled in during this chapter or that was derived automatically.

Global Functions on the Forwarding Order
At this point we’ve systematically browsed through the forwarding order tab by tab. However, there are some functionalities of the forwarding order that cannot be directly assigned to tabs. We discuss these next.
Recall from Figure 4.1 that the transportation process starts with a transportation requirement and then continues with planning using the freight unit document. Consequently, the forwarding order has to build freight units in order to continue the transportation process.

We discuss the freight unit building step in Chapter 6, Section 6.1, but for now, we need to take a closer look at how to trigger it from the forwarding order either manually or automatically. You can define this in Customizing of the forwarding order type. If you choose to use automatic freight unit building, the freight unit is created the first time the forwarding order is saved. If you make any planning-relevant changes to the forwarding order later, the freight unit is updated accordingly.

**Prerequisites for Freight Unit Building**

Whether you are using automatic or manual freight unit building, some fields in the forwarding order need to be filled in to create a freight unit:

- Sales Organization
- Source and Destination Location
- Items with Quantities
- Dates and Times
- Movement Type
- Shipping Type
- Transportation Mode

In some cases, even more fields are required. You can check whether you have filled all required fields for freight unit building by clicking the Check button in the action toolbar of the forwarding order.

You can also manually create freight units by selecting Follow-Up • Create Freight Units from the action toolbar. Manual freight unit building is often used if freight units might be built for several forwarding orders. In this case, you can select several forwarding orders from the POWL and then create freight units from the POWL. If dates, locations, sales organization, and so on are the same on several forwarding orders, the freight unit consolidates these forwarding orders into one freight unit.

To create freight units, you need to assign an FUBR to the forwarding order type in Customizing. If the way freight units should be built depends on data in the forwarding order, you can also assign a condition to determine the FUBR. Like with stage type profiles, you can specify an FUBR in addition to a condition in Customizing, to have a fallback scenario in case the condition does not return any result.

When a customer orders a cargo transport from his or her own premises to a customer, it is often the case that the customer also needs to be provided with a container that he or she can load prior to the actual cargo transport. You can also define in the forwarding order document that an empty container should be provided to the shipper before the cargo transport happens. The transportation activities ordered with the forwarding order can then include the actual cargo movement as well as the movement of empty containers, as shown in Figure 4.30.

**Figure 4.30  Empty Provisioning and Empty Return Process**

To do so, you can define in the item detail of a container item that this container item should be provided to the shipper and/or returned from the consignee to a container yard after it is unloaded. Once it is defined that the container item is subject to empty provisioning and/or empty return, new tabs appear in the item detail area where you can define the container yard where the empty container is
supposed to be picked up or returned to. Along with this information, you can also define when the container should be picked up and brought to the shipper (in the case of empty provisioning, when it should be picked up at the consignee, or returned to the container yard, in the case of empty return).

Please note that even though empty provision and empty return are now also part of the forwarding order, the source and destination locations of the forwarding order remain the shipper and the consignee. The information of empty provisioning and empty return remains on the container item.

When you create freight units for forwarding orders that include empty provisioning and/or empty return, freight unit building is triggered separately for the actual cargo movement (between shipper and consignee) and the empty container movements. This means that the freight unit for the cargo movement can be of a different document type than the empty container movement. Furthermore, you get a separate freight unit or container unit document for the empty container movement.

In an LSP business, there are multiple empty container movements that need to be organized. For the LSP, it is therefore often beneficial not to transport the empty container back to a container yard and subsequently pick it up from there to transport it to the next shipper, but instead to transport it directly from a consignee to a shipper.

As you can see in Figure 4.31, the container travels directly from the consignee of one forwarding order to the shipper of another forwarding order. This process is called **triangulation**. You can triangulate empty container units on the container unit POWL. You can select all container units or a subset of them and choose **Triangulation** / **Create Triangulation**. The system then automatically finds container units that can be triangulated based on the following information:

- Involved container yards
- Pickup and delivery dates
- Container types or container numbers

If applicable container units are found, the container unit from the container yard to the shipper of a forwarding order is merged into the container unit from the consignee to the container yard, which means the container yard location is no longer part of the container unit and one of the two container units is deleted because it is now also represented with the other container unit.

Sometimes, forwarding orders are created only for charge calculation and business administration reasons. In this circumstance, avoid passing these forwarding orders onto transportation planning; in Customizing of the forwarding order type, you can choose restricted processing of the forwarding order. This way, the forwarding order is always blocked for planning and execution.

**Empty Provision and Empty Return**

While we have talked about empty provisioning and/or empty return of containers only, it is important to note that it is also possible to use the same functionality for railcar items in the forwarding orders. However, if we have an item hierarchy including a railcar item that contains one or several container items, empty provisioning and/or empty return is possible only for the railcar item (i.e., the highest level of the item hierarchy).

SAP TM integrates with SAP Credit Management to provide the credit limit check feature. You can activate the credit limit check in Customizing of the forwarding order type. The activation of the credit limit check is allowed only if forwarding settlement is also allowed; this way, the credit limit check is performed when the forwarding order is created. The order data is passed on to SAP Credit Management, and the check is performed there.
In Customizing of the forwarding order type, you can decide what happens if the credit limit check fails. The negative check result can either be only informative and have no impact on the forwarding or cause a planning and execution block until the credit limit check is successful.

A credit limit check is always performed again if any of the following information of the forwarding order has changed:

- Sales organization
- Credit limit check amount (usually the result of the charge calculation)
- Business partners
- Logistics data with influence on charge calculation

If you need to cancel a forwarding order, you can do this either from the action provided in the POWL or directly from the document. If you cancel a forwarding order and freight units have already been created for this document, those freight units are canceled and withdrawn from the freight documents on which they might have been planned.

### Canceling Freight Units from Freight Documents

If freight units are canceled (e.g., because the related forwarding order was canceled), then the planning is withdrawn, which means the freight units are taken off the freight order or freight booking. If you want to notify the planner automatically about this change, you need to set up your freight documents accordingly by using a change controller strategy that handles this situation.

You can find more information on the setup of freight documents and change controller strategies in Chapter 7.

When you cancel the forwarding order by clicking the **Cancel Document** button either on the document itself or on the POWL, you are asked to define a cancellation reason code. The code you choose can be used for analysis and is displayed on the **General Data** tab of the forwarding order below **Life Cycle Status**, which is changed to **canceled**.

You can define cancellation reason codes in Customizing via the IMG menu path `SAP Transportation Management • Transportation Management • Forwarding Order Management • Define Cancellation Reason Codes`. It's not necessary to specify a cancellation reason code when canceling a forwarding order.

As you have seen, the forwarding order contains a lot of information for business administration, transportation planning, charge calculation, and organizational interaction. In many LSP processes, these different process areas are usually performed by different areas within the company.

For the person who takes the order, it would be cumbersome to navigate through all the tabs we have mentioned to enter relevant data. Therefore, he or she can use the page selector, which is located in the action toolbar in the top-right corner of the forwarding order document.

Recall from Chapter 2, Section 2.2.4 that you can customize the forwarding order screen according to your needs. However, it might be useful to switch between a fast order entry screen and the full-blown forwarding order document. SAP TM provides fast order entry screens for the air, land, and sea transportation modes because the required information depends on the transportation mode.

Figure 4.32 shows a fast order entry screen for land transportation. It displays only the data needed for order entry, including the business partners, sales organization, general terms, locations, dates, and items.

![Fast Order Entry](image)

**Figure 4.32** Fast Order Entry

If you need more information on the fast order entry screen, you can add more fields in screen Customizing.

Notice that there is no action toolbar in Figure 4.32. The fast order entry works only for order entry. You need to switch back to the conventional forwarding order screen for processing the forwarding order.
As already mentioned, the ordering party can send an order via EDI messages to make the LSP or carrier create a forwarding order. This process can be automated with SAP TM because the service interface `TransportationRequestRequest_In` works for all fields that might be relevant for creating a forwarding order. Make sure you have done the setup of the field and service mapping in SAP PI properly. The forwarding order is created automatically if this service interface is triggered.

If you want to confirm data back to the ordering party, you can also use EDI communication with the service interface `TransportationRequestConfirmation_Out`. For more information about the automatic creation of documents using service interfaces and communication with web services, return to Chapter 2, Section 2.4.

Summary
The forwarding order is the central document for entering information into the system. The forwarding order can be created automatically by a B2B service or manually by an order entry clerk.

The information entered in the forwarding order is relevant for charge calculation between the LSP or carrier and the order party, as well as for transportation planning. For transportation planning, the planning process can be influenced by the forwarding order by defining stages on the forwarding order.

After planning, execution, and charge calculation and settlement, the forwarding order can be used to do a profitability analysis to determine whether the customer’s order for transportation services is profitable. Profitability analysis can also be used to decide up front whether the order should be accepted and confirmed.

However, there is a third way of creating forwarding orders: If a forwarding quotation was used for the interaction with the customer, all data from the forwarding quotation can be transferred to the forwarding order. This is described in detail in Section 4.2.3.

4.2.2 Charge Estimation
Customers often call the LSP to request a price for a transportation service. You can enter a forwarding order and perform charge calculation on the forwarding order, but entering a forwarding order takes a lot of time, and since the customer is on the phone, you might require a quicker way of calculating charges.

For this reason, you will find another menu entry in the work area forwarding order management in SAP NWBC: charge estimation. The SAP NWBC menu path `Forwarding Order Management • Charge Estimation • Estimate Forwarding Charges` takes you to a screen where you can quickly estimate the charges for the customer’s order.

Charge Estimation
To use the charge estimation, you need to have set up the Transportation Charge Management component. You can find more information on charge management in Chapter 10.

Notice that because the charge calculation itself usually works independently of the document type, no forwarding order type is necessary to start the charge estimation; only the transportation mode needs to be entered. The charge estimation screen in Figure 4.33 looks a little like the fast order entry of a forwarding order. On this screen you are asked to enter all data that is relevant for charge calculation. The following fields are mandatory:

- **Sales Organization**
- **Source Location**
- **Destination Location**
- **Ordering Party**

Other fields may not be mandatory for system validation but are often required to perform charge calculation (such as items).

If no pickup date is entered, the current system date is used as the pickup date for the charge calculation.

Charge Estimation Application
As described in Chapter 2, Section 2.2, SAP TM applications can be displayed in a browser using a hyperlink. Since this also applies to the charge estimation, think about providing the customer with the link to the charge estimation application. This allows the customer to use SAP TM’s capability without contacting the LSP.

If you do this, make sure you thoroughly check your authorization setup so that the customer can estimate charges only for himself or herself.

The charge estimation is read-only; that is, the estimated charges cannot be saved or turned into a forwarding order.
4.2.3 Forwarding Quotations

We have spent a long time talking about the forwarding order, which is the document that represents the actual order or contract between an ordering party and an LSP or carrier.

Before you can create an order in the transportation process, you often need to create a quotation, which is covered by SAP TM with the forwarding quotation document. This business document helps the ordering party send the data of a potential forwarding order with the quotation price. When the quotation is successful, the forwarding order can be created in relation to the quotation.

Notice that the forwarding quotation looks very similar to the forwarding order. In fact, you can do most of the things we talked about in Section 4.2.1 in the forwarding quotation. You can create forwarding quotations via the SAP NWBC menu path Forwarding Order Management • Forwarding Quotation • Create Forwarding Quotation. Just like you did with the forwarding order, when creating a forwarding quotation, you need to define a forwarding quotation document type. You can specify a forwarding quotation document type in Customizing by following the IMG menu path SAP Transportation Management • Forwarding Order Management • Forwarding Quotation • Define Forwarding Quotation Types.

When looking at the forwarding quotation itself and customizing its type, you can find many similarities between the forwarding quotation and the forwarding order. The following features and processes are handled exactly the same way as in the forwarding order:

- Item definition
- Defining items with different source or destination locations
- Item type assignment to document type
- You can find the corresponding Customizing activity via the IMG menu path SAP Transportation Management • Forwarding Order Management • Forwarding Quotation • Assign Item Types to Forwarding Quotation Types. Make sure that when you create a forwarding order out of a forwarding quotation, the same item types are assigned to the forwarding order type that is used for the forwarding order creation.
- Stage determination by either movement type or stage profile
- Automatic charge calculation when saving the document
- Partner determination by partner determination profile
- Transportation proposals
- Creation of one-time locations
- Canceling the forwarding quotation with a reason code

Not everything is the same, though. Figure 4.34 shows the most important differences between a forwarding quotation and a forwarding order. In the quotation, you can specify a valid-to date, which is the deadline by which the quotation must be accepted or rejected.
Just like with charge calculation on the forwarding order, SAP TM can calculate the quotation price. This takes place, for example, if the customer calls the LSP or carrier and asks for a price. The price is calculated, and you can submit it to the ordering party by selecting **Response**/Submit from the action toolbar at the top of the screen.

The communication that takes place during the quotation process can vary from customer to customer. When communication occurs by phone, you can simply update the status of the quotation manually using the actions provided by the Response button. Below the quotation price, as depicted in Figure 4.34, you can see your response to the customer—whether you have accepted the quotation or rejected the quotation. When rejecting a quotation, you can specify a rejection reason; this can also be communicated to the ordering party. The forwarding quotation document is canceled once the quotation has been rejected.

The forwarding quotation also supports the communication between ordering party and LSP via EDI communication. In this case, the forwarding quotation can be created via the corresponding web service `TransportationRequestQuotation-CreateRequest_In`. This service interface provides all the necessary fields to create a forwarding quotation in SAP TM, just like manual creation of a forwarding quotation. The response of the carrier or LSP is then sent out to the ordering party with the service interface `TransportationRequestQuotationConfirmation_Out`.

A quotation can also be made in the course of a tendering process. Imagine that the ordering party also uses SAP TM and starts a tendering for a freight order in their system (more about triggering the tendering process can be found in Chapter 7, Section 7.3). A request for quotation is sent out to the LSP or carrier, and a forwarding quotation is created for the customer’s request for quotation.

**EDI Messaging from SAP TM to SAP TM**

It is possible to start a tendering process and communication between an ordering party’s SAP TM system and a carrier’s SAP TM system. However, you need to make sure you have the correct SAP PI setup in place so that the outgoing B2B messages of the request for quotation are matched to the correct incoming B2B service interfaces.

If you want to use your forwarding quotation as part of the tendering process, you need to define this in Customizing of the forwarding quotation type. In the Customizing activity, change the setting QUOTATION MODE to WITH REQUEST FOR QUOTATION. The forwarding quotation document in SAP NWBC changes slightly. You get additional fields showing the response due date and a potential price limit.

As shown in the top-right corner of Figure 4.35, the response options are now restricted to ACCEPT and REJECT because you can only accept or reject a request for quotation and communicate a price.

Whether you are using a forwarding quotation with or without request for quotation, the processing of a forwarding quotation is mostly the same. Processing a forwarding quotation is not much different from processing a forwarding order.

When the forwarding quotation has come in, you can do the routing of the quotation. This routing can be done manually on the ACTUAL ROUTE or ORDERED ROUTE tab. (Return to Section 4.2.1 for more information on how to do manual routing on this tab.) Alternatively, you can use a transportation proposal for the route determination of the forwarding quotation by specifying an FUBR in Customizing of the forwarding quotation type, similar to Customizing...
of the forwarding order type. No freight units are built based on the forwarding quotation; the FUBR is used only for the simulation of the freight unit building and optimizer planning in the transportation proposal.

After you route the forwarding quotation, you can calculate charges for the document in exactly the same way as on the forwarding order. The prerequisite is again the correct combination of sales organization and ordering party and existing master data in SAP TM Transportation Charge Management. As before, the calculated price is displayed on the General Data tab, as shown on the figures above. You can also manually overwrite the quotation price later. Only this value is communicated to the customer.

As with the forwarding order, you can view the detailed result of charge calculation on the Charges tab. Because the quotation does not serve as an actual order or contract, settlement is not possible based on the forwarding quotation document.

If the customer has accepted the quoted price, you can now create an actual order for the quotation. But don’t worry—you do not need to create a new forwarding order from scratch; you can create the forwarding order directly from the forwarding quotation by selecting Follow Up » Create Forwarding Order in the action toolbar of the forwarding quotation.

The forwarding order type that is used for creation must be defined in Customizing of the forwarding quotation type, you can specify how many forwarding orders may be created out of the forwarding order.

Additionally, a forwarding order can be created out of a forwarding quotation only if the quotation was already submitted.

All relevant data is copied from the quotation to the order. The most important data copying is probably the calculated charges. Since master data in SAP TM Transportation Charge Management might change during the quotation and order-taking process, you want to avoid calculating charges again on the forwarding order when a different result could occur. Therefore, the charge calculation results are copied to the forwarding order, and the status for charge calculation indicates that no further charge calculation is necessary. If you need to do a charge calculation on the forwarding order again, you can do so using the functionality covered in Section 4.2.1.

The assignment of the forwarding quotation to the forwarding order is displayed in the document flow if you have created a forwarding order from a forwarding quotation. Later, the document flow of the freight unit and freight orders will document that the process has started with a forwarding quotation.

However, in some cases you create a forwarding order independently of the forwarding quotation even though a quotation exists for this workflow. In this case, you can subsequently assign a forwarding quotation to a forwarding order.

On the forwarding order, actions are available in the action toolbar that enable the retroactive assignment of the forwarding quotation to the forwarding order, as shown in Figure 4.36: When you want to assign a forwarding quotation to the forwarding order, click the Assign FWQ button. A new popup appears in which you can enter the document number of the forwarding quotation. However, checks are performed if the selected forwarding quotation aligns with the current forwarding order. The standard checks include whether the locations and dates in both documents match and whether the combination of ordering party and sales organization is the same.

Customizing of the forwarding quotation type, you can specify how many forwarding orders may be created out of the forwarding order.

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All relevant data is copied from the quotation to the order. The most important data copying is probably the calculated charges. Since master data in SAP TM Transportation Charge Management might change during the quotation and order-taking process, you want to avoid calculating charges again on the forwarding order when a different result could occur. Therefore, the charge calculation results are copied to the forwarding order, and the status for charge calculation indicates that no further charge calculation is necessary. If you need to do a charge calculation on the forwarding order again, you can do so using the functionality covered in Section 4.2.1.

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Enhancing the Standard Check

You can enhance these checks with a BAdI found via the IMG menu path SAP TRANSPORTATION MANAGEMENT • TRANSPORTATION MANAGEMENT • BUSINESS ADD-INS (BAdIs) FOR TRANSPORTATION MANAGEMENT • FORWARDING ORDER MANAGEMENT • ASSIGNMENT OF FORWARDING QUOTATION TO FORWARDING ORDER • BAdI: EXTENSION OF CHECKS FOR ASSIGNMENT OF FORWARDING QUOTATION TO FWO.

When you are creating documents for an import/export process, you can also assign an import forwarding quotation to an export forwarding order. You will find more information on import/export processes in Chapter 8.

4.2.4 Creating Orders and Quotations with Reference

In the transportation business, LSPs and carriers often have a stock of regular customers who frequently order transportation services for the same route or with similar items. If you do not want to create new orders or quotations from scratch, you can use existing documents and create new ones from them.

One option is to copy an existing forwarding order (e.g., from a transportation service performed in the past) and update certain information, such as dates. When you copy the forwarding order, no link is established between the existing forwarding order and the copy. A forwarding order can also be copied with a new type, meaning the new forwarding order takes over most of the data from the existing forwarding order but is assigned a different forwarding order type. This method is used in import/export processes where an import forwarding order is created from the export forwarding order. (Again, Chapter 8 offers more information about import and export forwarding orders.) When you display a forwarding order, click the COPY WITH NEW DOCUMENT TYPE button in the action toolbar to open a new tab in SAP NWBC. In this tab, you can specify the new document type and, if necessary, a new transportation mode.

You can get to this screen shown in Figure 4.37 by following the SAP NWBC menu path FORWARDING ORDER MANAGEMENT • FORWARDING ORDER • CREATE FORWARDING ORDER.

In the upper screen area, you define information that should be assigned to the new document you want to create. In the lower screen area, or the reference area, you assign references to existing documents. We revisit this screen in a few pages, so keep it in mind.

Figure 4.37 Initial Screen of Forwarding Order Creation

You can use this initial screen to create a forwarding order as a copy from an existing forwarding order. Enter the forwarding order type in the upper screen area and specify a forwarding order document number in the reference area. The new document acquires all the data from the reference forwarding order. However, as already mentioned, no reference is shown in the document flow.

The risk with copying an existing forwarding order is that you have to be very careful with the data in the existing forwarding order. Discrepancies might result if you accidentally copy item quantities that the customer did not order.

To avoid this risk, you can create templates for forwarding orders. To create a template, you follow the same menu path as when creating forwarding orders. On the initial screen, as shown on Figure 4.37, select the TEMPLATE checkbox in the upper screen area. You do not need to customize any separate forwarding order template types, but you can use the forwarding order types.

If you look at the template document, you will see that it closely resembles the forwarding order (which is no surprise, since it’s a template for creating forwarding orders). Note that you cannot trigger charge calculation or freight unit
building for forwarding order templates because these functionalities are reserved for the forwarding order document itself.

The template document is missing some tabs that appear on the actual forwarding order document: PROFITABILITY, ATTACHMENTS, INTERNAL CHARGES, OUTPUT MANAGEMENT, and HBL or HAWB. These forwarding order tabs are concerned with the actual execution of the transportation service. Because the template is not meant to have anything to do with process steps that trigger transportation execution, freight unit building and charge calculation are disabled.

The biggest difference is that you cannot define any dates in the LOCATIONS AND DATES/TIMES tab. This is because templates should be timeless, meaning that in most cases it is the dates that differ from order to order.

Once you save the template, a document number is assigned. We recommend that you use a different number range for templates and actual forwarding orders to differentiate between the two document categories. You can assign the number range of both the forwarding order documents and the forwarding order templates in Customizing of the forwarding order type.

Now when you want to create a forwarding order from a template, you have different options. One option is to use the POWL that was shown in Figure 4.14 for forwarding orders. This POWL includes queries to find template documents. For example, you can search template documents for a certain combination of sales organization and ordering party or a specific routing. When you have found the right template, you can select it in the POWL and click the CREATE FORWARDING ORDER FROM TEMPLATE button at the top of the POWL.

Alternatively, you can display the template by following the SAP NWBC menu path FORWARDING ORDER MANAGEMENT • FORWARDING ORDER • DISPLAY FORWARDING ORDER. If you know the document number of the template, you can insert it. The system automatically recognizes that you have chosen a template. If you don’t know your document number, you can select the TEMPLATE checkbox on the initial screen. If this checkbox is selected, the F4 help displays only forwarding order template documents.

When displaying the template document, you can also click the CREATE FORWARDING ORDER FROM TEMPLATE button from the action toolbar. If you want to copy the template with a new document type, as explained previously, the new document is also a template document.

The third option is to use the initial screen of the forwarding order creation. In the reference area, you can specify a template document number. All data from the template is then copied into the forwarding order. Like when you copy existing forwarding orders, no relationship between the template and order is displayed.

Creating forwarding orders from the forwarding quotation is possible not only with the features described in Section 4.2.3. If you look at Figure 4.37 again, you will see that you can also define a forwarding quotation in the reference area.

Creating a forwarding order with reference to a forwarding quotation is the same process as creating a forwarding order from the forwarding quotation—meaning that the prerequisites for creating a forwarding order from a forwarding quotation must be met. In this case, the forwarding quotation is added to the forwarding order’s document flow as a predecessor document.

In the reference area of Figure 4.37, you can assign forwarding agreements as a reference for the forwarding order that is being created. This referencing has a slightly different effect than the referencing of quotations, templates, and other orders.

No data is copied into the new forwarding order. The referencing here is used to avoid the system-based agreement determination, which is explained in detail in Chapter 10, Section 10.2. If you assign agreements as reference, these agreements are considered when calculating charges on the forwarding order.

We’ve primarily concentrated on forwarding orders during our discussion of the template. But using templates is also possible for forwarding quotations; the following features are also applicable for quotations:

- Defining different number ranges for templates
- Creating forwarding quotation templates
- Reference area on the initial screen of the forwarding quotation creation
  - Referencing forwarding quotations
  - Referencing forwarding quotation templates
  - Referencing forwarding agreements
- Disabling charge calculation of forwarding quotation template
Because the transportation requirement document marks the beginning of the transportation planning, charging, and execution process, it is a very important document for the whole process. The information entered in the transportation requirement is passed on to the next process steps.

The transportation requirement document is the only document in which information about the goods to be transported is entered into the system.

Consider Figure 4.38, which was shown at the beginning of this chapter in relation to which transportation requirement documents exist and how they are used. You should be able to explain the differences between the documents and give details about each of the documents depicted by the bottom-left boxes. No matter which of these documents are created, they all have the same technological basis: the transportation request business object. Document categories differentiate these documents.

There are two ways of creating transportation requirement documents in SAP TM. The first option is the integration of SAP ERP order and delivery documents into SAP TM, which was explained in detail in Section 4.1. This option is used by the so-called shipper industry that uses SAP TM for the transportation of its own manufactured and sold or purchased materials.

You can integrate the following SAP ERP orders:
- Sales orders
- Purchase orders
- Stock transfer orders
- Scheduling agreements

The SAP ERP order integration described in Section 4.1.1 and Section 4.1.2 works using the output determination procedure in SAP ERP. You need to do some configuration concerning the output management and the activation of the transfer of the orders from SAP ERP to SAP TM. A prerequisite for order integration is the integration of master data such as customers, creditors, and material that is used in the orders. The CIF is used to integrate master data.

If you want to integrate SAP ERP orders created in the MM component (purchase orders or stock transfer orders), use the output processing workflow.

Once the SAP ERP order has been transferred to SAP TM, an OTR is created. For the OTR, a freight unit can be created to use in transportation planning. The OTR does not differentiate between SD and MM orders.

After the OTR's freight units have been planned, SAP TM can send a delivery proposal to SAP ERP. Deliveries can then be created based on the planning results in SAP TM, but the leading system that determines how deliveries are created is still SAP ERP.

The integration of created deliveries is configured like the integration of orders. After the integration of deliveries, a new document is created in SAP TM: the DTR. If a related OTR exists for the DTR, the DTR consumes the OTR’s freight unit. In any case, you can configure different integration scenarios, depending on what SAP ERP documents should be integrated into SAP TM. These integration scenarios are described in Section 4.1.6.

The second option for creating transportation requirement documents in SAP TM is creating forwarding orders and forwarding quotations. These documents are used by LSPs and carriers who need more information about the requested transportation process than what is integrated from SAP ERP orders.
Forwarding orders can be created via EDI messages or manually. The forwarding order document combines various pieces of information:

- Information relevant for business administration
- Charge calculation-relevant data
- Data crucial for transportation planning

This information is displayed in the document in different tabs. The most important tabs of the forwarding order are explained in Section 4.2.1.

If customers inquire about the price of a transportation service based on existing agreements, no order has to be created. The charge estimation, covered in Section 4.2.2, calculates the charges of transportation services without creating any documents in SAP TM. This application could possibly also be provided to the customer directly if a customer requests charge estimations very often.

In a tendering process, the customer’s inquiry does not necessarily result in the creation of an order. Therefore, the first step of the customer engagement is to create a forwarding quotation, as described in Section 4.2.3. With the help of the forwarding quotation, the customer’s inquiry can be communicated to and registered by the LSP or carrier, who then communicates a price to the customer. This communication can also be done electronically using web services.

Once the customer agrees to the quoted price and terms, a forwarding order can be created from the forwarding quotation.

If forwarding orders or quotations are often created for the same routing or material, the person who takes orders can make the task easier by creating template documents up front. When an order needs to be created, the data can be reused via templates, and the employee can add data specific to the individual order. Templates are covered in Section 4.2.4.

Once the transportation requirement is completely entered and confirmed and freight units have been built, the transportation planning process can start. Let’s continue in Chapter 5 with the creation of planning-relevant master data before going into the details of transportation planning in Chapter 6. In that chapter, you will recognize much of the information that we have entered in either the SAP ERP order or delivery or the forwarding order.
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