Proof of Concept: Integration of SAP TM and SAP EM with Trimble Telematics solutions

Applies to:
SAP Transportation Management, SAP Event Management

Summary
In order to show how Telematics Provider can be integrated with SAP TM via SAP EM, a proof of concept has been realized by SAP together with Trimble Transport & Logistic, controlling a transportation network by considering real-time execution data.

This document describes how the WSDL services provided by Trimble Telematics Solutions can be leveraged in SAP EM to get real-time tracking data to update the event handlers. It explains how the standard freight order tracking scenario (integration between SAP TM and SAP EM) can be enhanced to

• provide the expected events data from SAP EM, which is based on the planning data from SAP TM, to the Trimble Telematics Solutions and
• get the tracking data which is provided by the Trimble Telematics Solutions in (almost) real-time into SAP EM respectively SAP TM.

It describes in detail:

• which customizing settings have to be changed in SAP TM and SAP EM based on the standard freight order tracking scenario ODT30_TO to define a custom scenario
• additional activities and extraction functions which need to be implemented
• how third party services can be integrated with SAP EM
• how to trigger automatic updates of a freight order in SAP TM based on new execution information

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Introduction

The Internet of Things (IOT) is one of the hot topics right now. In general it’s about communication and related reactions of physical objects. One example is the integration of logistical IT systems like SAP TM with the physical transportation execution. If you know what happens to your utilities (like trucks, container, pallets, driver …) during execution, you can adjust planning and ultimately save money by avoiding idle situations or customer hassle.

So what we have done is a showcase together with one telematics provider, Trimble Transport & Logistics, used also by one of our SAP TM LSP customers. What we want to show is the SAP TM backend capabilities in order to adjust planning to real events and hence control the transport network.

SAP TM offers a standard integration to SAP EM, which is the generic framework to receive data from reality captured by any source. The implementation outlined below can also be realized with other providers, at least the WSDL mapping would look different. Also, of course, additional data can be considered, we focused on just a basic view to outline the idea.
Every telematics provider has its own server, so we are not communicating with the devices directly. The way how the tracking data can be accessed is specific to each provider.

Hence what we have done is really a proof of concept (PoC) for one possible integration scenario, not a standard solution. The goal of this PoC was to demonstrate that it is quite easy to integrate SAP EM (and with this SAP TM) with a third party service provider (in this case Trimble FleetWorks). Integration in this context means

- providing the planning data from SAP TM via SAP EM to Trimble FleetWorks and
- receiving the tracking data which is provided by Trimble FleetWorks in (almost) real-time in SAP EM and update the corresponding event handlers in SAP EM respectively the freight orders in SAP TM.

Multiple devices like on-board units can be connected directly to Trimble FleetWorks. The planning data can then be distributed by Trimble FleetWorks to the connected devices, which then provide real-time execution data about their related assets (e.g. trucks). In the PoC we worked with the Trimble devices Truck4U and FleetXPS and the FleetXPS App.

The picture above gives a rough overview on the components, which are used in this PoC.

**Scenario Description**

The scenario which has been implemented for the PoC is based on the standard freight order tracking scenario ODT30_TO. More information on the standard scenarios for tracking freight documents of SAP TM with SAP EM can be found in these two documents:

- SAP Event Management – Scenarios for SAP Transportation Management
- Freight Order Visibility Scenario (ODT40_TO) for SAP Transportation Management

It is a very basic scenario, in which one freight order is planned to transport one container from a source location to a destination location. The truck driver gets two tasks on his device that he has to perform for such a tour. One task contains all activities to be executed at one location:

- Task „Loading and Departure“ for the source location
  Additionally to the confirmation of the planned activities “Loading” and “Departure the truck driver shall enter the container ID of the loaded container and document possible damages of the container.

- Task “Arrival and Unloading“ for the destination location
  Additionally to the confirmation of the planned activities “Arrival” and “Unloading” the truck driver shall enter the actual weight of the container and get the signature of the consignee. He can also document any issues as free text.

For each task the truck driver gets necessary information about the address and contact person of the location and further details as free text.

From all the activities and reports the driver confirms on his device, event messages are derived that are sent to SAP EM to update the corresponding event handlers and the related freight orders in SAP TM. The container ID and the actual weight is updated in the freight order, attachments are stored in SAP EM to document possible container damages and the proof of delivery (signature of consignee).

**Integration between SAP EM and Trimble FleetWorks**

In the PoC three web services provided by Trimble have been used for the integration between SAP EM and Trimble FleetServer:

- **PlanningService**: This web service is called by SAP EM to push new/updated planning data to the Trimble FleetServer. The call is triggered whenever a new event handler is created or an existing one gets a relevant update.

- **TrackingService**: This web service is called in SAP EM to poll for the latest tracking data that has been sent to the Trimble FleetServer from the connected devices. A report is scheduled for periodic execution that calls the web service.

- **FilesService**: In case the tracking data refer to some additional files (e.g. pictures) this web service is called to download these additional files from Trimble FleetServer.
On Trimble FleetWorks the necessary activity types and the reports had to be defined which are used in the PoC.

The following picture gives an overview on the integration between the different system and devices.

### Flow

The three web service calls are embedded into the SAP EM processing logic as explained in the following. The “Fleet Integrator Guide” (Version 1.14) which is provided by Trimble gives valuable information on how the different web services can be called.

After that a short overview on the necessary configuration that had to be done on Trimble FleetWorks is given.

**Planning Service: UpdateTerminalTrips**

The planning data of a freight order (SAP TM) is represented in the expected events of an event handler (SAP EM). To provide this data to Trimble FleetServer the method UpdateTerminalTrips of the web service PlanningService is used. The following table gives a rough terminology mapping between SAP EM and Trimble FleetServer.

<table>
<thead>
<tr>
<th>Trimble FleetServer</th>
<th>SAP EM / SAP TM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip</td>
<td>Freight Order</td>
</tr>
<tr>
<td>Task</td>
<td>All expected events with same location</td>
</tr>
<tr>
<td>Activity</td>
<td>One single expected event</td>
</tr>
</tbody>
</table>

In our simple scenario the freight orders are planned to transport a container from a source to a destination location. The event handler in SAP EM gets a couple of expected events for each of the locations. The web service method UpdateTerminalTrips is then called with following tasks and activities for one trip:

**SAP Community Network**
The web service is called out of an event handler update activity (EH update activity 2). By this the service gets called every time a new event handler has been created or an existing one has been updated.

**TrackingService: PollTraces**

A custom report has been implemented in SAP EM which calls method PollTraces of the web service TrackingService. This web service provides all the tracking data which has been sent to the Trimble FleetServer from the connected devices. To get exactly the delta of the trace data, which has been captured since the last service call, a special value called “MARK” has to be provided (see “Fleet Integrator Guide” chapter 2.3 and Generating event messages out of Trimble trace data). The tracking data returned by the service includes a lot of different trace data which have different trace types defined by Trimble. In the PoC only the data of trace type ‘Activity End’ (13) is evaluated. This kind of trace data is created whenever an activity is finished on one of the connected devices.

In the custom report the trace data is analyzed and event messages are created out of it. In the PoC scenario the following event messages are derived from the trace data:

<table>
<thead>
<tr>
<th>Activity End of</th>
<th>Event Messages for SAP EM</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Loading’</td>
<td>LOAD_BEGIN and LOAD_END</td>
</tr>
<tr>
<td>‘Departure from Customer’</td>
<td>DEPARTURE and CONTAINER_DAMAGED</td>
</tr>
<tr>
<td>‘Arrival at Customer’</td>
<td>ARRIV_DEST</td>
</tr>
<tr>
<td>‘Unloading’</td>
<td>UNLOAD_BEGIN, UNLOAD_END, POD and REPORT_QUANTITY</td>
</tr>
</tbody>
</table>
In addition a custom table has been defined which is used to store the timestamp (mark) of the last call of the service. This is necessary to call the service in a way that it returns only the delta to the last call.

**FilesService: DownloadFile**

In the PoC scenario the on-board device sends a file to the Trimble FleetServer in two cases:
- If a damage has been recognized on the container by the truck driver, he can take a photo of the container to document the damage. He is asked to do this when finishing activity ‘Departure from Customer’.
- After the container is unloaded at the destination location the truck driver shall get a signature from the consignee on screen of his device (FleetXPS). This is done when finishing activity ‘Unloading’ and sent as well as a picture to the FleetServer.

In both cases the trace date of type ‘Activity End’ of these two activities include the file name. In a second step method DownloadFile of web service FilesService can be used to download the file to SAP EM. There it is then sent as an attachment with the corresponding event message:
- Event message CONTAINER_DAMAGED gets the photo which documents a damage on the container as an attachment
- Event message POD gets the picture with the signature as an attachment

**Configuration on Trimble FleetWorks**

The following activity types which are used in the scenario had to be created on Trimble FleetWorks.

Activity types:
- ‘Loading’ (EL)
- ‘Departure from Customer’ (ED)
- ‘Arrival at Customer’ (EA)
- ‘Unloading’ (EU)

In addition some reports have been defined, which are then assigned to the activities where they shall be used. Reports have been defined for the following purposes:

<table>
<thead>
<tr>
<th>Report for activity</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Loading’</td>
<td>Truck driver shall enter the container ID.</td>
</tr>
<tr>
<td>‘Departure’</td>
<td>Truck driver can document a possible damage on the container by taking a photo.</td>
</tr>
<tr>
<td>‘Unloading’</td>
<td>Truck driver shall enter the actual weight of the container.</td>
</tr>
<tr>
<td></td>
<td>Truck driver can enter free text if any problems occurred.</td>
</tr>
<tr>
<td></td>
<td>Truck driver shall get the signature of the consignee.</td>
</tr>
</tbody>
</table>
Setting up the scenario

This chapter gives a step-by-step description on the necessary customizing settings that need to be done in SAP TM and SAP EM. Additionally some exemplary code is provided some of the steps which need custom implementation. As basis scenario the standard scenario ODT30_TO has been used.

SAP TM

New text schema and text type

You can create a specific text schema and text type that can later be used to record a tour description for the freight order. You can do this via IMG activity “Maintain Text Schema”:

![Text Schema and Text Type Image]

Extraction functions

Two new extraction functions should be implemented to get different tracking IDs and additional parameters for the event handler in SAP EM. This can be done via IMG activity “Define SAP EM Extraction Functions”.

New Tracking ID Extractor

You can create a new tracking ID extractor and related function module as a copy of ODT20_TOR respectively function module /SCMTMS/EXTR_TID_TOR:

![Tracking ID Extractor Image]

For the freight orders an additional tracking ID with new code set (e.g. 'TRIMBLE') should be added:
This new tracking ID can then later be used for the event messages that are generated out of the Trimble trace data.

**New Info Parameter Extractor**

You can copy info parameter extractor ODT20_TOR and assigned function module /SCMTMS/EXTR_IPARAMS_TOR to create the new extractor for info parameters:

The following new parameters should be extracted to provide additional information to the truck driver:
- **TOUR_DESCRIPTION**: The tour description can be extracted from the note of the freight order that has the above created text type. Notes of a freight order are stored in the node TEXTCOLLECTION (dependent object representation node) and can be retrieved like this:
Some details for each location:

- **LOCATION_ID**: For each location the LOCATION_ID should be extracted as index parameter.
- **LONGITUDE and LATITUDE**: The geo-coordinates have to be extracted with the same index as the related LOCATION_ID.
- **STREET and HOUSE_NUMBER**: Address details have to be extracted with the same index as the related LOCATION_ID.
- **Contact details such as CONTACTID, CONTACTNAME and CONTACTTEL**: shall be extracted from the related business partner with the same index as the related LOCATION_ID.

### New Expected Event Extractor

In addition to the standard extractor ODT20, the fields DATACS and DATAID are populated for each expected event. In PoC DATACS has been set to “STOP_ID” and DATAID has been populated with the STOP_ID of the corresponding TOR STOP. The STOP_ID is used in SAP EM to generate unique IDs for the Trimble activities and tasks.
Application Object Type

A new application object type has to be created, which can be done as copy of standard type ‘ODT30_TO’. The only changes need to be done regarding the ‘Parameter Setup’. New extraction functions are necessary for tracking IDs, info data and expected events (as described above). Therefore you simply have to assign your new extractors to your new application object type.

Freight Order Type

Of course, you need to create your own freight order type, which should have the “Execution Settings” as shown in the screenshot below. The new application object type has to be used.
Enhancements of EXECUTIONINFORMATION node

In the PoC scenario the container ID has to be stored as additional data on the EXECUTIONINFORMATION node. Therefore it is necessary that an APPEND structure is created for structure /SCMTMS/INCL_EEW_TOR_EXEC:

By doing this the node EXECUTIONINFORMATION can be enhanced with new fields. In this case with one new field ZCONTAINER_ID to store the container ID that then can be sent together with the standard execution information from SAP EM (see chapter Rule Set).

Trigger actions by processing events

In the PoC two updates or done on the freight order in SAP TM which need some custom enhancements:

- Event ‘LOAD_END’ sets the container ID in the freight order
- Event ‘REPORT_QUANTITY’ sets the actual quantities for the container

In general, information on what has to be considered when implementing such enhancements can be found in chapter “Updating data in TM triggered by new execution event” of SAP Event Management – Scenarios for SAP Transportation Management.

Update of Container ID

The container ID is automatically updated in the freight order whenever a new execution information arrives which contains a container ID. If the enhancement field ZCONTAINER_ID is populated in an instance of node EXECUTIONINFORMATION the update is triggered. A post-exit enhancement of method /BOBF/IF_FRW_ACTION~EXECUTE of class /SCMTMS/CL_TOR_A_PROC_EXEC can be used for this. It updates the related instance of node ITEM_TR with the container ID:
The post-exit enhancement coding can look like this:

```abap
io_read->retrieve(
  EXPORTING
  iv_node = /scmtms/if_tor_c=>sc_node-executioninformation
  it_key = it_key
  iv_fill_data = abap_true
IMPORTING
c_t_data = lt_d_exec ).

io_read->retrieve_by_association(
  EXPORTING
  iv_node = /scmtms/if_tor_c=>sc_node-executioninformation
  it_key = it_key
  iv_association = /scmtms/if_tor_c=>sc_association-executioninformation-to_root
IMPORTING
c_target_key = DATA(lt_k_root )
).

* check should be done that root is not locked currently.
* if lock cannot be set -> set trigger
  io_modify->do_action(
  EXPORTING
  it_key = lt_k_root
  iv_acc_key = /scmtms/if_tor_c=>sc_action-action-lock_root
IMPORTING
c_failed_key = lt_failed_key ).

IF c_failed_key IS INITIAL.
  io_read->retrieve_by_association(
  EXPORTING
  iv_node = /scmtms/if_tor_c=>sc_node-root
  it_key = lt_k_root
  iv_association = /scmtms/if_tor_c=>sc_association-root-item_tr
  iv_fill_data = abap_true
IMPORTING
c_data = lt_d_item ).

LOOP AT lt_d_exec ASSIGNING FIELD-SYMBOL(<exec>) WHERE zcontainer_id IS NOT INITIAL.
  "get corresponding item for this root
  READ TABLE lt_d-item
  ASSIGNING FIELD-SYMBOL(<items>)
  WITH TABLE KEY root_itemcat COMPONENTS root_key = <exec>-root_key
       item_cat = /scmtms/if_tor_const=>sc_tor_item_category-to_resource.

  IF sy-subrc = 0.
    <item>-tubes_id = <exec>-zcontainer_id.
    /scmtms/ol_mod_helper=>mod_update_single(
      EXPORTING
        is_data = <item>
        iv_node = /scmtms/if_tor_c=>sc_node-item_tr
        iv_key = <item>-key
        iv_bc_key = /scmtms/if_tor_c=>sc_bc_key
        changing
          co_mod = lt_mod ).
    ENDDIF.
  ENDLINK.
  IF lt_mod IS NOT INITIAL.
    io_modify->do_modify( it_modification = lt_mod ).
  ENDDIF.
ELSE.
  ma->core_object->set_trigger(
    EXPORTING
      it_key = it_key
      is_acc_ctx = is_ctx
      iv_trigger_id = /scmtms/if_trig_c=>sc_c_trigger_id-tor_process_exec_info
IMPORTING
      et_failed_key = et_failed_key
      changing
        co_message = ec_message ).
  ENDDIF.
```
Update of actual quantities

To get the update of the actual quantities for the container item BAdI /SCMTMS/TOR_EVENT_PROC needs to be implemented. This can be done via IMG activity “BAdI: Providing Execution Data for Transportation Activities”.

In BAdI method /SCMTMS/IF_COMMON_BADI~SET_BADI_WORK_MODE the work mode of the BAdI should be set to ‘C’ (Customer Logic Only):

```plaintext
Method /SCMTMS/IF_COMMON_BADI~SET_BADI_WORK_MODE.

  cv_work_mode = /scmtms/if_common_badi=>gc_mode_customer_logic_only.

endmethod.
```

In BAdI method PROCESS_EVENT the standard update method should be called. In the PoC scenario it is only necessary to determine to correct item of the freight order if new execution information with event code ‘REPORT_QUANTITY’ comes in. By default the main item is set as reference for any new execution information. For the ‘REPORT_QUANTITY’ event the container item has to be determined and used instead:
More information regarding reporting actual quantities via event message to SAP TM can be found in this document. Update actual quantities in SAP TM via event message in SAP EM.

**SAP EM**

**Event Codes**

For the unexpected events which are used in the scenario two additional event codes have to be defined (IMG activity “Define Internal Event Codes and Internal Event Code Groups”):

- REPORT_QUANTITY: Event to report the actual quantities
- CONTAINER_DAMAGED: Event to report that a container is damaged

To assign specific icons to these event codes custom status icon schemas can be created (IMG activity “Define Status Icons”).

**Expected Event Profile**

The only changes that have been done regarding the standard profile ODT20_TO is that the flag “Do Not Set” for data code set and data code ID is not marked. In SAP TM the expected event extractors have been enhanced to extract values for these two fields (see New Expected Event Extractor) and by this it is achieved that the values are stored in the expected events. They can then be used later on to generate unique Trimble activity and task IDs for a trip.

**Event Message Extension Table**

A scenario specific event message extension table has been defined to store the used event message parameters. This can be done via IMG activity “Define Extension Table for Event Message Header”.

![Change View "Event Message Header Extension": Details](image)

The assigned database table ZTRIMBLE looks like in the next screenshot. For each event message parameter a field is added in the table.
Event Message Parameters

These new event message parameters have been created – each one having the reference to the corresponding field on the extension table (IMG activity “Define Event Message Parameters”).

A new mapping profile has been created for the new event message parameter (IMG activity “Define Parameter Mapping for Event Messages”):
The new mapping profile and the new extension table ID have been assigned to the combination of tracking ID code set and sender code set, which is used for the event messages that are derived from the Trimble trace data.

**Extraction Profile for SAP TM Freight Document Tracking**

An extraction profile has been created to extract the event message parameter Z_CONTAINER_ID that it can be sent as additional data to the connected SAP TM system. This can be done via IMG activity “Define Extraction Profiles for SAP TM Freight Document Tracking”:

**Rule Set**

The standard rule set ODT30_TO has been copied and following rules have been changed/added:
- **LOADING_END**: The container ID is sent together with the ‘LOADING_END’ event message. The activity parameters of task SEND_DATE_TO_TM have been adjusted to use the extraction profile Z_TRIMBLE. By this the container ID is send as additional data to the connected TM system and can be stored automatically in the enhancement field ZCONTAINER_ID of node EXECUTIONINFORMATION.
**REPORT_QUANTITY**: The info parameter for the gross weight gets updated with the actual weight and the update to TM is as well done with extraction profile Z_TRIMBLE. This time this is used to get the actual weight and related unit of measure as additional parameters to the EXECUTIONINFORMATION.
In both multitask activities the standard activity to update the geo coordinates ODT30_EVM_GEO_DATA has been replaced by new one ZTRIMBLE_GEO_DATA, which is a copy that refers to the parameters for the geo coordinates that are used in this scenario.

Some rules could be deleted, since they are not used in the PoC scenario (COUPLING, CLEAR CUSTOMS IMP, DECOUPLING).
EH Update Activity

An EH update activity is used to push new/updated planning data to the Trimble FleetServer. Every time an event handler is created or updated the update activity is executed and therefore this is the right place to call the PlanningService (UpdateTerminalTrips) of Trimble FleetServer.

The standard EH update activity ODT30_TO_UPDATE_ACT is copied and enhanced with an additional task which is based on new custom activity function.

In this new activity function the mapping is done from the SAP EM structures (Event Handler, Expected Events) to the Trimble FleetWorks structures (Tour, Tasks, Activities) and in the end method UPDATE_TERMINAL_TRIPS of the generated proxy for the PlanningService is called. The task IDs are generated as concatenation of freight order ID and data code ID of one of the related expected events. The activity IDs are generated as concatenation of the freight order ID, the data code ID and a self-defined activity type.

In the PoC the assignment of a tour to a device (TERMINAL) has been done in a fixed way. Alternatively this assignment could be done on Trimble FleetWorks or by e.g. leveraging the driver functionality in SAP TM (which is available starting with SAP TM 9.3 SP03).

The outgoing XML message can look like in the screenshot below. For tracing such web service calls transaction SRT_UTIL can be used in the SAP EM system.

It may happen that the call of the web service method UpdateTerminalTrips throws an exception (CX_AI_SYSTEM_FAULT) with error message "Error during proxy processing (PART UNKNOWN (NULL))". This can be ignored and processing can be continued (i.e. caught without any further reaction).
New event handler type has been created as copy of ODT30_TO and the settings have been adjusted as seen below.
Event codes ‘CONTAINER_DAMAGED’ and ‘REPORT_QUANTITY’ have been added to the list of the “Unexpected Event Codes”.

**Info Parameters**

New info parameters have been defined and a new mapping profile has been created (as copy of ODT30_TO).
Generating event messages out of Trimble trace data

To get the execution data back into SAP EM a report has been created that is scheduled periodically, e.g. to run every 5 minutes. In this report the TrackingService (PollTraces) is called to get all trace data which has been received by Trimble FleetWorks since the last time the report called the service. To achieve this the correct MARK has to be provided for the call of PollTraces. Every call of PollTraces returns the MARK that shall be used for the next call. A custom database table has been created to store exactly this MARK which is used for and updated after every call of PollTraces.
There are plenty of trace types defined by Trimble, which contain very detailed information about many different things like start/end/switch/cancel of activities, accept/receive/refuse/finish tasks, outgoing/incoming phone calls, speed limit violations or fuel level increase/decrease to name just a few. However, in the PoC only the data of trace type ‘13’ (‘Activity End’) have been evaluated. From the finished activities and the assigned reports the corresponding event messages are derived as explained in chapter TrackingService: PollTraces. For each event message the rule set is processed in SAP EM and the related event handlers are updated accordingly. Additionally the event messages are propagated to SAP TM and persisted as EXECUTIONINFORMATION for the corresponding freight order, which then triggers e.g. update of container ID and update of actual quantities.

If the trace data indicates that an additional file is available (e.g. for a photo or a signature that has been captured by the truck driver), method DownloadFile of the FilesService is called. The file is then added as an attachment to the corresponding event message.

On Trimble FleetWorks the activities and reports have been defined which are used in the PoC (see chapter Configuration on Trimble FleetWorks).

The reports which can be assigned to the activities are defined as XML like shown in the following examples. In addition to the questions that need to be answered by the truck driver (e.g. enter container ID) each report has a hidden question to provide the location ID as an attribute in the trace data. This can then be used to post the event message with the correct location ID in SAP EM.
• Report assigned to activity 'Loading': Truck driver shall enter the container ID

```xml
<ReportDefinition id="EMCAUF1" version="0" firstquestion="NA">
  <Question id="NA" selectionmodel="none" text="Container Number" nextquestion="LOC">
    <Option id="in" valuetype="text"/>
  </Question>
  <Question id="LOC" hide="true" selectionmodel="none" text="Inhalt Location" nextquestion="END">
    <Option id="location" defaultvalue="#location" valuetype="text"/>
  </Question>
</ReportDefinition>
```

• Report assigned to activity 'Departure': Truck driver can document a possible damage on the container by taking a photo

```xml
<ReportDefinition id="EMFOTO1" version="0" firstquestion="SV">
  <Question id="SV" selectionmodel="single" text="Damages?">
    <Option id="01" text="Yes" valuetype="boolean" nextquestion="FOT"/>
    <Option id="02" text="No" valuetype="boolean" nextquestion="LOC"/>
  </Question>
  <Question id="FOT" selectionmodel="none" text="Take Photo:" nextquestion="LOC">
    <Option id="doc" valuetype="special" inputmask="photo:photo"/>
  </Question>
  <Question id="LOC" hide="true" selectionmodel="none" text="Inhalt Location" nextquestion="END">
    <Option id="location" defaultvalue="#location" valuetype="text"/>
  </Question>
</ReportDefinition>
```

• Report assigned to activity 'Unloading': Truck driver
  ➢ shall enter the actual weight of the container
  ➢ can enter free text if any problems occurred
  ➢ shall get the signature of the consignee

```xml
<ReportDefinition id="EMUNLOAD1" version="1" firstquestion="GEW">
  <Question id="GEW" selectionmodel="none" text="actual weight" nextquestion="LOC">
    <Option id="in" valuetype="numeric" text="Please ente the weight!" inputmask="#VALIDATE(\[\#REGEX(\[\b\d{1,6}\b\],\[#V\])\])"/>
  </Question>
  <Question id="LOC" hide="true" selectionmodel="none" text="Inhalt Location" nextquestion="UNR">
    <Option id="location" defaultvalue="#location" valuetype="text"/>
  </Question>
  <Question id="UNR" selectionmodel="single" text="Problems">
    <Option id="01" valuetype="boolean" text="Yes" nextquestion="BUN"/>
    <Option id="02" valuetype="boolean" text="No" nextquestion="SIGN"/>
  </Question>
  <Question id="BUN" selectionmodel="none" text="Problem Description" nextquestion="SIGN">
    <Option id="in" valuetype="text"/>
  </Question>
  <Question id="SIGN" selectionmodel="none" text="Signature" nextquestion="END">
    <Option id="01" valuetype="signature"/>
  </Question>
</ReportDefinition>
```
Tracking a freight order

This chapter shows some screenshots that have been captured during the execution of the PoC scenario from the different UIs:

- Freight Order UI in SAP TM
- Standard web dynpro UI in SAP EM with custom tracking scenario
- FleetXPS
- Custom Fiori App for SAP EM for this scenario

Freight order has been planned

SAP EM:

All data that has been extracted from the freight order in SAP TM can be displayed on the standard SAP EM UI. No expected event has been reported yet, transportation status is ‘New’.
On the freight order UI the data of the freight order can be checked including the expected event data which is retrieved on-the-fly from SAP EM. If relevant changes would be done here, data in SAP EM and on Trimble FleetWorks would be updated immediately.

Trimble FleetXPS:
1. The new freight order (trip) appears in the task list of the truck driver with descriptive name (source location city to destination location city).
2. The single tasks of the trip are listed with short description after trip has been selected. The execution of the trip can be started via button 'Activate'.
3. The text entered in SAP TM 'Notes' tab on the freight order UI is available as trip description ('More' button)
4. Details for the tasks are shown including description and first activity when selecting a task
5. Contact info such as name, telephone number, address, geo coordinates are shown for the selected task ('More' button). This information can be used for integrated navigation or phone calls.

Truck driver reports the activities at the source location

Trimble FleetXPS:
1. First activity ‘Loading’ can be reported as finished.
2. Container number of the loaded container has to be entered.
3. Second activity ‘Departure from Customer’ can be reported.
4. If the container has a damage that needs to be documented, a photo can be directly taken with the FleetXPS mobile device.
5. In the task list the first task is marked as completed.

SAP EM:
All events which are expected for location EM_HAMBURG_CUST have been reported now. The container ID has been updated with the reported container number. Transportation status is 'In Transit' now. Additionally an unexpected event 'Container is damaged' has been reported with an attachment, which is the photo of the damaged container.
SAP TM:

On the freight order UI the progress of the execution can be checked as well. Container number has been updated in SAP TM as well.

**Truck driver reports the defined activities at the destination location**

**Trimble FleetXPS**
1. First activity of second task ‘Arrival at Customer’ can be reported as finished.
2. Last activity ‘Unloading’ can be reported.
3. Actual weight has to be entered.
4. Signature of consignee has to be captured on the FleetXPS.
5. The trip is marked as complete.
All expected events have been reported and the gross weight has been updated. This has been done by unexpected event ‘Report Quantity’. The attachment with the signature is available for reported expected event ‘Proof of Delivery’.

### Event Messages:

<table>
<thead>
<tr>
<th>Event</th>
<th>Expected Event Date/Time</th>
<th>Location</th>
<th>Reporting Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading Begin (LOAD_BEGIN)</td>
<td>17.02.2016 09:07:16 CET</td>
<td>EM_HAMBURG_CUST</td>
<td>17.02.2016 14:02:40 CET</td>
</tr>
<tr>
<td>Loading End (LOAD_END)</td>
<td>17.02.2016 09:37:16 CET</td>
<td>EM_HAMBURG_CUST</td>
<td>17.02.2016 14:02:40 CET</td>
</tr>
<tr>
<td>Depature (DEPARTURE)</td>
<td>17.02.2016 10:07:16 CET</td>
<td>EM_HAMBURG_CUST</td>
<td>17.02.2016 14:02:40 CET</td>
</tr>
<tr>
<td>Container is damaged</td>
<td></td>
<td>EM_HAMBURG_CUST</td>
<td>17.02.2016 14:02:40 CET</td>
</tr>
<tr>
<td>Proof of Delivery (POD)</td>
<td>17.02.2016 06:54:25 CET</td>
<td>EM_MANNHEIM_ST</td>
<td>17.02.2016 14:02:40 CET</td>
</tr>
<tr>
<td>Report Quantity (REPORT_QUANTITY)</td>
<td></td>
<td>EM_MANNHEIM_ST</td>
<td>17.02.2016 14:02:40 CET</td>
</tr>
</tbody>
</table>
A custom Fiori app has been created for the PoC as well which can be started via the SAP Fiori launchpad. This can be done by using the SAP Web IDE plugin for SAP Event Management. After the Fiori app has been generated for the scenario some additional changes had to be done to include the attachments, which is not supported by the plugin itself.

SAP TM

The freight order has now execution status ‘Executed’, the actual quantities of the container have been updated.
Related Content

SAP Event Management – Scenarios for SAP Transportation Management
Freight Order Visibility Scenario (ODT40_TO) for SAP Transportation Management
How to extract additional parameters for the EM – TM integration
Update actual quantities in SAP TM via event message in SAP EM
SAP Web IDE plugin for SAP Event Management