Advanced Labor Management
### Document History

<table>
<thead>
<tr>
<th>Document Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
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</tr>
</tbody>
</table>
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1 Prerequisites

Setup:
You have already set up the Preconfigured Warehouse for SAP EWM.

Software:
- SCMEWM 950
- SAP_BASIS 750

Relevant SAP Notes
- 2537315
- 2422693
- 2496476
2  Configuration of Advanced Labor Management

This section describes the configuration necessary to set up Labor Management for the preconfigured warehouse. The configuration described here enhances and in some cases adapts the configuration of the preconfigured warehouse described here: Warehouse Management with pre-configured Processes.

The document describes the configuration of advanced Labor Management based on a preconfigured warehouse named W001. Please adapt the warehouse number if needed.

2.1  Configuration in SAP EWM

2.1.1  Activate BC Sets in SAP EWM

You need to activate certain Business Configuration sets (BC sets) in SAP EWM. The BC sets contain Customizing settings at client level or at warehouse level.

Procedure

2. Activate the following BC sets in the given sequence:

<table>
<thead>
<tr>
<th>Name BC Set</th>
<th>Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>/SCWM/PRC_LM_10</td>
<td>Advanced Labor Management Step 1</td>
<td>BC set at warehouse level</td>
</tr>
<tr>
<td>/SCWM/PRC_LM_15</td>
<td>Advanced Labor Management Step 2</td>
<td>BC set at warehouse level</td>
</tr>
</tbody>
</table>

2.1.2  Settings for Indirect Labor Tasks

This chapter describes the configuration for setting up the usage of indirect labor tasks.

2.1.2.1  Activate Order Document Management for Indirect Labor Tasks

You use this procedure to activate the order document management for indirect labor tasks in SAP EWM. By doing this, the database tables for indirect labor tasks are generated. This step is warehouse-independent and you only need to carry it out once per client.
Procedure

2. Choose Execute.

2.1.2.2 Maintain Number Range for Indirect Labor Tasks

You use this procedure to maintain the number range interval for indirect labor tasks and their assignment to your warehouse number.

Procedure

1. In Customizing for Extended Warehouse Management, choose Labor Management > Determine Number Range for Indirect Labor.
2. In the popup for Name of Activities, choose Define Number Ranges for Indirect Labor Tasks.
3. Create the following entry:

<table>
<thead>
<tr>
<th>Warehouse No.</th>
<th>Number range number</th>
<th>From No.</th>
<th>To Number</th>
<th>NR Status</th>
<th>Ext</th>
</tr>
</thead>
<tbody>
<tr>
<td>W001</td>
<td>01</td>
<td>100000000000</td>
<td>199999999999</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
4. Save your entry.
5. In the popup for Name of Activities, choose Assign Number Range Intervals for Indirect Labor Task to Warehouse Number.
6. Create the following entry:

<table>
<thead>
<tr>
<th>Warehouse Number</th>
<th>NRI Ind.Lab.Tsk</th>
</tr>
</thead>
<tbody>
<tr>
<td>W001</td>
<td>01</td>
</tr>
</tbody>
</table>
7. Save your entry.

2.1.3 Settings for Employee Performance Document

This chapter describes the configuration for setting up the usage of employee performance documents.

2.1.3.1 Make Settings for the HR System

You use this procedure to make settings for the HR system. Those settings are a prerequisite for creating employee performance documents.

Procedure

1. In Customizing for SCM Extended Warehouse Management, choose SCM Basis > Master Data > Resource > Processor > Make Settings for the HR System.
2. Create the following entry:

| HR System | Logical System | PDoc NRI | Origin | HRSysVers. | HR Preset. |
2.1.3.2 Define Number Range for Employee Performance Document

You use this procedure to maintain the number range interval for employee performance documents.

**Procedure**

2. Create the following entry:

<table>
<thead>
<tr>
<th>Number range number</th>
<th>From No.</th>
<th>To Number</th>
<th>NR Status</th>
<th>Ext</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>200000000000</td>
<td>299999999999</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3. Save your entry.

2.2 Settings and Master Data in SAP EWM

2.2.1 Activate Application Logs

You use this procedure to activate the application logs relevant for Labor Management.

**Procedure**

2. Check the following settings for warehouse number W001:

<table>
<thead>
<tr>
<th>Subobject</th>
<th>User</th>
<th>Subobject Text</th>
<th>Log Active</th>
<th>No Info</th>
<th>Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELS_CALC</td>
<td>-</td>
<td>Enhanced Labor Standards Calculation for Labor Management</td>
<td>Additional Information</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>EWL</td>
<td>-</td>
<td>Executed Workload</td>
<td>Additional Information</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>TDC</td>
<td>-</td>
<td>Travel Distance Calculation</td>
<td>Additional Information</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>TATT</td>
<td>-</td>
<td>Time and Attendance</td>
<td>Additional Information</td>
<td>-</td>
<td>30</td>
</tr>
</tbody>
</table>
2.2.2 Maintain Active Labor Activities

You use this procedure to define which labor activities are active in your warehouse.

Procedure

1. On the SAP Easy Access screen for SAP EWM, choose Settings > Labor Management > Maintain Active Labor Activity
2. Create the following entries for your warehouse:

<table>
<thead>
<tr>
<th>Labor Activity Code</th>
<th>Description</th>
<th>External Step</th>
<th>Calculate Standard Time</th>
<th>Fixed Time</th>
<th>Time Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATT</td>
<td>Change Battery</td>
<td>BATT</td>
<td></td>
<td>10</td>
<td>MIN</td>
</tr>
<tr>
<td>BREA</td>
<td>Break</td>
<td>BREA</td>
<td></td>
<td>60</td>
<td>MIN</td>
</tr>
<tr>
<td>CLEA</td>
<td>Cleaning</td>
<td>CLEA</td>
<td></td>
<td>10</td>
<td>MIN</td>
</tr>
<tr>
<td>EOS</td>
<td>End of Shift</td>
<td>EOS</td>
<td></td>
<td>10</td>
<td>MIN</td>
</tr>
<tr>
<td>FIRE</td>
<td>Fire Drill</td>
<td>FIRE</td>
<td></td>
<td>60</td>
<td>MIN</td>
</tr>
<tr>
<td>IHUUC</td>
<td>Movement of HU with unknown content</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMOVE</td>
<td>Movement inbound</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INVE</td>
<td>Physical inventory</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPACK</td>
<td>Packing inbound</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPTWY</td>
<td>Put Away</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPTWY_VE02</td>
<td>Put Away, Vendor VEND002</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEET</td>
<td>Meeting</td>
<td>MEET</td>
<td></td>
<td>60</td>
<td>MIN</td>
</tr>
<tr>
<td>OLOAD</td>
<td>Loading</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPACK</td>
<td>Packing</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPICK</td>
<td>Picking</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPIPA</td>
<td>Pick into ship HU</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPIPA_CU04</td>
<td>Pick into ship HU, customer CUST004</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OSTAG</td>
<td>Staging</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PREP</td>
<td>Preparation</td>
<td>PREP</td>
<td></td>
<td>10</td>
<td>MIN</td>
</tr>
<tr>
<td>QINSPE</td>
<td>Quality inspection</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.2.3 Defining Queue Sequence for Resource Group

You use this procedure to add queue sequences for resource groups.

Procedure


4. Create the following entries:

<table>
<thead>
<tr>
<th>Warehouse No.</th>
<th>Resource Group</th>
<th>Sequence No.</th>
<th>Queue</th>
<th>No Interleaving</th>
</tr>
</thead>
<tbody>
<tr>
<td>W001</td>
<td>RG01</td>
<td>5</td>
<td>Q-010-920</td>
<td></td>
</tr>
<tr>
<td>W001</td>
<td>RG01</td>
<td>6</td>
<td>Q-910-020</td>
<td></td>
</tr>
<tr>
<td>W001</td>
<td>RG01</td>
<td>7</td>
<td>Q-910-050</td>
<td></td>
</tr>
<tr>
<td>W001</td>
<td>RG01</td>
<td>8</td>
<td>Q-910-970</td>
<td></td>
</tr>
<tr>
<td>W001</td>
<td>RG01</td>
<td>9</td>
<td>Q-970-020</td>
<td></td>
</tr>
<tr>
<td>W001</td>
<td>RG01</td>
<td>10</td>
<td>Q-970-050</td>
<td></td>
</tr>
<tr>
<td>W001</td>
<td>RG02</td>
<td>9</td>
<td>Q-051-921</td>
<td></td>
</tr>
</tbody>
</table>

2.2.4 Maintain Processor Groups

You use this procedure to create processor groups.

Procedure


2. Create the following groups by pressing Create Group (Ctrl+Shift+F5) and enter the data as described in the table below:

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Partner</td>
<td>W001TEAM1</td>
<td>W001TEAM2</td>
<td>W001TEAM3</td>
</tr>
<tr>
<td>Business Partner Role</td>
<td>Business Partner (Gen.)</td>
<td>Business Partner (Gen.)</td>
<td>Business Partner (Gen.)</td>
</tr>
</tbody>
</table>
### 2.2.4.1 Define Number Range for Business Partner Relationship

You use this procedure to maintain the number range interval for the relationship between business partners.

**Procedure**

1. In Customizing, choose Cross-Application Components > SAP Business Partner > Business Partner > Basic Settings > Number Ranges and Groupings > Define Number Ranges.

2. Create/Check the following entry:

<table>
<thead>
<tr>
<th>Number range number</th>
<th>From No.</th>
<th>To Number</th>
<th>NR Status</th>
<th>Ext</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>00000000001</td>
<td>999999999999</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3. Save your entry

### 2.2.4.2 Maintain Relationships Between the Processor Groups

You use this procedure to maintain relationships between the groups.

**Procedure**


2. Create the relationship between the groups by pressing Maintain Relationships of Business Partner (Shift+F1).

3. In the Business Partner field, enter W001ALL and press Enter.

4. In the Relationship Cat. field, choose FLM0003 ‘Has a Subgroup’.

5. In the Relationship to BP field, enter W001TEAM1 and press Create.

6. In the Relationship to BP field, enter W001TEAM2 and press Create.

7. In the Relationship to BP field, enter W001TEAM3 and press Create.

8. Save your entries.

### 2.2.5 Maintain Processors

You use this procedure to create processors using a CSV file. The CSV file is attached to the SAP note 2529894. Make sure that you adapt the file at least for your warehouse number and your supply chain unit (SC Unit).
Please keep in mind that when you open CSV files in Excel, the leading zeros disappear. This affects several fields in the CSV file for uploading processors. These include:

- BP Group
- Region
- Occupation
- Work Category

Make sure that you add the leading zeros in your file for the fields you want to be uploaded.

**Procedure**

1. Download the CSV file "PRR_UPLOAD_W001.CSV" from SAP note 2529894 to your desktop.
2. Exchange at least the warehouse number and the SC unit with your warehouse number and your SC unit.
3. In SAP EWM, start transaction /SCWM/PRR_UPLOAD
4. Choose Physical File Name and select your CSV file using the value help for File Name.
5. Choose Execute (F8).
6. Choose Upload Data (F8).

**2.2.5.1 Assign Processors to Processor Groups**

You use this procedure to assign processors to processor groups.

**Prerequisites**

- You have created processors by uploading a CSV file as described in the previous chapter.
- You have created processor groups as described in chapter 4.3.4

**Procedure**

2. Choose your Warehouse Number, e.g. W001, and Monitor SAP and choose Execute (F8).
4. Under Search Term 2, enter TEAM1.
5. Choose Execute (F8).
6. Assign the selected Processors to Processor Group W001TEAM1 using the monitor method Assign to Group.
7. Choose Execute (F8).
8. Under Search Term 2, enter TEAM2
9. Choose Execute (F8).
10. Assign the selected Processors to Processor Group W001TEAM2 using the monitor method Assign to Group.
11. Choose Execute (F8).
12. Under Search Term 2, enter TEAM3.
13. Choose Execute (F8).
14. Assign the selected Processors to Processor Group W001TEAM3 using the monitor method Assign to Group.
15. Choose Execute (F8).
2.2.5.2 Define Group Responsible

You use this procedure to maintain the relationship Has Group Responsible for one processor of a group.

Procedure

2. Create the relationship between the groups by pressing Maintain Relationships of Business Partner (Shift+F1).
3. In the Business Partner field, enter W001TEAM1 and press Enter.
4. In the Relationship Cat. field, choose FLM0002 ‘Has Responsible for Group’.
5. In the Relationship to BP field, enter GARCIA and press Create and Save.
6. In the Business Partner field, enter W001TEAM2 and press Enter.
7. In the Relationship Cat. field, choose FLM0002 ‘Has Responsible for Group’.
8. In the Relationship to BP field, enter GONZALES and press Create and Save.
9. In the Business Partner field, enter W001TEAM3 and press Enter.
10. In the Relationship Cat. field, choose FLM0002 ‘Has Responsible for Group’.
11. In the Relationship to BP field, enter SCOTT and press Enter or Create and Save.

2.2.6 Maintain Shifts and Shift Sequences

You use a shift to define a start and end working time for processors working together in a warehouse. You can assign breaks and a shift factor to the shift, thereby reducing the productive working time of a shift. You use the shift to determine the productive labor capacity at a certain point of time in your warehouse. You can determine the labor performance of a shift.

When warehouse tasks are confirmed and Labor Management is activated, the shift of the confirming warehouse worker is determined and written into the executed workload record for later labor performance evaluation.

You use the shift sequence to define a shift order for as many consecutive days as you want. The shift sequence repeats itself in cycles, for example, every 5 days for a 5-day shift sequence.

Prerequisite

Check the following settings in Customizing for Extended Warehouse Management, choose > Labor Management > Shift Management > Define Capacity Variants.

<table>
<thead>
<tr>
<th>Cap. Var.</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2 Normal Capacity</td>
<td>Default Capacity for Shifts</td>
</tr>
</tbody>
</table>

Check the following settings in Customizing for Extended Warehouse Management, choose Labor Management > Shift Management > Maintain Shift Management Defaults

<table>
<thead>
<tr>
<th>Warehouse Number</th>
<th>Cap. Var.</th>
<th>Workdays</th>
</tr>
</thead>
<tbody>
<tr>
<td>W001</td>
<td>5</td>
<td>space</td>
</tr>
</tbody>
</table>

Procedure

On the SAP Easy Access screen for SAP EWM, choose Master Data > Shift Management > Maintain Shifts.

On the tab Shifts, create the following entry:

<table>
<thead>
<tr>
<th>Shift</th>
<th>Valid To</th>
<th>Start</th>
<th>End</th>
<th>Break Pattern</th>
<th>Break Duration</th>
<th>Shift Factors</th>
</tr>
</thead>
</table>
### 2.2.6.1 Assign Shift Lead to Shift Sequence

You use this procedure to assign a shift lead to a shift sequence.

**Procedure**

2. Start the monitor for your Warehouse Number, e.g. W001, and the Monitor ‘SAP’.
3. Navigate to the monitor node Labor Management > Shift Management > Shift Lead.
   a. On the selection screen, do not restrict the search (include Shifts Sequences without Shift Lead).
   b. On the results screen, select shift sequence W001_Shift.
   c. Click Assign Shift Lead.
   d. Assign processor WALKER as shift lead with any start date, e.g. today.

### 2.2.6.2 Assign Processors to Shift Sequence

You use this procedure to assign the processors to a shift sequence.

**Procedure**

2. Start the monitor for the Warehouse Number W001 and the Monitor ‘SAP’.
3. Navigate to the monitor node Labor Management > Shift Management > Assigned Processors.
   a. On the selection screen, do not restrict the search.
   b. On the results screen, select all processors.
   c. Click Assign by Shift Lead.
   d. Assign processors by using the shift lead WALKER.

2.2.7 Define a Network for Travel Distance Calculation (TDC)

You use this procedure to define settings that are needed to be able to calculate a travel distance within the preconfigured warehouse.

2.2.7.1 Define Number Range for the Network

You use this procedure to maintain the number range interval for the travel network.

Procedure

1. Start Transaction /nSNUM.
2. Enter object /SCWM/TDCN.
3. Use Interval Editing.
4. Create the following entry:

<table>
<thead>
<tr>
<th>Number range number</th>
<th>From No.</th>
<th>To Number</th>
<th>NR Status</th>
<th>Ext</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>00000000001</td>
<td>9999999999</td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

5. Save your entry.

2.2.7.2 Check Warehouse Number Control (BC Set)

You use this procedure to check the settings of the warehouse related to the activation of the travel distance calculation.

Procedure

1. In Customizing for Extended Warehouse Management, choose Master Data > Define Warehouse Number Control.
2. Check the following entry in the Details view for your warehouse number:

<table>
<thead>
<tr>
<th>Warehouse Number</th>
<th>Activate Travel Distance Calculation</th>
<th>Use Euclidian Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>W001</td>
<td>X</td>
<td>-</td>
</tr>
</tbody>
</table>
2.2.7.3  **Check Resource Types (BC Set)**

You use this procedure to check the settings of the resource types related to the velocity needed for travel time calculations.

**Procedure**

2. Check the following entry in the Details view for your warehouse number:

<table>
<thead>
<tr>
<th>Warehouse Number</th>
<th>Resource Type</th>
<th>Description</th>
<th>ResTypeVel</th>
<th>Velocity Z</th>
<th>UoM</th>
</tr>
</thead>
<tbody>
<tr>
<td>W001</td>
<td>RT01</td>
<td>Forklift Truck</td>
<td>2</td>
<td>1</td>
<td>M/S</td>
</tr>
<tr>
<td>W001</td>
<td>RT02</td>
<td>High Level Order Picker</td>
<td>1,50</td>
<td>1</td>
<td>M/S</td>
</tr>
<tr>
<td>W001</td>
<td>RT03</td>
<td>Human Resource</td>
<td>0.50</td>
<td></td>
<td>M/S</td>
</tr>
</tbody>
</table>

2.2.7.4  **Upload Example File for the Network**

You use this procedure to upload a travel network needed for travel distance calculation.

**Procedure**

1. Locate the CSV file for the travel network.
   The SAP note 2529894 has an CSV file attached with the network.
2. On the SAP Easy Access screen for SAP EWM, choose Settings > Travel Distance Calculation > Upload Travel Distance Network.
3. Upload the CSV file to your system.
   Use the global and storage type specific networks during upload (set radio button to Include Global Network).

2.3  **Configuration and Settings in BRFplus**

2.3.1  **Upload BRFplus Settings**

You use this procedure to define settings in BRFplus to support the following processes:

- Labor activity determination
- Engineered labor standards
- Travel time calculation
- Personal needs, fatigue and delay (PFD) factor determination
Procedure

1. Download BRFplus content.
   The SAP note 2499035 has an XML file attached with the BRFplus content.
2. Upload the file to your system:
   a. Start transaction BRFPLUS.
   b. Click on Personalize. In the popup, there is a field called User Mode. Set this field to Expert. Then click Save. It is only possible to upload content in Expert mode.
   c. Under Tools, choose XML Import.
   d. Browse to the file you downloaded from the SAP note. Under Import Type, choose Standard. Under Mode, deselect Test Run.
   e. Click Upload XML File. This could take a minute.
   f. Check that no errors occurred. Warnings are no problem.
   g. Click Back to Workbench. Under Repository, the application Z_EWM_LM_STANDARD_W001 should be visible.

3. Check the rulesets are active. Activate them if necessary.

4. Check the warehouse number assignment
   The rules for the application are only executed for the warehouse W001. If the name of your warehouse is different, change this in the application as follows:
   The application is structured like a tree. Navigate to Expression > Constant. Click on the field GC_WAREHOUSE_NUMBER. In the detail area, change the value from W001 to your warehouse.
   Click Save.
   Click Activate.

2.3.2 Activate BRFplus Trace

You use this procedure to activate the trace files of BRFplus.

Procedure

1. On the SAP Easy Access screen for SAP EWM, choose Settings > Application Log > Activate Trace in BRFplus.
2. Select your warehouse number and activate the trace activation level Lean Trace for all trace objects.
3 Enhancement Concept of Advanced Labor Management

This section describes possible enhancements in some areas of Advanced Labor Management such as executed workload and BRFplus.

Note
In contrast to the configuration described in the previous section, the usage of the enhancement concept requires ABAP knowledge.

3.1 Enhancement Concept for Executed Workload

The enhancement concept for executed workload (EWL) is based on the following objects:
- Business Add-Ins (BAdIs)
- Enhancement structures in DDIC
- API methods (mainly for the creation of EWL records in custom transactions)

These objects are presented in the next chapter.

The enhancement concept for executed workload covers several use cases for enhancements. The subsequent chapters explain which enhancement objects can be used in each use case.

3.1.1 Enhancement Objects for Executed Workload

The following BAdIs can be used to enhance the executed workload functionality. You can find the BAdIs in Customizing for Extended Warehouse Management under Business Add-Ins (BAdIs) for Extended Warehouse Management → Labor Management → Workload.

<table>
<thead>
<tr>
<th>BAdI</th>
<th>Description</th>
</tr>
</thead>
</table>
| /SCWM/EX_LM_EWL_COMPLETION | BAdI: Check Completion of Executed Workload
With this BAdI you can raise an error message if EWL data could not be determined. As a result, the EWL record remains incomplete until it is re-processed successfully with report /SCWM/RLM_EWL_COMPLETE (transaction /SCWM/EWL_COMPL).
An example implementation is available to raise an error message if the service start date of a processor or the shift start date are missing. |
| /SCWM/EX_LM_EWL_CONTEXT | BAdI: Enrich Context for Executed Workload Determinations
The enriched context is not saved in the executed workload record but can be used for the determination of the labor activity code or adjusted planned duration in BRFplus.
An example implementation is available to extend the context for pick or putaway WO confirmation by ship-to or ship-from party and by RF logical transaction. |
The custom fields are saved in the executed workload record (DB table /SCWM/EWRKL). An example implementation is available to extend the executed workload records with the RF logical transaction (field LTRANS).

This BAdI is used together with the API methods for the creation of executed workload records for custom object types. An example implementation is available to enrich the executed workload records for a fictive custom object type ‘ZU’ (used for the loading of a transportation unit in a fictive custom transaction).

This BAdI has two purposes:

- allow the system to create immediately confirmed warehouse orders even if Labor Management is active in a warehouse
- set a start time for executed workload records of immediately confirmed warehouse orders

An example implementation is available to fulfill both functions.

You can find detailed information in the BAdI documentation.

The following DDIC enhancement structures can be used to enhance the executed workload functionality:

<table>
<thead>
<tr>
<th>DDIC Structure</th>
<th>Description</th>
</tr>
</thead>
</table>
| /SCWM/INCL_EEW_LM_EWRKL | Customer Enhancements: Executed Workload

The structure is used to add custom fields to executed workload records (DB table /SCWM/EWRKL). The fields are automatically displayed in the EWM monitor node for Executed Workload. They are also available for custom determinations of the labor activity code and adjusted planned duration in BRFplus.

If an EWL record is created from a planned workload record, fields added to the planned workload record (extension of DB table /SCWM/WRKL) are automatically moved to this structure if they have identical field names.

The structure is mainly used in combination with the BAdI /SCWM/EX_LM_EWL_EEW and with API methods for the creation of executed workload records for custom transactions.
<table>
<thead>
<tr>
<th>Structure Path</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/SCWM/INCL_EEW_LM_EWL_CTX_WO</td>
<td>Customer Enhancements: Context for Executed Workload (WO). Fields added to this structure are available for custom determination of the labor activity code or adjusted planned duration for executed workloads created from warehouse order confirmations. The structure is mainly used in combination with the BAdI /SCWM/EX_LM_EWL_CONTEXT for object type 'WO'.</td>
</tr>
<tr>
<td>/SCWM/INCL_EEW_LM_EWL_CTX_IL</td>
<td>Customer Enhancements: Context for Executed Workload (ILT). This structure is similar to /SCWM/INCL_EEW_LM_EWL_CTX_WO. It is used for executed workload records created from indirect labor task documents (object type 'IL').</td>
</tr>
<tr>
<td>/SCWM/INCL_EEW_LM_EWL_CTX_PI</td>
<td>Customer Enhancements: Context for Executed Workload (PI). This structure is similar to /SCWM/INCL_EEW_LM_EWL_CTX_WO. It is used for executed workload records created from physical inventory documents (object type 'PI').</td>
</tr>
<tr>
<td>/SCWM/INCL_EEW_LM_EWL_CTX_QD</td>
<td>Customer Enhancements: Context for Executed Workload (QD). This structure is similar to /SCWM/INCL_EEW_LM_EWL_CTX_WO. It is used for executed workload records created from quality inspection documents (object type 'QD').</td>
</tr>
<tr>
<td>/SCWM/INCL_EEW_LM_EWL_CTX_QE</td>
<td>Customer Enhancements: Context for Executed Workload (QE). This structure is similar to /SCWM/INCL_EEW_LM_EWL_CTX_WO. It is used for executed workload records created from quality inspection elements (object type 'QE').</td>
</tr>
<tr>
<td>/SCWM/INCL_EEW_LM_EWL_CTX_RH</td>
<td>Customer Enhancements: Context for Executed Workload (RH). This structure is similar to /SCWM/INCL_EEW_LM_EWL_CTX_WO. It is used for executed workload records created for the receiving of HUs from production (object type 'RH').</td>
</tr>
<tr>
<td>/SCWM/INCL_EEW_LM_EWL_CTX_RV</td>
<td>Customer Enhancements: Context for Executed Workload (RV). This structure is similar to /SCWM/INCL_EEW_LM_EWL_CTX_WO. It is used for executed workload records created for the receiving of HUs from vendor (object type 'RV').</td>
</tr>
<tr>
<td>/SCWM/INCL_EEW_LM_EWL_CTX_VS</td>
<td>Customer Enhancements: Context for Executed Workload (VS). This structure is similar to /SCWM/INCL_EEW_LM_EWL_CTX_WO. It is used for executed workload records created for the confirmation of VAS activities (object type 'VS').</td>
</tr>
<tr>
<td>/SCWM/INCL_EEW_LM_EWL_CONTEXT</td>
<td>Customer Enhancements: Context for Executed Workload. This structure is similar to /SCWM/INCL_EEW_LM_EWL_CTX_WO. It is used for executed workload records created for custom object types, in combination with: • API methods for the creation of executed workload records for custom object types • BAdI /SCWM/EX_LM_EWL_CONTEXT • BAdI /SCWM/EX_LM_EWL_CUSTOM_LMOBJTY</td>
</tr>
</tbody>
</table>
The following main API methods of interface /SCWM/IF_API_LM_EWL_MANAGER are available for the processing of executed workload records in custom transactions. For detailed information, see the interface and method documentation.

<table>
<thead>
<tr>
<th>API Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE</td>
<td>Create Executed Workload</td>
</tr>
<tr>
<td></td>
<td>You use this method to create an executed workload record with one call. Internally, it calls the OPEN, SET_CONTEXT and CLOSE methods. After one or multiple CREATE method calls, you must call the SAVE and CLEANUP method.</td>
</tr>
<tr>
<td>OPEN</td>
<td>Open Executed Workload</td>
</tr>
<tr>
<td></td>
<td>You use this method to start the creation of an executed workload record. The main purpose of this method is to set the start time of the executed workload.</td>
</tr>
<tr>
<td>SET_CONTEXT</td>
<td>Set Context</td>
</tr>
<tr>
<td></td>
<td>You use this method to give context information related to an executed workload record. The context information is not stored in the executed workload record but is used for the determination of the labor activity code and adjusted planned duration with BRFplus.</td>
</tr>
<tr>
<td>CLOSE</td>
<td>Close Executed Workload</td>
</tr>
<tr>
<td></td>
<td>You use this method to close an opened executed workload record. The main purpose of this method is to set the end time of executed workload and call the determination of labor activity code and adjusted planned duration with BRFplus.</td>
</tr>
<tr>
<td>SAVE</td>
<td>Save All Closed Executed Workloads</td>
</tr>
<tr>
<td></td>
<td>You use this method to save closed executed workload records on the database.</td>
</tr>
<tr>
<td>CLEANUP</td>
<td>Delete Buffer</td>
</tr>
<tr>
<td></td>
<td>You use this method after SAVE to delete the internal buffers for executed workload records.</td>
</tr>
<tr>
<td>SKIP_STANDARD_CALL</td>
<td>Skip Standard Call (Custom EWL via API)</td>
</tr>
<tr>
<td></td>
<td>You use this method to deactivate the standard creation of executed workload records. Typically, you use this method in a custom transaction for WO confirmation, in which you call the API methods to create executed workload records.</td>
</tr>
<tr>
<td>QUERY</td>
<td>Query Executed Workloads</td>
</tr>
<tr>
<td></td>
<td>You use this method to select existing executed workload records from the database.</td>
</tr>
</tbody>
</table>

You instantiate the API as described in the interface documentation.
3.1.2 Use Case 1: Ship-To Party in WO Context

In this use case, an executed workload record is created upon pick warehouse order (WO) confirmation. As the picking process for a specific ship-to-party (for example, customer CUST004) requires additional work, you want to determine a specific labor activity code (for example, OPIPA_CU04) when picking with external process step PICK for this customer, and calculate a longer adjusted planned duration for the labor activity code.

To determine a customer-specific labor activity code, you enhance the WO context by the customer number from the outbound delivery order, so that you can configure the labor activity code determination in BRFplus for this specific customer.

Procedure

1. In the ABAP Dictionary screen (transaction SE11), create and activate an append structure to structure /SCWM/INCL_EEW_LM_EWL_CTX_WO. In the append structure, include structure /SCWM/S_LM_CTX_EXTENSION. With this append structure, field EXT_1 is added to the EWL context structure for WO confirmation.

2. Create and activate an implementation of BAdI /SCWM/EX_LM_EWL_CONTEXT for your warehouse by copying example implementation class /SCWM/CL_EI_LM_EWL_CTX_EXAMPLE. If required, adapt the ABAP code delivered with the example implementation to your needs. With this BAdI implementation, field EXT_1 of the append structure is filled with the ship-to-party number of an outbound delivery order in case of pick WO confirmation.

CAUTION

Reading outbound delivery order data will have a negative impact on the performance of the pick WO confirmation transaction. For this reason, we recommend activating the asynchronous completion of executed workloads in the Easy Access menu for SAP EWM under Settings → Performance Settings → Activate Asynchronous EWL Completion (transaction code /SCWM/EWL_ASYNC).

Result

With the configuration described in chapter 4, the system will now determine labor activity code OPIPA_CU04 when confirming a pick warehouse order for external process step PICK and ship-to-party CUST004. With this labor activity code OPIPA_CU04, the system will determine a longer adjusted planned duration than for labor activity code PIPA, which is used for pick WO confirmation for other ship-to-parties.

3.1.3 Use Case 2: RF Logical Transaction in EWL Record

In this use case, an executed workload record is created upon receiving HU from vendor (reference object type ‘RV’ in executed workload record). If the vendor has sent an ASN, the user receives the HUs with an RF transaction requiring minor data entry. If the vendor has not sent an ASN, the user receives the HUs with another RF transaction requiring more data entry. Therefore, you want to determine the adjusted planned duration based on the RF logical transaction. In addition, you want to display the RF logical transaction in the EWM monitor node for Executed Workload for analysis purposes.

Note

As the RF logical transaction used for receiving HUs is not stored in the goods movement document, it is necessary to store it as custom field in the executed workload document to make it available for possible EWL updates or re-determinations.

The following figure illustrates the usage of BAdI /SCWM/EX_LM_EWL_CONTEXT in use case 1 and the usage of BAdIs /SCWM/EX_LM_EWL_EEW and /SCWM/EX_LM_EWL_CONTEXT in use case 2. In use case 1, the customer
is added to the EWL context but not to the database, as the context can be retrieved any time for EWL update or completion. In use case 2, the RF logical transaction is added both to the EWL database table and to the EWL context. Both fields, customer and RF logical transaction, are used to determine a specific labor activity code (LAC). Based on the labor activity codes, the system determines different adjusted planned durations (ELS).

Figure 1: Custom Fields in Executed Workload (Use Cases 1 and 2)

Procedure

1. In the ABAP Dictionary screen (transaction SE11), create and activate an append structure to structure /SCWM/INCL_EEW_LM_EWRKL with field LTRANS or ZZLTRANS (TYPE /SCWM/DE_LTRANS). With this append structure, field LTRANS (or ZZLTRANS) is added to database table /SCWM/EWRKL (executed workload records).

2. In the ABAP Dictionary screen (transaction SE11), create and activate an append structure to structure /SCWM/INCL_EEW_LM_EWL_CTX_RV. In the append structure, include structure /SCWM/S_LM_CTX_EXTENSION. With this append structure, field EXT_2 is added to the EWL context structure for receiving HU from vendor.

3. Create and activate an implementation of BAdI /SCWM/EX_LM_EWL_EEW for your warehouse by copying example implementation class /SCWM/CL_EI_LM_EWL_EEW_EXAMPLE. If the custom field created in step 1 is ZZLTRANS instead of LTRANS, adapt the ABAP code delivered with the example implementation by adding the following line before ENDMETHOD:

   ```abap
   cs_ewl_eew-zzltrans = ls_custom_fields-ltrans.
   ```

   With this BAdI implementation, field LTRANS (or ZZLTRANS) is now stored in executed workload records created from receiving HU from vendor, receiving HU from production, and pick WO confirmation via RF. It is also visible in the EWM monitor node for executed workload.

4. Create and activate an implementation of BAdI /SCWM/EX_LM_EWL_CTX for your warehouse by copying example implementation class /SCWM/CL_EI_LM_EWL_CTX_EXAMPLE. If required, adapt the ABAP code delivered with the example implementation to your needs.

   With this BAdI implementation, field EXT_2 of the append structure is filled with the RF logical transaction in the cases of receiving HU from vendor, receiving HU from production, and pick WO confirmation via RF.
Result

The RF logical transaction is now stored in the executed workload table. It is also available for BRFplus determinations based on RF logical transaction.

3.1.4 Use Case 3: EWL for Custom Reference Object Type

In this use case, you want to create an executed workload for a custom object such as the loading of a truck without warehouse tasks. The users use a custom RF transaction to perform this task.

A solution approach for this use case is to:

- Create an external process step for the executed workload related to the loading of a truck.
- Create a custom reference object type (for example ‘ZU’) for executed workload.
- Call the API to set the start time, the end time, and the custom reference object type of the executed workload, and to create the EWL record based on custom data.
- Implement BAdI /SCWM/EX_LM_EWL_CUSTOM_LMOBJTY to:
  - Fill the reference GUID and the reference number for the custom reference object type (e.g. S&R activity).
  - Fill the custom context (e.g. TU data) required for the determination of labor activity code, adjusted planned duration, and PFD factor.
  - Call custom determinations, as standard BRFplus determinations are not called for custom reference object types.
- Implement BAdI /SCWM/EX_LM_EWL_CONTEXT:
  - If there is the possibility that the workload will get the status incomplete due to the implementation of BAdI /SCWM/EX_LM_EWL_CUSTOM_LMOBJTY method CALL_DETERMINATIONS (setting the result of field success to false).
  - If there is the possibility that the workload will get the status incomplete due to the implementation of BAdI /SCWM/EX_LM_EWL_COMPLETION.
  - To fill the context for the new object type for the cases: create, update and complete EWL (see figure 1)

Procedure

1. Create an external process step, for example TULD in Customizing for Extended Warehouse Management under Labor Management → Define External Process Steps. This belongs to the configuration part, but it is mentioned explicitly here as the external process step is a mandatory parameter for method CREATE in step 5.
2. Create a new entry, for example ‘ZU’ (Description: Custom TU Loading), in the customer namespace of table /SCWM/TLMOBJJT with transaction SM31.
3. In the ABAP Dictionary screen (transaction SE11), create and activate an append structure (for example, ZTTUDATA) to structure /SCWM/INCL_EEW_LM_EWL_CONTEXT. The context structure shall at least contain the fields required to fill the reference object number and the reference GUID for the EWL record. Therefore, add the following components to the append structure ZTTUDATA:

<table>
<thead>
<tr>
<th>Component</th>
<th>Component Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT_ID</td>
<td>/SCMB/DE_SR_ACT_ID</td>
<td>GUID for Shipping and Receiving Activity</td>
</tr>
<tr>
<td>TU_NUM</td>
<td>/SCWM/DE_TU_NUM</td>
<td>Internal Number of Transportation Unit</td>
</tr>
<tr>
<td>TU_SR_ACT_NUM</td>
<td>/SCWM/DE_TU_SR_ACT_NUM</td>
<td>Shipping and Receiving Activity Number: Transportation Unit</td>
</tr>
<tr>
<td>TU_NUM_EXT</td>
<td>/SCWM/DE_TU_NUM_EXT</td>
<td>Transportation Unit</td>
</tr>
</tbody>
</table>
4. Create and activate an implementation of BAdI /SCWM/EX_LM_EWL_CUSTOM_LMOBJTY for your warehouse by copying the example implementation class /SCWM/CL_EI_LM_EWL_LMOBJTY_ZU. Adapt the ABAP code delivered with the example implementation to your needs, especially in method /SCWM/IF_EX_LM_EWL_CUSTOM_OBJ~CALL_DETERMINATIONS.

In method /SCWM/IF_EX_LM_EWL_CUSTOM_OBJ~FILL_REFDOC_KEY of your implementation class, de-comment the lines to fill the parameters CV_GUID_REF and CV_ID_REF.

5. Create and activate an implementation of BAdI /SCWM/EX_LM_EWL_CONTEXT for your warehouse if needed (see use case 1 and 2).

6. In the custom coding of your RF transaction, find an appropriate place to call the following main API methods of interface /SCWM/IF_API_LM_EWL_MANAGER:
   a. Instantiate the API service as described in the interface documentation.
   b. Call method CREATE (or OPEN, SET_CONTEXT and CLOSE) with the external process step defined in step 1.
   c. Call method SAVE.
   d. Call method CLEANUP.

Refer to the method documentation and to the code sample provided in appendix A for an example of how to call the API.

1. Note

   If your custom RF transaction also calls a standard function module like /SCWM/TO_CONFIRM to confirm a warehouse order/warehouse task, it may be necessary to prevent the creation of a duplicate executed workload from the standard function module. For this purpose, call API method SKIP_STANDARD_CALL.

Result

Executed workload records can now be created from your custom RF transaction, provided the configuration described in chapter 4 is set up correctly for your custom process.

3.1.5 Use Case 4: Mandatory Shift Assignment and Service Start Date

In this use case, you have defined PFD factors based on shift data and on the processors’ years of service. A new employee may start working in the warehouse without shift assignment and/or without service start date in the processor master record, but you want to prevent the completion of an executed workload without this data. For this purpose, you implement BAdI /SCWM/EX_LM_EWL_COMPLETION. As a result, the In Process indicator of an EWL record is set to E (Incomplete (Due to Error)) when the executed workload is created without shift assignment or service start date.

The process for completing the executed workload is the following:

1. You regularly monitor the incomplete executed workload records with transaction /SCWM/EWL_COMPL. The error message from your BAdI implementation informs you that shift assignment and/or service start date are missing for the given processor.

2. Depending on the error message, you maintain the shift assignment for the given processor on the given day, or you enter the service start date in the processor master record.

3. If you have changed the processor master record, you select all EWL records for the processor in the Executed Workload node of the EWM monitor and execute method Update Processor Data. This will copy the service start date from the processor master record to the selected EWL records, update the shift assignment, and execute the determination of labor activity code and adjusted planned duration.

   In this case, step 4 is not needed.

4. If you have only changed the shift assignment and not the processor master record, you have two options:
   o Execute transaction /SCWM/EWL_COMPL for the completion of the EWL records.
   o Select all EWL records for the processor in the Executed Workload node of the EWM monitor and execute method Update Shift Data.
Both options will update the shift assignment in the selected EWL records, and execute the determination of labor activity code and adjusted planned duration.

**Procedure**

Create and activate an implementation of BAdI /SCWM/EX_LM_EWL_COMPLETION for your warehouse by copying example implementation class /SCWM/CL_EI_LM_EWL_COMPL_EXAMP. If required, adapt the ABAP code delivered with the example implementation to your needs.

**Result**

From now on, executed workload created without shift assignment and/or service start date will be saved as incomplete.
3.2 Enhancement Concept for BRFplus Determinations

The determinations of
- Labor activity code
- Engineered labor standards
- Personal fatigue and delay (PFD)
- Travel time

is done in standard by using BRFplus. Examples for the settings in BRFplus are available for the preconfigured warehouse (see above).

To enable customers to adopt this concept to their needs, the BRFplus calls are embedded in an enhancement concept using BAdIs for the different object types. The calls to BRFplus are done in fallback/default implementations.

When implementing these BAdIs, it is possible to do the following:
- Add additional context for the determination using the predefined 9 extension fields EXT1...EXT9.
- Call customer-specific defined functions in BRFplus that have a customer-specific context.
- Perform the determinations in classic BAdI ABAP coding instead of calling BRFplus.

3.2.1 Enhancement Objects for Engineered Labor Standards

In Customizing for Extended Warehouse Management, choose Business Add-Ins (BAdIs) for Extended Warehouse Management > Labor Management > Standardized Standard Time Determination

<table>
<thead>
<tr>
<th>BAAd</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/SCWM/EX_LM_ELS_EWL</td>
<td>BAdI: ELS Determination for Executed Workload</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_HU</td>
<td>BAdI: ELS Determination for Handling Units</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_HU_I</td>
<td>BAdI: ELS Determination for Handling Unit Items</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_RH</td>
<td>BAdI: ELS Determination for HUs from Production</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_RV</td>
<td>BAdI: ELS Determination for HUs from Vendor</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_IL</td>
<td>BAdI: ELS Determination for Indirect Labor</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_QD</td>
<td>BAdI: ELS Determination for Inspection Documents</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_QE</td>
<td>BAdI: ELS Determination for Inspection Elements</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_WHOPI</td>
<td>BAdI: ELS Determination for Physical Inventories</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_INV_I</td>
<td>BAdI: ELS Determination for Physical Inventory Items</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_VAS</td>
<td>BAdI: ELS Determination for Value-Added Services</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_WHOST</td>
<td>BAdI: ELS Determination for Warehouse Orders</td>
</tr>
<tr>
<td>/SCWM/EX_LM_ELS_WT</td>
<td>BAdI: ELS Determination for Warehouse Tasks</td>
</tr>
</tbody>
</table>

3.2.2 Enhancement Objects for Labor Activity Code

In Customizing for Extended Warehouse Management, choose Business Add-Ins (BAdIs) for Extended Warehouse Management > Labor Management > Labor Activity Determination

<table>
<thead>
<tr>
<th>BAAd</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/SCWM/EX_LM_LA_HU</td>
<td>BAdI: Labor Activity Determination for Handling Units</td>
</tr>
<tr>
<td>/SCWM/EX_LM_LA_RH</td>
<td>BAdI: Labor Activity Determination for HUs from Production</td>
</tr>
</tbody>
</table>
3.2.3 Enhancement Objects for PFD

In Customizing for Extended Warehouse Management, choose Business Add-Ins (BAdIs) for Extended Warehouse Management > Labor Management > Personal Needs, Fatigue, and Unavoidable Delays

<table>
<thead>
<tr>
<th>BAdI</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/SCWM/EX_LM_PFD_DSM</td>
<td>BAdI: Decision Service for PFD Calculation</td>
</tr>
<tr>
<td></td>
<td>In addition to the default implementation, there is another example implementation available.</td>
</tr>
</tbody>
</table>

3.2.4 Enhancement Objects for Travel Time Calculation

In Customizing for Extended Warehouse Management, choose Business Add-Ins (BAdIs) for Extended Warehouse Management > Cross-Process Settings > Travel Distance Calculation

<table>
<thead>
<tr>
<th>BAdI</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/SCWM/EX_TDC_BRF_CALC_TIME</td>
<td>BAdI: Travel Time Calculation</td>
</tr>
</tbody>
</table>

3.2.5 Use Case: PFD Based on a ‘Summer Factor’ Achieved Without Using BRFplus

In this use case, you want to define a PFD factor based on a seasonal effect. In the summer time, the employees need to take additional breaks due to high temperatures in the warehouse.

**Procedure**

Create and activate an implementation of BAdI /SCWM/EX_LM_PFD_DSM for your warehouse by copying example implementation class /SCWM/CL_EI_LM_PFD_FATIGUE. If required, adapt the ABAP code delivered with the example implementation to your needs.
3.2.6 Use Case: Adopt ELS with a ‘Summer Factor’ Using a Customer-Specific Function in BRFplus

In this use case, you want to add a seasonal effect to the ELS determination. In the summer time, the employees need to take additional breaks due to high temperatures in the warehouse. Here, the customer chooses to not use PFD factor.

It should also be possible to change some of the settings in the future without needing ABAP development knowledge. Thus, using BRFplus is the preferred approach.

As the seasonal information is not part of the ELS context, a new function needs to be defined in BRFplus and called by ELS.

Procedure

1. Create a new function in BRFplus with a context including seasonal information.
2. Create and activate an implementation of BAdI /SCWM/EX_LM_ELS_WHOWT for your warehouse by copying the fallback implementation class /SCWM/CL_EI_LM_ELS_WHOWT. Adapt the ABAP code to your needs, e.g. call the new BRFplus function defined in step 1 with the defined context information.

   For this you can use a coding snippet that you can create using BRFplus for calling your new function.

Appendix

<< This section is optional.
If needed, you may want to add information such as short installation instructions, a list of reference codes, code examples, or an FAQ.
Use Heading 5 as the paragraph style of appendix headings so that they are not numbered. >>

Appendix A – Sample Code for Executed Workload API Usage

You can use the sample code as a reference for creating an executed workload record for a custom reference object type as described in chapter Use Case 3: EWL for Custom Reference Object Type.

```bash
*---------------------------------------------------------------------*
*& Report /SCWM/RTEST_API_LM_EWL
*---------------------------------------------------------------------*
*& Test Program for Executed Workload API /scwm/if_api_lm_ewl_manager
*---------------------------------------------------------------------*
* This program calls the EWL API for an existing TU to create an
* Executed Workload record for the loading of the TU.
*
* To keep the example simple and repeatable, it does not check the TU status
* 'loading finished', it does not check whether an EWL already exists for thi
*
* TU, it does not read the number of loaded HUs from the TU (but takes the
* number of pallets given as selection parameter), it does not read the
```
* loading start/end time from the TU (but takes the start/end time given as
* selection parameters), it does not consider the time zone of the warehouse.
*
* Pre-conditions:
* - Structure /SCWM/INCL_EEW_LM_EWL_CONTEXT has append structure with TU fiel-
ds:
*   . act_id type /SCMB/DE_SR_ACT_ID (S&R activity GUID)
*   . tu_num type /SCWM/DE_TU_NUM
*   . tu_sr_act_num type /SCWM/DE_TU_SR_ACT_NUM
*   . tu_num_ext type /SCWM/DE_TU_NUM_EXT (external TU number)
* - Example implementation of BAdI /SCWM/EX_LM_EWL_CUSTOM_LMOBJTY is active
* - Labor Management is active in the warehouse number of the TU
* - External Process Step TULD is defined in EWM customizing
* - Ref. object type 'ZU' exists in table /SCWM/TLMOBJTY (maintain with sm31)
*-------------------------------------------------------------------------------

REPORT /scwm/rtest_api_lm_ewl.

PARAMETERS:
  p_tunum TYPE /scwm/de_tu_num MEMORY ID /scwm/tu_num VALUE CHECK OBLIGATORY,
  p_tuact TYPE /scwm/de_tu_sr_act_num OBLIGATORY,
  p_quan TYPE numc3 DEFAULT '33', "Number of pallets
  p_unit_q TYPE /scwm/de_unit DEFAULT 'PAL',
  p_start TYPE sy-datum,
  p_starth TYPE sy-uzeit,
  p_end TYPE sy-datum DEFAULT sy-datum,
  p_endh TYPE sy-uzeit DEFAULT sy-uzeit,
  p_prr TYPE /scmb/de_prr MATCHCODE OBJECT /scwm/sh_prr_id_coll OBLIGATORY,
  p_procs TYPE /scwm/de_procs MATCHCODE OBJECT /scwm/sh_procs_lm DEFAULT 'TULD' OBLIGATORY.

CONSTANTS sc_30min TYPE p LENGTH 4 VALUE '1800'.

TYPES:
  BEGIN OF ys_tudata,
    act_id    TYPE /scmb/de_sr_act_id,
    tu_num    TYPE /scwm/de_tu_num,
    tu_sr_act_num TYPE /scwm/de_tu_sr_act_num,
    tu_num_ext TYPE /scwm/de_tu_num_ext,
  END OF ys_tudata.

DATA:
  lv_lgnum    TYPE /scwm/lgnum,
  lv_lmobjty  TYPE /scwm/de_lm_objty,
  lv_start    TYPE timestamp,
  lv_end      TYPE timestamp,
  ls_ewl_message TYPE /scwm/if_api_message=>ys_message,
  ls_tudata   TYPE ys_tudata,
  lo_ewl_manager TYPE REF TO /scwm/if_api_lm_ewl_manager,
  lo_message  TYPE REF TO /scwm/if_api_message,
  lo_bom      TYPE REF TO /scwm/cl_sr_bom,
  lo_bo_tu    TYPE REF TO /scwm/cl_sr_bo_tu.

*---- Set Default Start Date and Time -------------------------------
AT SELECTION-SCREEN OUTPUT.

IF p_start IS INITIAL.
  CONVERT DATE p_end TIME p_endh
  INTO TIME STAMP DATA(lv_timestamp) TIME ZONE space.
  DATA(lv_timestamp2) = cl_abap_tstmp=>subtractsecs( tstamp = lv_timestamp
                               secs = sc_30min ).
  CONVERT TIME STAMP lv_timestamp2 TIME ZONE space
INTO DATE p_start TIME p_starth.

ENDIF.

*------------------------------------------------------------------------*
START-OF-SELECTION.

*---- Select TU -----------------------------------------*
DATA(ls_key) = VALUE /scwm/s_tu_sr_act_num( tu_num = p_tunum
   tu_sr_act_num = p_tuact ).
IF ls_key IS NOT INITIAL.
  TRY.
    lo_bom = /scwm/cl_sr_bom=>get_instance( ).
    lo_bo_tu = lo_bom=>get_bo_tu_by_key( ls_key ).
  CATCH /scwm/cx_sr_error.
    MESSAGE e000('TU + activity not found:
    p_tunum p_tuact space INTO DATA(lv_msg).
    WRITE: / lv_msg.
  ENDTRY.
ENDIF.

IF lo_bo_tu IS NOT BOUND.
  WRITE: / 'EWL could not be created'. RETURN.
ENDIF.

TRY.
  lo_bo_tu=>get_data( IMPORTING es_bo_tu_data = DATA(ls_bo_tu_data) ).
  "Note: TUDLV is not read in this example program
  "as number of pallets is taken from report parameters
  CATCH /scwm/cx_sr_error.
    MESSAGE ID sy-msgid TYPE sy-msgty NUMBER sy-msgno
      WITH sy-msgv1 sy-msgv2 sy-msgv3 sy-msgv4 INTO lv_msg.
    WRITE: / sy-msgid, sy-msgno, lv_msg. RETURN.
  ENDTRY.

*--- Fill EWL and context data for EWL API ---------------------*
CONVERT DATE p_start TIME p_starth INTO TIME STAMP lv_start TIME ZONE space.
CONVERT DATE p_end TIME p_endh INTO TIME STAMP lv_end TIME ZONE space.

ls_tudata = CORRESPONDING #( ls_bo_tu_data ).

DATA(ls_context) = VALUE /scwm/s_lm_wl_context(
  * s_ewl_ctx_eew = VALUE #( act_id = ls_bo_tu_data-act_id
  * tu_num = ls_bo_tu_data-tu_num
  * tu_sr_act_num = ls_bo_tu_data-
  * tu_num_ext = ls_bo_tu_data-tu_num_ext )
  s_pre_ewl = VALUE #( quantity = p_quan
    unit_q = p_unit_q
    weight = ls_bo_tu_data-load_weight
    unit_w = ls_bo_tu_data-load_weight_uom
    volum = ls_bo_tu_data-load_volume
    unit_v = ls_bo_tu_data-load_volume_uom )).

MOVE-CORRESPONDING ls_tudata TO ls_context-s_ewl_ctx_eew.

*--- Call EWL API -----------------------------------------*
"Instantiate service
/scwm/cl_api_factory=>get_service( IMPORTING eo_api = lo_ewl_manager ).
"CREATE EWL record. Alternative: call methods OPEN + SET_CONTEXT + CLOSE

lo_ewl_manager->create(  
    EXPORTING  
        iv_lgnum = ls_bo_tu_data-yard_lgnum  
        iv_procs = p_procs  
        iv_prr_id = p_prr  
        iv_start_actual = lv_start  
        iv_ref_type = 'ZU'  
        is_context = ls_context  
        iv_end_actual = lv_end  
    IMPORTING  
        eo_message = lo_message  
    RECEIVING  
        rv_success = DATA(lv_success) ).

IF lv_success = abap_true.  
"SAVE on DB  
lo_ewl_manager->save( ).  
"CLEANUP  
lo_ewl_manager->cleanup( ).

WRITE: '/EWL created for TU', p_tunum. RETURN.
ENDIF.

IF lo_message IS BOUND.  
  ls_ewl_message = lo_message->get_most_important_message( ).  
MESSAGE ID ls_ewl_message-mgid TYPE ls_ewl_message-msg  
  NUMBER ls_ewl_message-msgno  
  WITH ls_ewl_message-msgv1 ls_ewl_message-msgv2  
  ls_ewl_message-msgv3 ls_ewl_message-msgv4 INTO lv_msg.
  WRITE: / sy-mgid, sy-msgno, lv_msg. RETURN.
ENDIF.

Appendix B - <<Short Title>>

<< Enter description and optional procedure here. For example, a list of code references.

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