# BOPF Validations

SAP AG, 2012

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# Agenda

Introduction

Action Validations

Implementation

Consistency Validations

Consistency Groups

Overview

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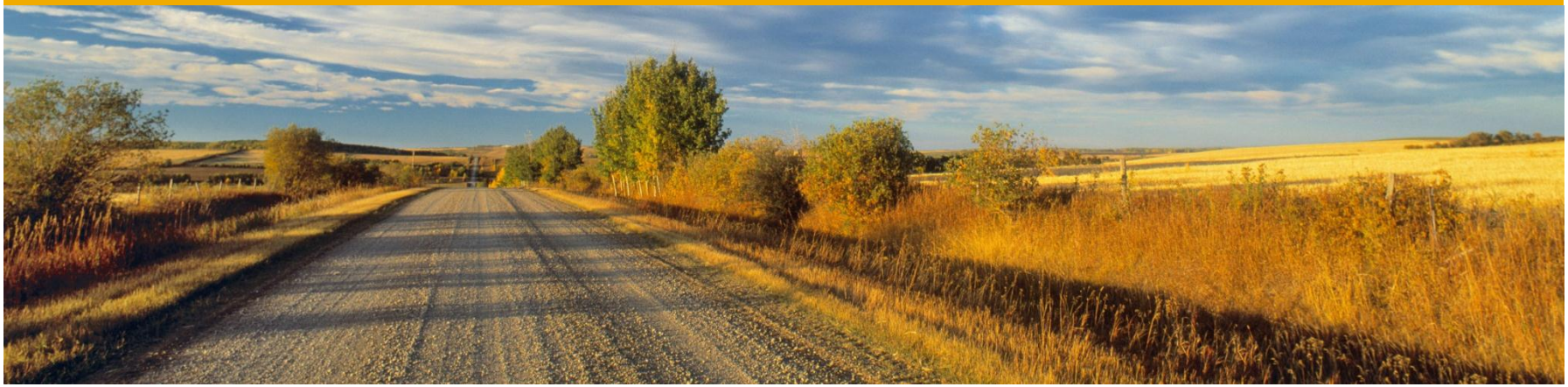

# Introduction

# Definition

Validations are business logic entities that are triggered in certain situations to check different aspects of a given set of node instances.

Validations never modify any data!

Validations return messages and the keys of failed node instances.

There are two categories of validations:

- **Action validations**
  Check whether necessary preconditions for executing an action on a node are fulfilled.
- **Consistency validations**
  Check the consistency of a node instance

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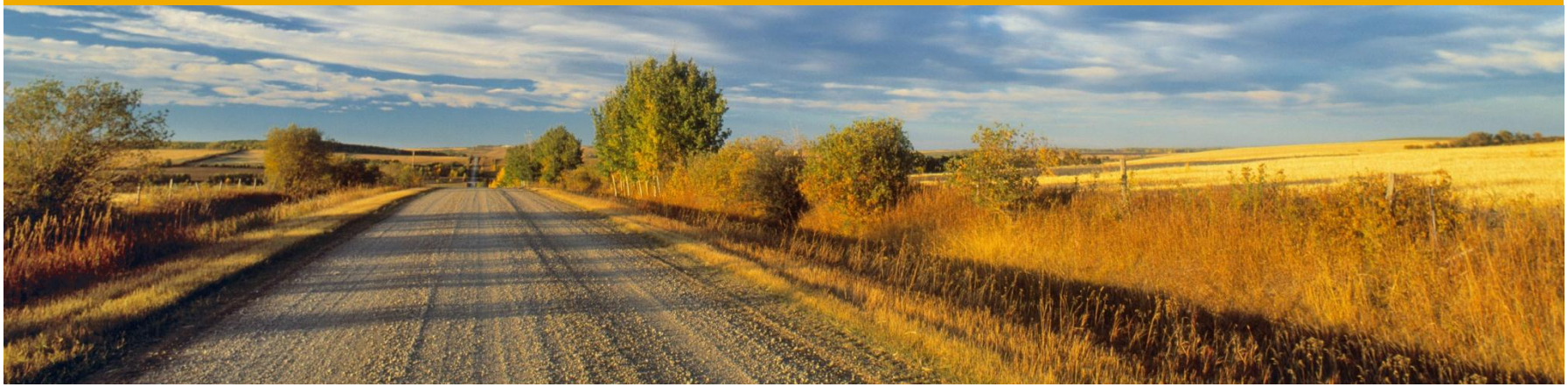
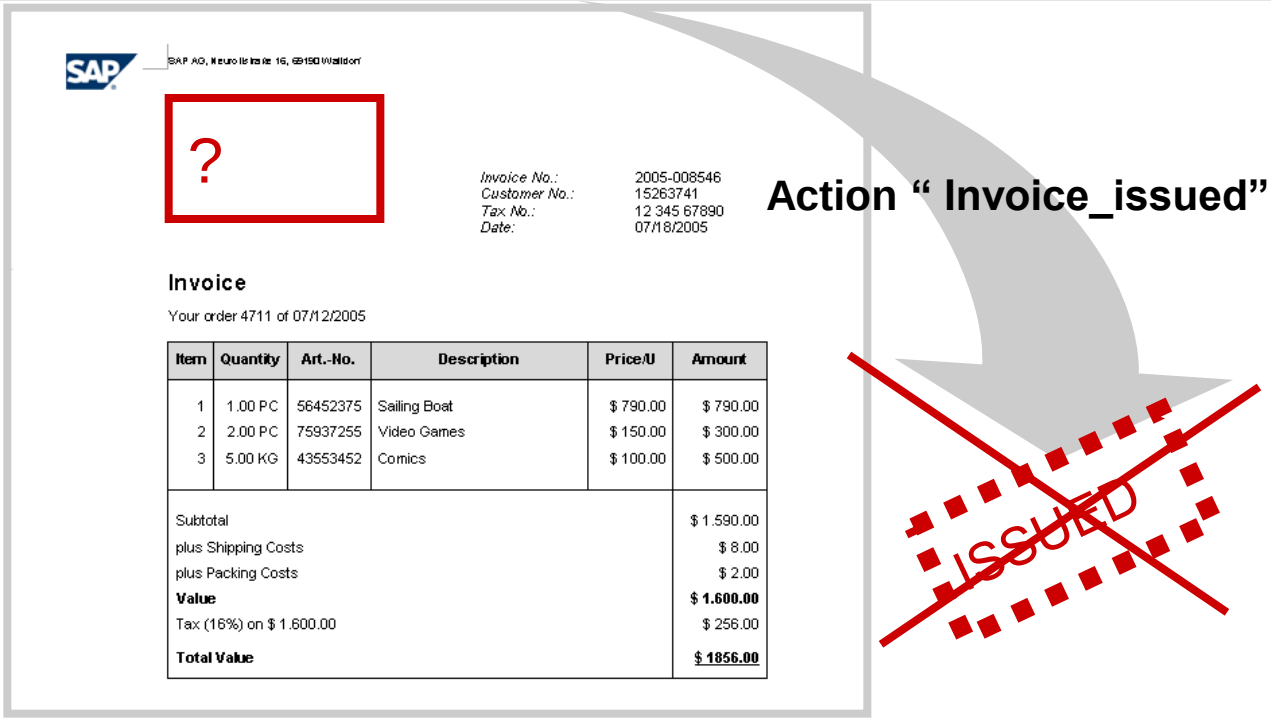


# Action Validations

# Action Validations




## Motivation for action validations

- Only invoices with a specified billing party are to be issued.
  Thus we need to check whether the corresponding BOPF action `INVOICE_ISSUED` is currently allowed.
- **Example**: Unless the complete customer address data is specified,
  the invoice cannot be issued.

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# Action Validations

Action validations check whether it is possible to execute a certain action on a set of node instances.

Action validations only return messages and the keys of failed instances
(i.e. instances for which the action may not be executed).

Action validations are triggered by attempts to execute an action.
Therefore it is not necessary to configure request nodes.

The BOPF framework actions (e.g. “ create”, “ delete”, and “ update”) can also be subject to an action validation (e.g. action validations can prevent instances with incomplete data from being created).

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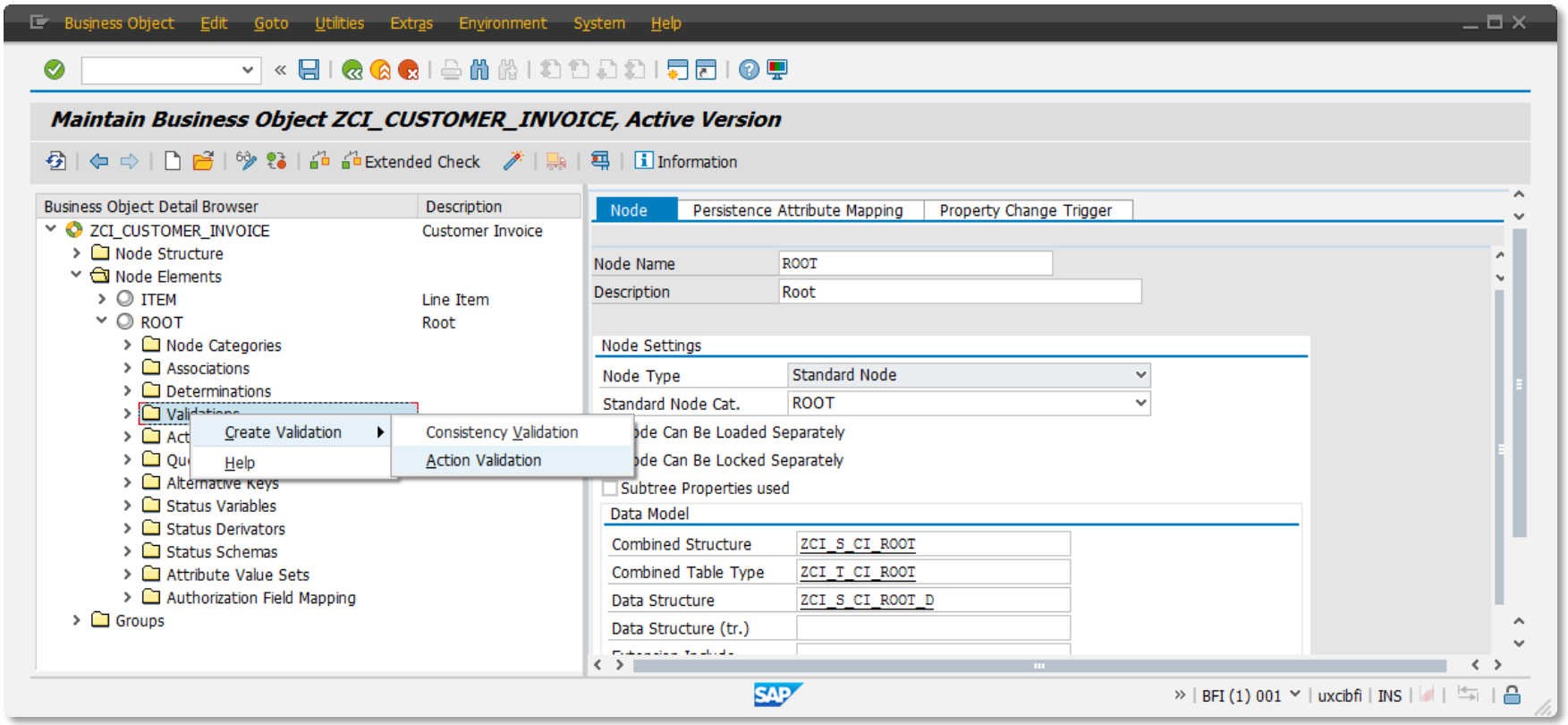
# Action Validations

## How to Create Them

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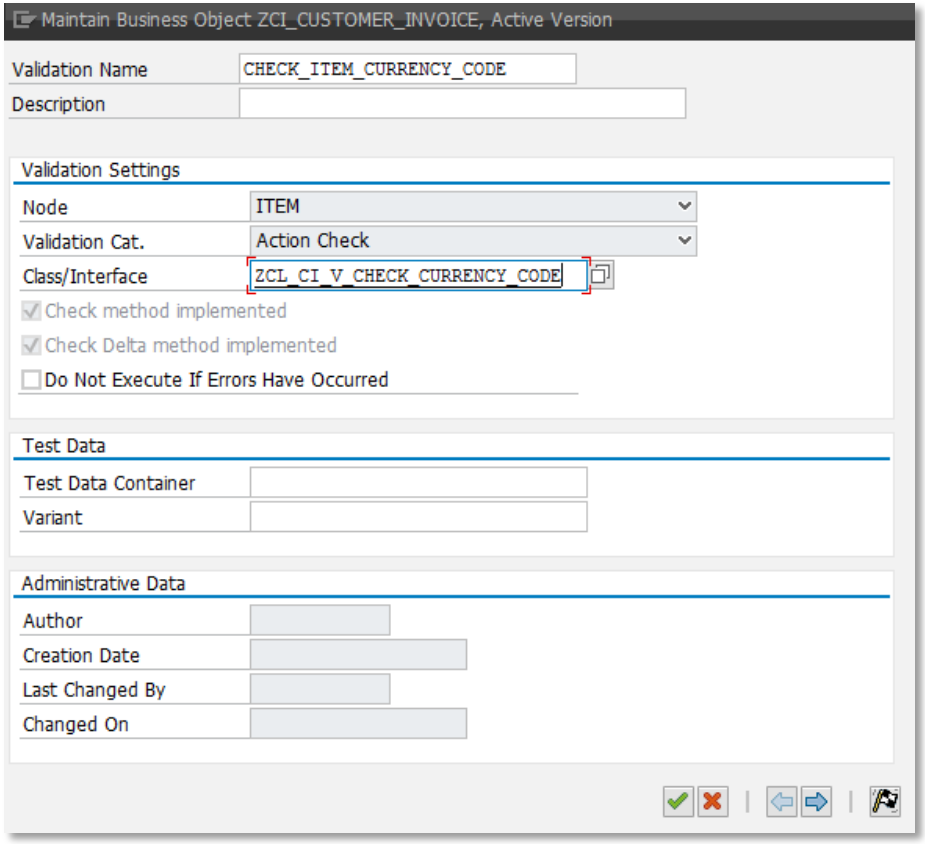
# Action Validation

## Configuration




- Right-click on the validation to start the guided procedure.
- Enter a validation name and the description, and create a class using forward navigation.

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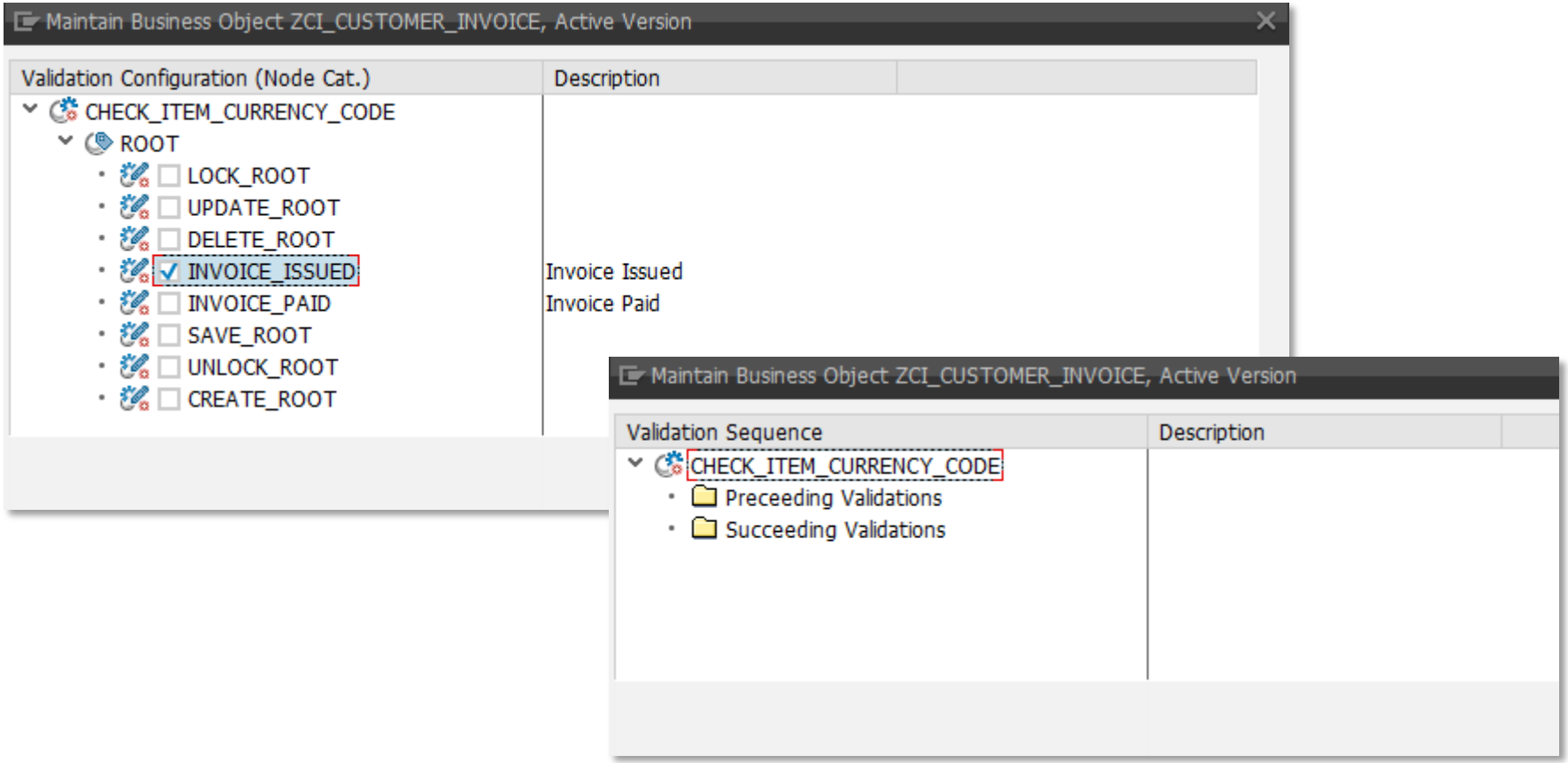
# Action Validation

## Configuration




- Choose the actions to be checked by the validation.
- Define the order of the action validations (not usually necessary) and press “Finish”.

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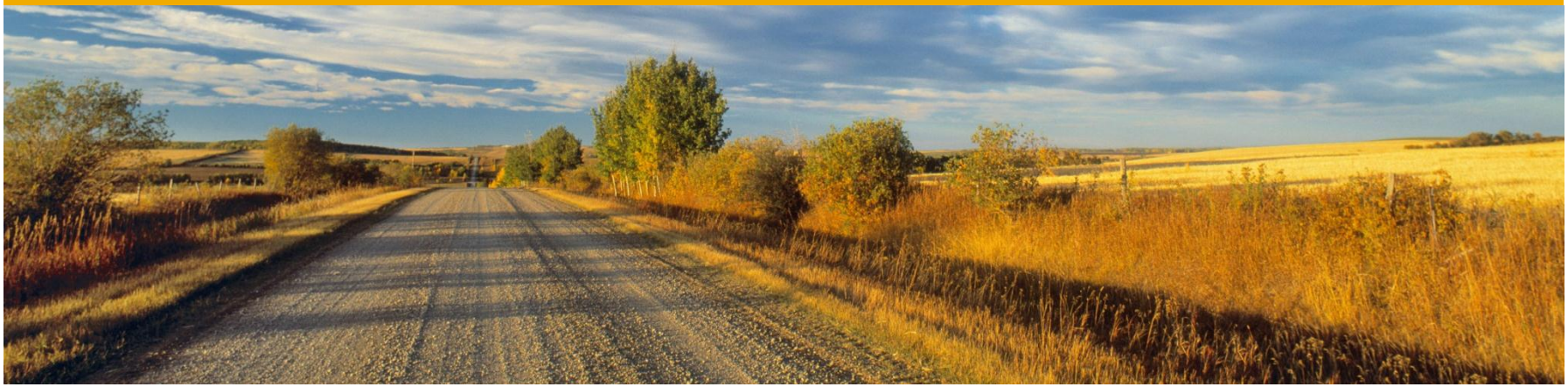


# Implementation

# Implementation
## Overview

1. CHECK_DELTA (optional)

2. CHECK (optional)

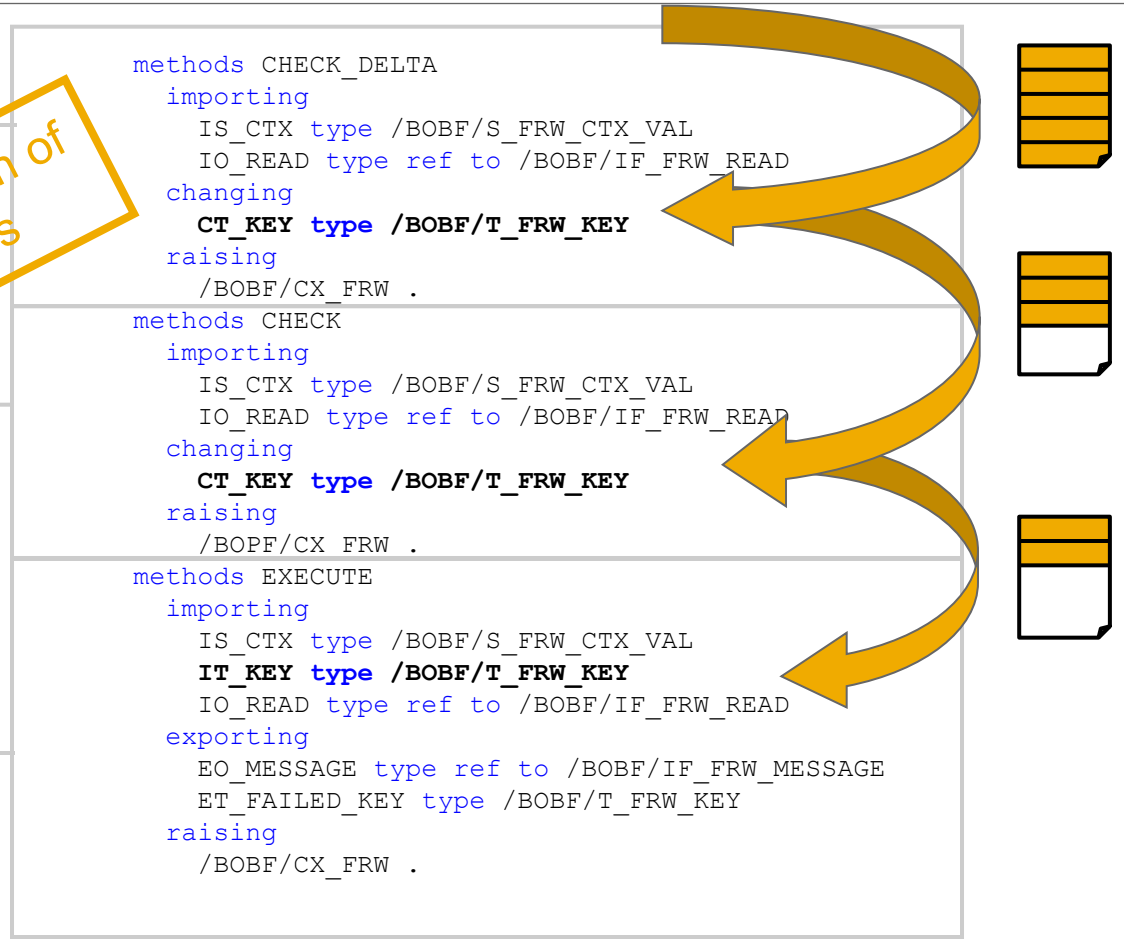
3. EXECUTE

Separation of Concerns

```
methods CHECK_DELTA
  importing
    IS_CTX type /BOBF/S_FRW_CTX_VAL
    IO_READ type ref to /BOBF/IF_FRW_READ
  changing
    CT_KEY type /BOBF/T_FRW_KEY
  raising
    /BOBF/CX_FRW .
```

```
methods CHECK
  importing
    IS_CTX type /BOBF/S_FRW_CTX_VAL
    IO_READ type ref to /BOBF/IF_FRW_READ
  changing
    CT_KEY type /BOBF/T_FRW_KEY
  raising
    /BOPF/CX_FRW .
```

```
methods EXECUTE
  importing
    IS_CTX type /BOBF/S_FRW_CTX_VAL
    IT_KEY type /BOBF/T_FRW_KEY
    IO_READ type ref to /BOBF/IF_FRW_READ
  exporting
    EO_MESSAGE type ref to /BOBF/IF_FRW_MESSAGE
    ET_FAILED_KEY type /BOBF/T_FRW_KEY
  raising
    /BOBF/CX_FRW .
```



A validation is realized by a class implementing the IF_FRW_VALIDATION interface. A validation gets a table of keys of all relevant node instances. Using sequential execution of the interface methods, this table is reduced to a relevant set of instances.

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# Implementation

## Method: CHECK_DELTA

```
methods CHECK_DELTA
  importing
    IS_CTX              type /BOBF/S_FRW_CTX_VAL
    IO_READ             type ref to /BOBF/IF_FRW_READ
  changing
    CT_KEY              type /BOBF/T_FRW_KEY
  raising
    /BOBF/CX_FRW .
```

The CHECK_DELTA method can be implemented to reduce the set of changed node instances (CT_KEY) on which the validation is executed. This helps to improve performance.

- Filter out the node instances that were not changed in a way that is relevant for the validation.
- **Example**: A change made to the amount attribute does not make that instance relevant for a currency code validation.
- **Hint**: The method is only called for consistency validations (**exception**: action validations for CREATE, UPDATE and DELETE).

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# Implementation
## Method: CHECK

```
methods CHECK
   importing
     IS_CTX          type /BOBF/S_FRW_CTX_VAL
     IO_READ         type ref to /BOBF/IF_FRW_READ
   changing
     CT_KEY          type /BOBF/T_FRW_KEY
   raising
     /BOBF/CX_FRW .
```

The CHECK method checks the relevance of the instances and removes irrelevant instances from CT_KEY.

- Unlike the CHECK_DELTA method, the semantics of instances is respected. Typically, the attributes of the instances are checked against special values in this method.
- **Example**: As long as the currency field is blank, there is no need to check the validity of the currency code.

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# Implementation
## Method: EXECUTE

```
methods EXECUTE
    importing
      IS_CTX                type /BOBF/S_FRW_CTX_VAL
      IT_KEY                type /BOBF/T_FRW_KEY
      IO_READ               type ref to /BOBF/IF_FRW_READ
    exporting
      EO_MESSAGE            type ref to /BOBF/IF_FRW_MESSAGE
      ET_FAILED_KEY         type /BOBF/T_FRW_KEY
    raising
      /BOBF/CX_FRW.
```

The EXECUTE method contains the main validation logic.

- IO_READ: Reference to an access object to access instance data
- EO_MESSAGE: Message object, for returning messages related to the validation
- ET_FAILED_KEY: Keys from the IT_KEY that do not match the validation criteria. If we implement an action validation, the corresponding action is not executed on items contained in ET_FAILED_KEYS (e.g. if the item quantity of one instance is negative).

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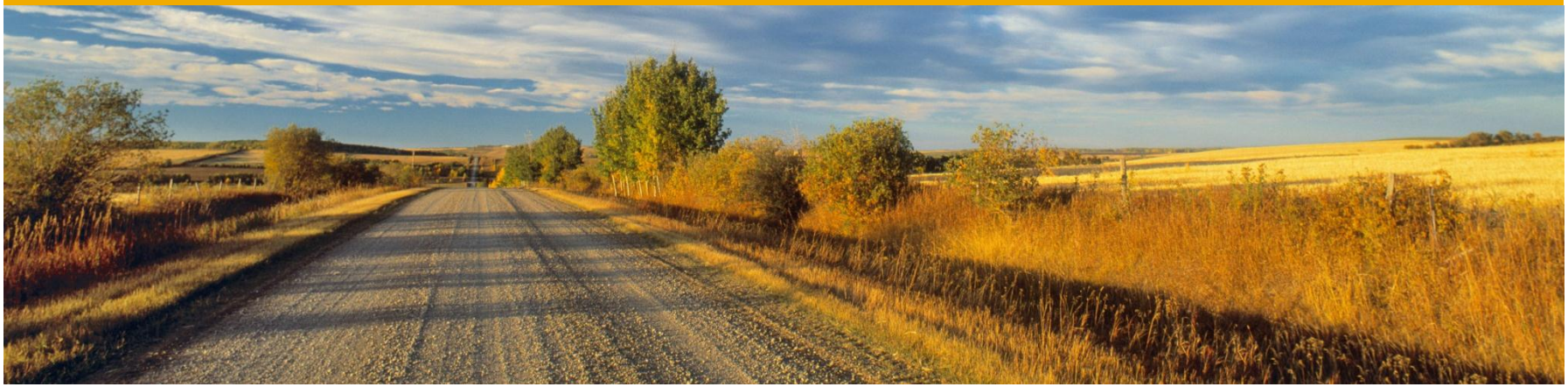
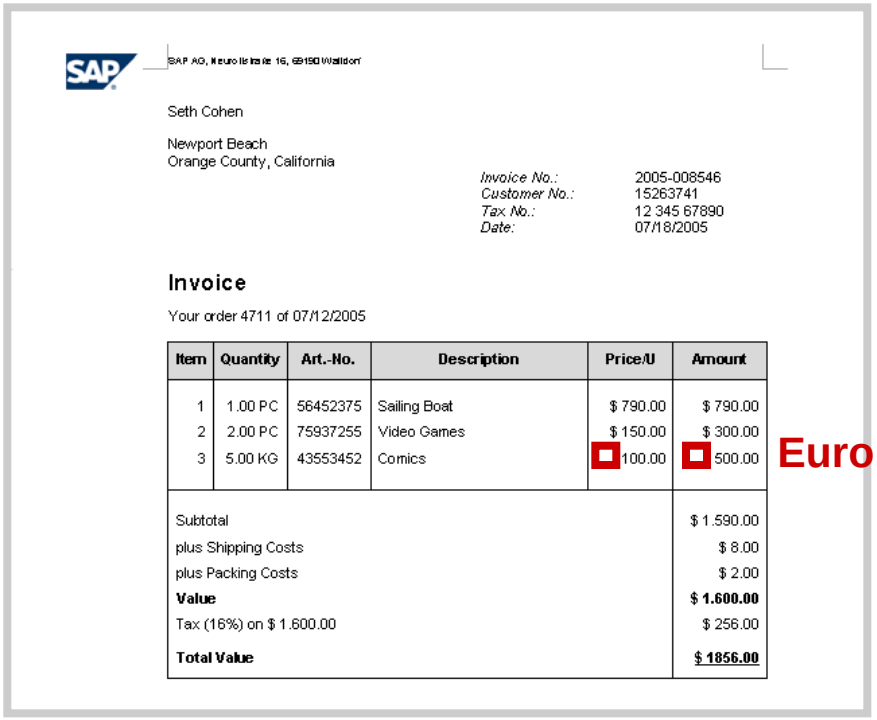


# Consistency Validations

# Consistency Validations



SAP AG, Neurottstraße 16, 69190 Walldorf

Seth Cohen

Newport Beach
Orange County, California

*Invoice No.:* 2005-008546
*Customer No.:* 15263741
*Tax No.:* 12 345 67890
*Date:* 07/18/2005

**Invoice**

Your order 4711 of 07/12/2005

| Item | Quantity | Art.-No. | Description | Price/U | Amount |
|---|---|---|---|---|---|
| 1 | 1.00 PC | 56452375 | Sailing Boat | $ 790.00 | $ 790.00 |
| 2 | 2.00 PC | 75937255 | Video Games | $ 150.00 | $ 300.00 |
| 3 | 5.00 KG | 43553452 | Comics | 100.00 | 500.00 |

| | |
|---|---|
| Subtotal | $ 1.590.00 |
| plus Shipping Costs | $ 8.00 |
| plus Packing Costs | $ 2.00 |
| **Value** | **$ 1.600.00** |
| Tax (16%) on $ 1.600.00 | $ 256.00 |
| **Total Value** | **$ 1856.00** |

**Euro, dollar, … ?**

## Motivation for consistency validation

- Consistency validations check whether a node instance is consistent with respect to the consistency criteria imposed by the business requirements.
- **Example**: If the node instance `ITEM` has the attribute `PRICE_AMOUNT` specified, but the attribute `PRICE_CURR_CODE` is initial, the node instance is inconsistent.

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# Consistency Validations

Consistency validations check the consistency of node instances.

Consistency validations only return error messages and the keys of the failed instances (i.e. instances that do not match the consistency criteria).

Consistency validations can be configured to be executed at the following times:

- If a consumer executes a check and the request node of the consistency validation is in the check scope (e.g. check or check & determine).
- If there a change is made to the request node of the consistency validation (e.g. create, update, delete).
- If a consistency group that contains this consistency validation is executed.

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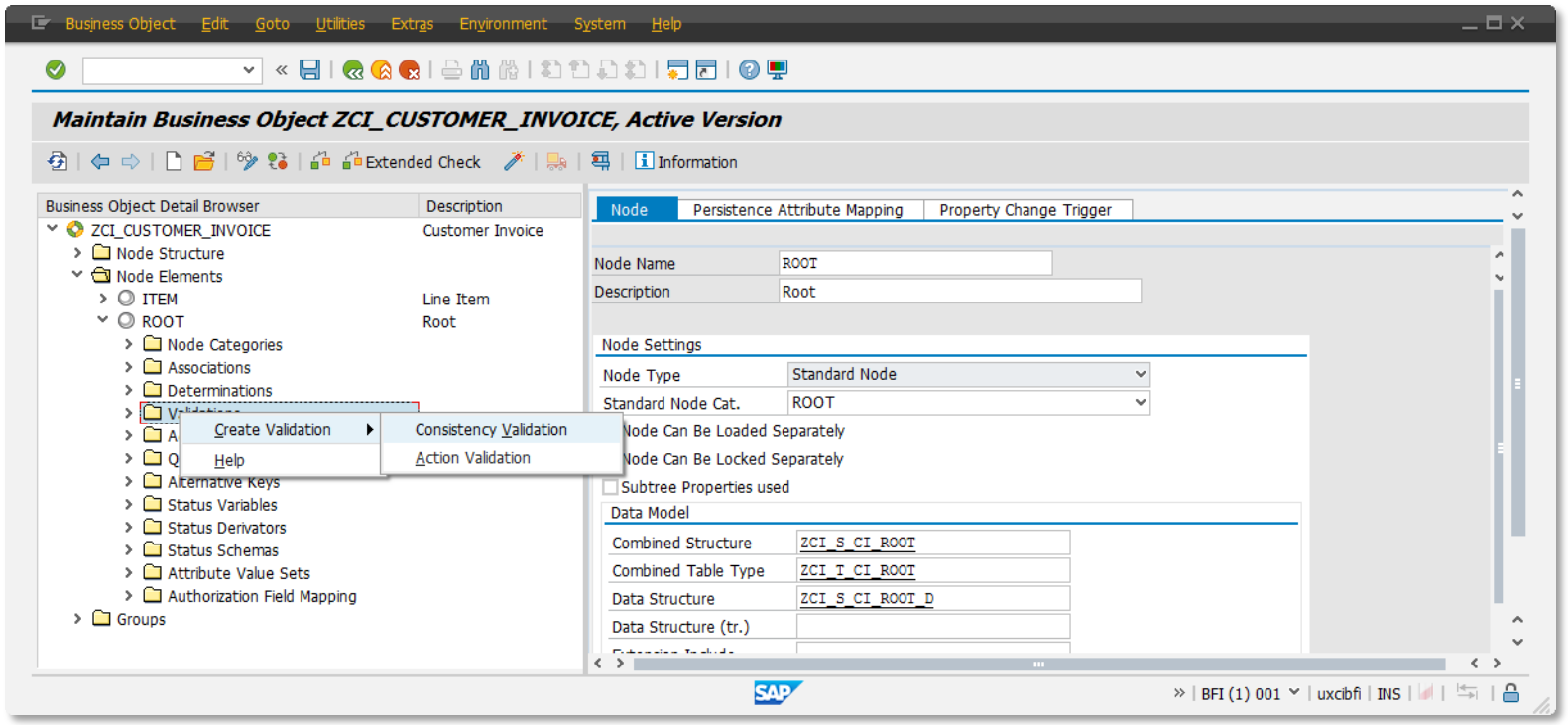
# Consistency Validations

## How to Create Them




The guided procedure starts automatically after a consistency validation is created, or can be executed afterwards from the context menu.

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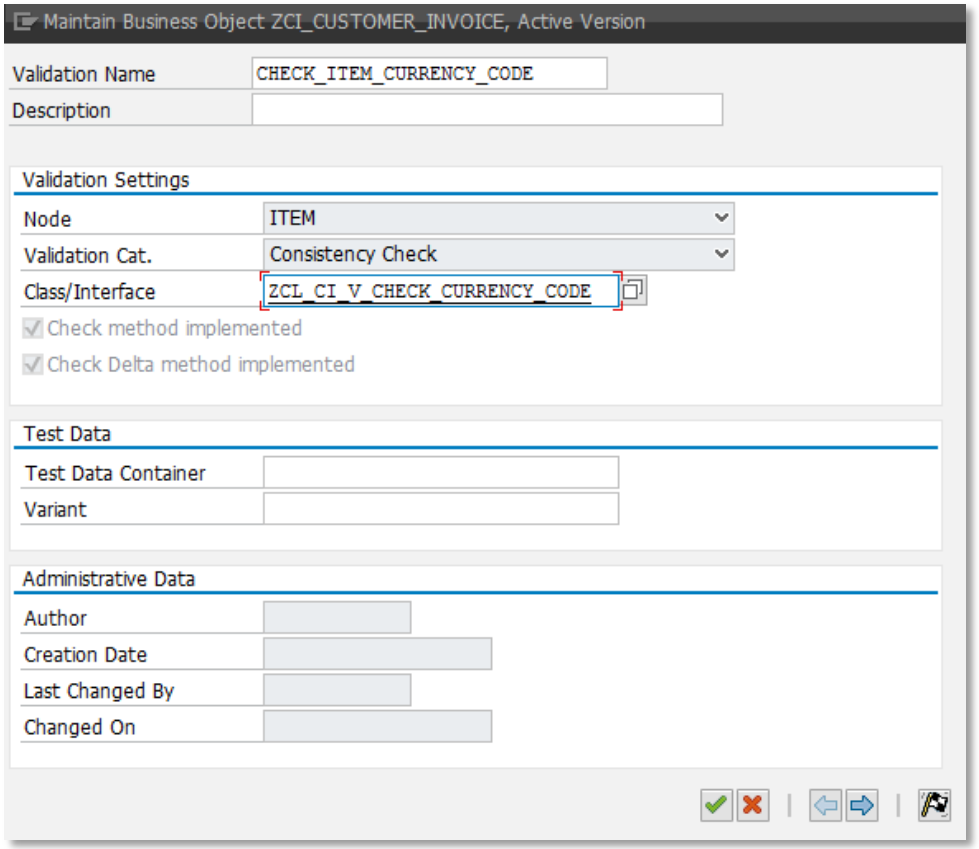
# Consistency Validations

## Configuration




Define a name, description, and implementing class (the implementing class can be created from this screen using forward navigation).

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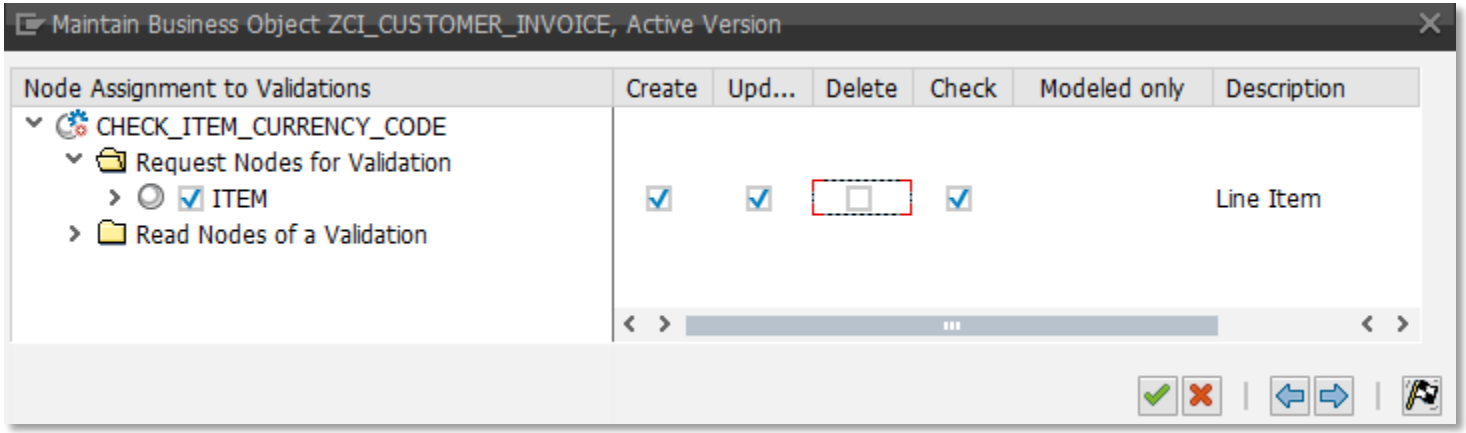
# Consistency Validations

## Request Nodes




**Define the request node and trigger condition:**

- **Request Node**: Node that triggers the validation execution if the trigger condition is fulfilled.
- **Request Condition**: Defines which kind of operation of a request node's instance triggers the validation execution. This can be triggered by a change of data (create, update, delete) or by the user executing a check on the request node.

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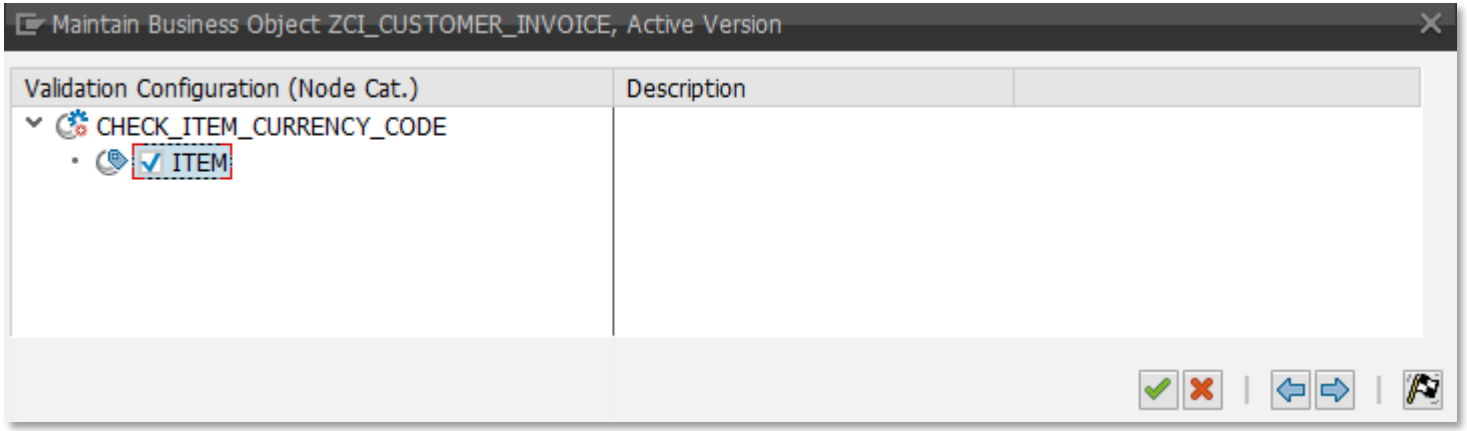
# Consistency Validations

## Node Category Assignment




Activate the validation for an existing node category.

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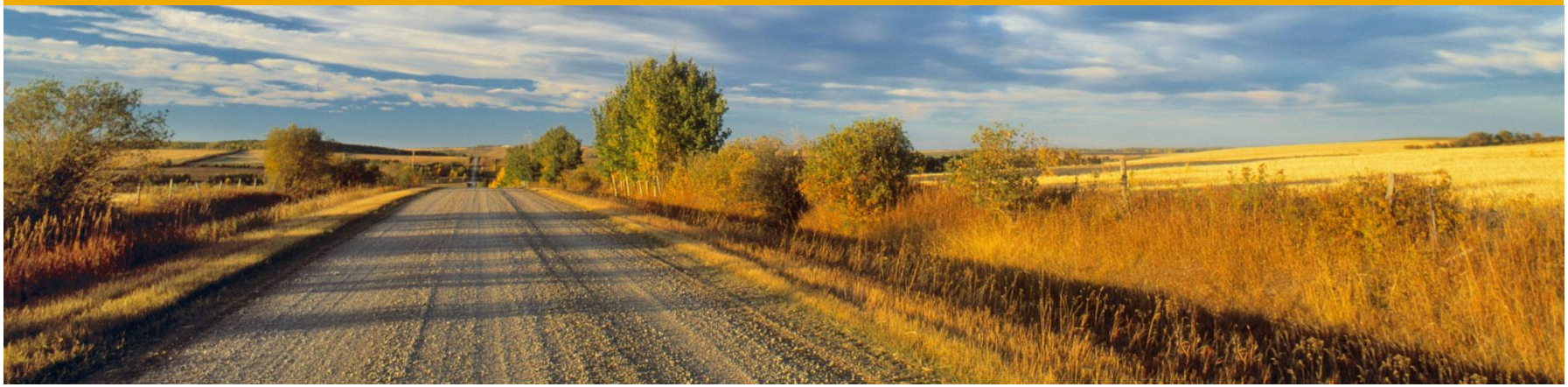
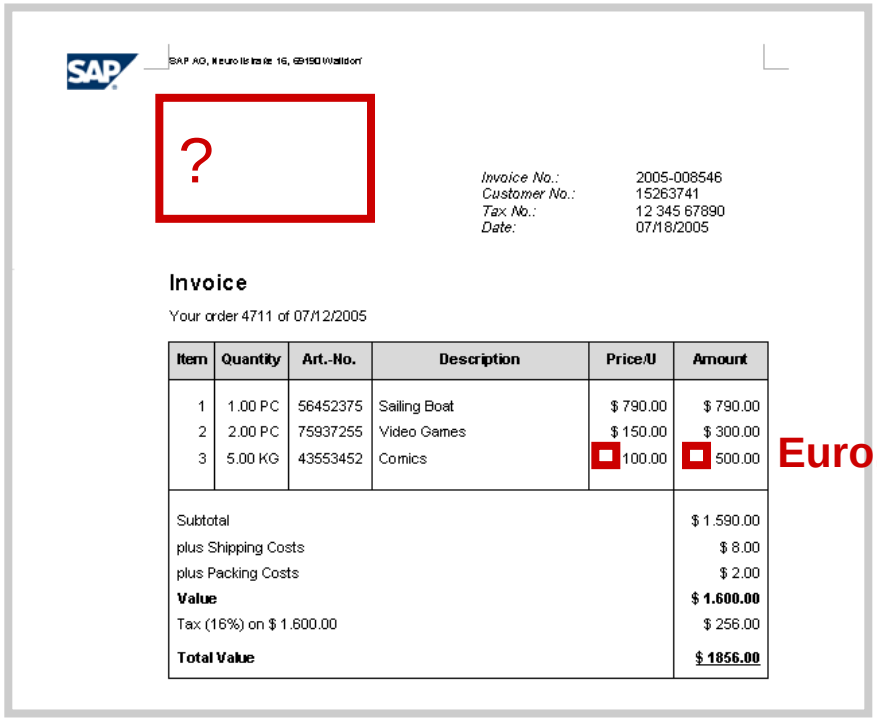


# Consistency Groups

# Consistency Groups
## Motivation




**Euro, dollar, … ?**

### Motivation for Consistency Groups

- Only the instances of the invoice business object that are in a consistent state are to be saved.
- **Example**: If there is no currency code, the invoice cannot be saved.

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# Consistency Groups

## Motivation

### Consistency groups contains a set of:

- **Consistency validations**: Only their failed keys are evaluated; messages are not relevant.
- **Delegated nodes**: Their error messages are evaluated (more about delegated nodes is described in *BS-BOPF Extended Training*).

### General properties of consistency groups

- The contained consistency validations are still executed if their trigger condition is met (regardless of which consistency group they belong to).
- If a consistency group is executed, each group "member" is executed.

### Consistency groups are either used to…

- **Prevent inconsistent BO instances from being saved** (described in Basic Training here)
  To reuse consistency validations (to prevent inconsistent instances from being saved), consistency groups can be used.
  If at least one failed key is returned from a validation of a group, no saves are possible.
- **Or to set a consistency status** (described in BS-BOPF Extended Training)
  Saves are not prevented, but a status variable is set instead.

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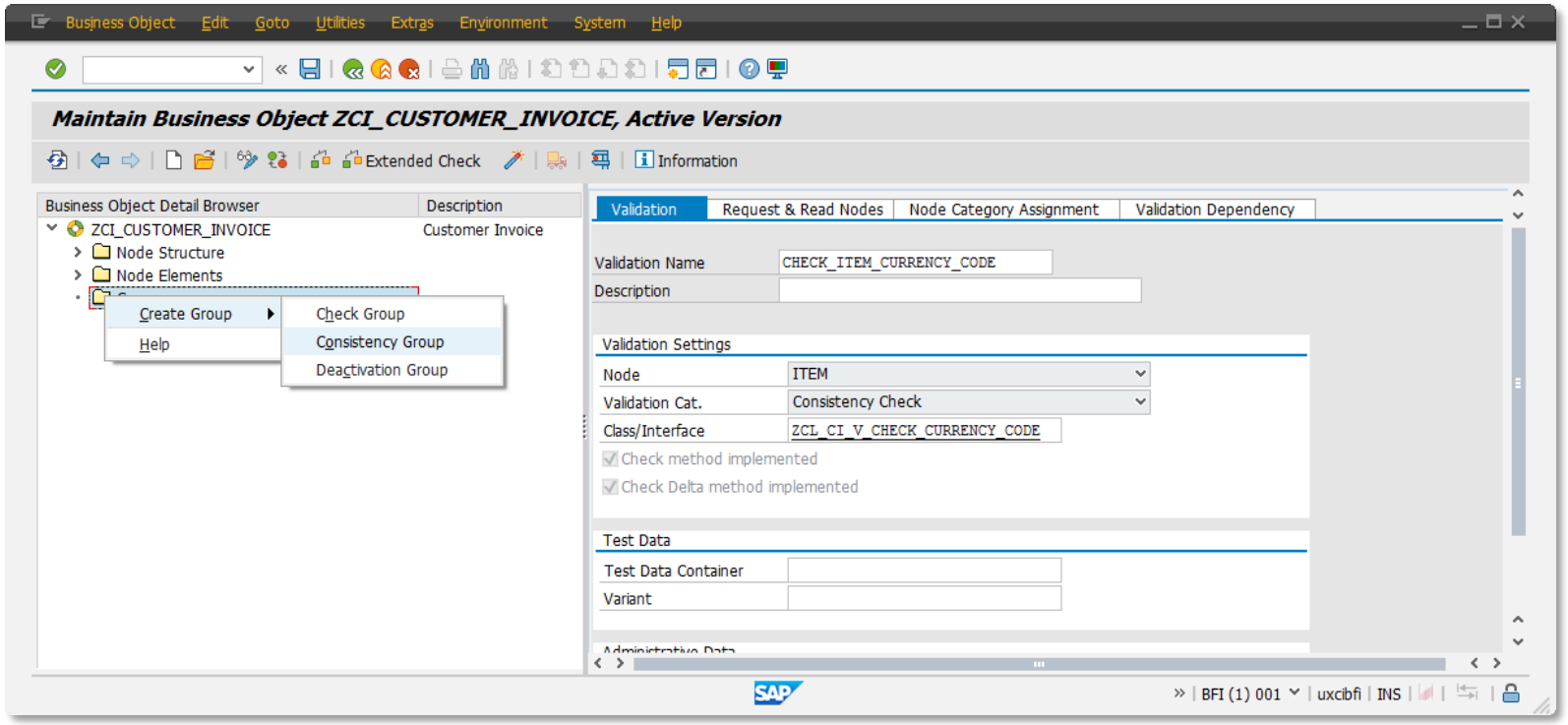
# Consistency Groups

## How to Create Them




Consistency groups are created using a context menu entry.

Afterwards the guided procedure for configuration starts automatically.

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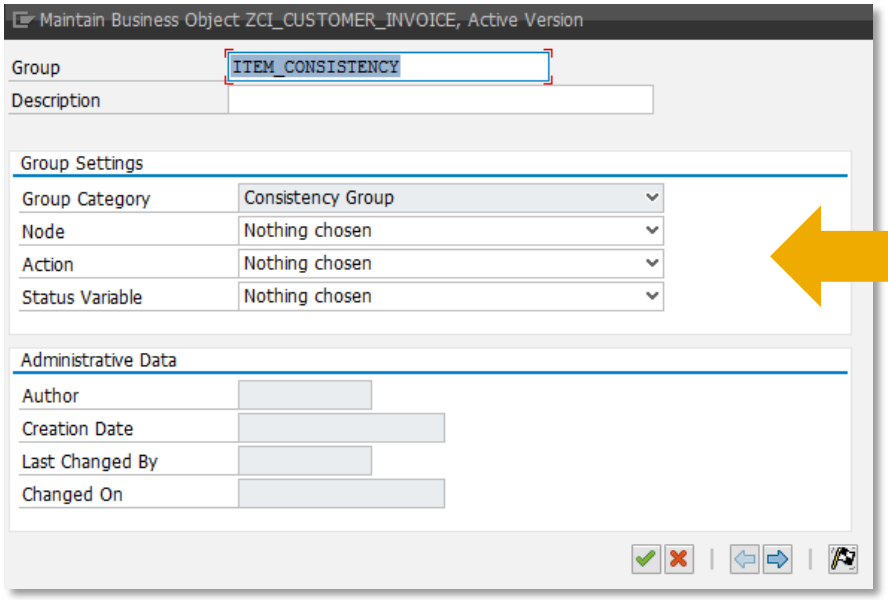
# Consistency Groups
## Configuration




Keep these fields empty to define a consistency group that prevents saves.

- Start the guided procedure.
- Enter a name and description for the group.

**Important**: Since the consistency group must prevent saves and not set a consistency status, the fields “ Node”, “ Action”, “ Status Attr. Name”, and “ Status Variable” must stay blank.

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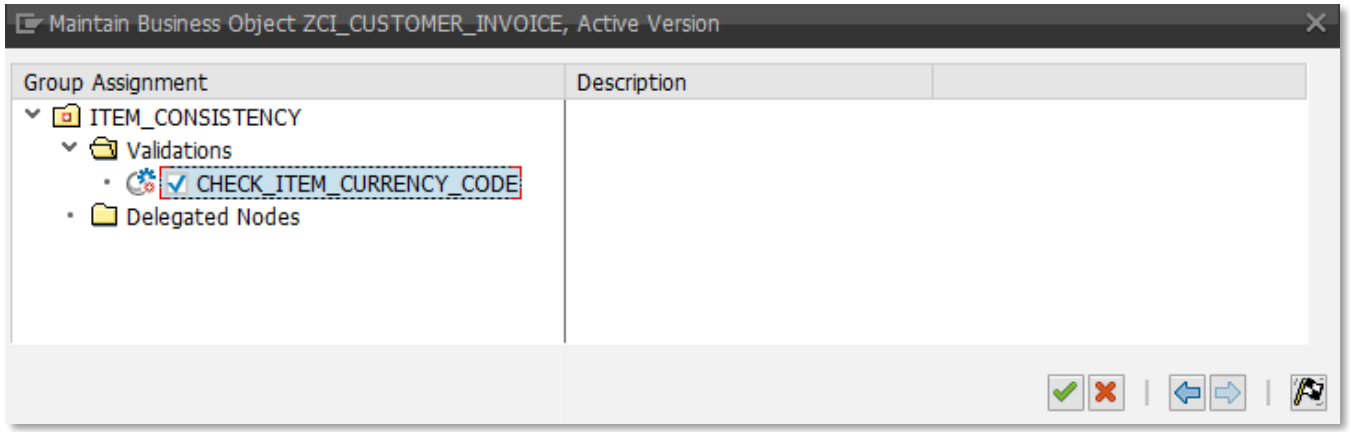
# Consistency Groups
## Configuration




Assign the consistency validations that are to be part of this group.

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# Overview
## Examples of Validation Configurations

| | **Execution of Check Core Service** | **Before a certain Action is executed** (action is not executed for instances failing the validation) | **Before a Modification is executed by the framework** (modifications are rejected in case of failing the validation) | **Immediately after a Modification has been executed by the framework** (no modification rejection, only messages can be returned) | **At Save** (save rejected in case of failing the validation) |
|---|---|---|---|---|---|
| **Action Validation** (configured to an own action) | | X | | | |
| **Action Validation** (configured to Create/ Update/Delete) | | | X | | |
| **Action Validation*** (configured to Save) | | | | | X |
| **Action Validation** (configured to Create/ Update/ Delete and Save) | | | X | | X |
| **Consistency Validation**** (not member of a group) | | | | X | |
| **Consistency Validation***** (which is member of a Save Preventing Consistency Group) | | | | X | X |
| **Consistency Validation** (configured to Check and Save) | X | | | | X |

*) Ensures consistent persisted instance data
**) Usability advantage as user can always save and leave the application (e.g. go for lunch), but allows to persist inconsistent data
***) Validations are executed twice which might cause performance issues for very expensive validations.

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