

ABAP Part III

Lesson 05: Enhancement and Modification

Lesson Objectives



After completing this lesson, participants will be able to understand-

- Changing the SAP Standard System
- Personalization
- Enhancements to ABAP Dictionary Elements
- Enhancements Using Customer Exits
- Business Transaction Events
- Business Add-Ins
- SAP Modifications
- Enhancement Framework





SAP System provides a comprehensive infrastructure for business computing.

To streamline the business processes some modifications may be done to the standards

For a specific environment, the functions provided can be enhanced, modified or reduced.

When making changes to the SAP standard, first determine which type of modification suits best.

Introduction



R/3 Business
Applications
(SAP-Standard)

Exits
Add-Ins

Customer
Programs

Customizing

Personalization

Modification

Enhancement
Business Add-Ins

Customer
Development

Accelerated SAP

ABAP Workbench



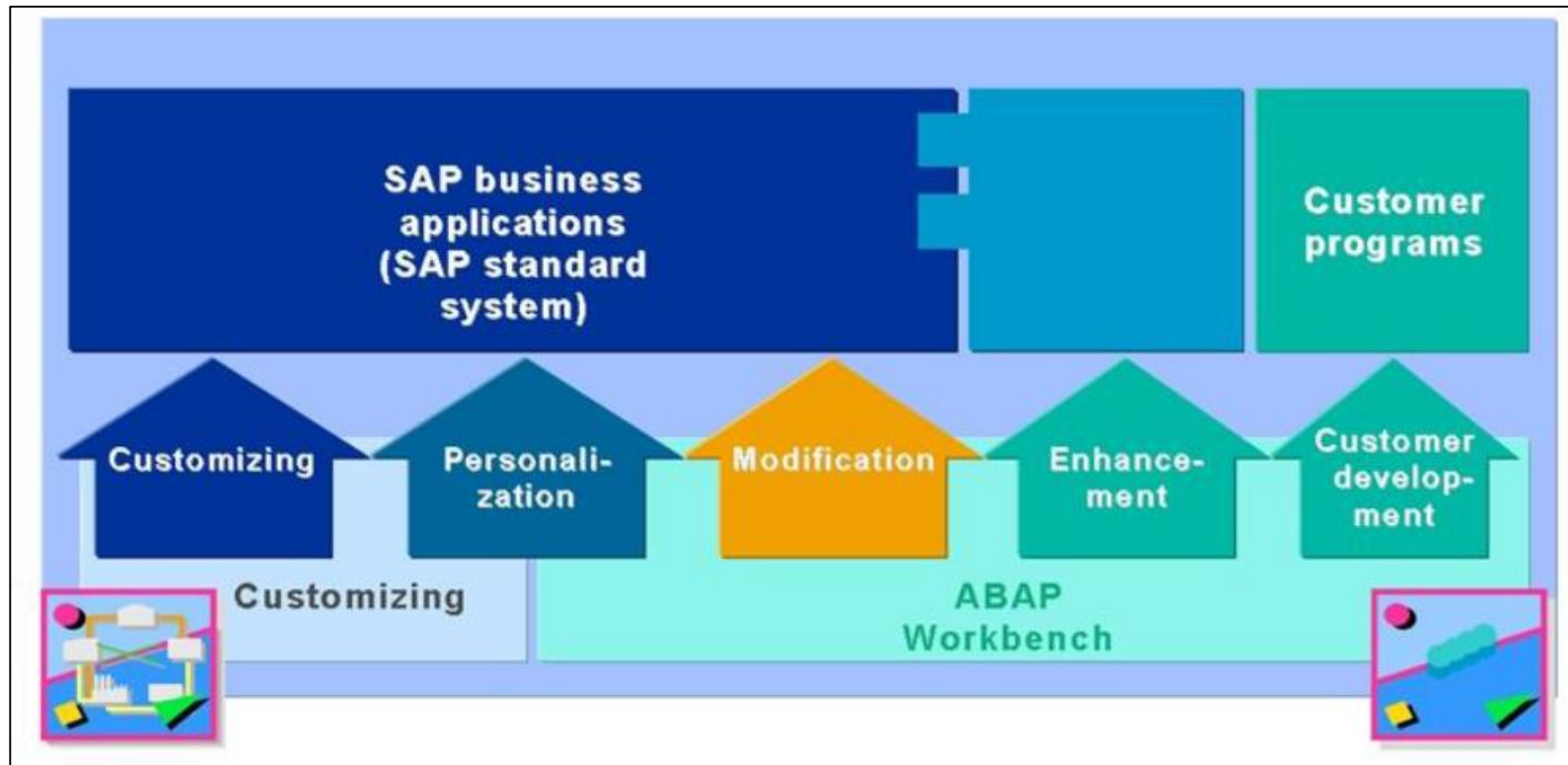
- There are several ways for modifying a SAP standard.
- R/3 system can be adjusted to meet the customer needs in different ways
 - Customizing
 - Personalization
 - Modifications
 - Enhancements
 - Customer Development

Changing the SAP Standard System



Customizing and most personalization are achieved using the tools found in the Business Engineer.

Customer developments, enhancements, and modifications are all made using the tools available in the ABAP Workbench





You can adjust the SAP R/3 Enterprise to meet your needs in the following ways:

- Customizing: Set up specific business processes and functions for your system according to an implementation guide. The need for these changes has Already been foreseen by SAP and an implementation procedure has been developed.
- Personalization: Make changes to the global display attributes of particular fields, which means to set the default values or hide fields, as well as create user-specific menu sequences.
- Modifications: Signifies the changes to the SAP repository objects made at the customer site. If SAP delivers a changed version of the object, the Customer's system must be adjusted to reflect these changes. Prior to Release 4.0B, these adjustments had to be made manually using upgrade utilities. From Release 4.5A, this procedure has been automated with the Modification Assistant.

Changing the SAP Standard System



- Enhancements: Create the repository objects for individual customers, which indicate the objects that already exist in the SAP repository.
- Customer Developments: Create repository objects unique to individual customers in a specific namespace reserved for new customer objects.

Changing the SAP Standard System

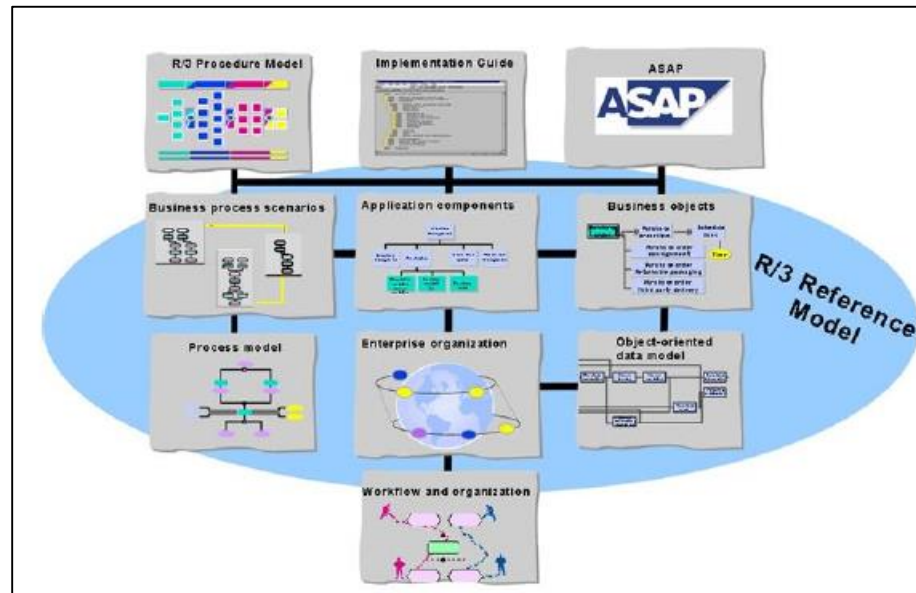


Customization in Change Levels

The Business Engineer is made up of all SAP implementation tools.

These include:

- 1.The SAP R/3 Reference Model - Contains all the models used to describe SAP R/3 Enterprise including the process model, data model, and organization model)
- 2.The Implementation Guide (IMG) - A complete list of all customizing changes





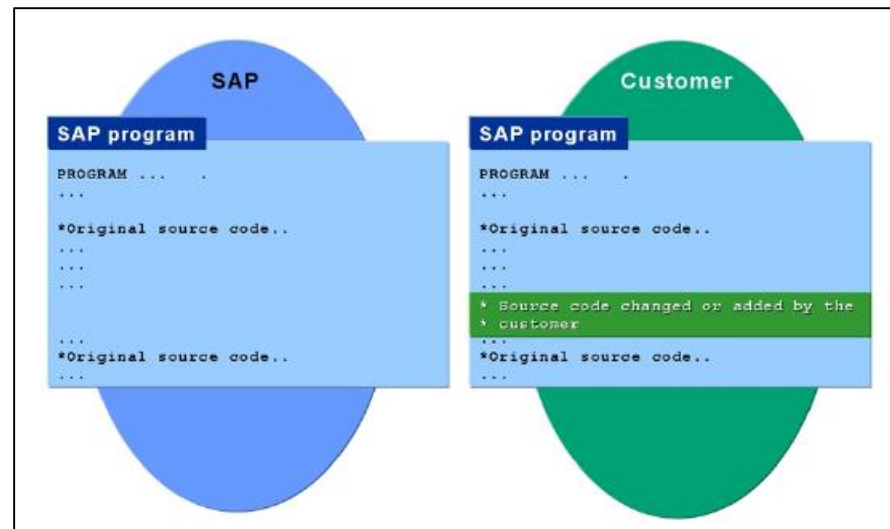
Personalization in Change Levels

- Personalization accelerates and simplifies how business cases are processed by SAP R/3 Enterprise. During personalization, individual application transactions are adjusted to meet the business needs of your company as a whole or even to the needs of specific user groups within your company.
- Unnecessary information and functions in the transaction are switched off.



Modification in Change Levels

- 1. Any change that you make in your system to an object that has been delivered by SAP is known as a modification.
- 2. Modifications can lead to complications at upgrade.
- 3. When SAP delivers a new version of the object, you must decide whether the new object should be used or you want to continue using your old object.



What is Customizing?



Customizing is the setting of system parameters via SAP's own interface.

Possible changes to the standards have been thought out and organized by SAP.

Customizing is an obligatory part of the R/3 implementation process.

Customizing (Contd.).



If a company has decided to implement the SAP System, they must adopt the software to meet their individual business requirements

This process of customizing the system can be controlled and accelerated using the Accelerated SAP method.

The term Customizing refers to the process of system configuration during which the members of the project teams make the required system settings.

In the SAP System, Customizing activities are performed through the Implementation Guide (IMG). SPRO T-Code

Customizing (Contd.).



- Customizing supports the project teams in the following situations:
 - Implementing the SAP System
 - Enhancing the SAP System
 - in release and system upgrades

Functions of Customizing



- Customizing provides the following functions:
 - Tools for making and documenting system settings
 - Recommendations for system settings
 - Customizing provides a means for controlling the management, editing and analyzing the processes of implementation and upgrade projects
 - Support for transferring the system settings from the test system into the production system
 - Support for transferring the system settings by means of Business Configuration Sets in a group rollout
 - Tools for system upgrades and release upgrades and Pre-configured industry systems

Personalization



- Personalization means to adjust the SAP System to meet the work requirements of specific users or user groups.
- Personalization is aimed at accelerating and simplifying the business transactions that the SAP System processes.
- Based on the "What you see is what you need" slogan, application Personalization refers to two sub-areas:
 - Simplifying navigation
 - Simplifying transactions

Personalization - Simplifying Navigation



- The standard point of entry into the system is the SAP Easy Access user menu.
- Each user of the SAP System can be assigned a user menu tailored to the individual activities of that user that appears when the user logs on to the system.
- System administrators can choose from more than 1200 pre-defined standard roles and assign these roles to one, several or all users of a company.

Personalization - Simplifying Transactions



- Menus and the transactions of the SAP System can be adjusted to the business environment of the company.
- In many cases, the fields and options contained in the standard transactions are not needed for specific process flows.
- Besides other tools, transaction and screen variants are used to adjust the transactions of the SAP System.
- Transaction and screen variants are used to:
 - Hide fields and even entire screens
 - Pre-assign values to fields
 - Change the ready for input status of fields
 - Change the properties of table control columns and hide specific columns
 - Hide menu options



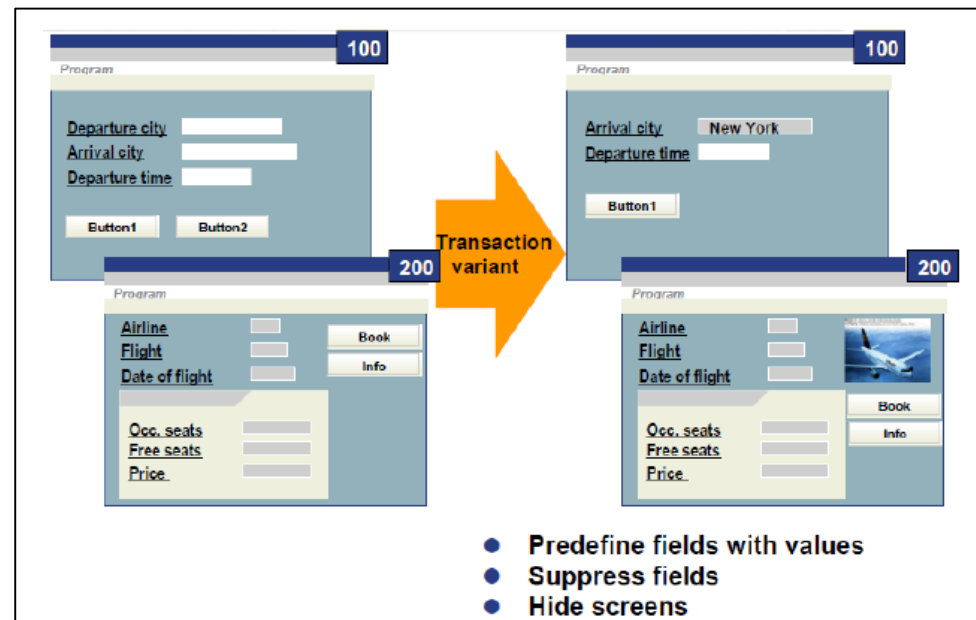
Transaction Variants: Objectives

- **1.** Simplify system by suppressing functions that are not required
 - Predefine fields
 - Revoke ready for input status
 - Suppress screen elements that are not needed (fields, subscreens, screens)
- **2.** Different scope:
 - System: Global fixed values
 - Transaction: Transaction variants
 - Standard variants or individual variants
 - WYSIWYG maintenance with special recording function



Transaction Variants: Example

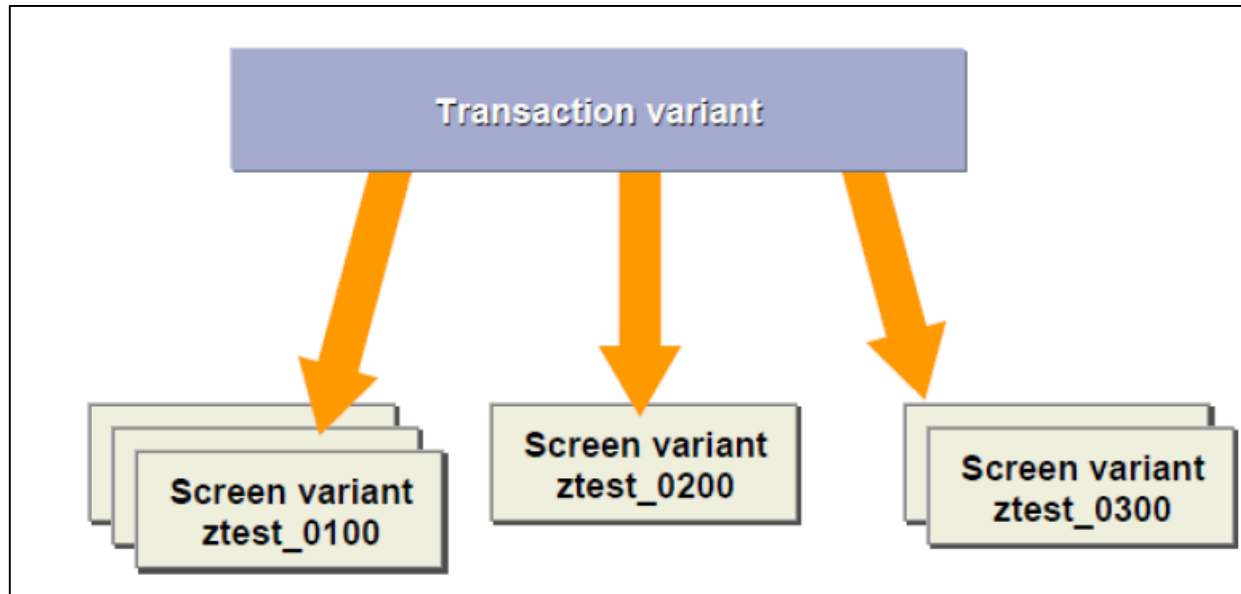
- 1. In this example you see two screens of an SAP transaction that should be redesigned using a transaction variant.
- 2. Screen 100 is changed as follows: Fields are hidden; field attributes are changed; buttons are hidden.
- 3. Screen 200 shows the following changes: buttons moved and screen inserted (with GuiXT).





Transaction Variants: Principle

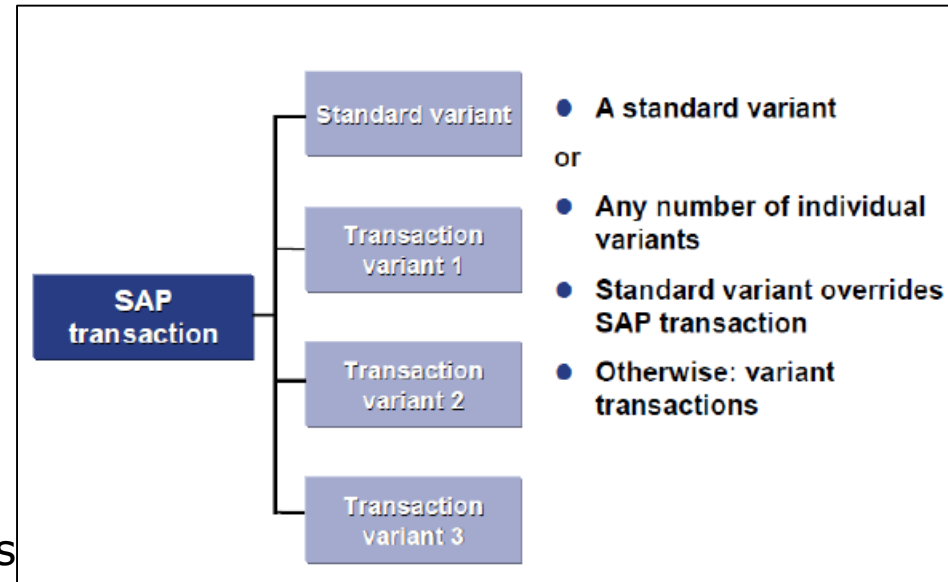
- 1. A transaction variant is a reference to a set of screen variants.
- 2. You can create any number of screen variants for a screen. The transaction variant consists of these screen variants.





Transaction Variants: Options

- 1.You can create different kinds of transaction variants for an SAP transaction:
 - A standard variant
 - Any number of "normal" transaction variants
- 2.The standard variant is executed at runtime instead of the SAP delivered transaction. No new transaction code is required.
- 3.A normal transaction variant will be called with its own transaction code of type "variant transaction".





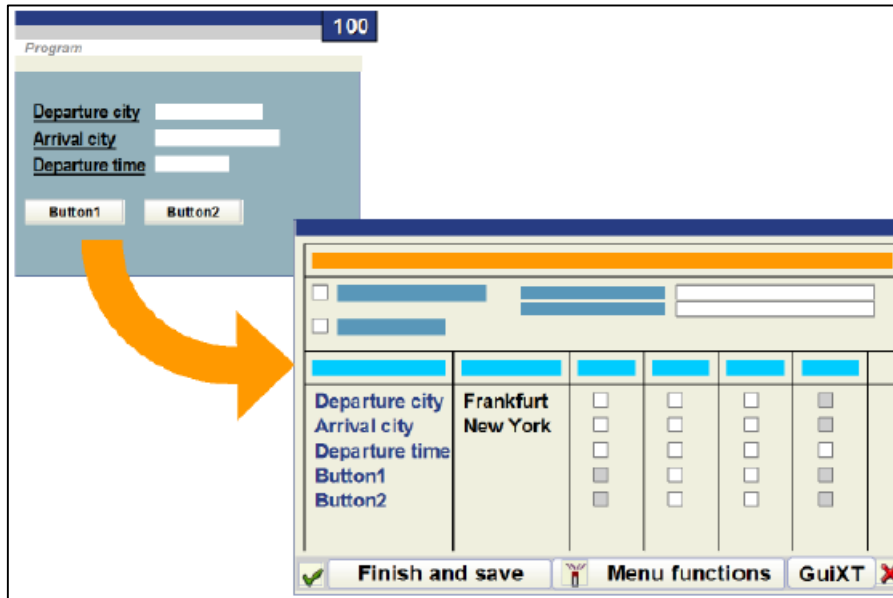
Creating Transaction Variants

- 1. Tools -> AcceleratedSAP -> Personalization -> Transaction variants
- 2. To create transaction variants, choose the component *Personalization* from the entry *AcceleratedSAP* in the *SAP* menu and then *Transaction variant*. You go to the transaction for maintaining transaction variants.
- 3. Enter the name of the transaction from which you want to create a variant. The name of the variant must be unique in the system and be in the customer namespace.
- 4. With the menu option *Goto*, choose whether you want to create a client-specific or a cross-client transaction variant.
- 5. To create the variant

The screenshot shows the SAP 'Transaction variants' maintenance screen. It features a title bar at the top labeled 'Transaction variants'. Below the title bar, there are two input fields: 'Transaction' and 'Variant'. To the right of these fields is a toolbar containing a 'Create' button. Three yellow callout boxes with arrows point to the 'Transaction' field, the 'Variant' field, and the 'Create' button, with labels 'Transaction name', 'Variant name', and 'Create' respectively.

application toolbar.

Transaction Variants: Evaluating Fields



Program 100

Departure city

Arrival city

Departure time

Button1 Button2

Departure city	Frankfurt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arrival city	New York	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Departure time		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Button1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Button2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Finish and save Menu functions GuiXT



Screen Variants

- 1. A screen variant is an independent Repository object, which has a unique name in the system. The name is constructed as follows:
 - Variant name
 - Client (only for client-specific transaction variants)
 - Screen number
- 2. Here you specify whether or not field contents should be copied to the screen variant. You can set various attributes for the individual fields: You can undo or hide the input status of a field. You can find a detailed list of options in the online documentation about transaction variants.

The screenshot shows a configuration window for a screen variant. It includes a table for field attributes and a bottom bar with action buttons. Callouts point to specific elements:

- Screen variant name:** Points to the top text field.
- Description:** Points to the second text field.
- Set field attributes:** Points to the table of field attributes.
- Deactivate menu functions:** Points to the 'Menu functions' button.

Departure city	Frankfurt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arrival city	New York	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Departure time		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Button1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Button2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bottom bar: ☒ Finish and save | Menu functions | ☒ GuiXT

Demo: Create a transaction variant



Enhancements to ABAP Dictionary Element



- Following enhancement techniques are available to Enhance ABAP Dictionary elements
- Add custom fields to SAP tables without modifications using,
 - Append Structure
 - CI Include
- Text enhancements to Change the field label and documentation of data element.
- Create secondary indexes for SAP tables without making modifications using Extension Index.
- Add additional fixed values to SAP domains without making modifications using Fixed Value Append.

Note: Enhancement techniques 3 & 4 are available In SAP NetWeaver 7.0.

Enhancements to ABAP Dictionary Element

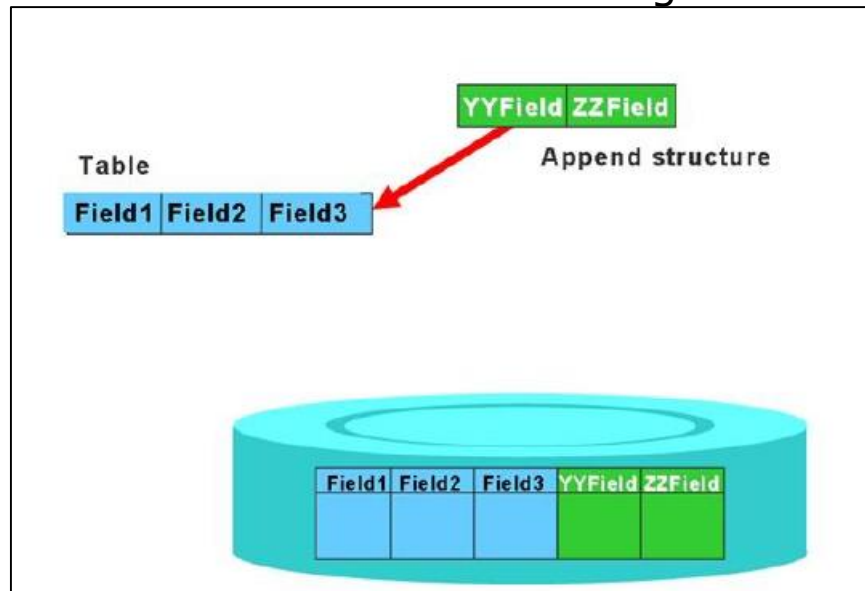


- There are two ways that you can add extra fields to an SAP table without a modification:
 - Append structure
 - Created in Customer Namespace
 - Customers can create an append structure for an SAP table (without SAP preparation)
 - Multiple append structures can be used with a single SAP table
 - They can be used in the same way as normal structures in programs
 - Customizing include
 - Is already integrated into SAP tables by SAP
 - The customer fills it with the desired additional fields
 - May contain source code or screen exits provided by SAP for processing or displaying the fields



Append Structures

- Append structures allow you to attach fields to a table without the need to modify the table itself.
- If you copy a table that has an append structure attached to it, the fields in the append structure become normal fields in the target table.



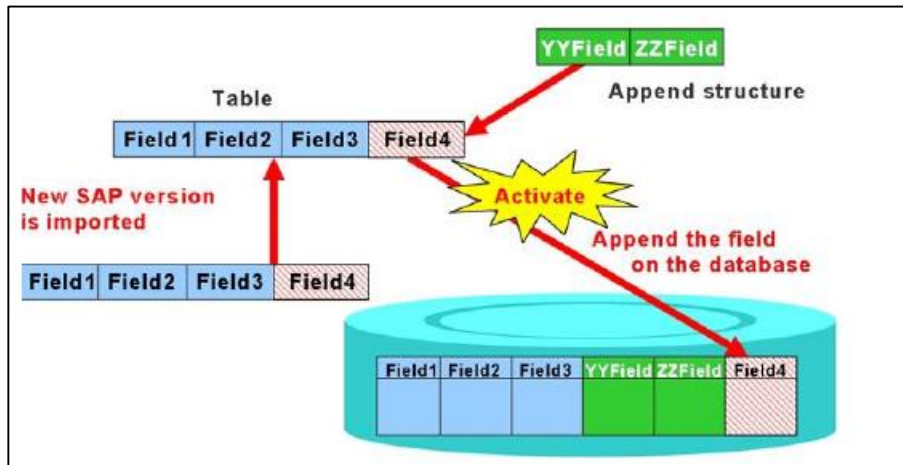


- Append Structures at Upgrade
 - You create append structures in the customer namespace. This protects them from being overwritten at upgrade or during release upgrade.
 - New versions of standard tables are loaded during upgrades. The fields contained in the active append structures are then appended to the new standard tables when these new standard tables are activated for the first time.
 - From Release 3.0, the field sequence in the ABAP Dictionary can differ from the field sequence in the database. As a result, no conversion of the database table is required when adding an append structure or inserting fields into an existing one.
 - All the necessary structure adjustment is taken care of automatically when you adjust the database catalog, ALTER TABLE.

Enhancements to ABAP Dictionary Element



- Append Structures at Upgrade



Demo: Append Structure



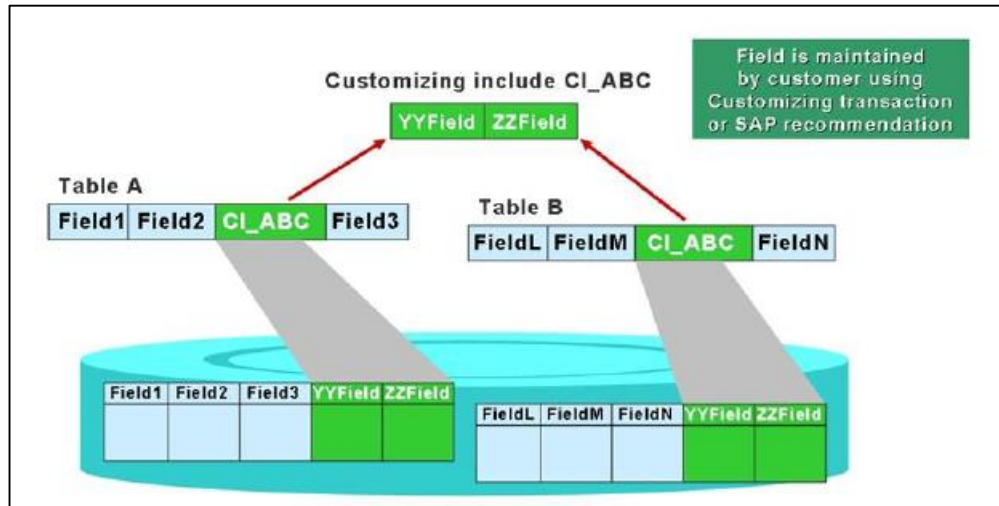


- Customizing includes
 - Some of the tables and structures delivered with the R/3 standard contain special include statements: These are known as Customizing includes.
 - Customizing includes are part of the customer namespace, and their names start with "CI_". This naming convention guarantees that nonexistent Customizing includes do not lead to errors.
 - The Customizing include field names must lie in the customer namespace just like field names in append structures. These names must all begin with either "YY" or "ZZ".
 - In contrast to append structures, Customizing includes can be inserted into more than one table. This provides for data consistency throughout the tables and structures affected whenever the include is altered.

Enhancements to ABAP Dictionary Element



- Customizing includes



Demo: Customizing Includes

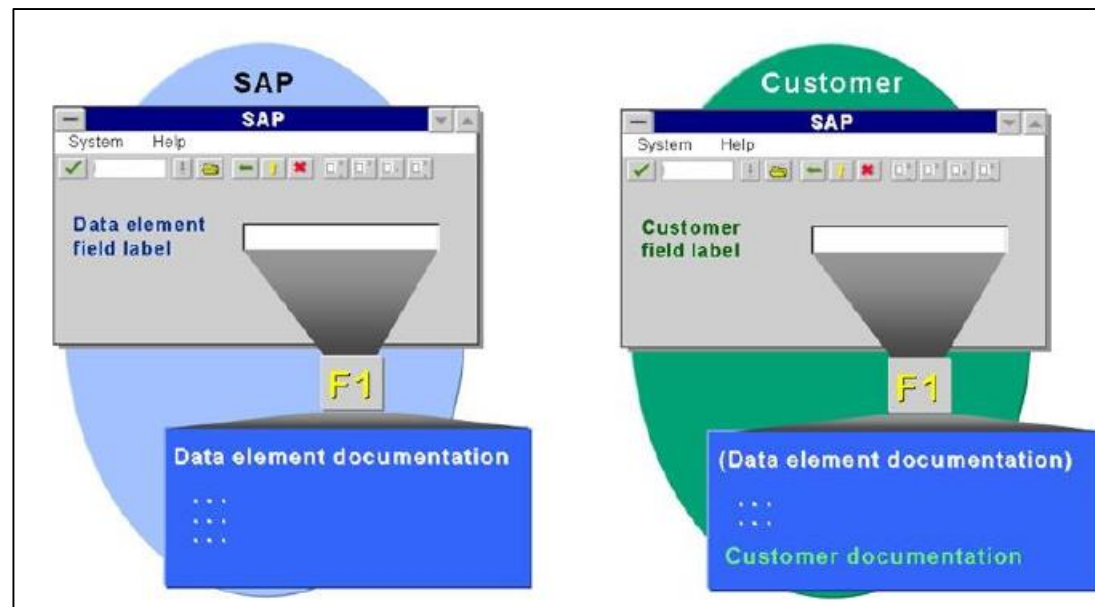


Enhancements to ABAP Dictionary Element



■ Text Enhancements: Overview

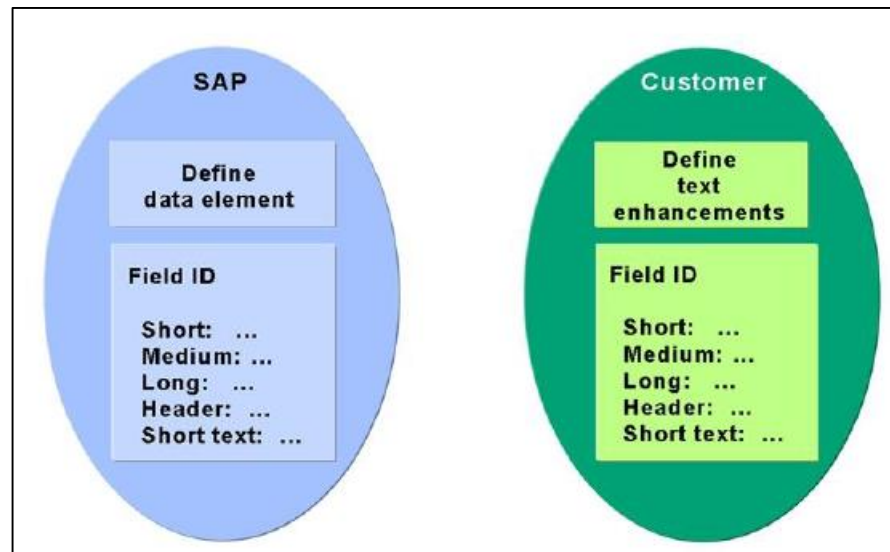
- Possible text enhancements include “Customer keywords” and “Customer documentation” of data elements.
- Text enhancements differ from other application enhancements in that they take effect globally in all the related SAP applications after activation (Global enhancements)



Enhancements to ABAP Dictionary Element



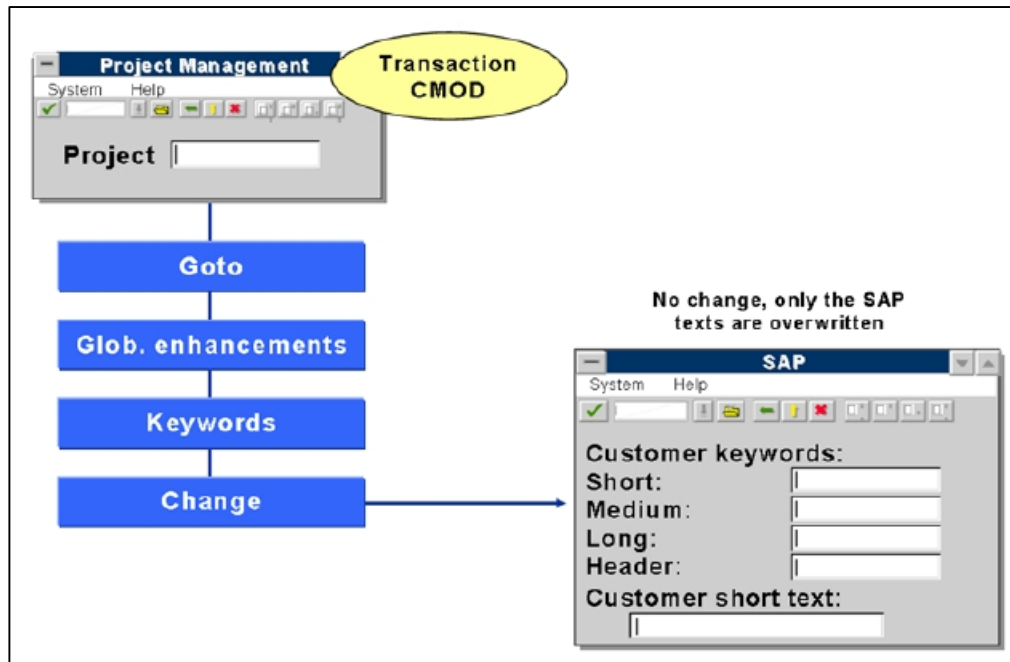
- **Overwriting SAP Field Labels (Keywords)**
 - SAP application programmers define keywords in different lengths and provide a short description for each data element.
 - Use the project management function to change these keywords and short text.
 - All the screen fields that use the keyword text of data elements can be renamed in this way.



Enhancements to ABAP Dictionary Element



- Overwriting SAP Field Labels (Keywords)
 - To edit the text elements in project management, choose ABAP Workbench→ Utilities→ Enhancements→ Project management.



Demo: Overwriting SAP field labels

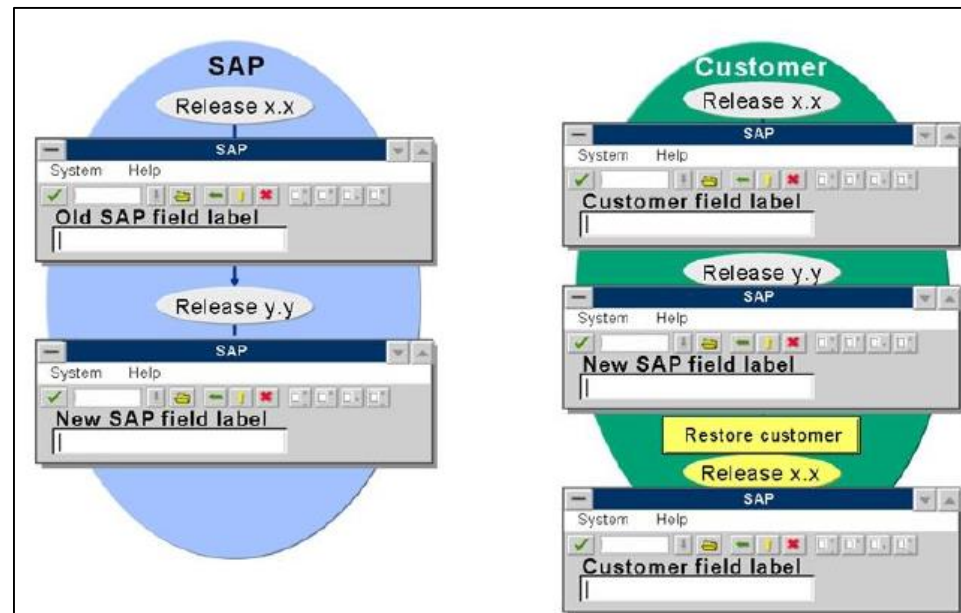


Enhancements to ABAP Dictionary Element



■ Overwritten Texts in Upgrades

- You must always restore keywords after a release upgrade or after new corrections have been imported whenever SAP has redelivered the existing keywords.
- If customers want to retain their own keywords from the last release, they should choose the menu option, Restore customer.
- SAP recommends that you always restore your keywords after a release upgrade

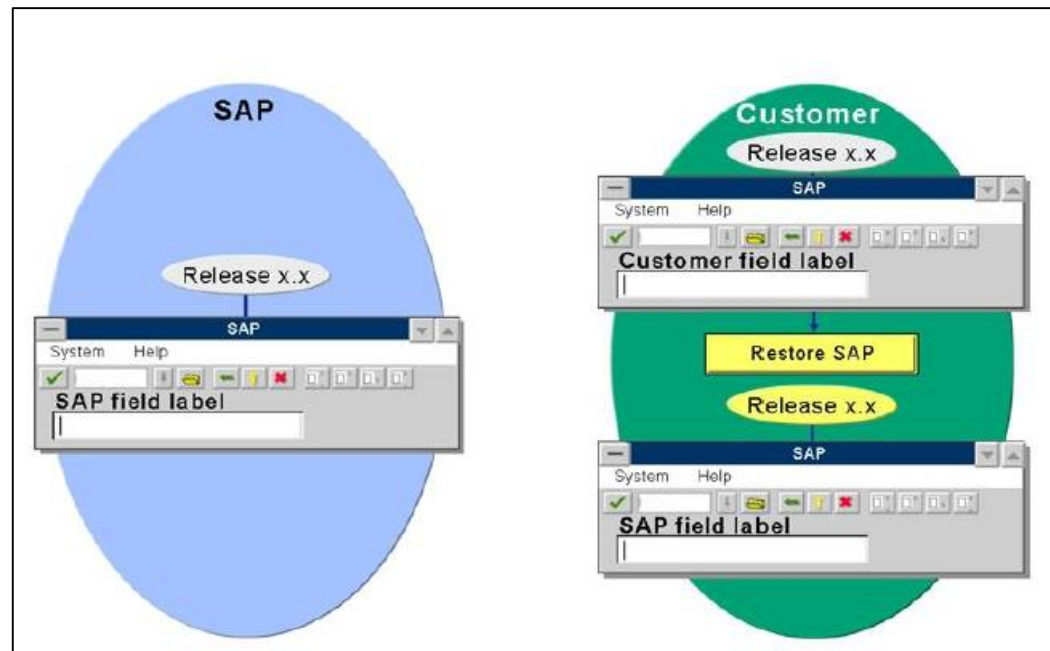


Enhancements to ABAP Dictionary Element



■ Restoring SAP Field Labels

- To undo keyword changes, choose the menu option, Restore SAP.
- Keywords are restored by a program running in the background. This program checks all the data elements that you have edited and restores their keywords and short text, if necessary.

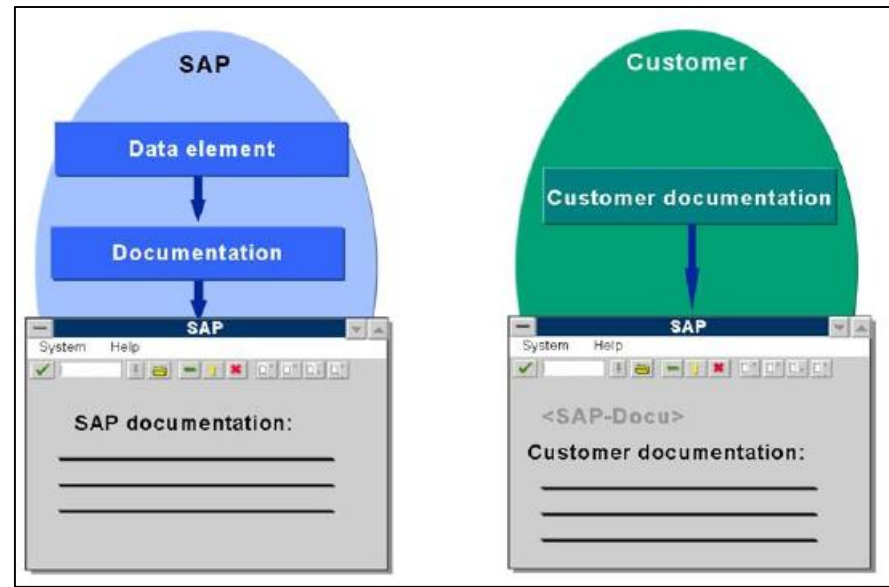


Enhancements to ABAP Dictionary Element



■ Enhanced Documentation for Data Elements

- When enhancing data element documentation, include your SAP documentation as an include module. By doing this, you do not lose the reference to SAP documentation. Any following documentation delivered by SAP is also taken into account.
- Simply delete your own documentation if you want the original SAP documentation to be displayed

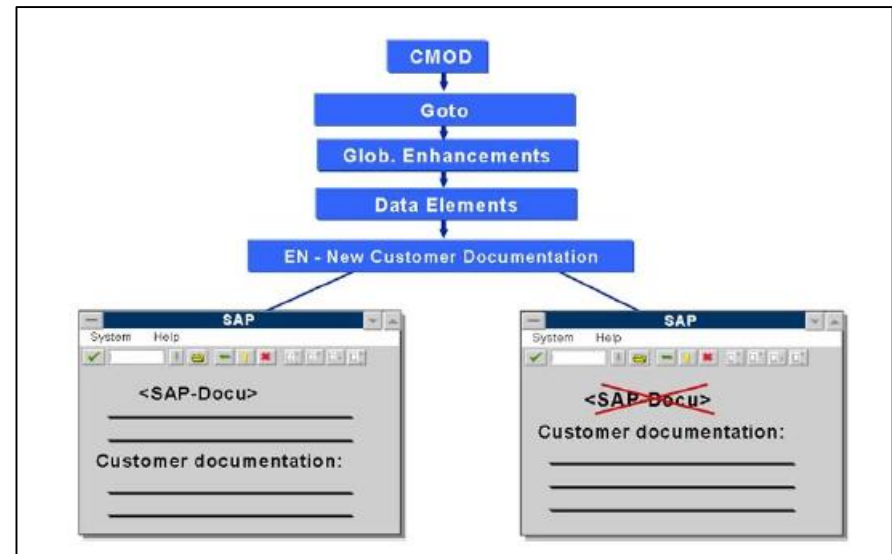


Enhancements to ABAP Dictionary Element



■ Creating Customer Documentation

- You also have the option to create your own data element documentation independent of the SAP documentation.
- Notice that this is not recommended because the reference to SAP documentation is lost.
- If SAP R/3 Enterprise delivers a new version of the documents in question, you may miss important information



Demo: Create customer documentation

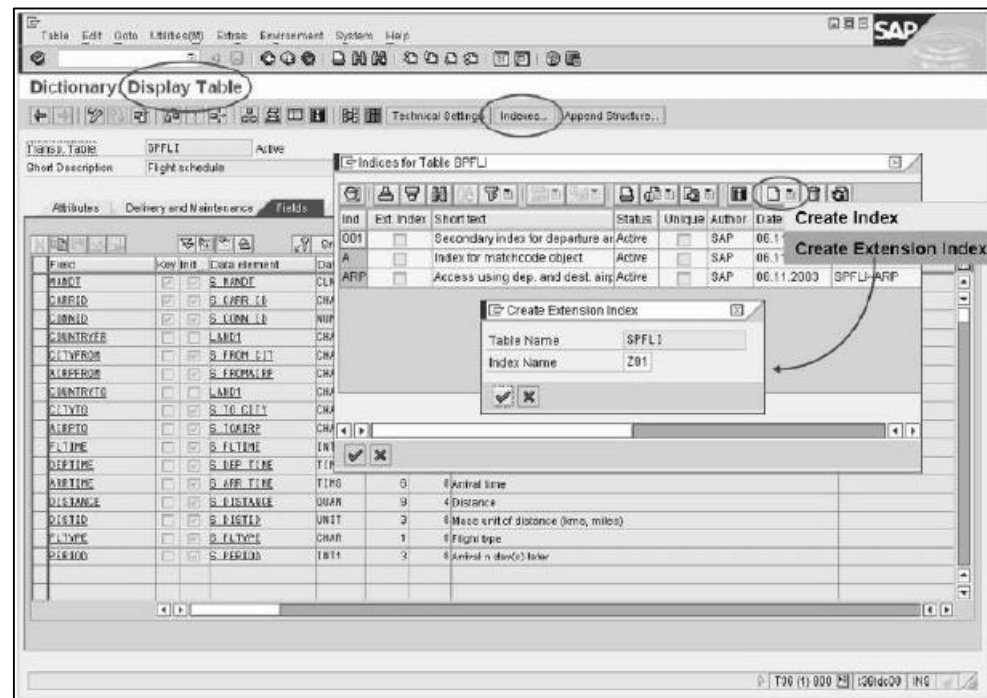


Enhancements to ABAP Dictionary Element



- Extension Index for SAP Tables

- Creating a secondary index for an SAP table is a modification even though the customer name space is retained.
- In SAP NetWeaver 7.0, you have the option of creating secondary indexes without making modifications. This type of index is called an Extension Index.





- Fixed Value Append for SAP Domains
 - Previously, you had to use modifications to add additional fixed values to SAP domains.
 - 2. In SAP NetWeaver 7.0, you can use fixed value appends to add additional fixed values and you do not have to use modifications.
 - 3. The following two figures (next 2 slides) illustrate how to create a fixed value append for an SAP domain.

Enhancements to ABAP Dictionary Element



- Creating a fixed value append

Fixed Value Append

Domain: S_OPERATOR Active

Short Description: Arithmetic Operator for Calculator

Create Fixed Value Append for S_OPERATOR

Append Name: ZA_OPERATOR

Properties Definition Value Range

Single Vals

Fix.Val.	Short text
+	Addition
-	Subtraction
*	Multiplication
/	Division

Intervals

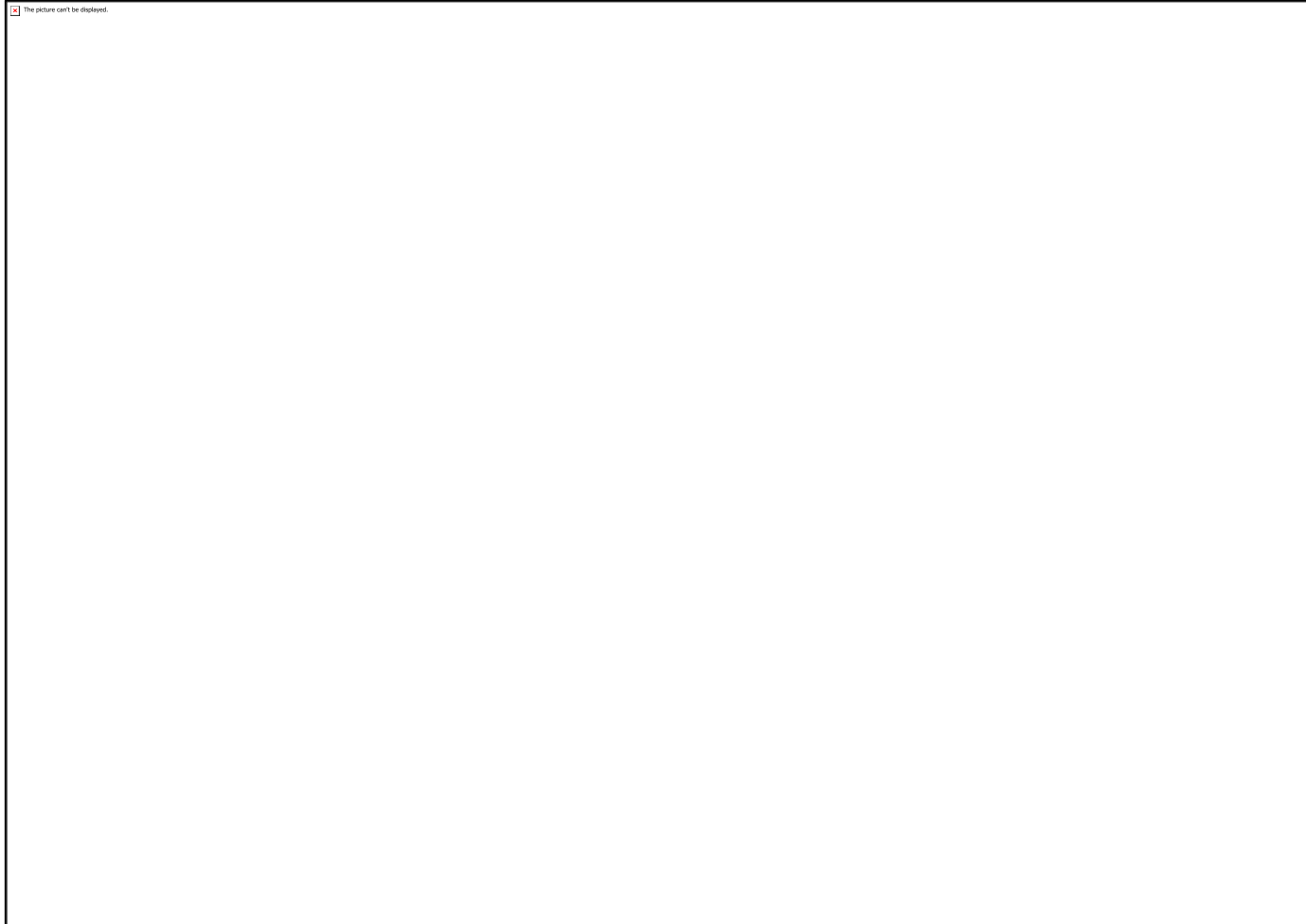
Lower limit	UpperLimit	Short text

Value Table

Enhancements to ABAP Dictionary Element



- Maintaining additional fixed values



Locating Application that have Exits



- To take advantage of exits if SAP has added them to one of its standard applications, we need to know how to locate the exits available in the SAP System.
- SAP organizes its exits in packages called SAP enhancements.
- Each SAP enhancement can contain many individual exits.



- Choose Tools → ABAP Workbench → utilities --> Enhancements --> Project Management from the ABAP Workbench menu.
- The CMOD Screen is displayed.
- Then choose utilities --> SAP enhancements to call a selection screen that allows to look for the exits available in the standard applications.
- To list all the enhancements in the entire system, choose the Execute function without specifying any selection criteria.

Demo: Locating an Exit



Enhancements using Customer Exits



- There are two main reasons why exits should be used rather than modifying SAP software.
- Add-ons attached to exits have the advantage that:
 - They do not affect standard SAP source code
 - When a new functionality is added to SAP System using SAP's exits, the source code of standard SAP programs is not altered any way.
 - The code and screens created are encapsulated as separate objects.
 - These customer objects are linked to standard applications, but exist separately from SAP's standard software package.
 - They do not affect software updates
 - When adding new functionality to SAP System using SAP's exits, the objects (called customer objects) must adhere to strict naming conventions.
 - When it comes time to upgrade a to a new software release, customer objects' names ensure that they will not be affected by any changes or new additions to the standard software package.



- There are several different types of customer exits.
- Each of these exits acts as hooks where add-ons can be attached or "hanged" .
- Menu Exits
 - Menu exits add items to the pulldown menus in standard SAP applications.
 - These menu items can be used to call up own screens or to trigger entire add-on applications.
 - SAP creates menu exits by defining special menu items in the Menu Painter.
 - These special entries have function codes that begin with "+" (a plus sign).
 - Specify the menu item's text when activating the item in an add-on project.



■ Screen Exits

- Screen exits add fields to screens in R/3 applications.
- SAP creates screen exits by placing special subscreen areas on a standard R/3 screen and calling a customer subscreen from the standard screen's flow logic.
- The subscreen is called during flow control of the main screen with the CALL CUSTOMERSUBSCREEN statement.

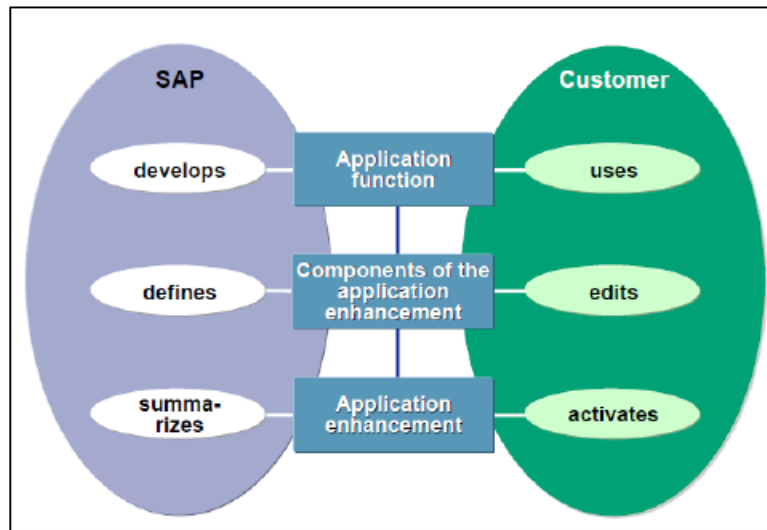
■ Function Module Exits

- Function module exits add functions to R/3 applications.
- Function module exits play a role in both menu and screen exits.
- SAP application developers create function module exits by writing calls to customer functions into the source code of standard R/3 programs.
- These calls have the following syntax: CALL CUSTOMER-FUNCTION '001'.

Enhancements using Customer Exits



- Application enhancements allow customers to enhance their application functions. Customer exits are preplanned by SAP and generally consist of several components
- Application enhancements are inactive when delivered and can be completed and activated by customers as they are needed.
- As a customer, you do not need in-depth knowledge of how to implement SAP R/3 Enterprise applications.
- You do not need to adjust enhancements at upgrade because of new functions that SAP has developed.

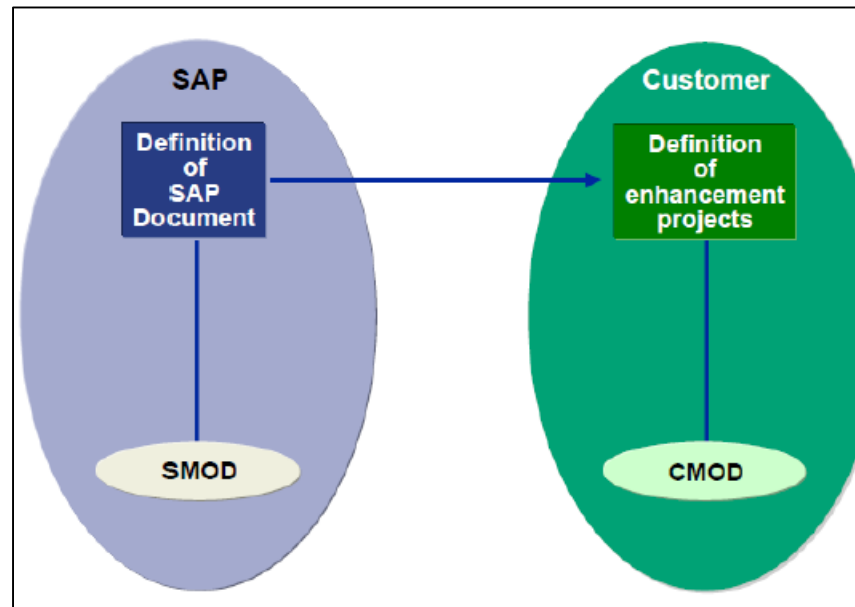


Enhancements using Customer Exits



■ Customer Enhancement Project

- The SAP application programmer creates SAP enhancements from function module exits, menu exits and screen exits. A management function is provided for this purpose (transaction code SMOD).
- Customers are given a catalog containing an overview of existing SAP enhancements. They can then combine the SAP enhancements they want into an enhancement project using transaction CMOD.



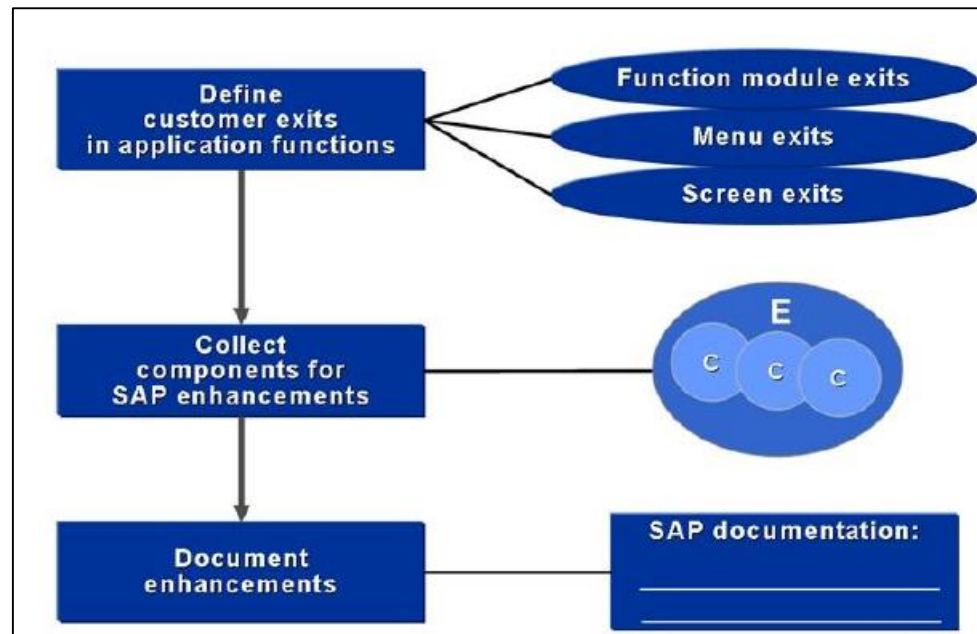


- Enhancements and Enhancement Projects
 - SAP enhancements are made up of component parts. These components include function module exits, menu exits, and screen exits. A specific component may be used only once in a single SAP enhancement (this guarantees the uniqueness of SAP enhancements).
 - Customer enhancement projects consist of SAP enhancements. Each individual SAP enhancement may be used only once in a single customer enhancement program (this guarantees the uniqueness of a customer project).

Enhancements using Customer Exits



- The SAP application programmer plans possible application enhancements in an application and defines the necessary components. These components are combined in SAP enhancements
- The programmers document their enhancements as best they can, so that customers can implement the enhancements without having to analyze program source code or screen source code.

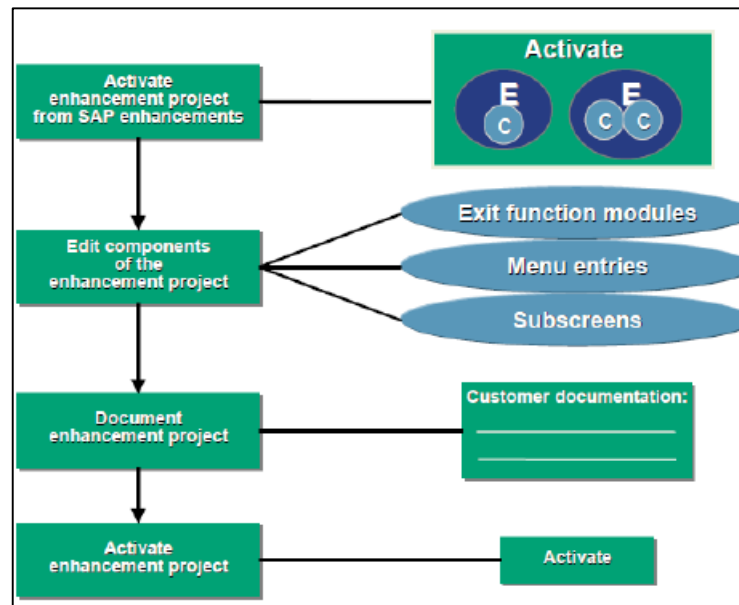


Enhancements using Customer Exits



■ Procedure at the Customer Site

- 1.First, create an enhancement project and then choose the SAP enhancements that you want to use.
- 2.Next, edit your individual components using the project management function and document the entire enhancement project.
- 3.Finally, activate the enhancement project. This activates all of the project's component parts.



Demo: Create a Screen Exit

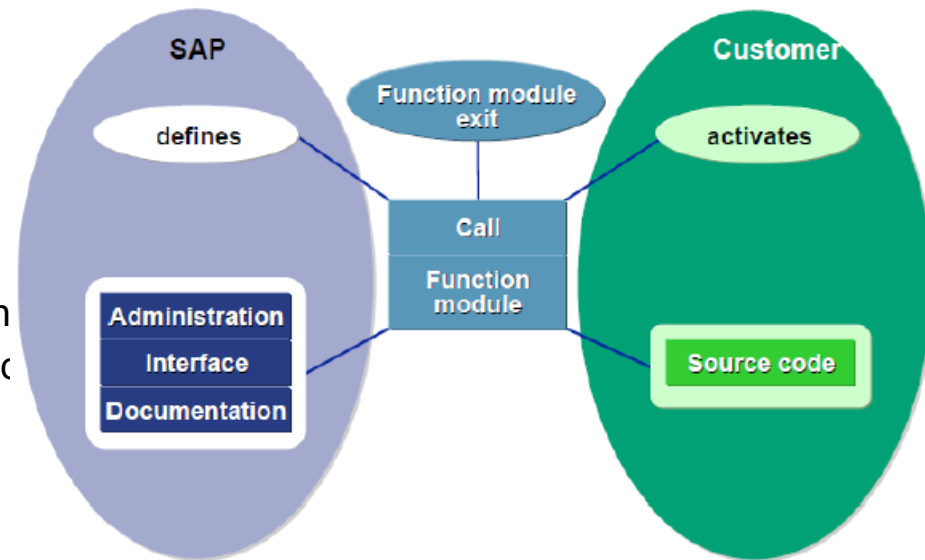


Enhancements using Customer Exits



■ Function Module Exit

- Function module exits allow customers to implement additional logic in application functions.
- SAP application programmers define where function module exits are inserted and what kind of data they transfer.
- You write the source code for the function modules yourself. If need be, you can also create your own screens, text elements, and includes for the function group.
- The system processes your ABAP code when the enhancement project (of which your function module is a component) is activated. Function module exits have no effect prior to enhancement project activation

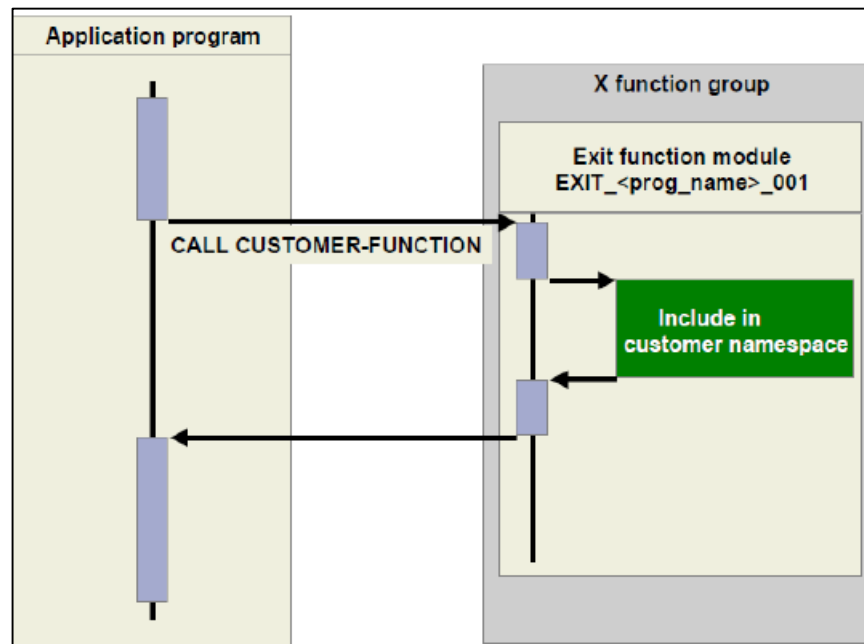


Enhancements using Customer Exits



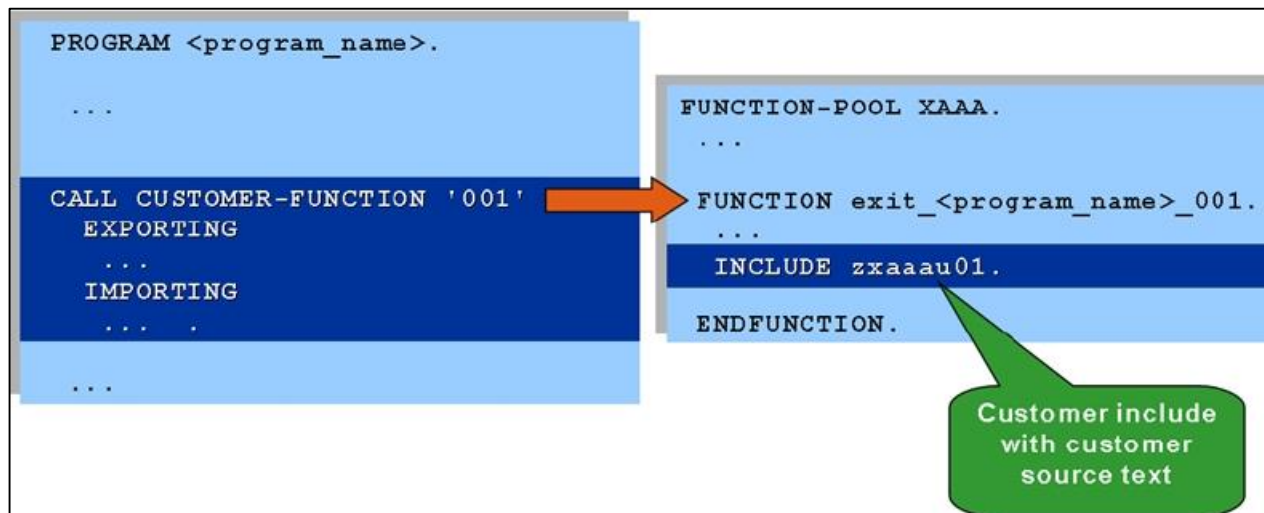
■ Program Exit- Architecture

- 1. The exit function module is called at a position determined by the SAP application developer.
- 2. Within the function module, the user can add functions in the customer namespace using an include



- Program Exit- Syntax

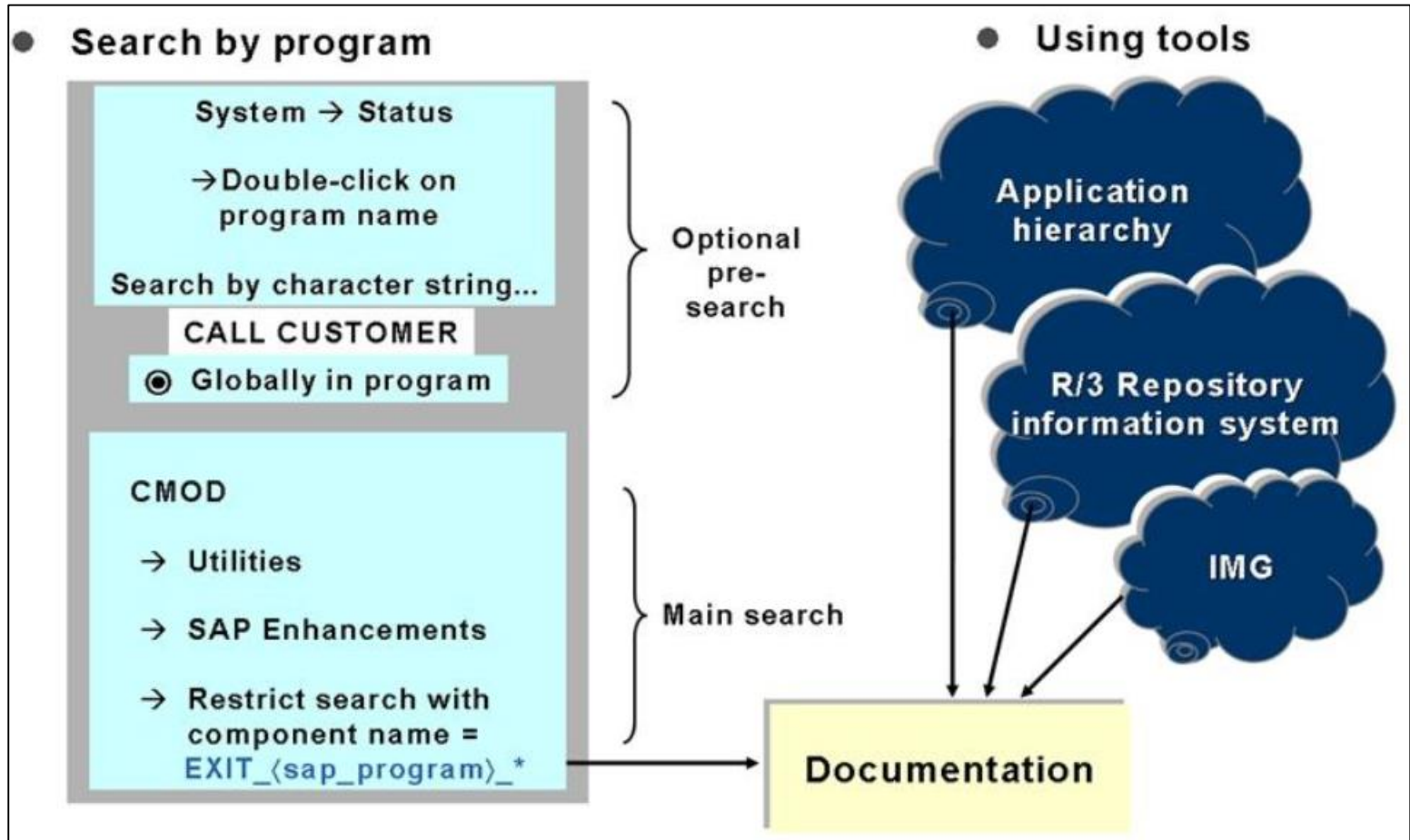
- 1.SAP application programmers use the ABAP statement CALL CUSTOMER-FUNCTION 'nnn' to call function modules, where nnn is a three-digit number.
- 2.These function modules belong to function groups whose names begin with X (X function groups).
- 3.The CALL CUSTOMER-FUNCTION statement is only executed if the enhancement project has been activated. Multiple calls of the same function module are all activated at the same time.



Enhancements using Customer Exits



■ Finding Program Exits

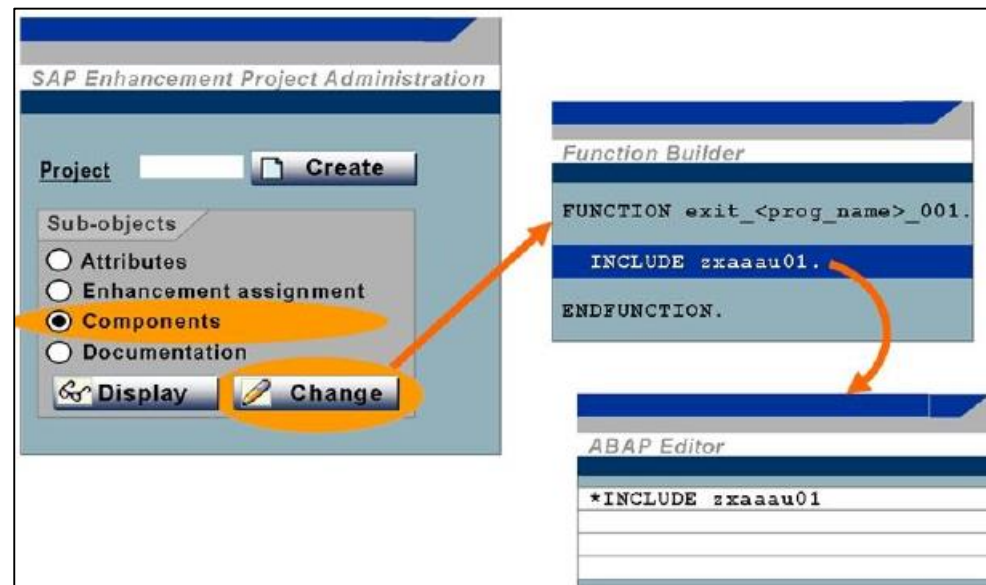


Enhancements using Customer Exits



■ Editing Program Exits

- 1. Use the project management (transaction: CMOD) function to edit function modules for function module exits.
- 2. DO NOT change the function module itself. It is especially important that you do not alter the interface in any way. The function module, however, contains an INCLUDE statement for an include program that you have to create in the customer namespace.



Demo: Create a Function Exit

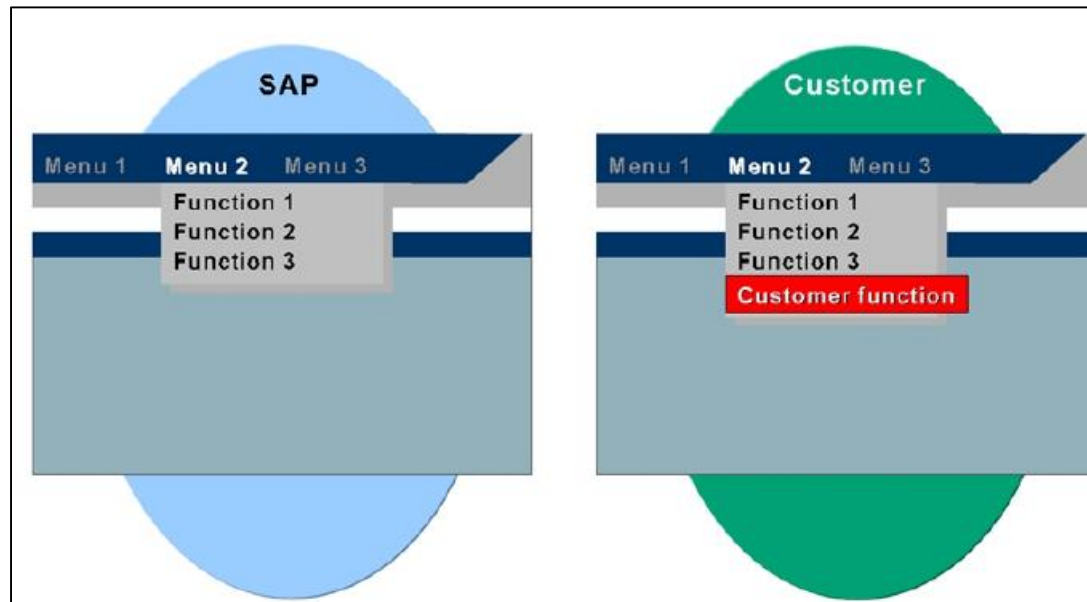


Enhancements using Customer Exits



■ Overview of Menu Exits

- 1. Menu exits
- 2. SAP application programmers reserve certain menu entries in your GUI interface for this. This allows you to define a text for the reserved menu entry and add your own logic, often in the form of a related function module exit.

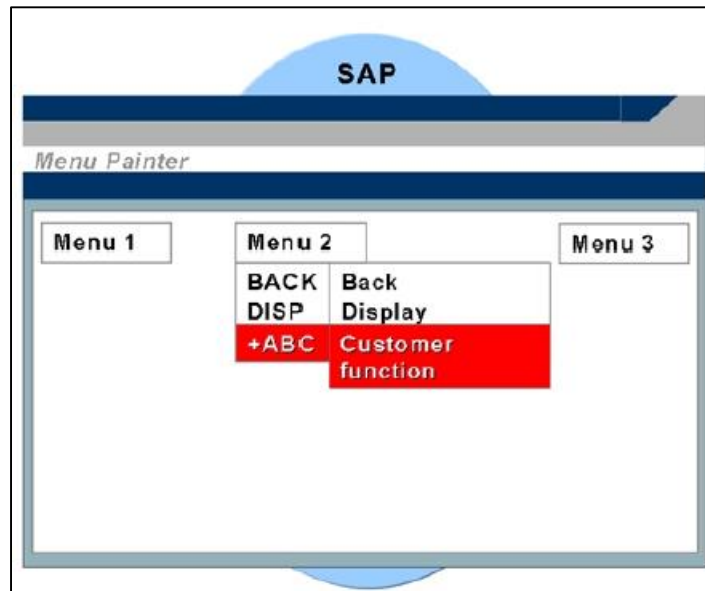


Enhancements using Customer Exits



■ Menu Exit Requirements

- 1. In order for you to be able to implement menu exits, SAP application programmers must equip the GUI interface with function codes that begin with a plus sign ('+').
- 2. These function codes are inactive at first and do not appear in the GUI until you have activated them. They do not appear on the screen.

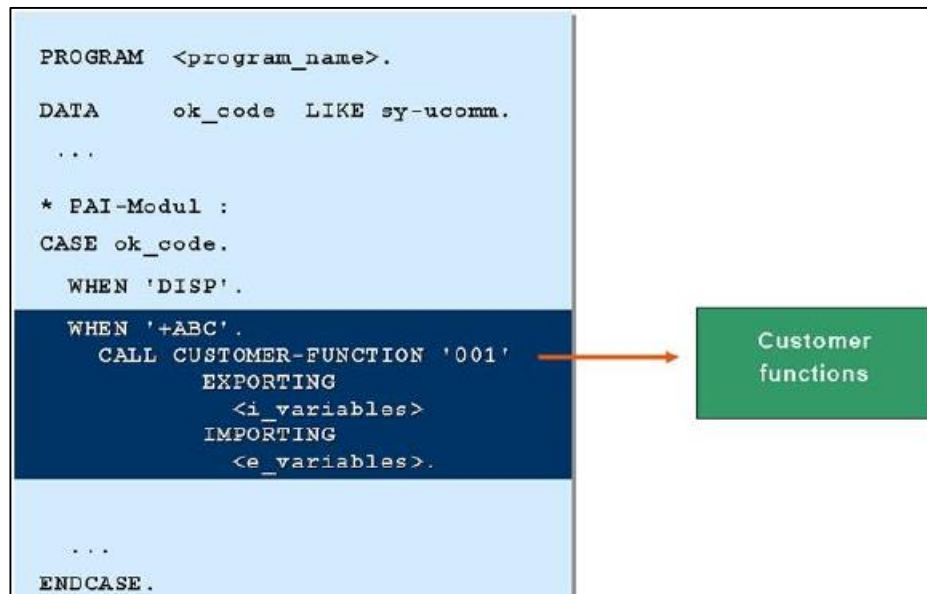


Enhancements using Customer Exits



■ Menu Exits and Program Exits

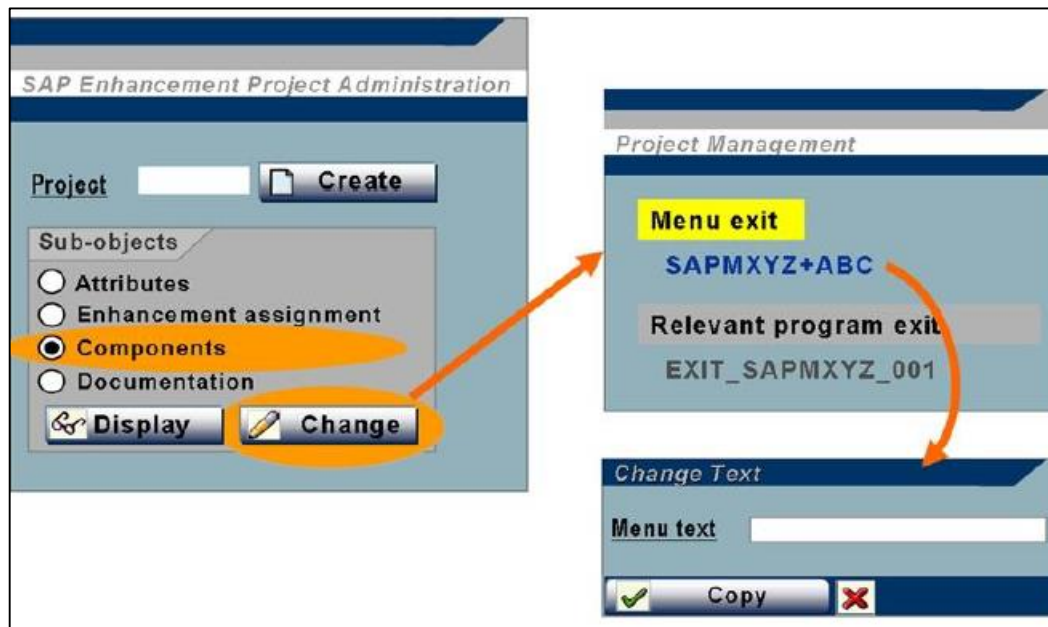
- 1.SAP application programmers determine where a program reads additional function codes and how it reacts--- either with a function module exit or with a predefined function.
- 2.Menu exits and function module exits are both part of the same SAP enhancement.
- 3.No pushbuttons may be assigned to additional function codes.



Enhancements using Customer Exits



- Naming and Editing Menu Exits
 - Menu exits are edited with the project management transaction (CMOD).



Demo: Create a Menu Exit





In this lesson, you have learnt:

- Changing the SAP Standard System
- Personalization
- Enhancements to ABAP Dictionary Elements
- Enhancements Using Customer Exits
- Business Transaction Events
- Business Add-Ins
- SAP Modifications
- Enhancement Framework



Review Question



Question 1. _____ allow you to attach your own functions to menu options in SAP menus.

Question 2: _____ exits allow customers to implement additional logic in application functions

