



Best Practice / Next Practice: Regression Testing of SAP-centric Business Processes

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1. Introduction

Today's SAP customers need to deploy software changes for their SAP-centric solutions on a regular basis. Maintenance tasks as well as innovations and business process extensions lead to a significant number of software changes and involved persons. It is of high importance to manage this change process well and to avoid disruptions of business operations.

Regression testing plays a vital part in this change process. Beside the standard tests for new functionality including unit -, integration -, scenario- and user acceptance tests, SAP customers need to ensure that all other areas that are potentially affected operate as expected after the changes are deployed in the production landscape. This is especially true for mission-critical business processes.

Unfortunately, setting up reliable regression tests has many obstacles such as

- missing transparency about the business processes and their steps that needs to be included in regular regression tests
- Test teams with insufficient know-how about the relevant business processes in combination with business teams without sufficient time to engage in recurring regression tests
- outdated test systems which do not reflect the situation of the production landscape
- insufficient resources to perform full regression tests after significant software changes
- decreasing time window to perform required tests
- missing transparency on what to test

Many SAP customers have made the unpleasant experience of not fully tested changes that got transported into the production landscape leading to high efforts for subsequent stabilization.

This Best Practices document will help you to successfully address the main obstacles by providing a number of detailed recommendations on how to setup reliable regression tests. In addition the document will discuss a number of customers which were able to significantly improve their change and test management processes, such as Sara Lee from Netherlands with 80% reduced effort for regression testing through test automation resulting in the ability to run a full test cycle in 2 days and 90% less defects in the production landscape.

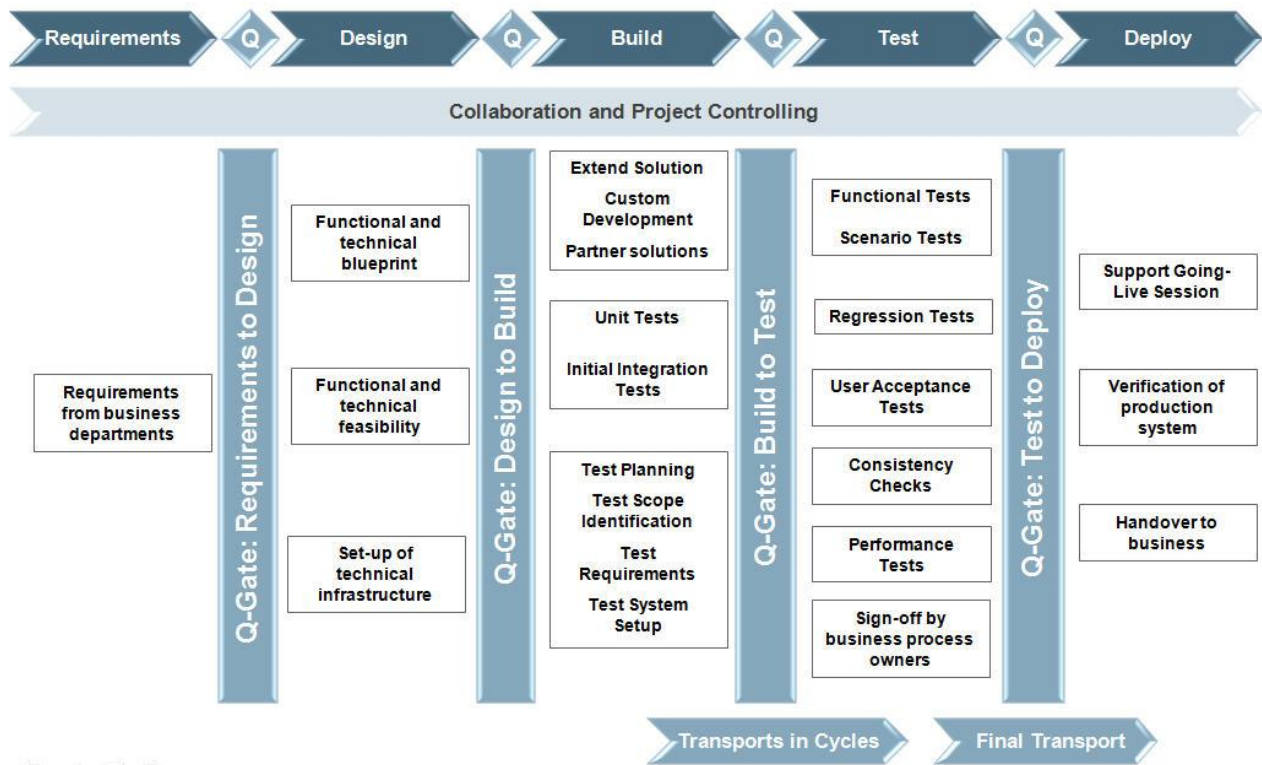


Chart 1.1: Change and test management process

Many successful companies have done a rigid assessment of their Application Lifecycle Management (ALM) processes to improve their change and test management before deployment of additional software capabilities and products. SAP Customers with a SAP Enterprise Support contract can choose from a variety of test management capabilities fully integrated with other relevant ALM capabilities. Appendix 1 provides a complete overview of available tools and their integration.

Customer benefits

SAP customers who follow the recommendations for regression testing have achieved significant ROI from their improved test management processes. Examples:

Sara Lee

- 80% reduction in the cost of comprehensive regression testing
- 90% decrease in the number of defects found in the PRD landscape
- 70% reduction in test execution time
- Elimination of all critical defects before going into production
- More time and resources available to perform testing of 80-90% of critical functionality (up from 10%) and 80% of noncritical functionality

Baker Hughes

- Cost savings through defects discovered earlier in the life cycle
- 40% Reduced testing effort by automating regression testing
- Reduced User Acceptance Testing to 3 weeks

- Reduced costs to implement and sustain by leveraging partnership model
- Estimate 20% savings due to reuse of existing test cases for future releases
- Estimate 25-30% savings in maintenance due to component based approach
- Delivery of high quality complex application release with minimal production issues
- Tracking all testing activities using a central test management tool

Dow Corning

- Parallel projects of the innovation stream and maintenance activities cause 400 – 600 transports per month
- Ability to automatically test the change effects for the most important 250 end-to-end processes within 6 hours
- Ability of weekly validation of the system landscape

2. Regression tests as integral part of the software change process

Most SAP customers have 2 distinct change processes in place. On one hand side SAP provides software updates which is managed by the SAP customer through a **Maintenance Stream**. Depending on the need of the customer to get important corrections applied, the deployment frequency might vary from every 6 weeks to only once or twice per year.

Regression tests play a major role in the maintenance stream. SAP Support Packages get first deployed in the development landscape. Many SAP customers perform a first set regression tests with a limited scope in the development landscape before the SAP Support Packages get deployed in the test landscape followed by a second set of regression tests. It strongly varies between customers how intense existing business processes get tested and the methods and tools to plan, prepare and perform regression tests.

On the other hand, SAP customers extend their business processes in order to stay competitive. This is organized through change or implementation projects of a second **Innovation Stream**. The transport frequency strongly depends on the planned go-live dates of these projects. Regression tests are embedded in the innovation stream as well. They are generally deployed after the functional scenario and integration tests of the newly implemented functionally have been performed.

The main reason of regression tests in the innovation stream is to avoid negative side effects of the new functionality on the rest of the business processes.

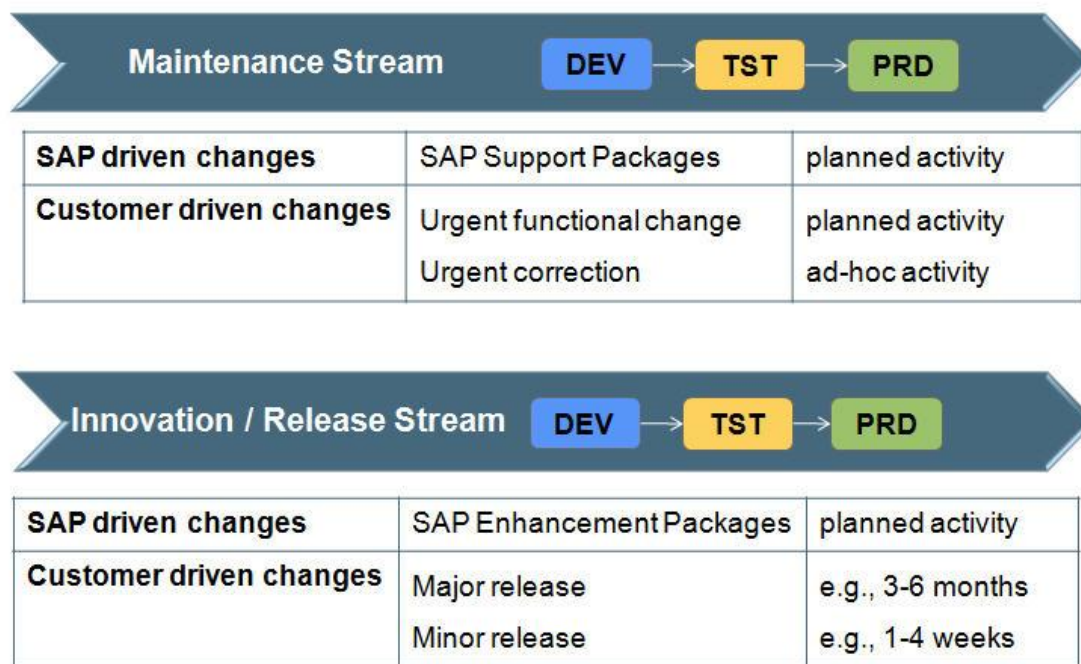


Chart 2.1: Software change types in the Maintenance and Innovation Stream

SAP customer with good practices have embedded regression tests within the **Innovation Stream** in the following way

- Test Cycle 1: manual functional and integration tests of the changed business processes followed by corrections of identified defects and manual re-testing.
- Test Cycle 2: regression tests of all critical business processes via automated tests
- Test Cycle 3: User-acceptance tests of changed business processes through manual testing of Business Process Experts

3. Best Practice: 9 Recommendations for Regression Tests of SAP-centric Solutions

Many SAP customers have setup a powerful procedure for regression testing by applying a subset of the below described recommendations

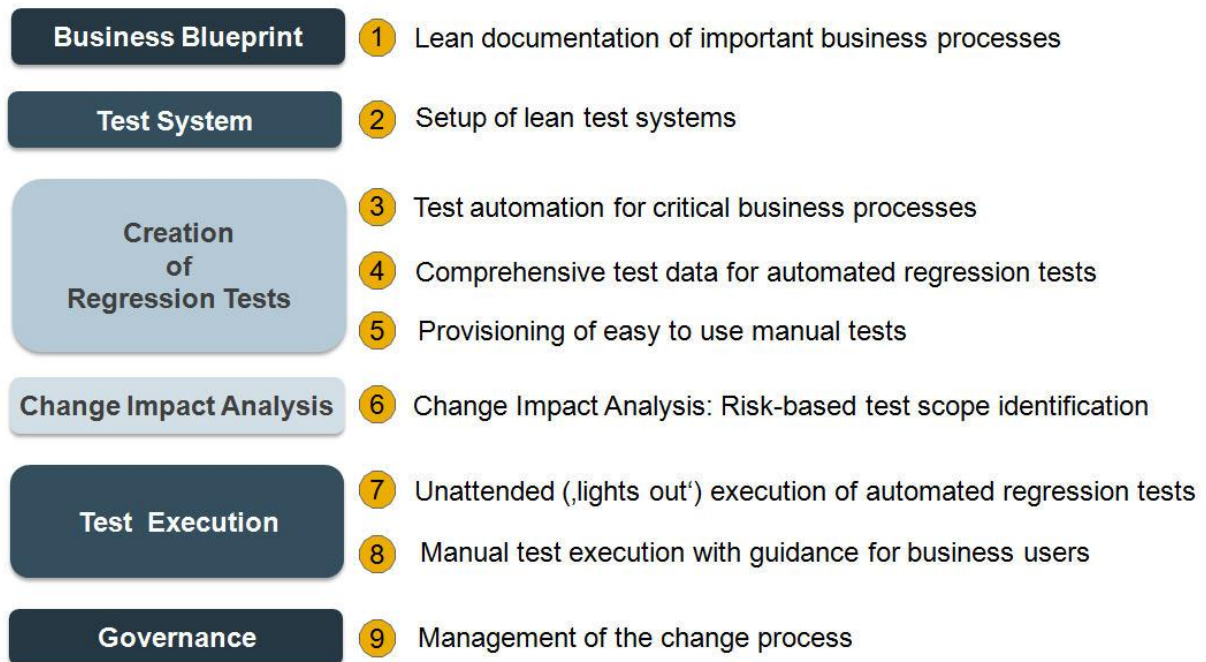


Chart 3.1: Nine best practice recommendations for regression testing

3.1 Recommendation #1: Lean documentation of important business processes

Goal: Lean documentation of all important business processes and process steps including hierarchy and sequence of process steps. Such a business process hierarchy acts as anchor for the assignment of all regression tests – independent whether they are manual or automated tests.

Test cases for functional test should be assigned to the respective process steps of a larger business process and business scenario. Experience shows that business processes / process steps can be used to assign important additional information via attributes, such as business process priority or flags that indicate which process steps need to be included in regression tests. This approach prepares for fast creation of a suitable regression test plan. The combination of attributes like process

priority and regression test on the process step level allows further differentiating the scope when the time window limits the number of tests.

SAP Solution Manager supports the implementation and change of business processes through an html-based Work Center from where the user is guided to setup and maintain the Business Blueprint (SOLAR01) as well as Configuration (SOLAR02) of business processes. Different to many other software solutions, SAP Solution Manager combines following types of information within one maintenance transaction:

1. Business processes and the system landscape differentiated by system roles such as development-, test- , production systems
2. Business processes with all business related information such as business requirements, process documentation, transaction code / URL to start the process steps, suitable test cases, custom code and interface documentation, etc.

Many SAP customers who have followed this approach now refer to SAP Solution Manager as “single source of truth”.

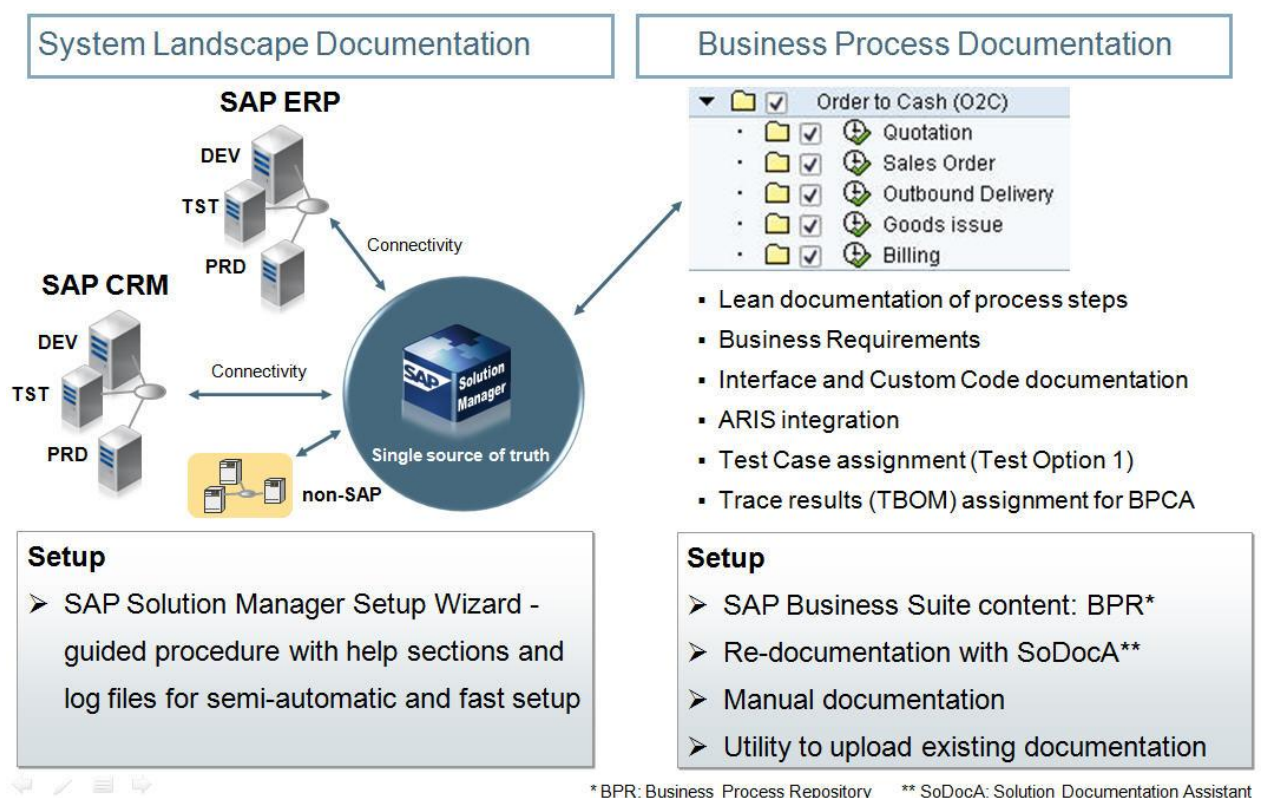


Chart 3.2: SAP Solution Manager – System landscape and business process documentation

The management and assignment of regression tests to process steps leads to another notable advantage: whenever business processes get changed, extended or added, it is possible to run a check report whether all priority 1 process steps which are ear-marked for regression tests actually have regression tests assigned to them.

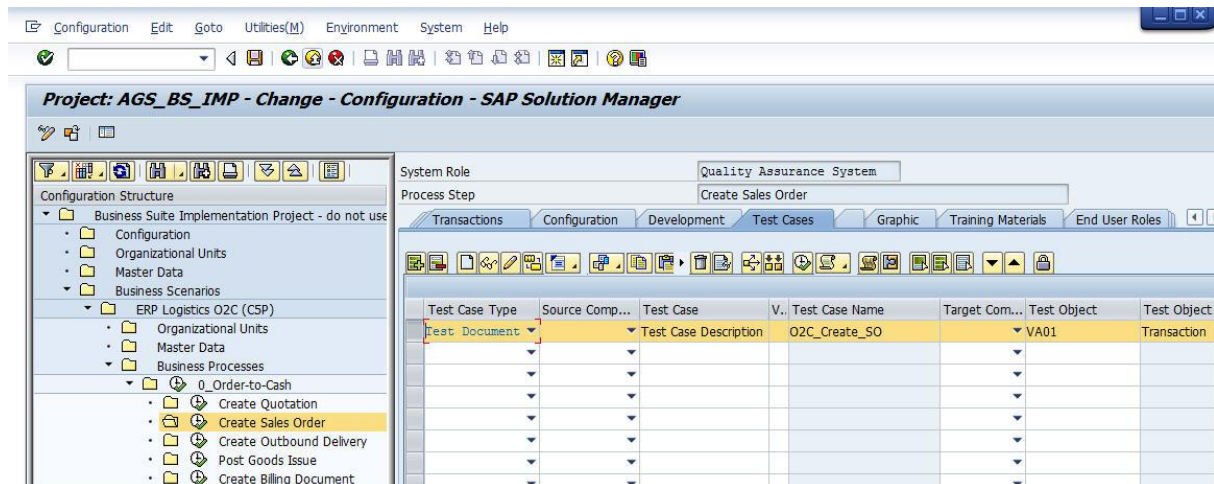


Chart 3.3: SAP Solution Manager – Business process hierarchy with assigned regression tests

The setup of a "lean" documentation at least for the important business processes in general takes significantly less time than many SAP customers expect. Most customers have some sort of documentation available in MS Office format or could interview their business process experts. For a "lean" solution documentation approach, only the following information is required

- Setup of new project in SAP Solution Manager
- 3 level hierarchy for each relevant business process
- For each process step
 - Short text to describe process step or its variant
 - SAP system used for business process execution via logical component
 - Transaction code or other start method
 - Later: assignment of manual / automated test cases

The following chart shows the results of a Proof-of-Concept project at a SAP customer in EMEA. No documentation was available in SAP Solution Manager in the beginning. The existing MS Excel based documentation was used and enriched with transaction codes and SAP system information. In addition, the customer decided to enter the business process information in ARIS first with a subsequent automatic import into SAP Solution Manager. All together, the "lean" solution documentation for 5 complete business processes was done in half a day.

SAP Solution Manager Upgrade	<ul style="list-style-type: none"> Update SAP Solution Manager 7.0 SP19 to SP20 SAP Solman agent update in managed system SAP SolMan Setup Wizard used 	<ul style="list-style-type: none"> 5.5 hours No additional effort
SAP Solution Documentation	<ul style="list-style-type: none"> Business process definition in MS Excel Adjustment of existing process structure to 3 level hierarchy in SAP Solution Manager Business process modeling of MM-Procurement processes in ARIS and upload into SAP Solution Manager (for 5 business processes incl.steps) 	<ul style="list-style-type: none"> Already available 30 minutes 2 hours for 5 business processes
SAP Business Process Change Analyzer (BPCA)	<ul style="list-style-type: none"> BPCA preparation: trace (TBOM) for each business process via manual process execution BPCA analysis for 5 software changes including customizing and program changes 	<ul style="list-style-type: none"> 5h for 14 processes* 15 min for each analysis

* 14 variants of the 5 procurement processes

Chart 3.4: Proof of Concept project at SAP customer in EMEA – project steps and required effort

Rule of thumb: It is strongly recommended to setup a business process hierarchy using a “lean” solution documentation approach for the 150 most important process steps.

3.2 Recommendation #2: Setup of lean test systems

Goal: The test system landscape needs to get updated regularly to achieve a system environment with configuration, master data and selected transactional data which is identical or at least very similar to the production landscape.

A prerequisite for regression tests to deliver representative results is the availability of a suitable test system environment. To fulfill this prerequisite the test system landscape (TST) requires the same

1. set of integrated systems,
2. deployed SAP-, partner and non-SAP applications
3. customizing and system configuration
4. representative subset of master and transactional data

as the production system landscape (PRD). The system setup and integration steps (prerequisite 1 and 2) are one off activities which hardly can be accelerated through automation.

Prerequisite 3 and 4 deal with the various types of data which need to be available and refreshed in the TST landscape on a regular basis. Many SAP customers perform system copies from their PRD into the TST landscape to refresh their test landscapes. This is not an easy task and is performed rather seldom, since it involved a lot of rework after the system copy, e.g. RFC connections. On average, Customers reported efforts of 1-2 weeks for 2 individuals to perform this task. As a consequence, many SAP customers do not refresh their test system landscapes on a regular basis.

SAP has developed SAP TDMS to accelerate the regular data refresh of non-productive system environments like test and training systems.

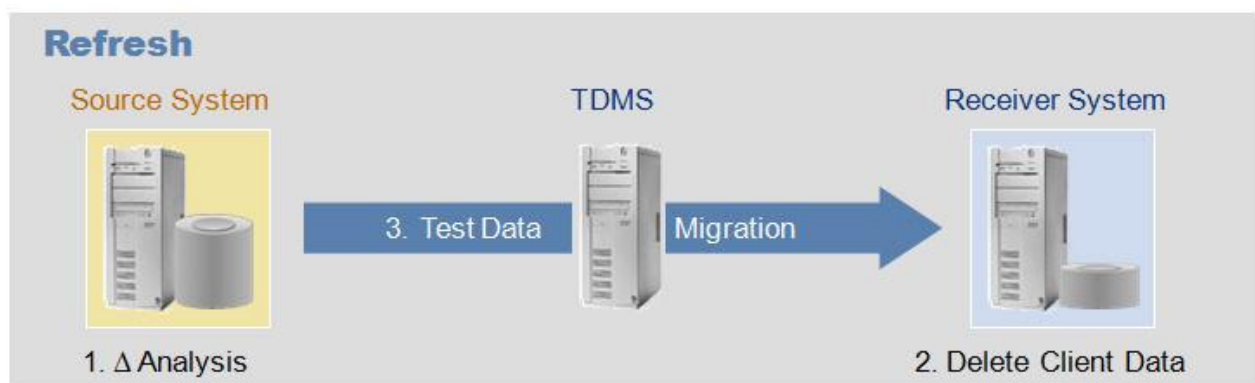


Chart 3.5: Setup of lean test system environments with SAP TDMS

With SAP TDMS customers can accelerate the following aspects to build lean TST systems

- refresh of configuration and master data
- copy of suitable subsets of transactional data, for example limited to a selected time period like 3 months or selected organizational units
- selective transfer of business objects and process data based on TDMS Business Process Library (BPL)
- scrambling of sensitive HR data

Beside these standard scenarios, SAP TDMS provides a workbench to allow the setup of customer-specific data transfer rules. To reduce the burden of the source systems (e.g. PRD), data will be first read, temporary stored and in a subsequent step the receiver systems (e.g. TST) are getting updated.

Rule of thumb: SAP customers should refresh their test system landscape at least twice a year.

3.3 Recommendation #3: Test automation for critical business processes

Goal: All critical business processes must be tested before deployment of changes in the production landscape. Manual testing is not suitable to achieve this goal due to various reasons. SAP customers need to explore options on how to automate regression tests at least for their mission critical business processes.

Tight timelines of the test phase after a significant software change usually do not allow testing all core business processes via manual testing. Based on customer interviews many additional reasons speak against covering regression testing entirely via manual tests. The following chart provides an overview of these reasons:

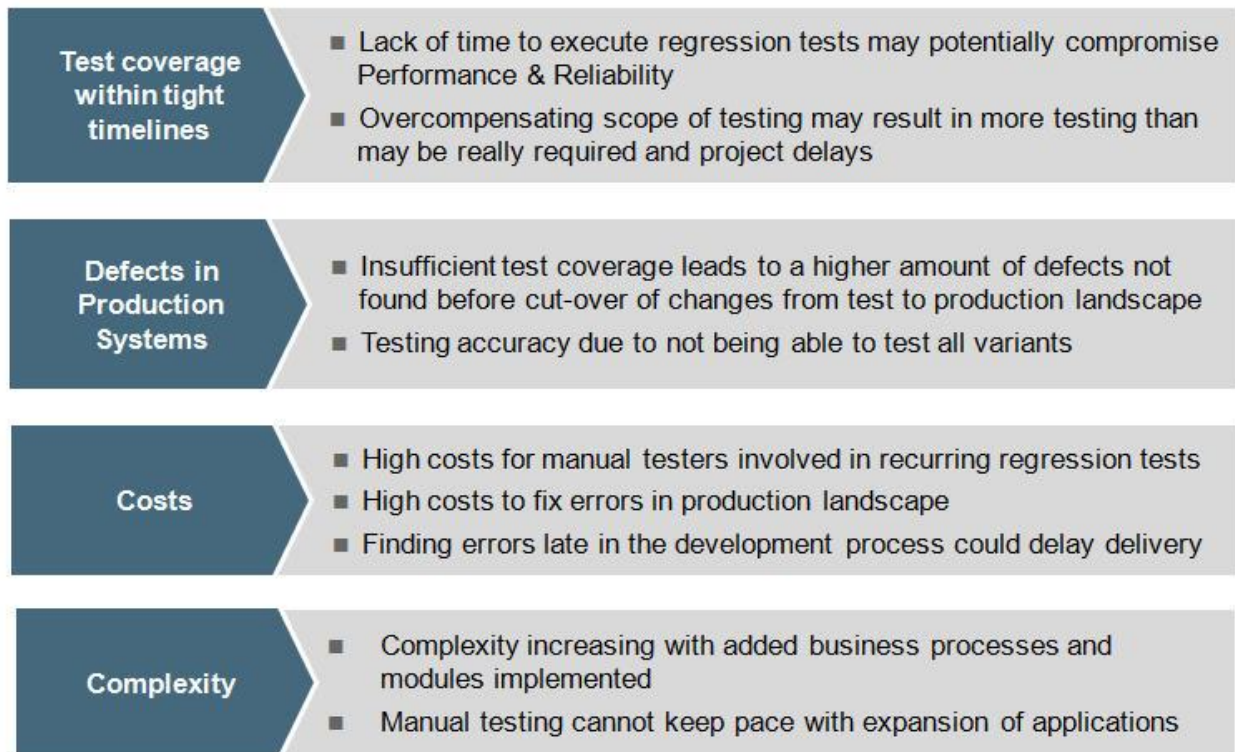


Chart 3.6: Disadvantages of manual testing compared to test automation

The intention of regression tests after software changes is to find defects and unwanted business process behavior. The correction of defects results in customizing and / or development adjustments in the DEV environment which in turn require re-testing in the TST environment. These iterative activities can be best supported by automated functional regression tests which will free up a significant amount of time for the QA team and the individuals usually involved in manual test execution.

SAP and 3rd party test tool vendors have advanced their test automation tools in the last years to a degree that customers now can get the functionality and maturity that they need to setup regression tests via test automation. Most test tools allow semi-automatic creation of test scripts that can handle complex business transactions without requiring detailed technical expertise. As a result, Business Process Experts (BPx) as well as outsource providers can handle the creation and maintenance of automated tests to a large degree. In addition, SAP has made a significant effort to improve the infrastructure for test automation especially the handling of system under test (SUT) information and test data provisioning to make the overall process much more reliable and efficient.

From a test scope perspective, SAP recommends to identify the core / mission-critical business processes and to develop automated tests for these business scenarios. As mentioned in recommendation #1, the average number of process

steps identified via this approach are approximately between 100 – 200 process steps for which automated tests should be considered.

3.3.1 Test Option 1

With SAP Solution Manager 7.0, customers can integrate 3rd party test automation tools via the eCATT infrastructure to setup automated tests for functional regression tests. Many customers are interested to use 3rd party test tools for test automation in addition to SAP test automation capabilities to cover end to end business processes that include SAP and non-SAP applications. From a technical point of view it is noteworthy that a 3rd party test script like HP QTP and other 3rd party test automation tools can be linked to SAP Solution Manager via an eCATT wrapper script.

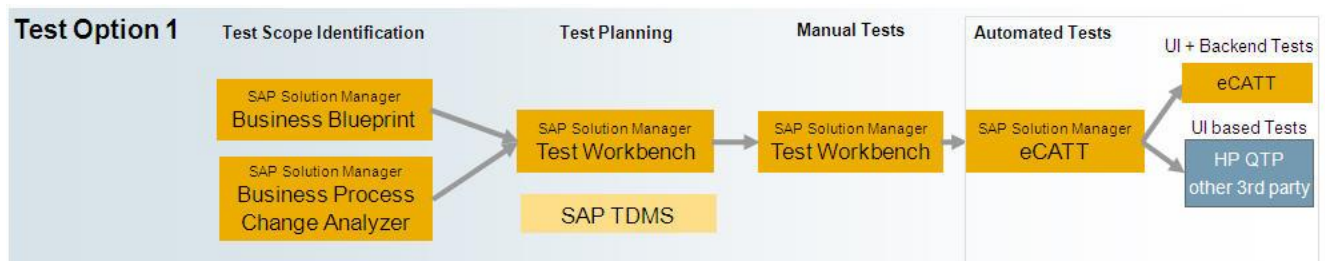


Chart 3.7: Test Option 1 with SAP Solution Manager 7.0

SAP Solution Manager 7.1

To resolve the above limitation, providing a smooth integration with 3rd party test automation tools and much richer functionality, SAP has developed a new Test Automation Framework as part of SAP Solution Manager 7.1.

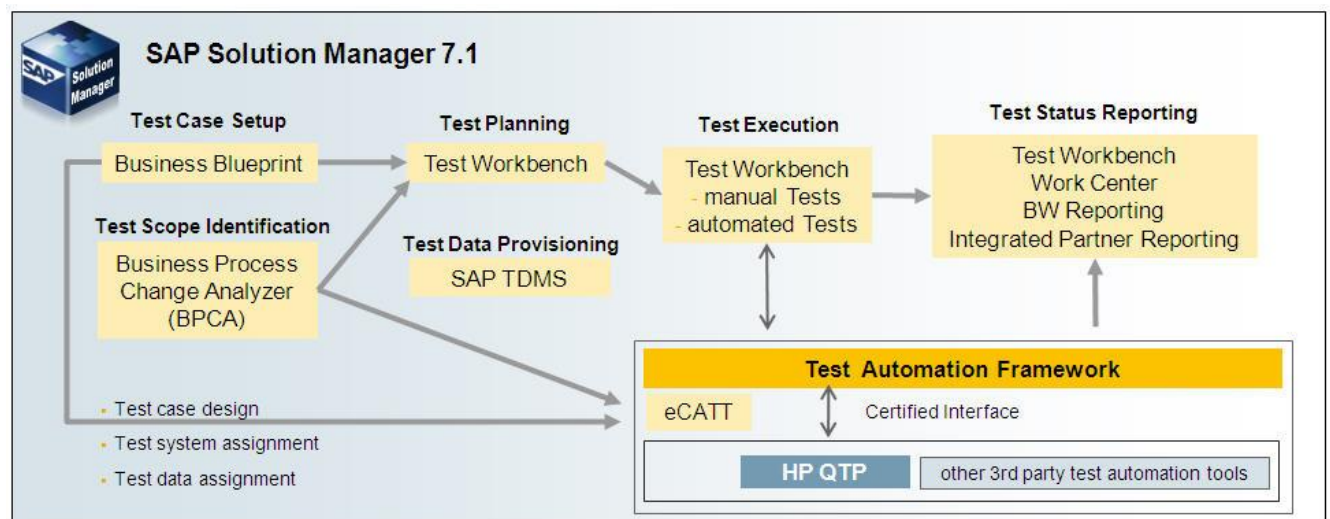


Chart 3.8: Test Option 1 with SAP Solution Manager 7.1 – Test Automation Framework

With the new Test Automation Framework customers can easily setup Test Configurations which consist of 3 essential parts:

- **Test Script** – SAP ecATT, HP QTP or other 3rd party test automation tool like Worksoft Certify with certified integration with SAP Solution Manager.
- **Test Data Container** – environment to plan or upload test data consumed by test scripts
- **System Data Container** – system landscape information controlled by customer to allow convenient switch between landscapes that need to be tested, e.g. DEV , TST or Pre-PRD

Test Configurations get assigned to process steps or business processes of the Business Process Hierarchy and can be selected for a test plan to allow mass execution.



Chart 3.9: Automated regression tests assigned to the business process hierarchy

Functionality provided by the Test Automation Framework of SAP Solution Manager 7.1 includes:

Test script creation and assignment of test data and systems under test	<ul style="list-style-type: none"> • Seamless creation and assignment of 3rd party test automation scripts to process steps • Central planning of test data and assignment to parameters of the test scripts • Central compilation of “systems under test” (SUT) – no individual setup in each test script
Scheduling and execution	<ul style="list-style-type: none"> • Standard Test Workbench functionality to setup test plans, test packages and to execute tests with capturing of test results • New scheduling functionality to allow test execution un-attended mode, at any time and at local or at remote locations
Reporting	<ul style="list-style-type: none"> • Standard status and progress reports provided by the Test Workbench and BI

	<ul style="list-style-type: none"> Gap reports to discover business processes without tests, outdated test plans, coverage of new tests in test plans, ...
Test case repair	<ul style="list-style-type: none"> Tester can create a repair request for damaged test cases which is sent automatically to the respective Test Engineer and includes all necessary context information Test Engineers work in an environment where all context information about the damaged test cases is available. From here all functions are available to run, analyze, maintain and repair damaged test cases.

3.3.2 Test Option 2

Customers using SAP Quality Center by HP for managing the test process can use HP QTP for test automation of heterogeneous business processes including SAP and non-SAP applications.

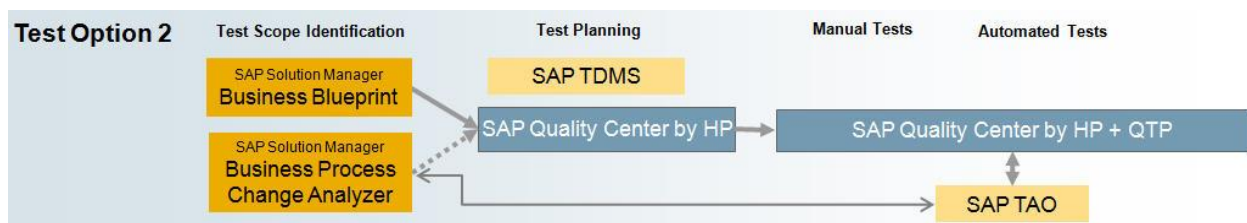
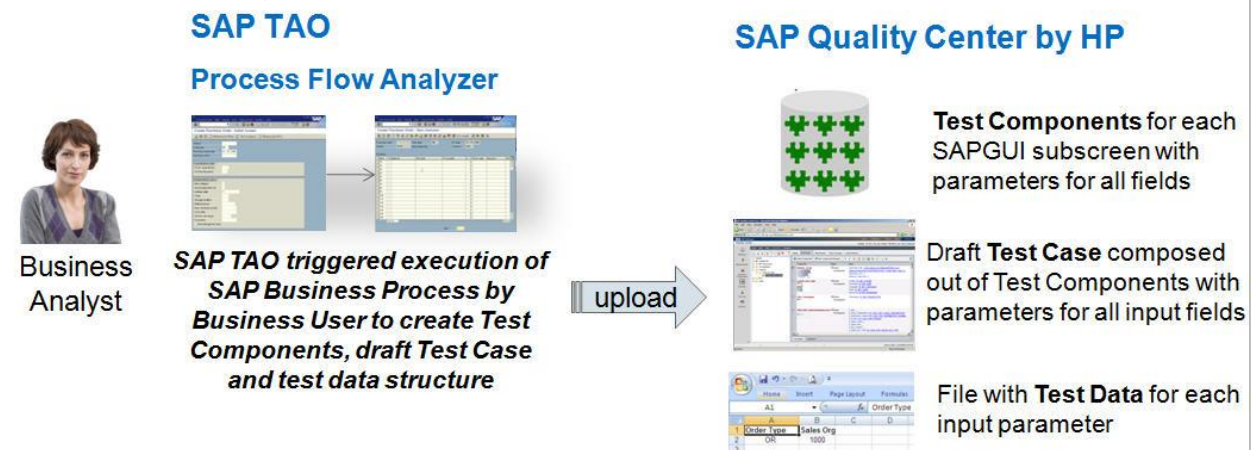


Chart 3.10: Test Option 2 with SAP TAO and SAP Solution Manager 7.0

To accelerate the creation of automated test cases and to lower the maintenance effort of automated tests, SAP strongly recommends deploying SAP Test Acceleration and Optimization (SAP TAO) in conjunction with QC and QTP to build automated regression tests.

Test Case composition



Test Case refinement

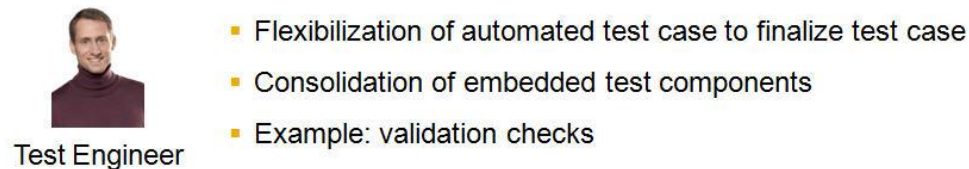


Chart 3.11: Accelerated creation of automated business process tests with SAP TAO

Approach and advantages of SAP TAO

- Business Analysts can easily build automated tests via normal execution of business processes – no special technical expertise is needed
- SAP TAO automatically creates all important test assets in the background
 - Test components** representing sub-screens of the automated business processes with automatically assigned parameters for all fields
 - Complete composition of **test script** based on SAP TAO test components
 - Test data** entered by the Business Analysts is captured in specially tailored MS Excel worksheets and are used for later test execution
 - Validation steps** are included automatically into the test script and can easily be added by a test engineer based on customer needs.
- Upload to QC allows customers to use the rich test management environment of Quality Center to build test plans and test sets based on standard QTP scripts and SAP TAO created test scripts.
- Maintenance of damaged automated test cases is accelerated by SAP TAO via integration with Business Process Change Analyzer which helps identifying damaged test components which in turn can be rapidly repaired via SAP TAO

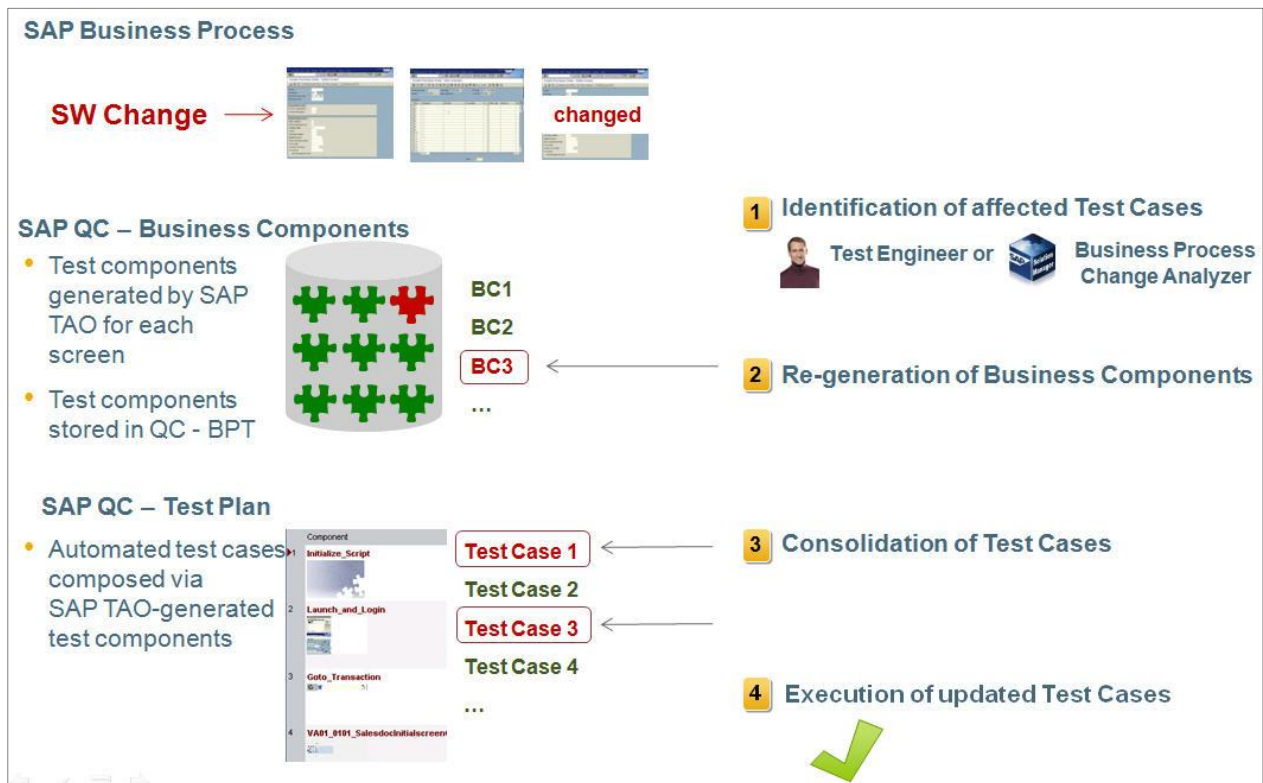


Chart 3.12: Accelerated repair of damaged test cases with SAP TAO

SAP Customers like **Baker Hughes** / US have realized the following benefits by using SAP TAO in combination with SAP Quality Center by HP and QTP

- Cost savings through defects discovered earlier in the life cycle
- 40% Reduced testing effort by automating regression testing
- Reduced User Acceptance Testing to 3 weeks
- Estimated 20% savings due to reuse of existing test cases for future releases
- Estimated 25-30% savings in maintenance due to use of SAP TAO
- Delivery of high quality complex application release with minimal production issues
- Tracking all testing activities using a central test management tool

Source: SAPPHIRE 2009

Rule of thumb: SAP customers should consider automating the regression test scripts of their critical business processes – approximately 100-200 process steps. Many companies reported that this can be achieved within a 3 month timeframe. SAP customers starting with test automation should consider

1. Avoid long and too complex test scripts
2. Consider scenario tests which consist of single functional tests with parameter handover from one to the next test script
3. Consider meaningful test data – see recommendation # 4
4. Avoid automating all possible variants – start with the most important process flows

3.4 Recommendation #4: Comprehensive test data for automated regression tests

Goal: Provisioning of test data for automated tests in the TST system that represent standard business process execution.

One of the biggest hurdles to setup efficient automated regression tests belongs to the provisioning of suitable test data. It is not sufficient to provide data in the test system landscape. For automated tests, the test data must be provided in a format that suits the used test automation tool. In addition, the data must be up-to-date, i.e. fit to the customizing and master data in the respective test systems. From this point of view a PRD to TST system copy or data refresh using SAP TDMS only provides the necessary data environment in the test system landscape, but it does not solve the complex challenge of providing the necessary data for consumption in test automation tools.

3.4.1 Use of “Reference business documents” as input for test data

In order to execute manual or automated tests for a set of critical business processes, SAP customers need to identify the relevant data required for data entry during business process execution.

- **Test Data Planning:**

It is recommended to identify a set of already posted business documents from the PRD system landscape that represents the typical scope of process execution. These already posted business documents are called “reference documents” since their data can be used for regression tests to verify the expected system response.

- **Test Data Provisioning:**

In a second step the test data that is required during test execution needs to be entered in a test data repository which is connected to the selected test automation tool. With this approach SAP customers can provide relevant test data for the core business processes independent from the test scripts that consume the test data later on.

- **Test Execution:**

During execution of the automated regression test cases, the relevant test data (sourced from the reference document) is selected from the repository

and used to populate the input fields of the business transaction. With this approach it possible to verify that the changes deployed in the test system do not damage the business processes included in the scope of the regression test.

3.4.2 Test Data handling in SAP Test Option 1

For customers using Test Option 1 (SAP Solution Manager and integrated 3rd party test automation tools) it is highly recommended to plan and provide test data through the mature functionality of **Test Data Container** (TDC) provided by SAP Solution Manager 7.0 with the following functionality:

- User can define the test data structure for a set of single fields and structures with reference to SAP Data Dictionary
- Manual planning of test data as well as file uploads
- Wizard to map test data stored in TDC with parameters of the test script (via Tab “Variables” in the Test Configuration)

Step 1

During design time, the user creates a Test Configuration within SAP Solution Manager. After providing header and “System under Test” information the preferred test automation tool is launched to create a test script. It is recommended to replace fields that require data input with parameters within the test automation tool. These parameter definitions are sent back from the test automation tool to the Test Configuration in SAP Solution Manager.

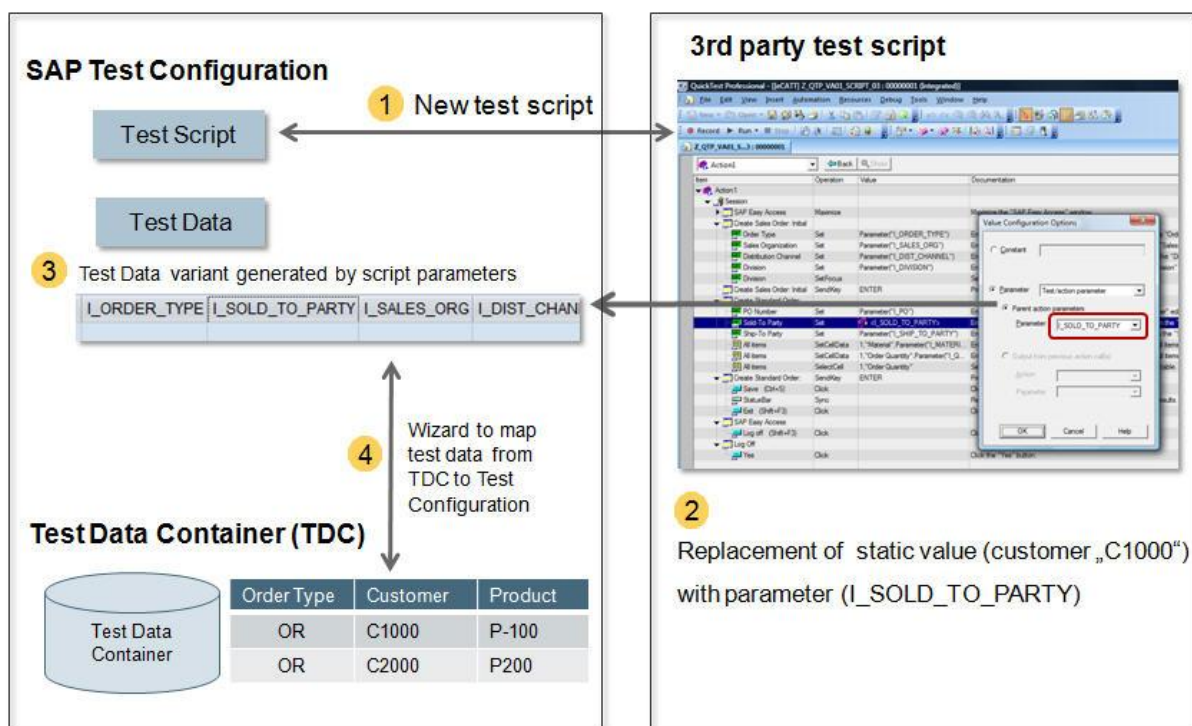


Chart 3.13: Parameter mapping from 3rd party test automation tool to Test Configuration of SAP Solution Manager and assignment of test data from Test Data Container

Step 2

Test data can be entered into the Test Data Container which has been defined for the respective business processes. Here the Test Engineer can make use of the recommended approach to enter data from business documents already posted in the PRD system that represent the desired process execution variants. At the end of this step the user might have entered 2-10 test data variants which subsequently lead to 2 – 10 test iterations.

Step 3

A Wizard supports the user to select suitable test data stored in the Test Data Container and to assign it to the Test Configuration, which contains the test script. More complex situations can be handled as well, since the user can assign data from multiple Test Data Containers which can hold different types of data. The Test Configuration provides the following 2 test data views which can be toggled

1. Reference view: the user can check the link between parameters of the test script and the fields / records from the assigned Test Data Container
2. Data view: the reference is replaced with the test data read online from the TDC. In this view the user can see which test data will be used during execution.

The screenshot displays the 'Change Test Configuration' window for 'ZO2C_SALESORDER_QTP_92_TDC_01'. It includes fields for 'Test Configuration', 'Title' (Create Sales Order with HP QTP (with TDC)), and 'SAP Solution Manager' (Project: AGS_BS_IMP -> Role: Quality Assurance System). The 'Test Data' tab is active, showing a table of linked test data with columns for various fields and two data rows.

Ex...	V	D	I_ORDER_TYPE	I_SALES_ORG	I_DISTRIBUTION_CHANNEL	I_DIVISION	I_SOLD_TO_PARTY	I_SHIP_TO_PARTY	I_MATERIAL	I_QUANTITY
<input type="checkbox"/>	E									
<input checked="" type="checkbox"/>	1		OR	1000	10	00	1000	1000	P-100	1
<input type="checkbox"/>	2		OR	1000	10	00	1000	1000	P-200	1

Chart 3.14: Test Configuration with linked test data from Test Data Container

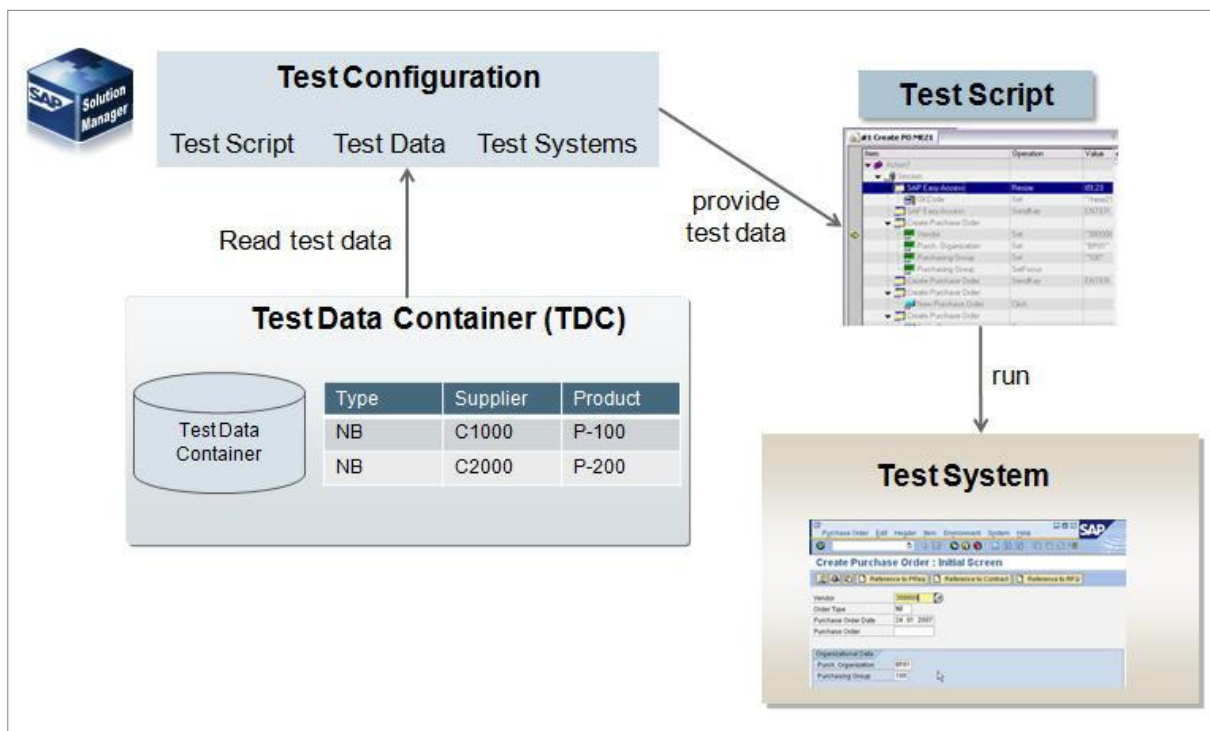


Chart 3.15: Test Data handling via Test Automation Framework during test execution

A SAP standard interface provides the functionality to link 3rd party test automation tools with SAP Solution Manager, thus allowing the provisioning of test data at runtime from Test Data Container to the test script. The following test automation tools can make use of this approach:

- SAP eCATT
- HP Quick Test Professional (QTP)
- Worksoft Certify
- IBM Rational Functional Tester (RFT)
- ...

During test execution, the Test Configuration reads the test data from the TDC and transfers it to the test script of the test automation tool for execution. Each test data record from the TDC will trigger an additional test execution.

3.4.3 Test data handling in Test Option 2

For customers using Test Option 2 (SAP Solution Manager, SAP TAO and SAP Quality Center by HP) SAP provides the following advanced capabilities to handle test data in automated scripts:

- The user creates a new test script via SAP TAO by executing a business transaction and entering data for all input fields
- SAP TAO creates all necessary test assets in the background, including
 - test script

- test components which represent screens / sub-screens and parameters for all fields
- MS Excel file with above input parameters as column header and 1 data row which includes the test data from the initial process execution.
- The file with the test data can be placed on a central group server to allow test execution by multiple users
- Users can enter additional test data directly in the MS Excel file as additional rows. At runtime, Quality Center will execute the test script as many times as test data rows included in the data file.

The automatic creation of parameters for input fields allows users to build sophisticated test scripts in a very fast manner and to assign test data in a very convenient way, since the MS Excel file includes already the required data structure.

Step 1

A casual user executes the business transaction. SAP TAO creates test components with parameters for all input fields, test script using test components in the right order, file with test data and the connection of the script parameters with the columns of the test data file.

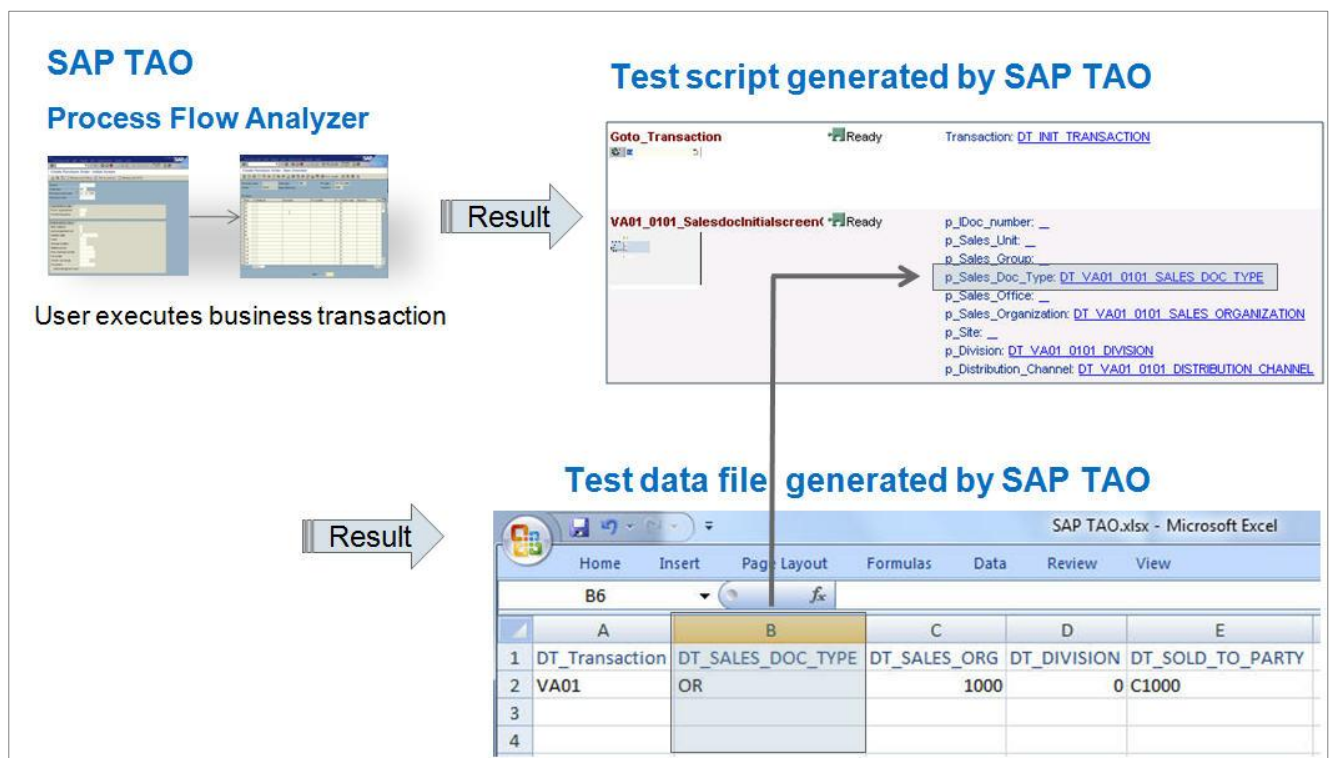


Chart 3.16: Creation of test script and test data file with SAP TAO 2.0

Step 2

A business analyst, SME or test engineer can enter additional test data in the data file. Customers should consider identifying business documents in the production

system that reflect standard variations. The data from these business documents can be entered as test data in the test data files.

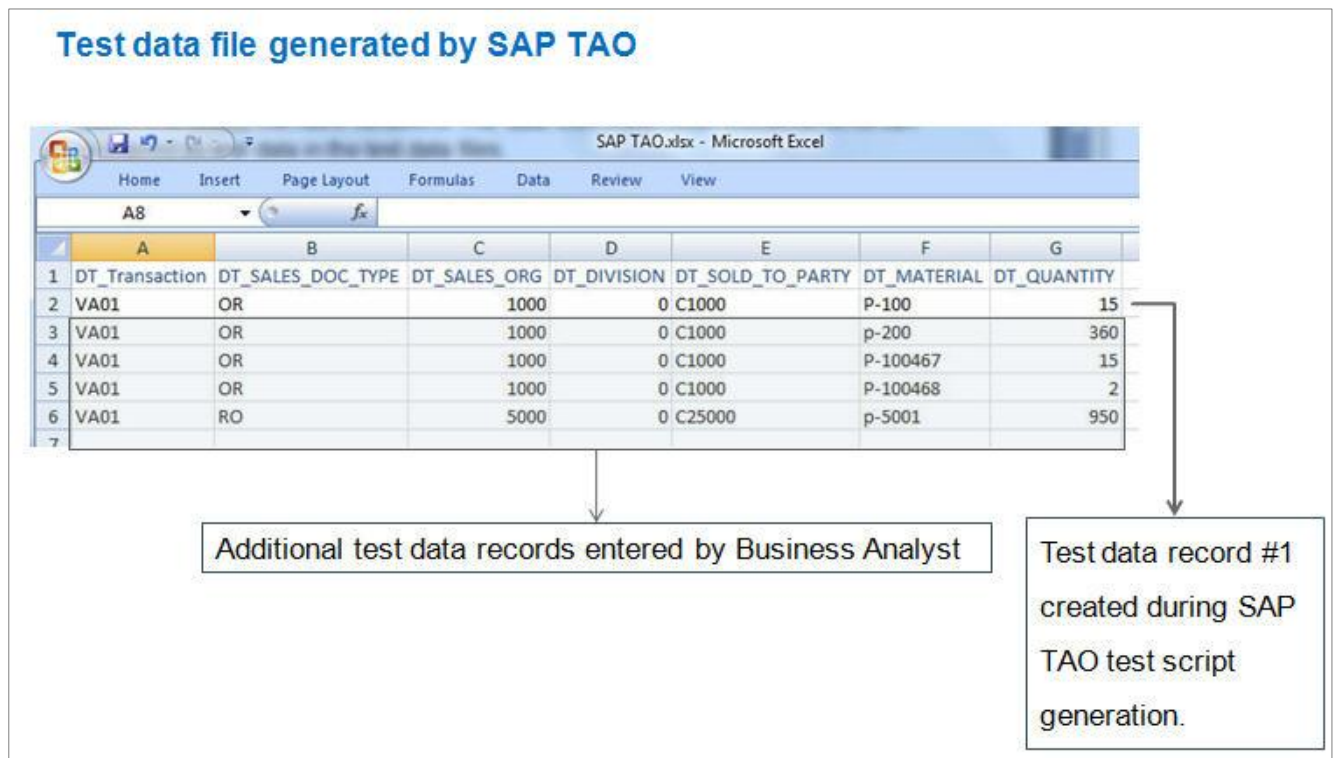


Chart 3.17: User enters additional test data records in SAP TAO generated test data file

Step 3

Quality Center executes the SAP TAO script and accesses the test data file via the link included in the test script. Test data from the file will be retrieved and entered into the input parameter at runtime. For each test data record a separate test execution takes place.

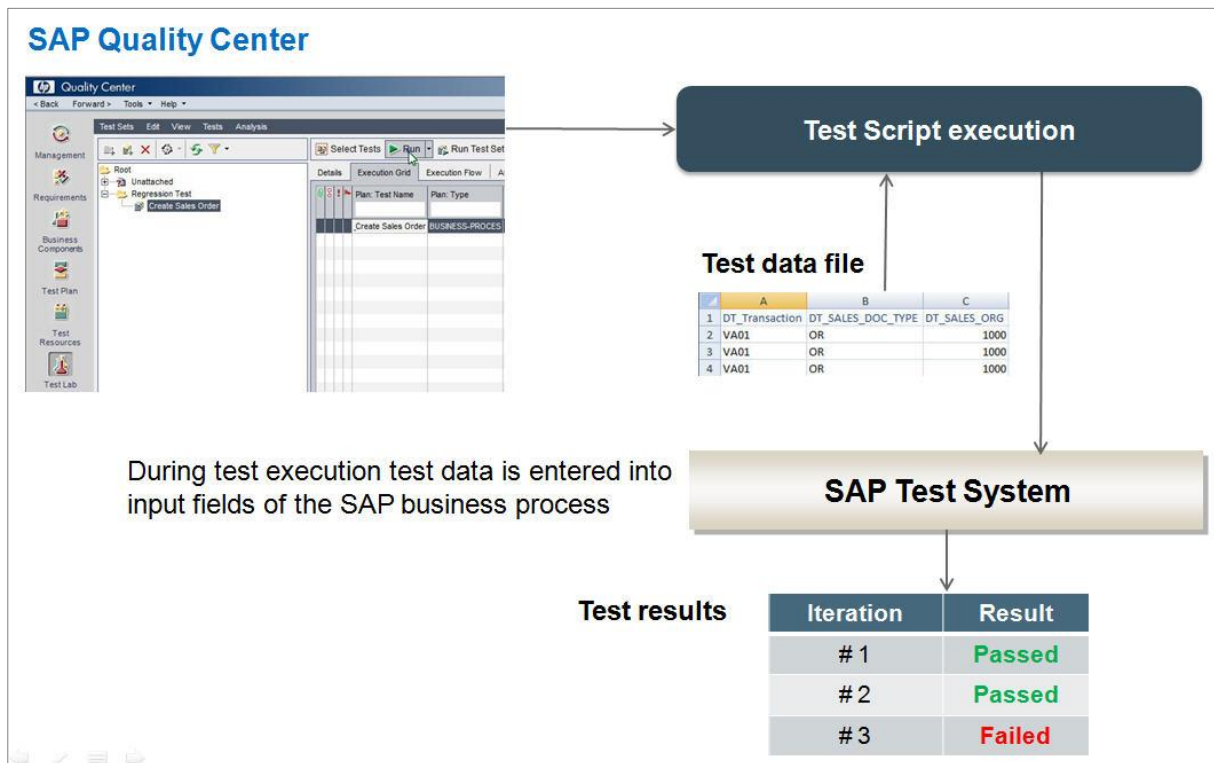


Chart 3.18: Test execution with multiple iterations triggered by test data file

Rule of thumb: SAP customers should identify a set of approx. 5-10 business documents for each regression test that have been posted in the Production System which represents the normal variation of process execution that should be re-used for regression testing. The data of these business documents can be entered in the Test Data Container or MS Excel files used by test automation tool.

3.5 Recommendation #5: Provisioning of easy to use manual tests

Goal: Setup of manual test cases that include guidance for test execution and at the same time are easy to use by casual testers during manual test case execution. Connection to the test systems should allow smooth start of test execution.

Many SAP customers have not been able to automate their regression tests and thus rely on manual execution. To support casual users to perform manual tests in the most efficient way, the following aspects shall be considered when setting up manual test cases:

1. Manual test scripts need to include guidance on how to execute the single steps of the business transaction and the expected results
2. Assignment of business transaction of the test systems to allow direct start of test execution
3. Setup of test sequences in case of business scenario tests with multiple roles performed by multiple testers

3.5.1 Manual Test Cases in SAP Test Option 1

Setup of manual test scripts

Manual test scripts are defined in the transaction Configuration of SAP Solution Manager. This capability can be reached easily from the Work Center “Test Management” – view “Test Preparation”.

A new manual test script is created by choosing Test Case Type “Test Document” for the process step of the Business Blueprint.

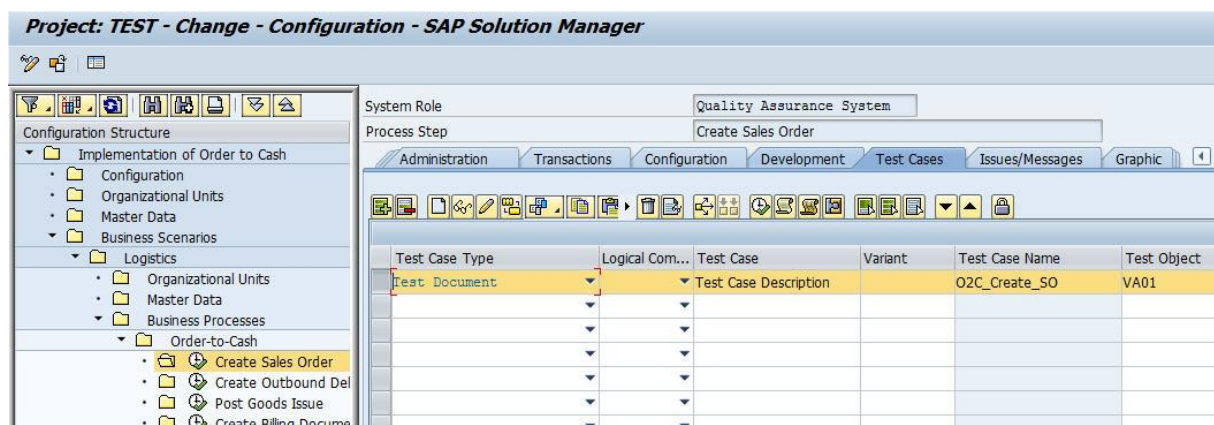



Chart 3.19: Business Blueprint with assigned manual test script for selected process step

The test script consists of a document that is typically created by a Business Analyst who knows the business transaction very well. The document can be created in various formats and should include the following details

- Author and last editor with time stamp
- Prerequisites – what needs to be in place before this test is executable
- Test data for the business transaction or a link where to find the test data
- Information on how to start the business transaction
- Execution Steps including user activity and expected results
- The tester needs to understand how the expected test results can be verified

Test Case Description



Create Sales Order

Last changed by:	Mr. John Miller, Business Analyst
Last changed on:	201x December 12

1 Prerequisites

Master data for products and customer, as well as sales organization

2 Test Data

Standard test data is included in the following test script. Please use the value help functionality in the SAP test system to obtain additional test data

3 Test Execution

Your test package includes a button to start the business transaction **Create Sales Order** (transaction code VA01).

Step	Activity / Default Test Data	Expected result	Actual result
1 Initial screen	Enter data for the following fields <ul style="list-style-type: none">• Order Type (OR)• Sales Org (1000)• Distribution Channel (10)• Division (00)• Press enter	Entered data is checked and accepted. Next screen will be processed.	
2 Standard Order Overview	Enter data for the following fields <ul style="list-style-type: none">• Sold-to party (1000)• Ship-to party (1000)• ...• Press enter	Entered data is checked and accepted.	
3 Save	Press the Save button	Success message and sales order number.	
4 Verification	Check sales order with display sales order transaction (VA03)	Display transaction shows data as entered in steps 1-3	

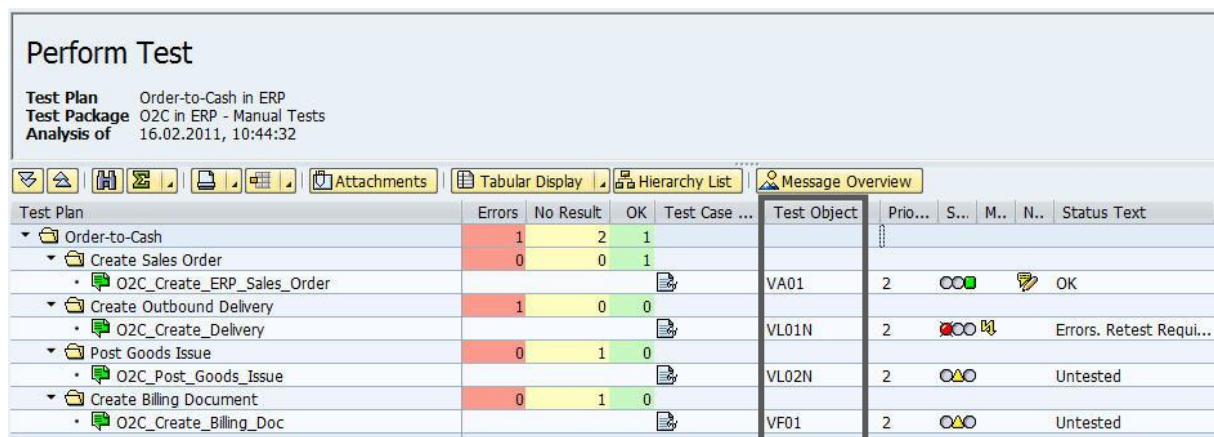
Chart 3.20: Manual test script with steps, activities, expected and actual results

Test Planning

The test coordinator or quality manager selects the appropriate test cases for regression tests based on the agreed test scope. The selection process can be performed semi-automatically by the Test Workbench of SAP Solution Manager. Various selection methods help the test coordinator to compile a test plan with appropriate test cases from the business blueprint or change impact analysis. In a second step, the overall test plan gets divided into test packages with assignment of users that act as manual testers.

Assignment of business transaction to manual test case

To allow a smooth start of the business transaction by the manual tester, it is recommended to include the test object, e.g. transaction code into the individual test package of each tester. With this approach, the tester can start the test execution with 1 click on the test object in the assigned test system, which not only improves the usability but also avoids searching for the respective systems.



The screenshot displays the 'Perform Test' interface in SAP Solution Manager. It shows a hierarchical tree of test cases under the 'Order-to-Cash' test plan. The table includes columns for 'Errors', 'No Result', 'OK', 'Test Case ...', 'Test Object', 'Prio...', 'S...', 'M..', 'N..', and 'Status Text'. The 'Test Object' column is highlighted with a black box, showing values like VA01, VL01N, VL02N, and VF01.

Test Plan	Errors	No Result	OK	Test Case ...	Test Object	Prio...	S...	M..	N..	Status Text
Order-to-Cash	1	2	1							
Create Sales Order	0	0	1							
O2C_Create_ERP_Sales_Order					VA01	2	OO	GG		OK
Create Outbound Delivery	1	0	0							
O2C_Create_Delivery					VL01N	2	XX	OO	GG	Errors. Retest Requi...
Post Goods Issue	0	1	0							
O2C_Post_Goods_Issue					VL02N	2	OO	GG		Untested
Create Billing Document	0	1	0							
O2C_Create_Billing_Doc					VF01	2	OO	GG		Untested

Chart 3.21: Tester Worklist of SAP Solution Manager with assigned Test Cases and Test Objects

3.5.2 Manual Test Cases in SAP Test Option 2

Customers using SAP Quality Center by HP (Test Option 2) can use the QC Test Plan module to define manual test cases.

As first step it is recommended to transfer the Business Blueprint and assigned business requirements from SAP Solution Manager to the QC Requirements Module.

In the optional step 2 the user can define additional test requirements. In step 3 the user creates manual tests including test steps, activity descriptions, expected results as well as attachment to guide the user through the test execution.

The Test Plan module is tightly integrated with the Requirements module to assign test cases to Business and Test Requirements, which in turn allow tests coverage analysis by the test coordinator later-on.

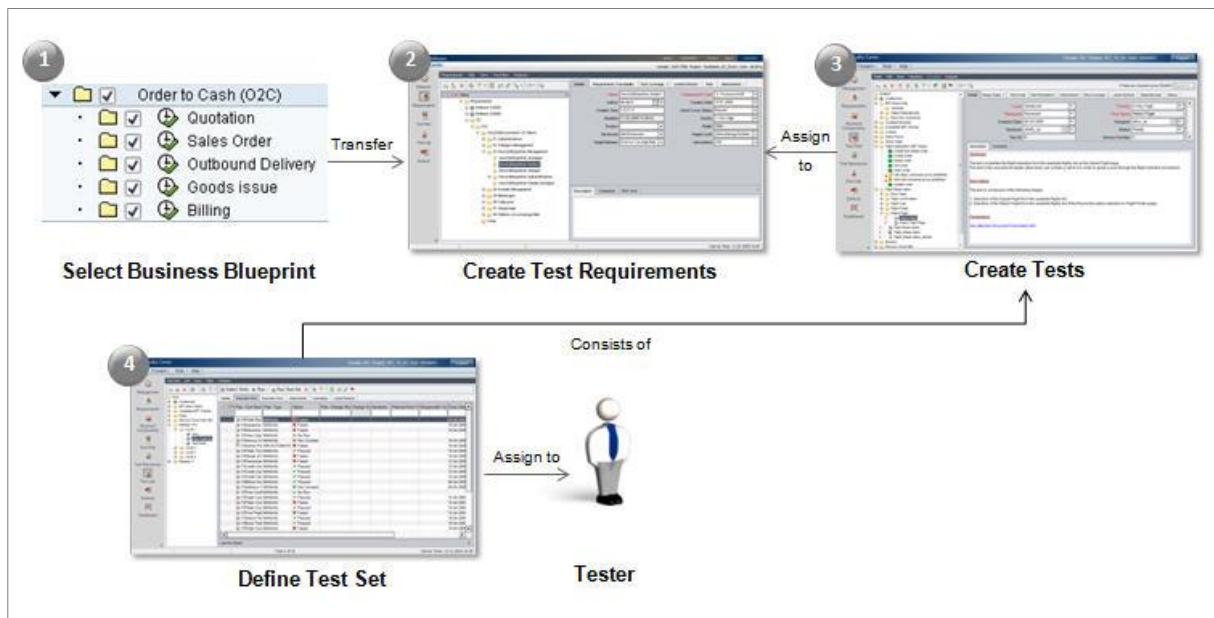


Chart 3.22: Modules and workflow of SAP Solution Manager and SAP Quality Center

In step 4 the test coordinator defines test sets by selecting appropriate tests and assigns manual testers to the test sets.

The manual test script consists of a sequence of steps to guide the tester through the single test activities. For each step it is possible to assign expected results or descriptions about further activities in order to validate results.

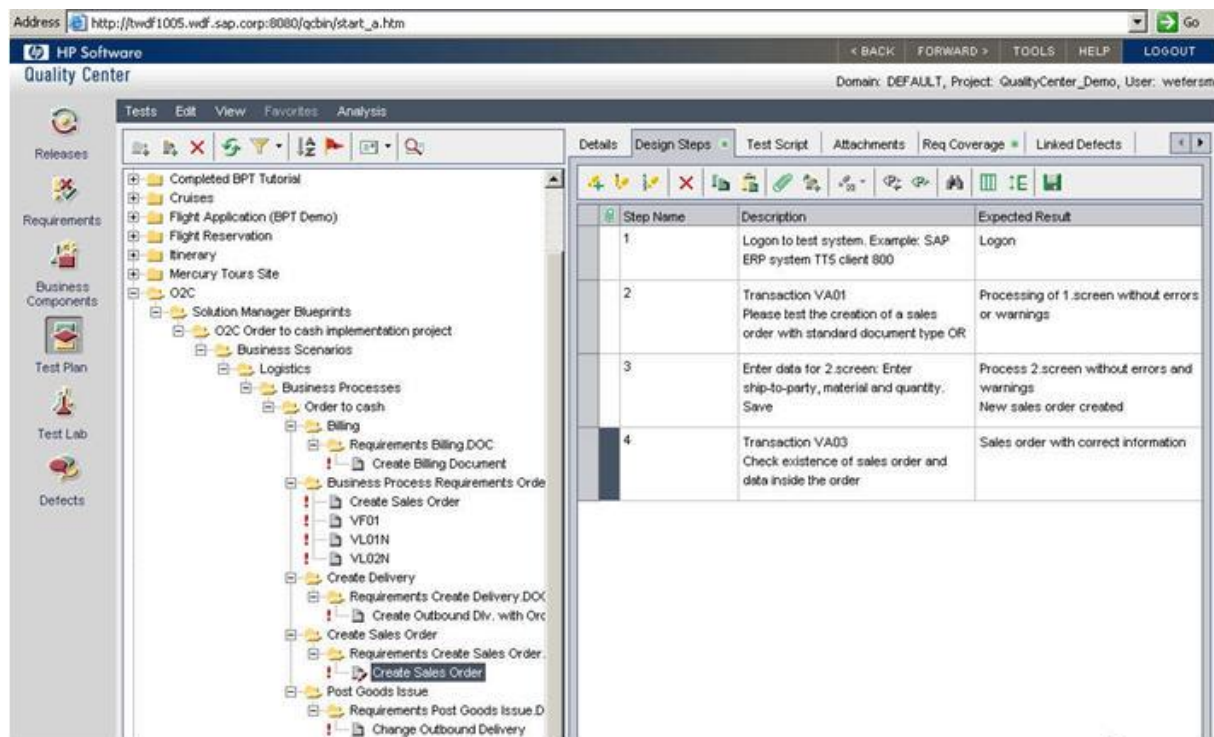


Chart 3.23: Manual test case definition with SAP Quality Center by HP

For scenario tests it is possible to show the execution flow of included single tests in a graphical format.

Rule of thumb: SAP customers should consider defining their manual tests with clearly and easy to follow step descriptions. The launch of manual tests should be supported with links in the test package to allow hassle-free start of the business process in the assigned test system.

3.6 Recommendation #6: Change Impact Analysis and risk-based Test Scope Identification

Goal: *Reduction of test scope to those business processes impacted by software changes. Enable Quality Experts and Test Coordinators to organize tests that fit into tight budgets and time windows before cut-over and go-live.*

SAP customers are confronted with the decision on what needs to be tested when performing changes of their SAP-centric business processes as part of maintenance or innovation activities. Most companies have restricted time windows for performing the necessary regression tests and because of this cannot test all mission-critical business processes. As a result, many QA departments have to make an educated guess about required regression tests instead of following the approach of change impact analysis to identify the test scope. This recommended approach is known as risk-based test scope optimization which is supported by SAP with the application **Business Process Change Analyzer (BPCA)**, available with SAP Solution Manager 7.0 SP18.

BPCA Approach

The main concept of change impact analysis is based on the functionality to create a link between technical SAP objects that have been changed and the business processes that are making use of the changes SAP objects. With this know-how it is possible to analyze SAP transport orders and the impact on business transactions.

During a **preparation phase** BPCA performs an analysis to identify all technical SAP objects used by a business transaction including code, tables, user-interfaces, etc. The resulting trace file (technical bill of material - TBOM) is assigned to the respective process step of the Business Blueprint. The trace can be created through manual execution of the business transaction or automatically via automated tests.

During a change event, the QA Expert performs a **Change Impact Analysis** by selecting a range of SAP transport orders that include the changed technical SAP objects. BPCA performs an assessment and identifies the impacted process steps. For each process step it becomes clear which changed object caused the impact. Based on the results of the change impact analysis, BPCA can perform a **Risk-based Test Scope Identification** by selecting appropriate manual and automated test cases. As final step a Test Plan including the test recommendation can be generated.

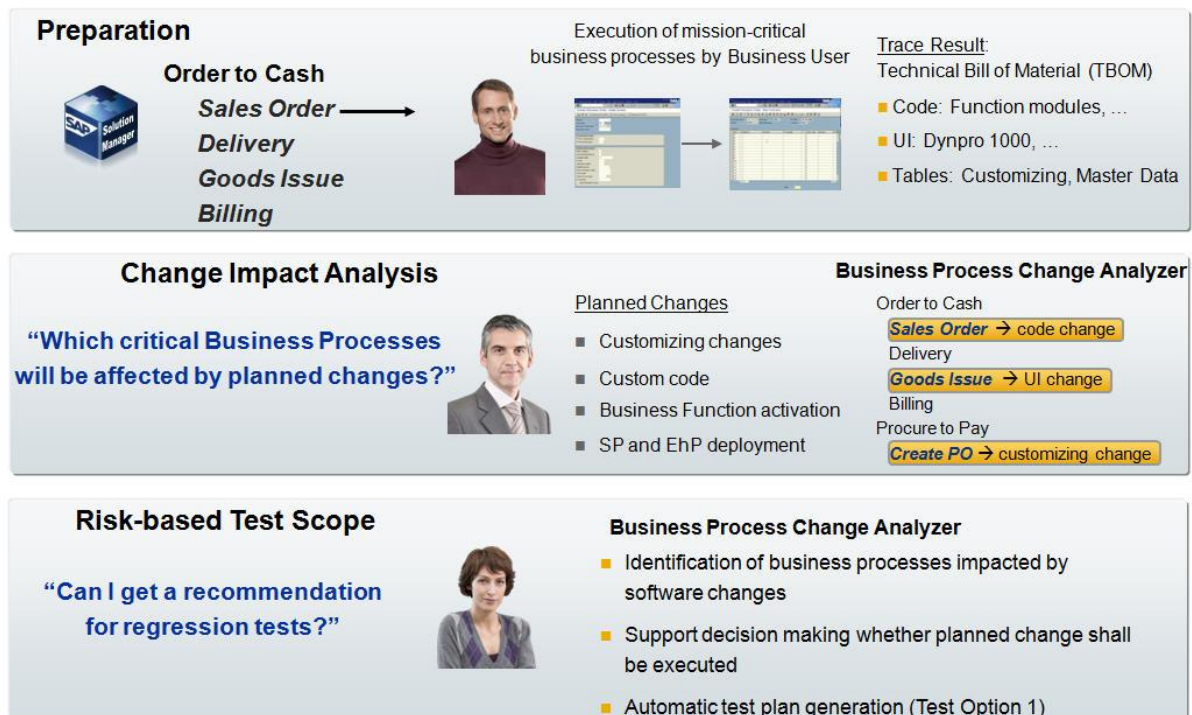


Chart 3.24: Risk-based test scope identification with Business Process Change Analyzer of SAP Solution Manager

Software Change Types 1+2: Customizing and Custom Code Developments

Business departments often request changes to the behavior of business transactions which result in customizing and configuration changes. In addition, when the requested functionality is not available in the SAP standard solution, customers extend the functionality through additional software developments. All changes are collected and transported via SAP Transport Orders from the development to the test system.

When starting the BPCA change impact analysis, the user identifies the changes through entering of a date interval which retrieves the SAP Transports for a selected system. In addition, the user specifies the business processes that are subject of the change impact analysis.

The BPCA result screen shows the SAP Solution Manager projects, solutions and included process steps impacted by the selected software changes. As an option, the user can drill-down to a detailed screen to view the changed SAP objects which are the reason that the process step is marked as impacted. As an optional final step, the user can generate a regression test plan based on manual and automated test cases assigned to the impacted process step.

This BPCA functionality is available with SAP Solution Manager 7.0 SP18.

BPCA Use Case 1: Customizing Changes

Example: „Create Sales Order“ – input field „Purchase Order: optional → mandatory

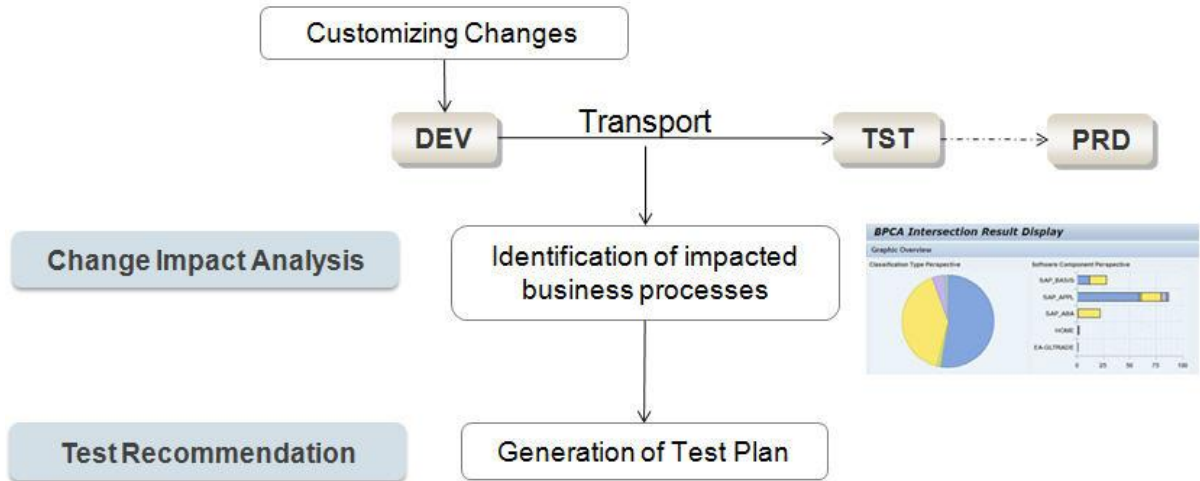


Chart 3.25: Change Impact Analysis for customizing change

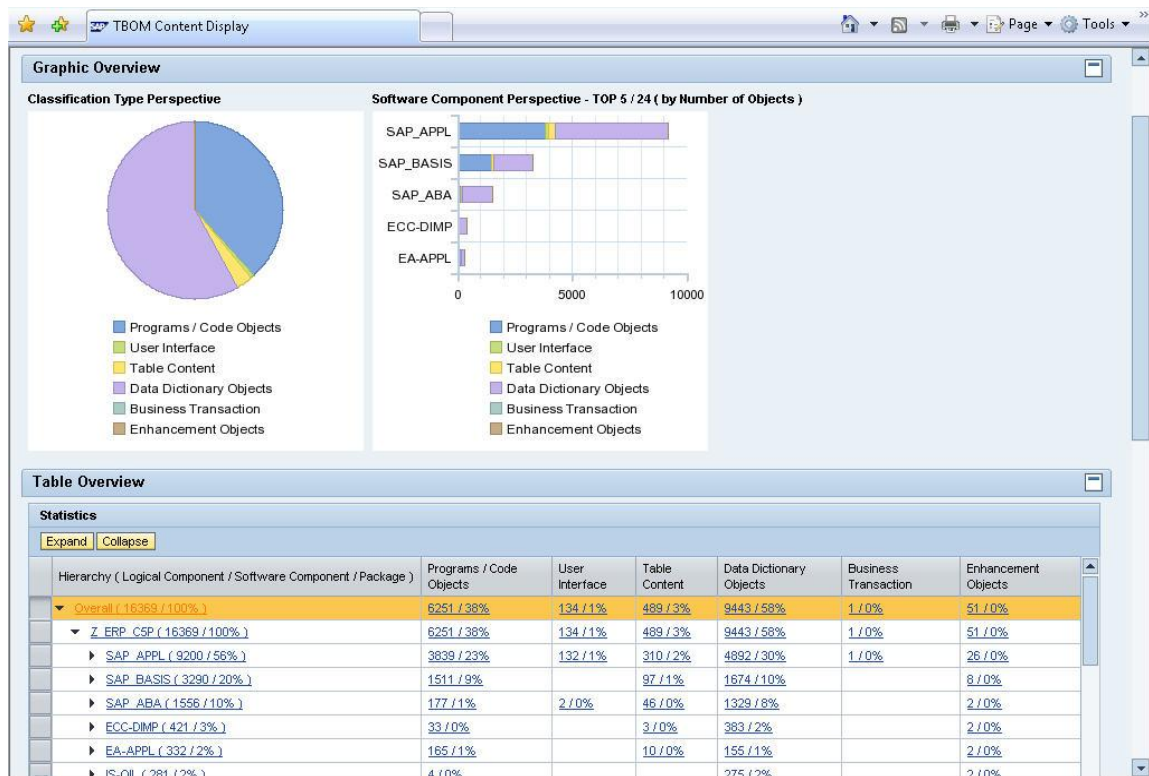


Chart 3.26: Graphical details of a BPCA change impact analysis – available with SAP Solution Manager 7.1

Software Change Type 3: planned Business Function activation

SAP provides innovations for the SAP Business Suite through Enhancement Packages (EhP) which include a number of Business Functions. Customers interested in this functionality have the choice to activate Business Functions on an individual level. This very flexible deployment concept got widely accepted by customers and received positive feedback. The only challenge that customers are facing results from the inability to reverse the activation of a Business Function once activated. For this reason, some customers hesitate to activate Business Functions.

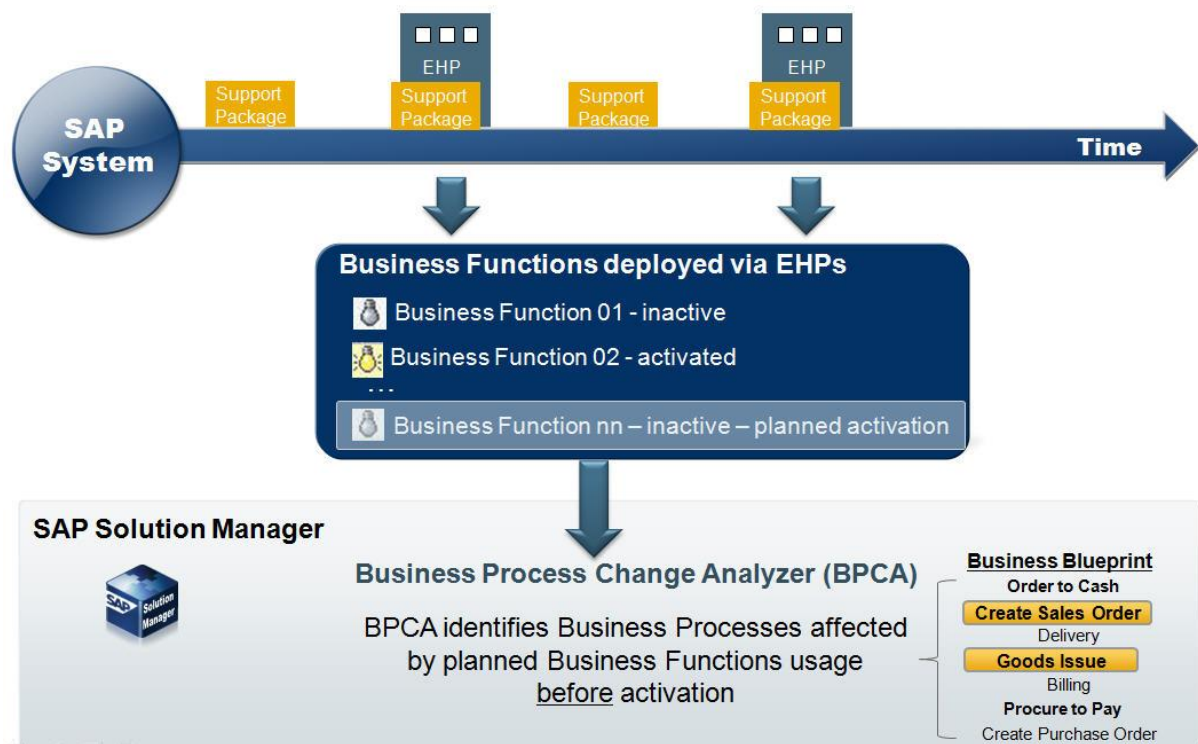


Chart 3.27: Change Impact Analysis for planned Business Function activation

To lower the hurdle of Business Function activation, BPCA provides a simulation functionality to identify process steps impacted by a **planned** Business Function activation **before** activation in the SAP system. Following steps are performed:

- User selection of SAP system and inactive Business Functions for which the company plans activation. For user convenience, BPCA lists all Business Functions and status (active, inactive) available in the selected system.
- BPCA change impact analysis for selected inactive Business Functions. The BPCA result shows all business process steps impacted by the planned Business Function activation.
- As an option the user can generate a regression test plan for the impacted process steps.

This BPCA functionality is available with SAP Solution Manager 7.0 SP23.

Software Change Type 4+5: Deployment of SAP Support Packages and EhPs

SAP Support Packages (SP) and SAP Enhancement Packages (EhP) include a high number of changed SAP objects which result in BPCA analysis results where a very high percentage of analyzed process steps are flagged as impacted. This result is absolutely correct, but unfortunately does not provide a reduced test scope.

BPCA Test Scope Optimization solves this issue with an advanced optimization procedure. Instead of identifying all process steps affected by a software change, BPCA optimizes in 2 dimensions

1. Ranking of process steps affected by most of the included software changes
2. Ranking of process steps which can be tested with the lowest effort

Example

Let's assume a SAP SP includes 5.000 changed technical SAP objects and the BPCA analysis covers a business blueprint with 200 process steps, the BPCA Test Scope Optimization will identify the one process steps that is affected by the highest number of changed SAP objects of the Support Package, e.g. 400 objects. The next highest change rate might find a process step #2 which is affected by 375 changed SAP objects. The second optimization dimension relates to the time that a company needs to spend on testing these process steps. In case that process step #1 has a manual test case assigned which requires 2h test execution time and process #2 has an automated test case assigned which requires only 10 minutes for result analysis, process step #2 will probably be listed first in the total ranking.

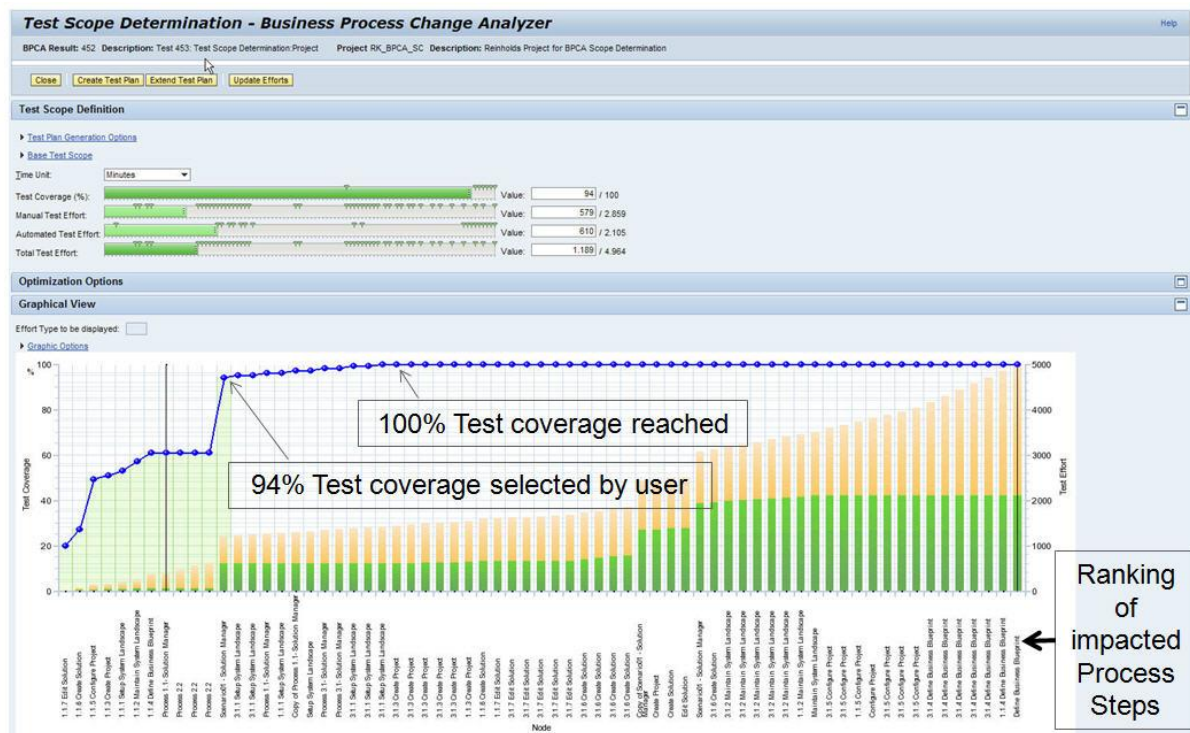


Chart 3.28: Test Scope Optimization with BPCA (SAP Solution Manager 7.1)

Chart legend

- X-axis: ranking of impacted process steps. Testing priority from left to right
- Y-axis left: Test coverage (%)
- Y-axis right: Test effort (time)
- Green vertical bars: cumulated effort of automated test cases (time)
- Orange vertical bars: cumulated effort of manual test cases (time)
- Vertical line: process steps left of this line are forced into the test scope, e.g. through attributes assigned to process steps such as process step priority

The above chart illustrates the substantial benefits of the optimization approach:

1. Test Coordinators and Change Managers get a clear guidance of what needs to be tested first
2. Graphical overview of the break-even point where additional testing does not cover additional changed objects – see 100 % test coverage
3. Levers at the top allow the user to change the test coverage percentage in case the test phase does not allow to include all test cases for 100% coverage - see 94 % test coverage
4. The user gets an indication about the total test effort
5. Mission-critical process steps impacted by the change event can easily be included in the test scope through flexible derivation mechanisms.
6. SAP customers are enabled to generate a regression test plan for SAP SPs and EhPs without the need to test all business processes.
7. Customers can optimize the development of new automated test cases based on gaps identified by BPCA.

This BPCA functionality is available with SAP Solution Manager 7.1 SP00.

Rule of thumb: SAP customers should create the BPCA prerequisites (TBOM) for at least all mission-critical process steps of their business blueprint, e.g. 100 – 200 process steps. Automated Test Cases should be considered to build the TBOMs automatically. Change impact analysis can help to significantly reduce the test effort when following the above recommendations. Extended BPCA functionality provided with SAP Solution Manager 7.1 allows optimizing the test scope for SAP SPs and EhPs.

3.7 Recommendation #7: Unattended (“lights-out”) execution of automated regression tests

Goal: Execution of automated regression tests in unattended mode to receive test status for all critical business process directly after deployment of software changes. Achieve efficiency gains since test teams can use their time and resource for tasks that need human interaction.

Another big advantage and efficiency gain of automated tests comes from the ability to schedule automated tests and execute them in unattended mode so that no users are tasked to monitor them. Following this approach, test engineers can schedule test execution at non-peak times such as during night time – which is also known as “lights-out tests”.

Customers following this approach could organize a change sequence as described in the following example:

1. Initial transport including implemented changes from DEV to the TST landscape
2. **Manual** testing of changed functionality through suitable users in the TST landscape
3. **Automated regression tests** of core business processes – executed over night (lights-out test) in unattended mode
4. Creation of incidents for business processes not working as expected
5. Assessment and adjustments of defects in the DEV environment and transport to TST
6. **Manual** testing of changed functionality through suitable users in the TST landscape
7. **Automated regression tests** of core business processes – executed in unattended mode
8. Result analysis and potentially creation of additional incidents
9. ...

With this approach, the test and change management team will have much more time to concentrate on value adding activities instead of execution of recurring tasks, i.e. execution of regression tests again and again.

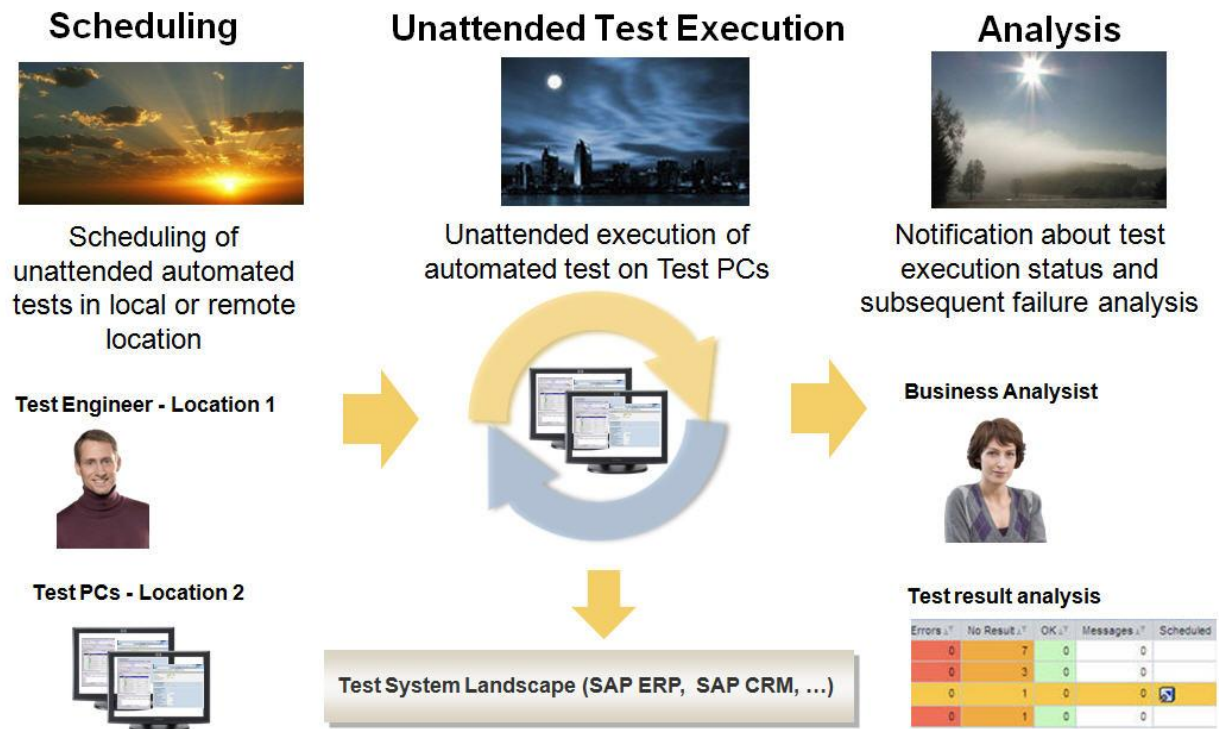


Chart 3.29: Setup of automated regression tests to run in unattended mode

3.8 Recommendation #8: Manual test execution with guidance for business users

Goal: Efficient introduction of the test environment and test execution tasks to business users acting as manual testers. Guidance for manual testers about test scripts, access to test systems and business transactions, test result documentation and incident creation in a convenient fashion.

The following criteria should be considered for the execution of manual regression tests executed by business users:

1. Test tool learning time and ease of use for business users acting as manual testers
2. Easy access to test scripts and business transactions for SAP and non-SAP test systems
3. Email notification to inform manual testers to start test execution
4. Convenient documentation of test status and test results
5. Creation of incidents in the context of the test case execution with integration to problem resolution

Test tool learning time

Business users involved in manual regression testing are scarce resources. The involvement of these users is crucial since they bring in the business aspects, but their involvement should be handled with highest efficiency. From this perspective the learning time of the test tool that guides the manual tester is very important. The available test management applications like SAP Solution Manager Test Workbench as well as SAP Quality Center by HP can handle this requirement very well.

As a rule of thumb, approximately 30-60 minutes initial training is sufficient to get the manual testers accustomed to the test tools for manual testing execution.

3.8.1 Manual Test Execution in SAP Test Option 1

Easy Access to test scripts and business transactions

In order to offer a convenient and straight forward access to test scripts and business transactions for manual testers, SAP Solution Manager provides a Tester Worklist which provides a list of all test cases assigned to the user. With one click, the Tester Worklist allows the user to

- open the test script to read the guidance on how to test the business transaction
- launch the business transaction in the respective SAP / non-SAP test system

With this approach the tester does not need any other information to access the test system for the execution of the business transaction that is getting tested. SAP customers like Ferrero rate this functionality as an important step to provide a hassle-free test environment for casual users – see customer use case in chapter 4.

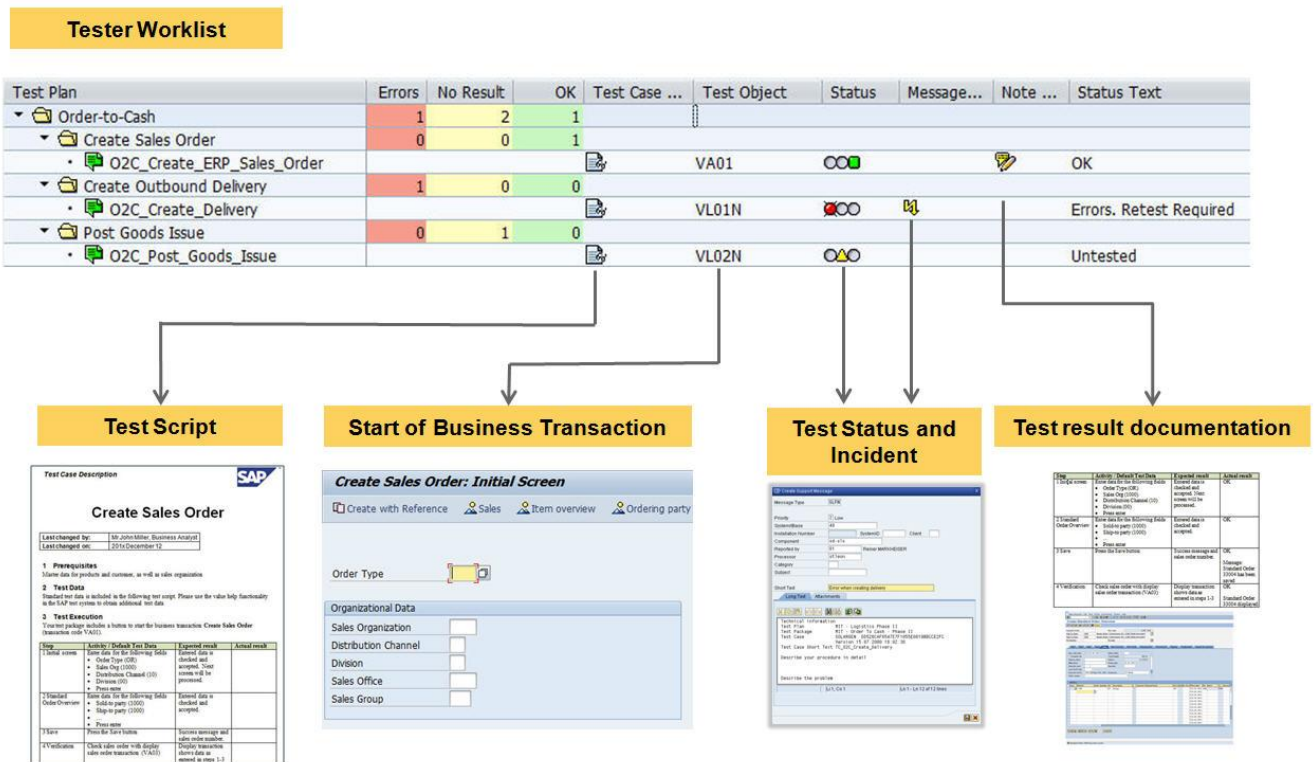


Chart 3.30: Tester Worklist of SAP Solution Manager - user access to his/her test package to start test execution

When the user has finished the test execution, it is possible to perform the following actions within the Tester Worklist:

- Test status setting
- Incident creation in case of unexpected results. He / she will be notified after problem resolution to start the retest (see below)
- Documentation of test results (see below)


Email notification

The test coordinator should inform the involved testers through email notifications to allow a smooth start of test activities. In case of scenario tests with involvement of multiple users this feature is of high importance as well, since test activities from individual testers are dependent of each other. Example: when testing an Order-to-Cash process, tester #1 might start with execution of a Quotation, Sales Order Creation, Delivery and Goods Issue followed by tester #2 performing the Billing. In

this example, tester #2 can receive an email notification when tester #1 has finished his tests.

Convenient documentation of test status and test results

The documentation of test execution results by the manual tester is an important task to ensure that the overall test is auditable. Testers can spend a lot of time with this task if not supported in an efficient way by the test tool. SAP Solution Manager Test Workbench provides a convenient way to capture the results. In SAP Solution Manager the user provides the test status from a drop down selection and subsequently creates a test note which uses a copy of the original test script. Here the manual tester enters the actual results next to the expected results (depending on company specific template) and the possibility to add screenshots to document the system response.

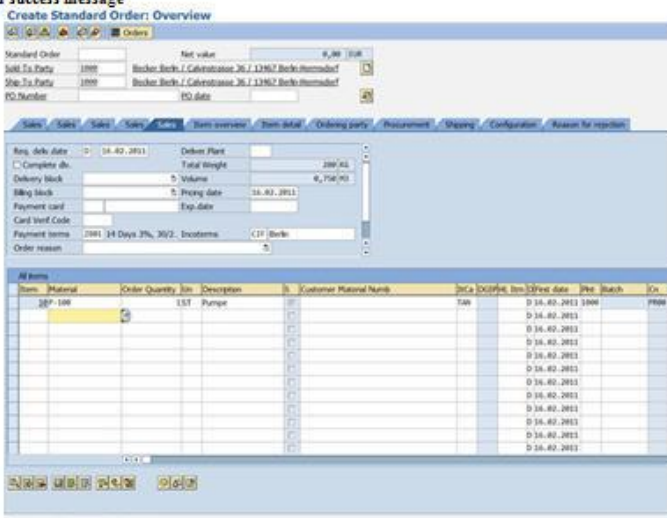
Test Result Documentation 

Create Sales Order

Test Results

Step	Activity / Default Test Data	Expected result	Actual result
1 Initial screen	Enter data for the following fields <ul style="list-style-type: none"> Order Type (OR) Sales Org (1000) Distribution Channel (10) Division (00) Press enter 	Entered data is checked and accepted. Next screen will be processed.	Ok
2 Standard Order Overview	Enter data for the following fields <ul style="list-style-type: none"> Sold-to party (1000) Ship-to party (1000) ... Press enter 	Entered data is checked and accepted.	Ok
3 Save	Press the Save button	Success message and sales order number.	Ok "Standard order 33004 has been saved"
4 Verification	Check sales order with display sales order transaction (VA03)	Display transaction shows data as entered in steps 1-3	Ok Standard order 33004 displayed

Screenshot with success message



Standard Order 33004 has been saved

Chart 3.31: Test Note with actual results and screenshot including success message

Incident creation and integrated problem resolution

The main motivation to perform tests is the detection of unexpected system behavior. There are many reasons why this could occur and therefore the tester should not hesitate to create an incident in these situations. To allow efficient handling of incident creation in the context of test execution, SAP Solution Manager as well as SAP Quality Center enable the creation of incidents directly during test execution. The incidents include information about the environment such as test system, test case and many more that is important for the service colleague or specialist who evaluates the incident.

It is of paramount importance that the test tool provides an integrated incident management capability to allow smooth exchange of often time critical information and allows the colleague handling the incident to get the entire context automatically. After incident clarification and problem resolution, the tester gets notified automatically and prompted to perform retest activities.

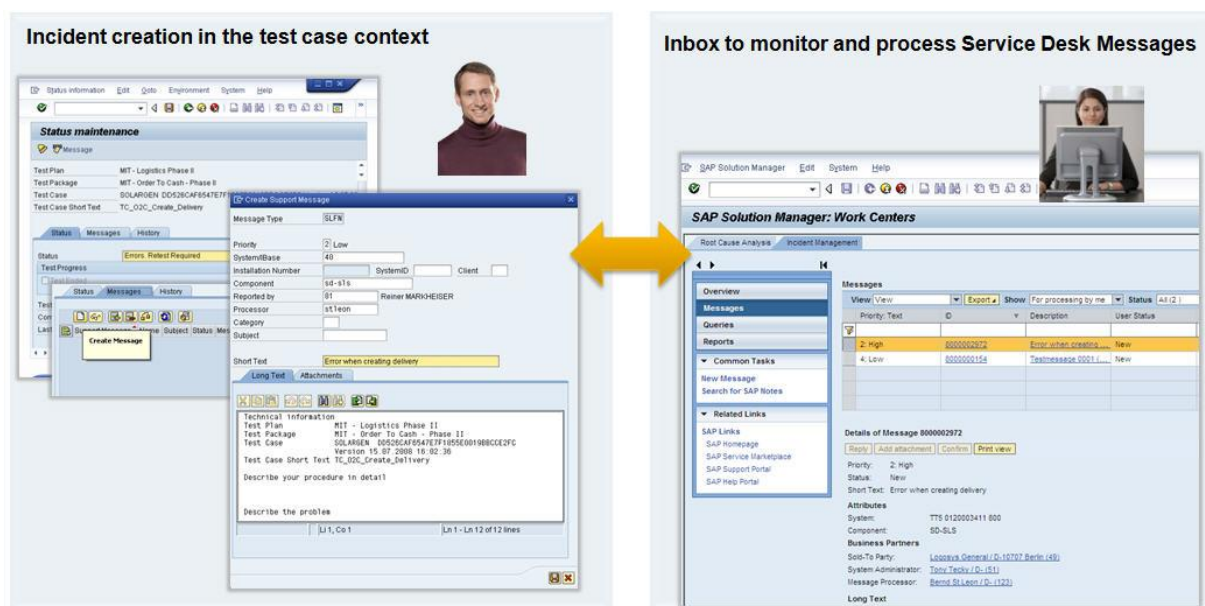


Chart 3.32: Integrated test execution, incident creation and incident handling provided by SAP Solution Manager Test Workbench and Service Desk.

3.8.2 Manual Test Execution in SAP Test Option 2

Test Option 2 includes products and capabilities from SAP Solution Manager and SAP Quality Center by HP which are tightly integrated.

The test activities get started by the test coordinator who notifies the manual testers via E-mail.

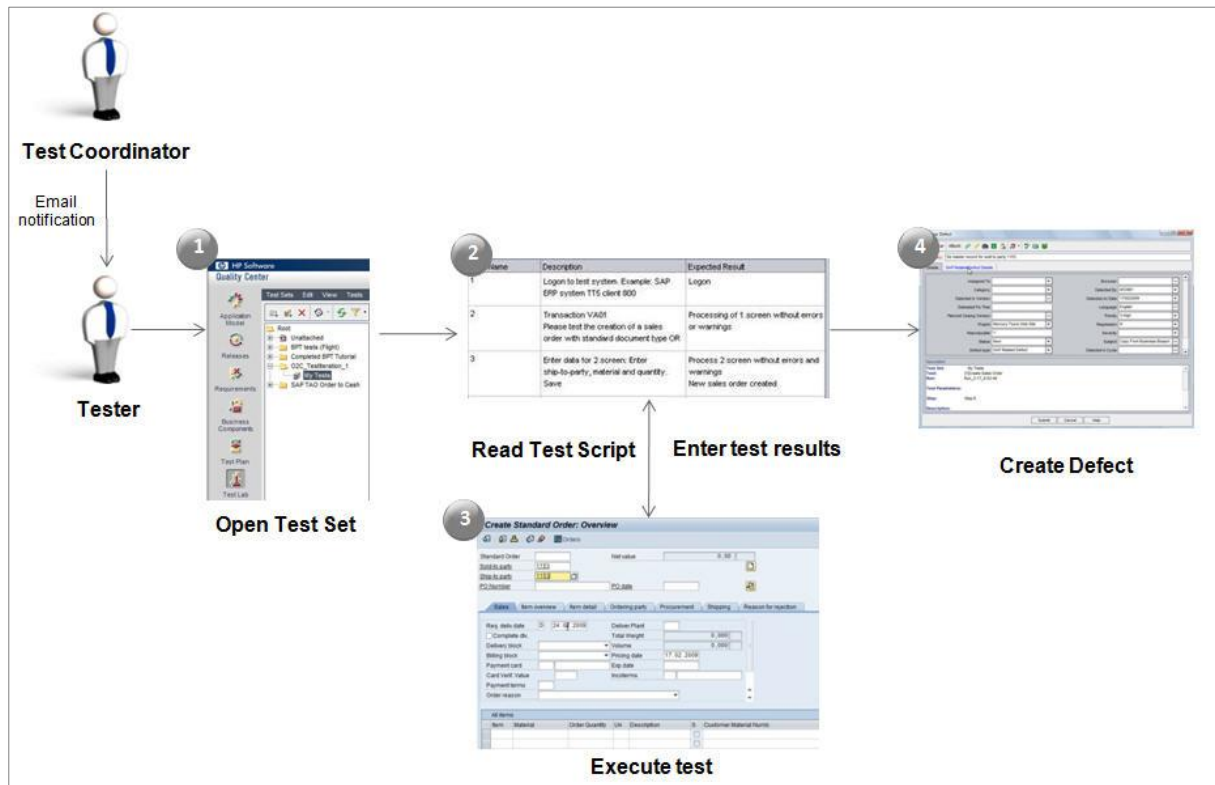


Chart 3.33: Activities of a manual tester using SAP Quality Center by HP

The manual tester performs the following test activities

1. The tester logs on to the Test Lab module of Quality Center and finds his / her specific test set including all test scripts assigned to the tester.
2. The tester reads the first test script which includes step descriptions, activities as well as expected results from the application under test.
3. The tester logs-on to the SAP test system and executes the business transaction as described in the test script. The tester returns to the test script and documents the actual test results with all necessary details. Quality Center provides a screenshot capability which helps to better document the test results for later auditing purposes.
4. In case of unexpected test execution results and test system behavior, the tester can create a defect in the integrated defect module. The defect is linked to the test case as well as to the test requirements, which enables full traceability for the test coordinator and support expert.

All activities of the tester are performed entirely in SAP Quality Center. When a defect cannot be clarified or solved by the test team, the defects get transferred to SAP Solution Manager via a standard SAP - HP interface (SAP Solution Manager Adapter for SAP Quality Center by HP). Here a support expert analyzes the incident and provides an appropriate resolution, which is transferred back to Quality Center. The tester gets notified and performs a retest. The test status is available in SAP Quality Center for test coverage and test progress reporting, as well as in SAP Solution Manager for subsequent project reporting.

The Adapter allows the exchange of Defects and solved Incidents

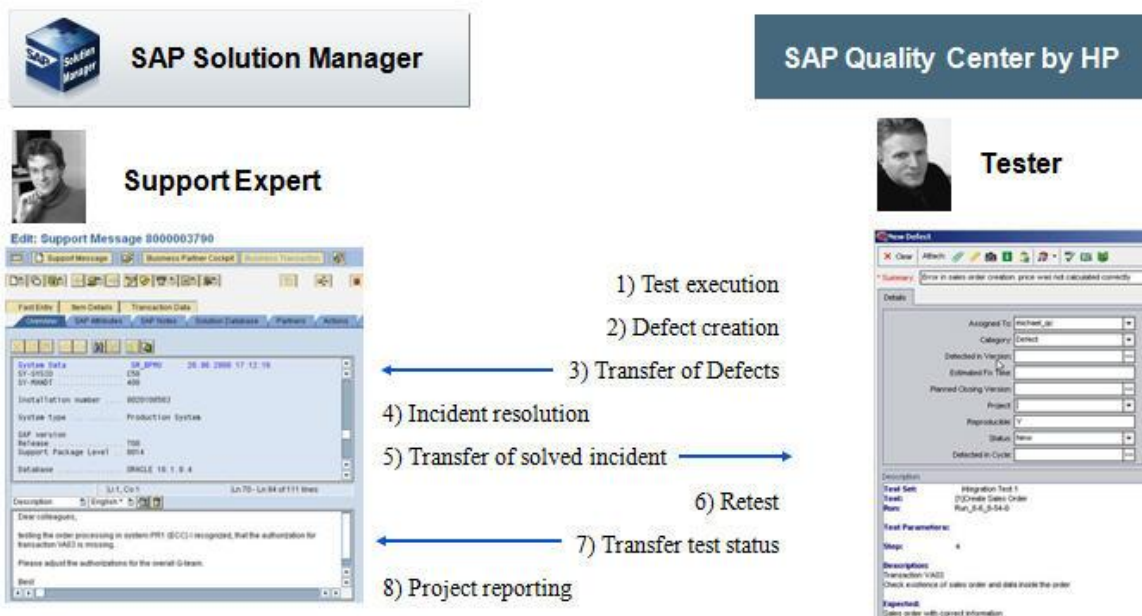


Chart 3.34: Exchange of Defects and Incidents between SAP Quality Center and SAP Solution Manager.

Rule of thumb: Manual testers shall be supported with a convenient test environment which allows efficient and easy to learn test handling. All relevant information and activities shall be accessible via a push of a button: Test scripts, launching the business transaction for test execution, setting the test status, test result documentation and incident creation.

3.9 Recommendation #9: Governance: Management of the change process

Goal: Consistent and integrated quality process across all organizational units to gain full transparency of all change activities and transport risks. Coordination of the change process through assignment of transport requests and subsequent imports of clustered transports. Sign-off of each phase (requirements, build, test and deploy) via quality gates based on customer defined exit criteria.

Many customers struggle with the coordination of the change process due to the following reasons

- Distributed, but unclear responsibilities
- Heterogeneous and non-integrated change management procedures, e.g. the SAP Basis team working with different change control tools compared to the Application teams
- Insufficient functional and load testing procedures and test automation
- Insufficient sign-off procedures and quality gate management
- Ability to control quality, e.g. concurrent activities between maintenance and project / innovation streams

Based on customer feedback the following change types, frequencies and resulting project types can be differentiated:



Chart 3.35: Change types, trigger and frequency

SAP Solution Manager - Quality Gate Management (QGM) - provides the basic functionality to address the above described pain points via a small number of involved roles and with a very short and attractive setup time.

Functionality provided by Quality Gate Management (QGM)

- Central creation and assignment of transport requests for planned changes to developers and process experts performing customizing changes. This activity is usually carried out by the Development Lead.
- Transport requests are not handled individually any longer, but clustered through a new “Change” entity that bundles all transports that belong to the same functionality across technology stacks, such as SAP ERP, SAP Enterprise Portal, SAP PI, etc.
- Central transport control to enable exports and imports of changes (clustered transports) in a synchronized fashion in all relevant systems at the same time. This improves the handling of technology dependencies that otherwise needs to be managed manually.
- Complete overview of transport risks and transport dependencies through the following analysis features
 - Open transports for a selected “change” or project (implementation, maintenance)
 - Missing transports for selected system role, e.g. TST or PRD
 - Missing synchronization to avoid conflicts between systems, e.g. SAP ERP and SAP Enterprise Portal
 - Transport errors such as import failures
- Starting with SAP Solution Manager 7.1, QGM provides SAP transport best practice functionality
 - Transport of copies to reduce the number of transports
 - Cross system object log – to avoid downgrade situations
- Quality Gates between phases with customer defined sign-off criteria such as check-lists and test results. QGM enforces Q-Gate ratings to avoid unauthorized import of transports.
- Quality Gate calendar to visualize timelines, project schedules and potential project conflicts



Chart 3.36: QGM - Quality Gate Calendar

Recommended functionality by SAP Solution Manager Release

- SAP Solution Manager 7.0 SP23: above described functionality except maintenance projects and QGM Transport Best Practices
- SAP Solution Manager 7.1: all of above described features

Rule of thumb: SAP Solution Manager QGM is a tool for Release Managers that can be implemented in a very short time - customers using CTS or CTS+ can setup QGM in less than 5 hours. Starting with this functionality, customers can use more advanced governance tools for change management which involves all actively involved uses, especially Change and Request Management (ChaRM) of SAP Solution Manager.

4. Customer Use Cases

4.1 Customer Case: Colgate Palmolive

Business Blueprint

Colgate makes use of the Business Blueprint functionality of SAP Solution Manager since 2005. Major business processes like Trade Promotion Management crossing various SAP Solutions are documented. Main reason for the business process documentation was the goal to setup an efficient software change management process including scoping, sign-off, configuration, implementation and testing of changes for mission critical business processes. Colgate is making use of all 3 hierarchy levels to document scenarios, business processes, and process steps down to the transaction level. In addition, interfaces, custom code and critical batch jobs are documented within the Business Blueprint for mission critical processes.

Colgate has setup 5 major SAP Solution Manager projects to manage regional dependencies. Whenever a new change activity is under way, a new SAP Solution Manager project is defined with a subset of the relevant regional Business Blueprint. Later on the implemented changes are moved back to the regional project, i.e. update of the regional Business Blueprint documentation.

Test system refresh

Although configuration and implementation changes are transported from the development to the test landscape and later on to the production system landscape, there is a significant amount of changes directly in the production landscape. This causes the test landscape to be out of synch with the production landscape after a certain time. Colgate performs test system refreshes for SAP ERP, SAP CRM and SAP APO approximately once per year depending on needs of the test team especially after significant changes. Colgate performs the system refresh via system copy which requires a team of 3-4 individuals for 2 weeks part time to perform the system copy and subsequent rework activities. No selected client copies or data scrambling is done, but users logging on to the test systems have only limited access to their applications.

Besides the test landscape which is part of the standard transport route, Colgate has an increasing need for sandbox systems to test and validate new applications which are still in ramp-up as well as business functions deployed via SAP Enhancement Packages. Sandbox systems are not part of the transport route and get updated or refreshed upon request.

Change events that trigger regression testing

Colgate performs regression tests for all of the below change events

- Maintenance through deployment of SAP Support packages
- Customizing changes and developments as part of the innovation stream (GRID process). Regression tests are performed to make sure that other priority processes did not get damaged.
- Other business process changes that are not part of the GRID process, e.g. legal changes or change requests initiated by important customers
- Regression tests for Disaster Recovery which is performed twice per year
- New functionality introduced through SAP Upgrades and Enhancement Packages (EhP)

The entire change management is governed via Change and Request Management (ChaRM) of SAP Solution Manager. This allows Colgate to control and document all change activities which is important for subsequent external audits. The accurate documentation of planned changes is important to ensure that the support organization can prepare for the appropriate regression testing of these changes.

Regression test planning

Colgate has defined a high number of manual test cases – more than 10,000 – in MS Office format and has assigned them to process steps of the Business Blueprint within SAP Solution Manager. The Test Workbench of SAP Solution Manager is used to manage test plans for each test phase. For a given test phase, the test coordinator selects suitable manual test cases via semi-automatic selection features and assigns them to a test plan. These test plans can be reused and updated for subsequent test activities. The test coordinator generates smaller test packages for each tester from the overall test plan.

Number of process steps for regression testing

For regression testing, Colgate has identified approximately 150 mission critical process steps from the following scenarios and SAP Solutions: Order-to-Cash, Produce-to-Pay, MRP execution, Warehouse Management, FI-AR, FI-AP as well as for custom developed applications.

Regression test execution

Colgate employees performing manual tests can logon to the Tester Worklist within SAP Solution Manager and can see their individual test packages including test cases that have been assigned to them. Each entry of the Tester Worklist includes a

- Test case description including information about the process step to be tested, data to be used and the tasks that should be performed. Colgate is using MS Excel worksheets embedded in each test case to provide this information for the manual tester.
- Link to the SAP test system (1 click access) which allows direct start of the process step in the respective test system

- Function to set the test cases status, e.g. test execution without errors as well as additional textual information and file attachments
- Link to the Service Desk of SAP Solution Manager for incident creation in case of problems during test cases execution

Test result documentation

Colgate's manual tester's document their test results in an MS Excel which is embedded in the test case description (see above) including relevant results like posted document numbers as well as screenshots from the system. This documentation remains assigned to the test package and thus to the test plan for subsequent auditing purposes. Sign-offs are provided by the tester through the test status ("green light") within the test package. Detailed test result documentation is done to satisfy regulatory requirements. Only in the case that the tester provides the evidence that test results are signed off, it is allowed to transport changes to the production landscape.

Therefore it is important that the entire change and test result documentation is available in one place. ***Colgate views SAP Solution Manager as their single source of truth.***

Validation after cutover to production landscape

Additional validations and test are performed after the final transport of changes from the test to production landscape. Developers responsible for the customizing and/or code change perform technical checks in the production environment. Business users who signed off in test systems also need to sign-off the correct system behavior in the production landscape.

Planned future improvements for test scope optimization and regression testing

Colgate plans to stream-line their regression test process by moving from manual to automated tests of their mission-critical business processes. To achieve this goal, Colgate and SAP are running a joined project which will allow Colgate to design automated tests provided by a SAP partner test tool vendor fully integrated with the already used Business Blueprint and Test Workbench of SAP Solution Manager. This functionality – Test Automation Framework - will be available for all customers with a SAP Enterprise Support contract with the new SAP Solution Manager release 7.1 in 2011 and will provide the following functionality

- Seamless integration of 3rd party test automation tools with SAP Solution Manager through certified interfaces
- Handover of SAP system information to automated test case during execution
- Planning of test data for business processes and handover to automated tests at runtime
- Integrated reporting between SAP Solution Manager reports and partner tool test logs

- Workflow based communication between tester and test engineer to trigger repair activities for damaged automated test scripts

In addition, Colgate plans to deploy the Business Process Change Analyzer (BPCA) of SAP Solution Manager. BPCA will help Colgate to optimize the scope for regression tests through a risk based approach by running a change impact analysis against changes included in transports. Based on this analysis, BPCA provides a recommendation for relevant test cases. The test scope optimization can be highly influenced by the customer.

Source: Interview with Warren Kaufmann / Colgate Palmolive and Rajiv Kumar / Colgate Palmolive, September 2010

4.2 Customer Case: FERRERO

SAP customer FERRERO is an international operating consumer products company with headquarter in Italy. Ferrero went through various upgrades of SAP Solutions including an SAP ERP 6.0 for which regression tests have been performed.

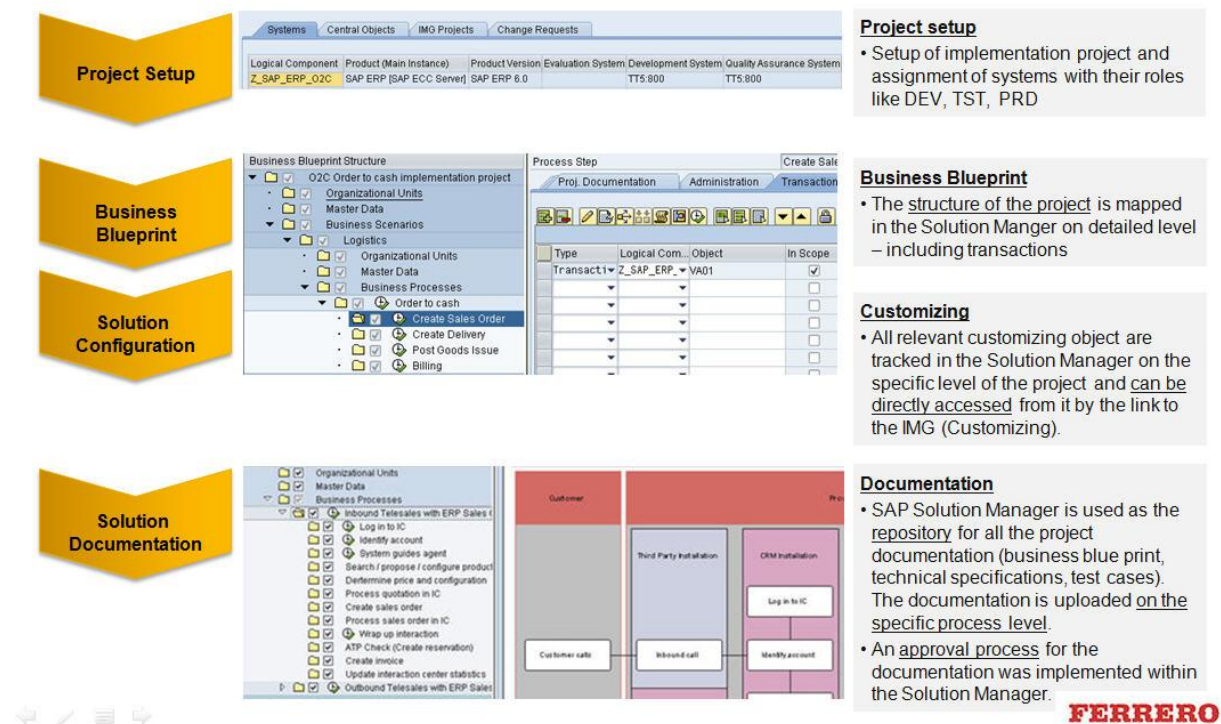


Chart 4.2: Project setup, business blueprint, configuration and documentation

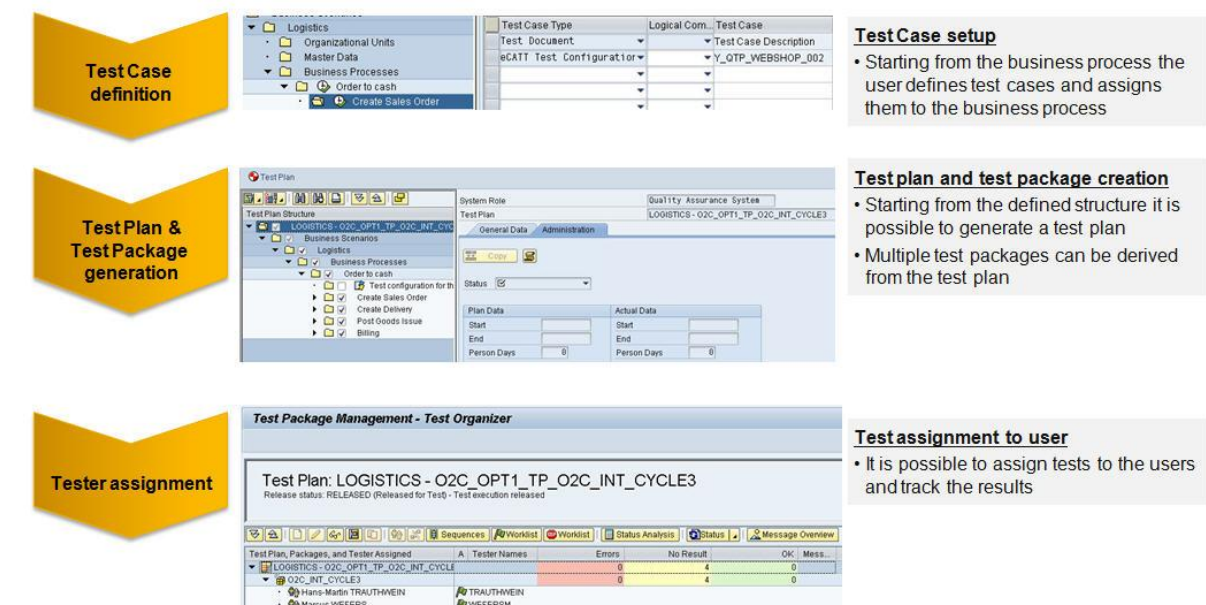
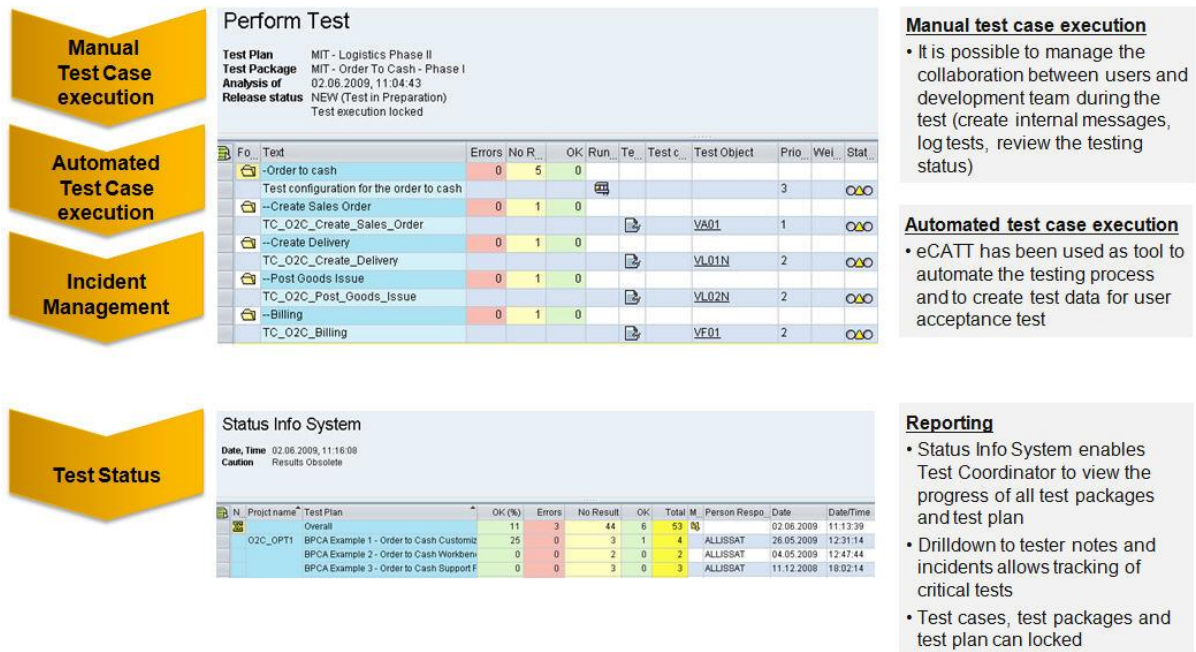


Chart 4.3: Setup of manual and automated test cases, test plan, test packages and assignment of manual testers.



FERRERO

Chart 4.4: Execution of manual and automated test cases from SAP Solution Manager

"Using the SAP Solution Manager is an excellent way of covering the life-cycle of a solution. It enables us to control every step from the design to the realization to the IT operation of the system, and guaranteeing a full tracking and a very effective introduction of the system. We obtained substantial benefits with this adoption, reducing TCO and above all we were successful to manage complex projects and leading edge operations"

Martin Flegenheimer
IT Director
Ferrero Germany

Source: Joined presentation with Martin Flegenheimer at 14th International Customer COE Info Forum in Frankfurt, November 2009

4.3 Customer Case: Sara Lee

Sara Lee Corporation, a leading food and beverage company with global operations, specializes in retail coffee, packaged meats, bakery goods, and other food service lines of business.

“With SAP Test Acceleration and Optimization, we’ve reduced the number of issues found by our users after going live with an upgrade or software changes, which has boosted business continuity and reduced risk.”

Joost Knoop, Solution Architect, Sara Lee Corporation

Planning Ahead for a Smooth, Rapid Upgrade

Sara Lee has relied on SAP ERP to run its core operations for years. “It’s been a solid solution for us, but because we were running an older version, we were having maintenance issues,” explains Knoop. “We were also launching new food service programs, and to support them, we needed new functionality that’s only available in the latest version of SAP ERP.” For example, management wanted to leverage new trade promotion functionality to promote new products, run campaigns, and drive new sales. Upgrading was the best way to gain this functionality, as the alternative was to build extensive and complex custom code for an outdated version of SAP ERP.

Because the upcoming food service programs were critical to meeting near-term revenue objectives, management wanted the upgrade completed in just eight months – a tight time frame for such a large project. “We considered our manual software testing approach one of the biggest risks to the project”, comments Knoop. “We had a solid testing methodology, but without automation, we simply couldn’t perform sufficient functional and regression testing in time to meet our deadline.” For example, the upgrade schedule required that final testing and retesting – just one step in the upgrade process – be completed in the three-week period prior to releasing the software in a production environment. This was simply not possible given current resources and processes.

The IT department also wanted to increase the scope and quality of its testing efforts to avoid releasing software with potential critical defects that could hurt business continuity. Explains Knoop, “In the past, we typically only ran tests on about 10% of critical software functionality – and even less on noncritical software. So business users ended up finding hidden defects and reporting them to us. We needed a way to automate the testing process so we could dramatically increase the scope of functionality tested and the quality of our testing – and release very stable, reliable functionality for our lines of business.”

Choosing and Deploying the Right Solution

Given that Sara Lee was preparing for a global upgrade of SAP ERP, management naturally looked to SAP for an automated testing solution. “SAP is a trusted solution provider,” says Knoop, “and we were already leveraging SAP MaxAttention, which includes support offerings specific to upgrades.” For example, leveraging the quality management of SAP MaxAttention services, Sara Lee could have an SAP expert on site during the upgrade to perform quality reviews on the main deliverables. These experts also helped solve any critical issues during the cut over. “This service would help us mitigate many of the risks of the upgrade,” notes Knoop.

To address its testing needs, Sara Lee deployed the SAP Test Acceleration and Optimization application (SAP TAO), which enables the IT department to streamline business process tests by automatically generating draft test cases and test components for SAP user interface–based transactions. The company then uploaded the test cases to the SAP Quality Center application by HP for execution. Because SAP Test Acceleration and Optimization creates modular test cases using test components instead of command lines, Sara Lee can easily reuse tests with updated data input and readily maintain them when test cases are damaged due to functional changes. IT can also add patches, provided by SAP, so that test cases remain valid. “With SAP Test Acceleration and Optimization, we could address our testing challenges head-on and lay the foundation for lower-cost, lower-risk upgrades going forward,” states Knoop.

Sara Lee chose FocusFrame Inc. as its partner to implement the automatic testing software using a proven SAP methodology and to create over 100 test cases in preparation for the upgrade. The project was completed in eight months, enabling Sara Lee and its implementation partner, Accenture, to complete its upgrade to SAP ERP on time.

Realizing the Benefits

“With SAP Test Acceleration and Optimization, now we can compose and execute automated business process tests in SAP software development and test systems,” explains Knoop. “These automated test cases – primarily regression tests – can then be run and executed on end-to-end business processes, dramatically boosting our testing productivity, quality, and efficiency.” Solution documentation for the new version of SAP ERP is maintained in the SAP Solution Manager application management solution, but test scripts are maintained in SAP Test Acceleration and Optimization.

The benefits of the automated testing software have been considerable. “We’ve been able to cut the cost of comprehensive regression testing by 80%,” states Knoop. “At the same time, we’ve lowered test execution time by more than 70%. Automated

testing is so much faster and more efficient, and we can get so much more done in a short period of time.”

This increased efficiency has also enabled the IT department to perform much more thorough testing, which is paying off in terms of reduced business risk and happier internal customers. For example, the number of defects found by operations is down by 90% as most defects are now found and fixed before software is released into the production environment. This is because Sara Lee can test 80% to 90% of critical functionality (compared to 10% using manual testing), as well as 80% of noncritical functionality. States Knoop, “If we had to do this scope of testing and retesting manually, it would have required 1,000 person-days. Now we can do it in 10 days.”

Looking to the Future

“With SAP Test Acceleration and Optimization, we’ve reduced the number of issues found by our users after going live with an upgrade or software changes, which has boosted business continuity and reduced risk,” explains Knoop. “We’re very pleased with the improvements in key metrics that we’ve realized.”

Looking ahead, Knoop anticipates that Sara Lee will expand the use of automated regression and functional testing to cover human resources and customer relationship management software from SAP. “We’re continuously trying to reduce test costs and increase the quality of our changes to SAP software, and SAP Test Acceleration and Optimization can help us do that.”

Benefits

- 80% reduction in the cost of comprehensive regression testing
- 90% decrease in the number of defects found by operations (after changes went into production)
- 70% reduction in test execution time
- Elimination of all critical defects before going into production
- More time and resources available to perform testing of 80% to 90% of critical functionality (up from 10%) and 80% of noncritical functionality

“We’ve been able to cut the cost of comprehensive regression testing by 80%. At the same time, we’ve lowered test execution time by more than 70%.”

Joost Knoop,
Solution Architect,
Sara Lee Corporation

Source: SAP Customer Success Story

4.4 Customer Case: ConAgra Foods

Company overview ConAgra Foods

- Location: Omaha, Nebraska
- Industry: Consumer Foods Group
- Products and Services: Healthy Choice, Chef Boyardee, Egg Beaters, Hebrew National, Hunt's & Banquet and others.
- Revenue: US\$11.6 billion
- Employees: 25,000
- Web Site: www.conagrafoods.com
- SAP Solutions and Services: SAP® ECC 6.0, SAP SCM, SAP SRM, SAP SEM, SAP NetWeaver® BI, SAP Solution Manager, SAP TAO, SAP Quality Center

Challenges and Opportunities

- Testing was manual and labor intensive
- Conversion of critical business process manual test cases into automated scripts leveraging SAP Test Acceleration and Optimization
- Implement automation as efficiently as possible with a pre-selected group of teams to include P2P, OTC/OIR, RM, FI and ALM.

Objectives

- Increase the quality of testing through automation of pre-existing test cases
- Decrease the amount of time and resources required for testing while increasing quality

Implementation Highlights

- Implemented automation for parts of 3 super macro processes included in ConAgra's end-to -end integration test phase
- Increased the amount and quality of testing that could be completed within approved test cycle timeframes for unit, scenario and integration test phases

Why SAP

- The SAP Test Acceleration and Optimization application allowed us to implement a test strategy that didn't require an overly technical team to automate critical business processes
- The SAP TAO allowed us to automated tests quickly and efficiently with less maintenance than standard record and playback automation

Benefits

- Automated majority of End to End test cases
- Decreased test execution time for teams that have automated test scripts

- Automation has helped process teams to meet very aggressive schedules and produce quality releases using fewer resources
- Enhanced ability to implement quarterly releases and multiple plant rollouts with confidence, high quality and on-time

“By implementing SAP Solution Manager, HP Quality Center and the SAP Test Acceleration and Optimization application (SAP TAO), we have increased our ability to complete testing on-time and with much higher quality”

Kevin Needham

Director Information Technology
ConAgra Foods

Source: SAP Customer Reference Slide

4.5 Customer Case: SOKA-BAU

Company overview SOKA-BAU & SOKA-IT

- Headquarters: Wiesbaden, Germany
- Industry: Insurance
- Revenue: € 4.8 billion
- Employees: 1,200
- Web site: www.soka-bau.de
- www.soka-it.de
- SAP® solution and services: SAP ERP, SAP CRM, SAP BW, SAP Solution Manager

Challenges and Opportunities

- Implement extension of proven test management capabilities of SAP Solution Managers by using functional enhancements of Enhancement Package 1

Objectives

- Optimize test planning through Business Process Change Analyzer (BPCA)
- Improve test execution via deployment of test sequence functionality
- Increase user and process efficiency through html-based work center for test and incident management
- Raise quality of SAP solution documentation through deployment of Solution Documentation Assistant (SoDocA)

Implementation Highlights

- Email notifications for all status changes of test cases & central access and administration for all test relevant information
- Set-up of new wizard for SAP Solution Manager configuration within three hours

Why SAP Services

- End-to-end functionality and excellent integration into existing SAP solution landscape
- Possibility to leverage and re-use of already achieved results

Key Benefits

- Risk-based test scope identification leading to considerable reduction of test efforts
- Significant time savings within test preparation
- Streamlined communication during test execution
- Role-based approach for all test activities supported by new customer work-center

“We can significantly reduce our test efforts which affect our SAP solution operations by using a risk – based test scope identification provided by the Business Process Change Analyzer of SAP Solution Manager.”

Roland Krüger

Manager SAP Customer CoE
SOKA-IT

Source: SAP Customer Reference Slide

5. Appendix

5.1 Test Tool Options for functional tests of SAP-centric business processes

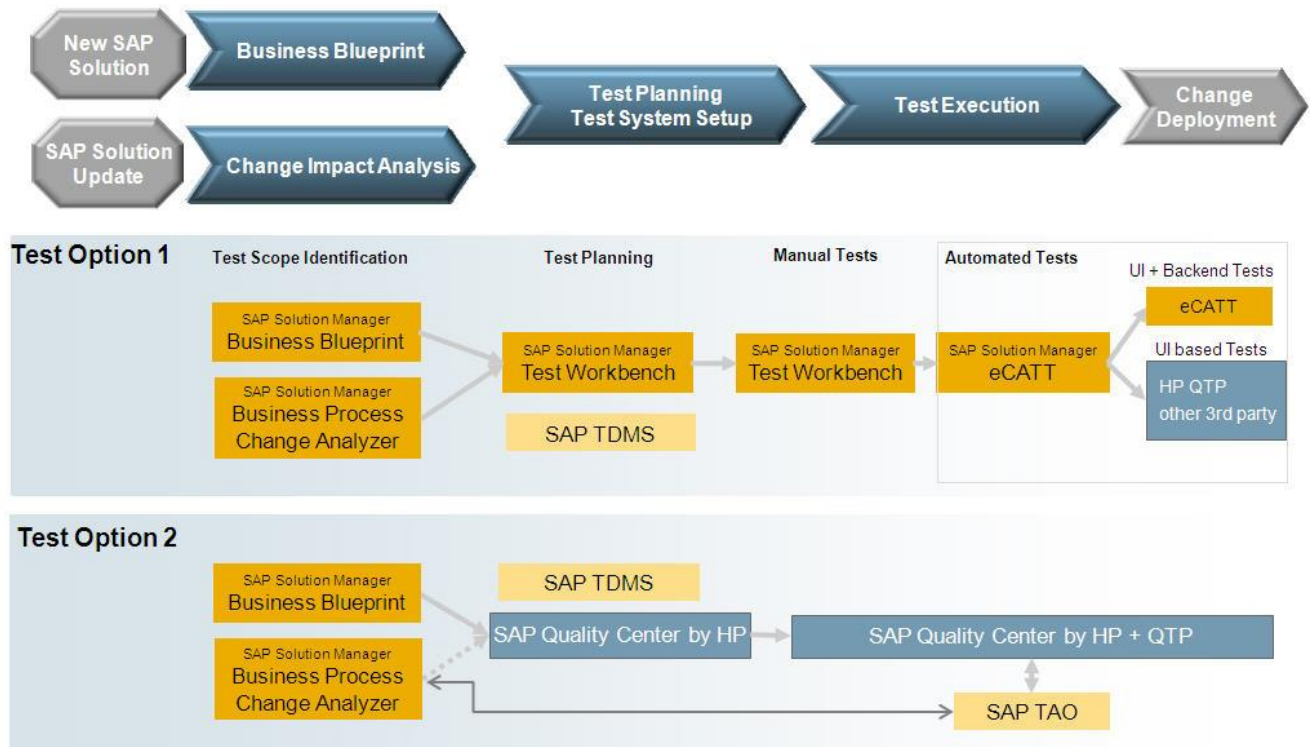


Chart 5.1: Test Options with SAP Solution Manager 7.0

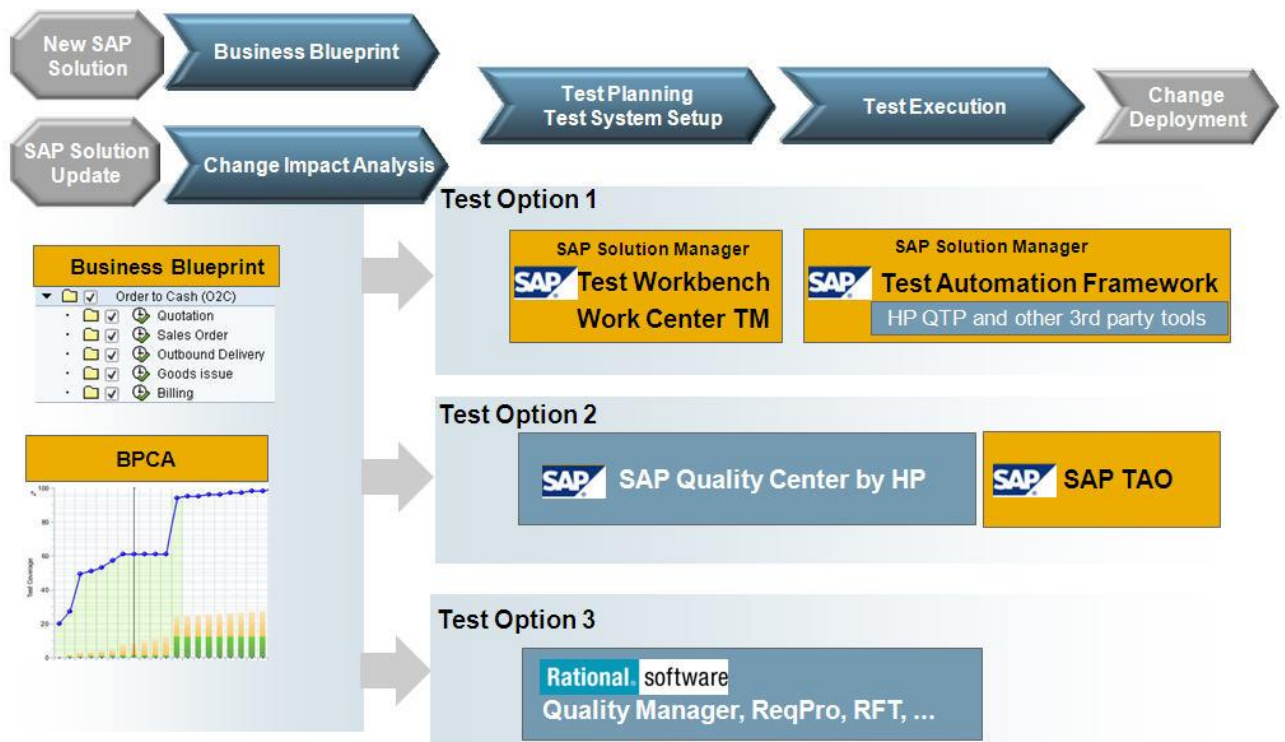


Chart 5.2: Test Options with SAP Solution Manager 7.1

5.2 Release Information

Product / Capability	Functionality	Release / SP
SAP Solution Manager	Work Center Test Management Business Blueprint Test Planning Test Execution Test Reporting	Release 7.0 EhP1 (SP18)
	BPCA – change impact analysis for custom code and customizing changes	Release 7.0 EhP1 (SP18)
	BPCA – change impact analysis for planned business function activation	Release 7.0 SP23
	BPCA – change impact analysis for SAP Support Packages / SAP Enhancement Packages through BPCA Test Scope Optimization	Release 7.1 SP01
	Test Automation Framework	Release 7.1 SP01

	Quality Gate Management	Release 7.1 SP01
SAP TDMS	TDMS Classic for SAP ERP, BW, CRM, HCM + Industry Solutions Business Process Library Data Scrambling Workbench Custom-Scenario Workbench	Release 3.0
	TDMS Classic for SAP ERP, BW, CRM, HCM , SCM, SRM, GTS + Industry Solutions Business Process Library Unified Data Scrambling Functionality Custom-Scenario Workbench ...	Release 4.0
SAP Quality Center by HP	Requirements Management Business Process Testing Test Plan Test Lab Defect Management	Release 9.2, 10, 11
	Quick Test Professional (QTP)	Release 9.2, 9.5, 10, 11
SAP Solution Manager Adapter for SAP QC	Exchange of Business Blueprint, Requirements, Test Objects, Test Results, Defects	SAP Solution Manager 7.0 and 7.1, HP Enterprise Integration 2.1, 2.5
SAP TAO	Process Flow Analyzer Change Analyzer (BPCA Integration)	SAP TAO 2.0 SP00
	Multi language support Self Test	SAP TAO 2.0 SP02
	Automated BPCA TBOM generation Run & Report	SAP TAO 2.0 SP04
SAP Solution Manager Connector for IBM Rational	Exchange of Business Blueprint, Requirements, Test Objects, Test Results, Defects	SAP Solution Manager 7.0 and 7.1, IBM Rational Connector for SAP Solution Manager 1.0

5.3 Further Information

Documents and Demos	Link
ALM	http://service.sap.com/alm
Test Management	http://service.sap.com/testing
SAP Standard for Test Management	http://service.sap.com/supportstandards
SAP TAO	http://service.sap.com/saptao
Change Management	http://service.sap.com/changecontrol
SAP Solution Manager e-learning material	http://service.sap.com/rkt-solman
Services	
Professional Services for Test Management	www.sap.com/services/testing
ALM services	http://service.sap.com/alm-services

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