Automated Testing with SAP Solution Manager and integrated Test Automation Tools

ALM Solution Management, AGS, SAP AG
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Agenda

Motivation and SAP Offering

Definition of Automated Tests and Assignment to Process Steps

Scheduling of Unattended Automated Tests

Reporting on Automated Tests

Accelerated Repair of Damaged Test Cases

Summary
Test Automation

Motivation and SAP Offering
Manual Testing
Disadvantages of manual testing compared to automated testing

Test coverage within tight timelines
- Lack of time to execute regression tests may potentially compromise Performance & Reliability
- Overcompensating scope of testing may result in more testing than may be really required and project delays

Defects in Production Systems
- Insufficient test coverage leads to a higher amount of defects not found before cut-over of changes from test to production landscape
- Testing accuracy due to not being able to test all variants

Costs
- High costs for manual testers involved in recurring regression tests
- High costs to fix errors in production landscape
- Finding errors late in the development process could delay delivery

Complexity
- Complexity increasing with added business processes and modules implemented
- Manual testing cannot keep pace with expansion of applications
E2E Test Management
Capabilities of Test Option 1 with SAP Solution Manager 7.1

Goals with SAP Solution Manager 7.1

1. Extended functionality of BPCA for risk-based test scope identification
2. Improved usability for manual testers
3. Smooth integration of 3rd party test automation tools with SAP Solution Manager
# New SAP Offering for Test Automation

## Goal
Support SAP customers to move from manual to automated regression tests in a convenient, reliable and cost efficient fashion for SAP and non-SAP applications.

<table>
<thead>
<tr>
<th>Offering</th>
<th>What’s new?</th>
</tr>
</thead>
</table>
| **SAP Solution Manager 7.1** | Test Automation Framework  
 to manage and integrate automated test scripts like HP QTP, test data, system under test, etc. |
| **HP Quick Test Professional 11** | HP QTP  
 with extended functionality for test data and test system handling for automated tests of SAP and non-SAP applications |
| **2 Licenses of HP QTP** |  
2 licenses of HP QTP for all SAP customers with SAP Enterprise Support, PSLE or Max Attention contract  
Access: https:/service.sap.com/testing |
### UI Technologies used in SAP-centric Business Processes

**Goal**

Provide **test automation** for all typical business processes used by SAP customers including SAP and non-SAP applications.

---

**HP QTP supports the following Business Scenarios / UI technologies***:

<table>
<thead>
<tr>
<th>SAP vs. non-SAP Business Process</th>
<th>Example</th>
<th>UI Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 % SAP</td>
<td>SAP CRM, SAP ERP, SAP Portal</td>
<td>SAPGui, Web-Dynpro ABAP, BSP, ...</td>
</tr>
<tr>
<td>SAP-centric</td>
<td>SAP CRM, SAP ERP + partner product for price determination</td>
<td>SAPGui, Web-Dynpro ABAP, BSP, html, .Net, JavaScript, ...</td>
</tr>
<tr>
<td>Non-SAP</td>
<td>Partner application or non-SAP application for HR processes</td>
<td>Html, .Net, JavaScript, ...</td>
</tr>
</tbody>
</table>

(*') see HP website for a complete list of supported UI technologies
Test Automation

Overview Test Automation Framework
Test Automation Framework

(1) Definition of automated Tests and assignment to Process Steps

- Seamless creation of automated test cases from SAP Solution Manager business process hierarchy with 3rd party test automation application.
- SAP Solution Manager provides Test Data and System Landscape to auto Test Case
- SAP provides 2 interfaces to link 3rd Party Test Automation tools with Test Management of SAP Solution Manager. 3rd party tool vendors can receive an SAP certification.
Test Automation Framework

(2) Test Execution

- Tester Worklist - manual and automated tests can be executed from the same html-based Work Center
- Exception reports support the tester to identify failed tests
- Scheduling of tests enable unattended test execution at night time with subsequent exception reports the next morning

Test execution from Tester Worklist

Scheduling of automated Tests for unattended execution
Test Automation Framework

(3) Integrated Test Status and Progress Reporting

- Multiple reporting options for Test Coordinators, Test Engineers, Testers and Project Manager
- Management of Test Plans: Completeness and gap reports for included test cases
- Test status and trend reports to monitor progress of test activities and problem solving
- Drilldown from test status reports to 3rd party test tool logs and dashboards
Test Automation Framework

(4) Accelerated repair of damaged tests

- Software changes of SAP Solutions can damage automated test cases → fast repair required
- Workflow to request repair activities - from Test Executor to Test Engineer
- Environment for test engineer to access the log, re-run the test and display/edit the test script
- Change Impact Analysis (BPCA) integrated into test case maintenance

**Workflow**: Tester requests repair activity after failed test case execution

**Change Impact Analysis**

for damaged test cases

**Central Repair Environment**

for Test Engineer to repair test case
Test Automation Framework

Customer Benefits

**Test Coverage**
- More business processes can be tested in a testing cycle
- Defects are caught earlier in test system before they move to production system

**Flexibility**
- Customers can jump-start their test automation project with 2 licenses of HP QTP
- All major vendors providing test automation tools are integrated via certifiable SAP interfaces

**Costs**
- Save cost by engaging less manual testers
- Fast Return on Investments

**Accelerated Approach**
- Workflow and analysis functions speed of the identification and repair of damaged test case
- Central repair environment for Test Engineer
Test Automation Framework

Definition of Automated Tests and Assignment to Process Steps
Test Automation Framework

(1) Definition of automated Tests and assignment to Process Steps

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Business Processes
- Order to Cash (O2C)
  - Quotation
  - Sales Order
  - Outbound Delivery
  - Goods Issue
  - Billing

Test Configuration

Test Script
- QTP
- other test automation tools

Test Data
- Doc Type: C 1000, P-100
- Doc Type: C 3500, X-500

System Data
Test Automation Framework
Initial Preparation

In Test Management Work Center:

1. Define which **Test Tool** to be integrated and specify the **Test Case Types** that should be used in Solution Manager...

2. Register 3rd Party Test Tool.

3. Select Test Case Types to be used.
Test Cases
Definition of a Test Configuration

Definition of a new automated Test Configuration and assignment to a Process Step in SAP Solution Manager

Business Processes with assigned test configuration

Test Case Type manual or automated

Test Configuration Test Script + Test Data + System Data
Test Automation Framework
System Data Container - Determination of Systems under Test

<table>
<thead>
<tr>
<th>Solution</th>
<th>System Role</th>
<th>Test execution</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP ERP</td>
<td>DEV</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>TST</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>PRD</td>
<td>not allowed</td>
</tr>
<tr>
<td>SAP CRM</td>
<td>DEV</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>TST</td>
<td>yes</td>
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</tr>
</tbody>
</table>

Handover of system access information (RFC, ...)

Client (Laptop / Desktop)
Execution of Test Scripts

No hard coded system information

Customer Test System Landscape (SAP ERP, ...)

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Test Automation Framework
Fast Test Script Creation

Direct access from SAP Solution Manager → Editor of 3rd Party Test Automation Tool → SAP Test System

Business Processes

HP QTP

SAP Test System
Test Automation Framework
Parameterization of test scripts and SAP Test Data Container

SAP Test Configuration

1. New test script

2. (Automatic) Replacement of static value (customer „C1000“) with parameter (I_SOLD_TO_PARTY)

3. Test Data variant generated by script parameters

4. Wizard to map test data from TDC to Test Configuration

Test Data Container (TDC)

<table>
<thead>
<tr>
<th>Order Type</th>
<th>Customer</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR</td>
<td>C1000</td>
<td>P-100</td>
</tr>
<tr>
<td>OR</td>
<td>C2000</td>
<td>P-200</td>
</tr>
</tbody>
</table>
Parameters defined in external Test Tool are automatically transferred to the Test Configuration in SAP Solution Manager.
**Test Data Container:** Test data planning independent of single test case

Test Data assigned to parameters used in test scripts
SAP Solution Manager – Test Configuration

Test Data assigned from Test Data Container

**Reference view:** Link between test script parameters with Test Data Container

**Data view:** Test Data retrieved from assigned Test Data Container
Test Automation Framework

Test Execution
Test Automation Framework

(2) Test Execution

- Tester Worklist - manual and automated tests can be executed from the same html-based Work Center
- Exception reports support the tester to identify failed tests
- Scheduling of tests enable unattended test execution at night time with subsequent exception reports the next morning

Test execution from Tester Worklist

Scheduling of automated Tests for unattended execution
Test Execution
Involved Components and Data Flow
Test Automation Framework
Scheduling of Unattended Automated Tests

**Scheduling**
Scheduling of unattended automated tests in local or remote locations

**Unattended Test Execution**
Unattended execution of automated test on Test PCs

**Analysis**
Notification about test execution status and subsequent failure analysis

Test Engineer - Location 1

Test PCs - Location 2

Test System Landscape (SAP ERP, SAP CRM, …)

Business Analyst

Test result analysis:

<table>
<thead>
<tr>
<th>Errors</th>
<th>No Result</th>
<th>OK</th>
<th>Messages</th>
<th>Scheduled</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Test Automation Framework
Execution of scheduled tests on remote PC

Front End

Local PC
Solution Manager
Tester Worklist:
1 Schedule job for test execution

Remote PC
Solution Manager
Transaction STPFE (Foreground Scheduler)
2 Register & activate session
3 Automatic start of test execution at scheduled time

3rd party Test Tool
Execution of test scripts
4

Returns test results to Solution Manager
5

System Under Test
Front End UI
Execution of tests
6 e.g. VA01 (SAP GUI), ...

e.g. CRM WebUI

e.g. Portal, WebDynpro...

Application Server
Solution Manager

ERP

CRM

Systems under Test

Test Engineer/Coordinator

Remote logon
Test Automation Framework

Integrated Test Status and Progress Reporting
Test Automation Framework
(3) Integrated Test Status and Progress Reporting

- Multiple reporting options for Test Coordinators, Test Engineers, Testers and Project Manager
- Management of Test Plans: Completeness and gap reports for included test cases
- Test status and trend reports to monitor progress of test activities and problem solving
- Drilldown from test status reports to 3rd party test tool logs and dashboards
Use Cases for Test Reporting

- **Sign-Off Test Scope**
  - Check for outdated Test plans
  - Expected Test Effort?
  - Coverage of Test Cases in Test Plans and Test Packages?

- **Sign-Off Test Plans**
  - Test Status and Progress?
  - Actual Test Effort?
  - Detected Errors and related messages?

- **Sign-Off Test Execution**
  - Test Completeness?
  - Message resolution?

- **Test System Setup**
  - Change Impact Analysis

- **Business Blueprint**
  - Test Case Coverage for documented Business Processes / Transactions?

- **Test Planning**

- **Apply Changes to Production**

- **Type of Change**
  - New SAP Solution
  - SAP Solution Update

- **Test Scope Identification**

- **Test documentation due to legal requirements**
Test Workbench - Test Reporting
Identification of Gaps in the Test Scope

**GOAL**
Check to what extent business processes are covered by test cases in order to identify potential gaps in the test scope.

**SCOPE**
- Display of entire business process structure to get an overview of the test scope completeness
- Identification of business process steps without test case assignment
- Analysis of gaps in the test scope

**ACCESS**
Work Center Test Management → Test Preparation → Pushbutton Evaluate

**BENEFIT**
The report allows to see at a glance what still needs to be done to complete the test scope definition.
Test Workbench - Test Reporting
Identification of Inconsistent Test Plans

**GOAL**
Identify test plans that have become inconsistent because the business process structure and/or test case descriptions were changed after test plan generation.

**SCOPE**
- All test plans of a project are listed in a table and inconsistent test plans are indicated
- Icons and specific search options allow you to easily find changed elements in the business process structure

**ACCESS**
Work Center Test Management → Reports → Inconsistent Test Plans

**BENEFIT**
The inconsistency check enables enhanced flexibility in the test process and allows you to ensure that test execution is based on the latest process and test descriptions.
Test Workbench - Test Reporting
Status Info System

GOAL
Check the test status for the current test phase and analyze the status of related messages.

SCOPE
- Point-in-time reporting to monitor the progress of one or several test plans
- Display of complete results for all test plans of a project
- Display of status analyses for individual test plans
- Display and analysis of test plan error messages

ACCESS
Work Center Test Management → Test Evaluation Status Infosystem

BENEFIT
The Status Info System provides decision support for test sign-off.
BENEFIT
Supports project leads and test coordinators in identifying potential delays or resource bottlenecks, and analyzing message-related data.

SCOPE

- **Status Report**
  Monitoring of the status of test cases at a certain point in time.

- **Progress Report**
  Visualization of the progress of the test case status over a certain period.

- **Messages Report**
  Overview of the number and status of messages at a certain point in time.

- **Test Effort Report**
  Analysis of the ratio between planned effort, actual effort, and expected total effort.

GOAL

Obtain a graphical representation of the day-to-day evolution of test status, test progress, test effort, and related messages.

Example: Progress of Test Status and Effort

![Graphical Overview - Status Progress](image)

![Graphical Overview - Effort History](image)
GOAL
Display an overview of the status of selected test plans including a message overview.

SCOPE
- Various drilldown options offering different levels of granularity
- Message overview for priority 1-3
- Percentage figures for test status
- View can be adjusted using additional drilldown and filter functionalities
- By default, the data of the last data extraction is set as the filter
- Detailed information provided in tabular overview

BENEFIT
Powerful reporting features that allow you to exactly extract the information you are looking for.
GOAL
Display the progress of the test case status over a certain period.

SCOPE
• Multiple drilldown and filter functionalities
• By default, the last 30 days are set as the filter
• Detailed information provided in tabular overview

BENEFIT
The progress report can, for example, support project leads and test coordinators in detecting potential delays.
BI Test Reporting
Messages Report

**GOAL**
Display an overview of the number and status of test-related messages at a certain time.

**SCOPE**
- Overview of messages by status
- Overview of messages by priority
- Multiple filter functionalities
- Can be displayed for selected projects or test plans
- List of messages with links allowing to directly access a message to obtain further details

**BENEFIT**
The messages report offers an efficient and flexible way to analyze message-related data.
BI Test Reporting
Test Effort Report

**GOAL**
Display an overview of the test effort and show if the planned effort is sufficient or whether it will be exceeded.

**SCOPE**
- Progress of test status
- Evolution of test effort
  - Expected total effort (for all test cases)
  - Actual effort
  - Planned effort (for test cases in process)
- Graphical representation of effort above/below plan

**BENEFIT**
The test effort report allows you to analyze the ratio between planned effort, actual effort, and expected total effort. It can support project leads and test coordinators in identifying potential resource bottlenecks.
BI Test Reporting
Test Effort Report: Actual Effort vs. Expected Effort

GOAL
Compare planned effort, actual effort, and expected total effort.

SCOPE
• Various display options:
  • Aggregate view on test plan/test package level
  • Show data on test case level
  • Show data Tester level

BENEFIT
This view allows you to detect deviations between actual effort and expected effort.
Test Automation Framework

Accelerated Repair of Damaged Test Cases
Test Automation Framework

(4) Accelerated repair of damaged tests

- Software changes of SAP Solutions can damage automated test cases → fast repair required
- Workflow to request repair activities - from Test Executor to Test Engineer
- Environment for test engineer to access the log, re-run the test and display/edit the test script
- Change Impact Analysis (BPCA) integrated into test case maintenance

Workflow: Tester requests repair activity after failed test case execution

Central Repair Environment for Test Engineer to repair test case

Change Impact Analysis for damaged test cases
Test Automation Framework
Workflow & Analysis for accelerated repair of damaged tests

Tester
1. Requests repair activity after failed test case execution
2. Receives message in Damaged Test Case Worklist
3. Analyses and repairs the test case
4. Requests retest
5. Performs retests
6. Confirms successful repair

Test Engineer
2. Receives message in Damaged Test Case Worklist
3. Analyses and repairs the test case

Central environment for analysis and repair
Accelerated Maintenance of damaged Tests
Central environment for Test Engineer to repair Damaged Test Cases

**GOAL**

Central environment for Test Engineer for fast repair of damaged automated test case with comprehensive information, background analysis features and links to logs and test edit mode.

**Possible Actions**

1. View information about test environment
2. View test execution log
3. Run test case
4. Navigate to test status
5. Change Impact Analysis to analyze recent system changes
6. Edit test script
7. Distribute error information to all affected test configurations
8. Close repair request and trigger retest
Business Process Change Analyzer (BPCA)
Motivation and Approach

Motivation

SAP Solution updates occur frequently
- SAP triggered: Support Packages, Enhancement Packages
- Customer triggered: Customizing changes, Custom code development

Pain Point

Which critical business processes are affected by planned changes?

Approach

SAP Solution Update

Change Impact Analysis
- Identification of business processes affected by change
- Risk-based Test Recommendation

Test Planning
- Test Case review and creation of missing test cases
- Test Plan generation

Test Execution
- Regression Tests
  - Manual Tests
  - Automated Tests
Accelerated Maintenance of damaged Tests
Change Impact Analysis

GOAL
Get background information about recent SAP test system changes and the potential impact on related business processes and assigned automated tests.

1. Workflow:
Test Engineer gets repair request for damaged test case which belongs to a specific Business Process Step.

2. SAP SolMan BPCA*:
Test Engineer starts a targeted change impact analysis directly from the Support Message for an appropriate time interval.

3. SAP SolMan BPCA result interpretation:
Test Engineer gets a list of changed SAP objects for selected business process step and thus assigned damaged test case.

Example: UI changes

* SAP Solution Manager – Business Process Change Analyzer (BPCA)
Accelerated Maintenance of damaged Tests
Central environment for Test Engineer to repair Damaged Test Cases

GOAL
Central environment for Test Engineer for fast repair of damaged automated test case with comprehensive information, background analysis features and links to logs and test edit mode.

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Test Automation Framework

Summary
SAP Solution Manager 7.1
New Test Automation Framework integrates 3rd party Test Automation Tools

(1) Test Case Setup
- Seamless integration of 3rd party test automation tools with Business Process hierarchy of SAP SollMan
- Test Data for parameters of test script provided by Test Data Container
- Test System info linked with test script

(2) Test Case Execution
- Scheduling for unattended execution of automated tests
- Exception reports and Workflows

(3) Integrated Reporting
- Status and Progress Reports integrated with 3rd party test logs

(4) Accelerated Test Case Repair
- Workflow-based repair order after failed test execution from Tester to responsible Test Engineer
- Central repair environment for Test Engineer with integrated BPCA
Customer Benefits

**Test Coverage**
- More business processes can be tested in a testing cycle
- Defects are caught earlier in test system before they move to production system

**Costs**
- Save cost by engaging less manual testers
- Fast Return on Investments

**Flexibility**
- Customers can choose their test automation tool of choice
- All major vendors support the certified interfaces with SAP Solution Manager

**Accelerated Approach**
- Workflow and analysis functions speed of the identification and repair of damaged test case
Thank You!