E2E Test Management

SAP TAO Overview

ALM Solution Management, Active Global Support (AGS), SAP AG
Agenda

Changing SAP Solutions – Customer Pain Points

Introduction to SAP TAO

Test Case Creation using SAP TAO

Test Case Maintenance using SAP TAO

Customer Usage and Benefits

Further Information

Appendix
Change is critical to Business Innovation…
…and impacts your SAP-centric Solution

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<tr>
<th>Business Drivers</th>
<th>Compliance Drivers</th>
<th>Technology Drivers</th>
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<tr>
<td>Changed business processes</td>
<td>Governance</td>
<td>Maintenance</td>
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<td>M &amp; A and reorganizations</td>
<td>Risk management</td>
<td>New functionality</td>
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<td>New products, vendors</td>
<td>Compliance</td>
<td>Upgrades</td>
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<td>Examples: SOX, SEC, FDA, Basel 2</td>
<td>Global rollouts</td>
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…these change events impact the life cycle of enterprise solutions

![Diagram showing change events and their impact on effort over time](image-url)
Test Management
End-to-End Testing of SAP-centric Solutions

Customer Pain Points

1. Tests in heterogeneous system landscapes
2. Software updates affecting mission-critical business processes
3. Test system setup and test data management
4. Effort for creation and maintenance of automated tests

SAP Strategy for Test Management

- SAP Solution Manager acts as central hub to manage SAP change events and E2E Integration Testing
- Superior functionality from risk-based test planning, manual/automated functional and performance testing to status reporting and sign-offs
- Integration of Partner Test Suites
## 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  
<table>
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<th></th>
<th>Overcompensating scope of testing may result in more testing than may be really required and project delays</th>
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| 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 |

SAP TAO along with SAP Quality Center by HP helps customers to create automated test cases – fast ROI within 2-3 test cycles
Introduction to SAP TAO

SAP TAO – at a Glance

Capabilities of Test Option 2 with SAP Solution Manager 7.0 and 7.1

3 Generations of test automation tools
SAP TAO – at a Glance

Mission

- Changing the testing paradigm from manual testing to “Testing by Composition”
- Reducing costs and risks for testing after SAP solution updates

Approach

- Automated Test Cases are composed out of test components (not single command lines) – to accelerate the repair of damage test scripts after SAP Solution changes.
- Test Components with parameters for input fields generated automatically by SAP TAO
- Test Data: First iteration is automatically created and linked to input parameters

Integration

Application Lifecycle Management
Test script & component generation
Test planning, test case composition and test execution
E2E Test Management
Capabilities of Test Option 2 with SAP Solution Manager 7.0 and 7.1

New SAP Solution

Business Blueprint

Test Planning
Test System Setup

Test Execution

Change Deployment

SAP Solution Update

Change Impact Analysis

Test Option 2

Solution Manager
Business Blueprint
- Setup of business process hierarchy
- Business requirements

Solution Manager
Business Process Change Analyzer
- Identification of business processes affected by code / customizing changes

Quality Center
- Test requirements
- Test planning

Quality Center
- Test Lab
- Defect management

SAP TAO
- Accelerated test case generation & maintenance

SAP TDMS
- Setup of lean test systems

Quick Test Pro
- Business Process Tests
- Quick Test Pro

LoadRunner
- Performance Tests
Approaches for Test Automation

3 Generations of Test Automation Applications

1st Generation
“Record and Replay”
Tools: HP QTP

- Allows parameterization
- Could be run in an unattended fashion
- Lot of effort to record a script
- A lot of duplication of activities
- High degree of ongoing maintenance
- Skilled Quality Engineers required

2nd Generation
“Business Process”
Tools: SAP QC BPT

- Allows parameterization
- Modularization of test cases leading to lesser maintenance
- Reduced development time of test cases
- Still had to record test scripts
- Maintenance at script level still required
- Skilled Quality Engineers required

3rd Generation
“Test Acceleration”
Tools: SAP TAO

- Library or pre-built test components for SAP applications
- Automatically creates components
- Eliminates record/replay activities
- Fast and convenient way to create test cases
- Greatly reduces test case maintenance cost
- Quick ROI, within 2-3 test cycles
Test case creation using SAP TAO

- Approach for Test Case Creation and Execution
- Test Automation of Business Processes using SAP TAO
- Options to execute SAP TAO based test scripts
- Test case executions of business process variants using Iterations
- Test Execution Logs and Reports
SAP TAO
Approach for Test Case Creation and Execution

- **Business Processes**
- **Test case creation**
- **Test Case execution**
- **Test Reporting**

**Selection of business processes for Test Automation from SAP SolMan**

**Test case creation using SAP TAO**

**Test case execution using SAP QC and SAP TAO**

- SAP TAO logs
- HP QTP logs
- SAP QC Reports
- SAP SolMan Report
SAP TAO
Test Automation of Business Processes using SAP TAO

Business Scenario “Order to Cash”

SAP TAO Process Flow Analyzer

Business Analyst executes
business transaction from SAP TAO

SAP Quality Center by HP

Test Components for each
SAPGUI subScreen with
parameters for all fields

Test Case* composed out of
Test Components with
parameters for all input fields

File with Test Data for each
input parameter

(*) Note: Further test case refinement might be needed e.g. Test engineer may add more validation steps and
consolidate the test case for performance improvement.
SAP TAO
Test Automation of E2E Business Processes

SAP TAO test scripts

- Test script variants can be built easily via additional Test Components, Flows and Test Data
- Scenario tests can be built easily through composition of the appropriate single test
SAP TAO

Test Execution with SAP TAO built test scripts

SAP Quality Center by HP

Test Script execution

Test data file

During test execution test data is entered into input fields of the SAP business process

SAP Test System

Test results

<table>
<thead>
<tr>
<th>Iteration</th>
<th>Result</th>
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<tr>
<td>#1</td>
<td>Passed</td>
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<tr>
<td>#2</td>
<td>Passed</td>
</tr>
<tr>
<td>#3</td>
<td>Failed</td>
</tr>
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</table>
SAP TAO
Options to execute SAP TAO based test scripts

Test script creation from SAP TAO

Test script execution from SAP Quality Center

Normal execution for regression testing

Test script execution creates TBOM for BPCA in SAP Solution Manager
SAP TAO
Test case executions of business process variants using Iterations

Goal: Run test cases multiple times with variants of data.

1. Generation of test scripts and test data files using SAP TAO PFA

2. Additional data records entered by user

3. SAP TAO automatically update iterations in QC

4. Test scripts run multiple times
SAP TAO
Test Execution Logs and Reports

Test Execution Logs
- HP QTP Logs
- SAP TAO Logs: Information on input parameters, screenshots, error messages, etc.

Reporting
- Reports in Quality Center, e.g. Coverage analysis
- Test Status and Defects can be transferred to SAP Solution Manager via SAP QC Adapter to give a consolidated view to a Project Manager.
Test case maintenance using SAP TAO

Software Changes of SAP Solutions affecting automated test cases
Introduction to Business Process Change Analyzer
Accelerated Repair of SAP TAO test scripts
Typical software changes affecting automated tests

1. Customizing changes for process step (optional field → mandatory field, ...)
2. Custom Code changes for process step (additional mandatory fields, additional screens, ...)

Customer benefit: SAP TAO provides accelerated repair functionality through rapid and semi-automated exchange of central test components
Accelerated Repair of SAP TAO test scripts

After software change in SAP Solution

1. Identify affected SAP TAO test scripts
   → info from change team, failed execution, BPCA analysis
2. Repair SAP TAO test scripts
   → provide parameter value for new screen field or
   → insert missing test components
3. Consolidate SAP TAO test script and scenario test
4. Provide input data in test data file

After repair of SAP TAO test scripts

1. Identify affected SAP TAO test scripts
   → info from change team, failed execution, BPCA analysis
2. Repair SAP TAO test scripts
   → insert missing test components or
   → inspection and exchange of outdated test components
3. Consolidate SAP TAO test script and scenario test
4. Provide input data in test data file

Accelerated repair of damaged SAP TAO test scripts

Business Process changed via SAP Customizing
1. Identify affected SAP TAO tests scripts
   → info from change team, failed execution, BPCA analysis
2. Repair SAP TAO test scripts
   → provide parameter value for new screen field or
   → insert missing test components
3. Consolidate SAP TAO test script and scenario test
4. Provide input data in test data file

Business Process changed via Custom Code
1. Identify affected SAP TAO tests scripts
   → info from change team, failed execution, BPCA analysis
2. Repair SAP TAO test scripts
   → insert missing test components or
   → inspection and exchange of outdated test components
3. Consolidate SAP TAO test script and scenario test
4. Provide input data in test data file
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
**Business Process Change Analyzer (BPCA)**

### Preparation

**Business Blueprint**

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

**Trace to identify objects by process**

- Manual execution of process step
- Automated

**BPCA Trace Result (TBOM)**

- Transactions
- ABAP Code: Function modules, …
- UI: Dynpro 1000, …
- Tables: Customizing, Master Data

### Change Impact Analysis

**“Which critical Business Processes will be affected by planned changes?”**

**BPCA use cases**

1. Customizing changes
2. Custom code development
3. Business Function activation
4. SP and EhP deployment

**BPCA Test Scope Optimization and Test Plan Generation**

- Identification risk-based test scope based on affected process steps
- Test Scope Optimization
- Semi-automatic test plan generation (automated for Test Option 1)

**Risk-based Test Scope Identification**

**“Can I get a recommendation for regression tests?”**
SAP TAO Change Management
Test Case Repair

Change Type 1: Customizing Change

Example: Create Sales Order transaction - PO Number input field is made mandatory

Identification
- Identify impacted test scripts

Repair
- Inspect screen, add screen components and/or provide parameter values
- Re-consolidate repaired test scripts
- Provide test data

Validation
- Execute the repaired test scripts
Change Type 2: Custom Code Change

Example: Custom Create Sales Order transaction - New input field is introduced

Identification

- Identify impacted test scripts

Repair

- Inspect screen components and/or provide suitable parameter values
- Re-consolidate repaired test scripts
- Provide test data

Validation

- Execute the repaired test scripts
SAP TAO Benefits, Customers and ROI Calculator

SAP TAO - Customer Benefits
Customer Success: SaraLee, Computer Associates, ConAgra Foods
SAP TAO – ROI Calculator
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

Accelerated Approach
- Fast, convenient and semi-automatic way to generate automated test cases
- Simple, easy and streamlined approach for maintenance of test cases

Costs
- Save cost by engaging less manual testers
- Fast ROI with in 2-3 test cycles

Tangible Benefits
- Up to 40% reduction in testing effort.
- Up to 30% savings in maintenance of test cases
SaraLee Reduces Risk After an Upgrade via SAP® Test Acceleration and Optimization

QUICK FACTS

Sara Lee Corporation
- Location: Downers Grove, Illinois
- Industry: Consumer products
- Products: Coffee, meat, bakery goods
- Revenue: US$10.7 billion
- Employees: 33,000
- Web Site: www.saralee.com
- SAP Solutions: SAP Test Acceleration and Optimization, SAP Solution Manager application management solution, SAP Quality Center application by HP.
- Implementation Partners: FocusFrame Inc. and Accenture

“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 continuity and reduced risk.”

Joost Knoop
Solution Architect
Sara Lee corporation

Challenges and Opportunities
- Optimize core operations by upgrading to the latest version of the SAP® ERP Application
- Ensure business continuity and meet quality objectives
- Perform sufficient functional and regression testing in tight time frame

Objectives
- Reduce testing time and effort with automated testing solutions
- Find, fix, and centrally manager defects before software changes are used by the business

Implementation Highlights
- Upgrade completed in 8 months across international IT landscape
- Partner built and maintained test scripts

Why SAP
- Trusted solution provider
- Comprehensive test automation solution optimized for existing SAP Software landscape

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

“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 continuity and reduced risk.”

Joost Knoop
Solution Architect
Sara Lee corporation
CA uses SAP Test Acceleration and Optimization to Automate End-to-End Testing

Challenges and Opportunities
- Need for regression testing around major releases or during the application of support packs
- Inadequate manual testing; processes not tested within project timeframes
- Prior automation approach of using record-and-play not scalable to changes

Objectives
- Decrease costs of using contracted employees to do testing
- Decrease internal testing costs for the business users
- Reduce time of E2E test cycles
- Improve end user and customer satisfaction
- Increase accuracy and efficiency by reducing human factor and increasing automation
- Increase test coverage

Implementation Highlights
- Automated 40 test cases during pilot
- Discovered that out of 1,231 test cases included in E2E, only 211 were unique
- After completion, 62 E2E test sets will be included in test bed against SAP ERP, SRM, and Portal for future releases

Why SAP
- SAP TAO works with complete testing toolset (QC, BPT, QTP) that we already use
- Cost-effective solution
- Offers best of breed software

Benefits
- Decreased external contractor costs
- Easier to maintain in a rapidly changing environment
- Relieved business users from out-of-scope testing duties
- Testing is more consistent, accurate and efficient
- Broadened testing scope and shortened testing cycles
- Allows for more frequent deployments

CA
- Location: Islandia, NY
- Industry: Application Software
- Products and Services: IT Management Software
- Revenue: 4.34B
- Employees: 13,700
- Web Site: www.ca.com
- SAP Solutions and Services: SAP Quality Center by HP, SAP Test Acceleration and Optimization
- Implementation Partners: SAP Consulting, FocusFrame, Inc.

“...change is the only constant. I can’t imagine how it would be feasible to maintain a complete E2E test bed without a robust tool like TAO and BPT to allow for quick mass modifications.”

Liza Galano
Project Manager
CA

QUICK FACTS
ConAgra Foods leverages SAP® Solution Manager, SAP Quality Center and Test Acceleration and Optimization

Quick Facts

ConAgra Foods
- Location: Omaha, Nebraska
- Industry: Consumer Foods Group
- 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
- Partner: SAP Consulting, FocusFrame

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

Kevin Needham
Director Information Technology
ConAgra Foods

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
Manual vs. Automated Testing by SAP TAO
Customer specific ROI calculation

Questions to calculate customer-specific ROI for manual vs. SAP TAO based tests

- # of business processes for regression tests?
- # of regression test cycles per year?
- # of manual testers – internal and external?
- ... 
- Expected percentage of test automation?
- Day rates for internal and external manual tester?
- Costs for disruption and problem fix in PRD Landscape

ROI calculation

Please contact SAP Professional Services for a customized ROI calculation!
Further Information
Test Management – Information Sources

Infos, Presentations, Demos
http://service.sap.com/testing

ALM Infos, Presentations, Demos
http://service.sap.com/alm

Classroom Training E2E220

Remote Service
Expert Guided Implementation
http://service.sap.com/alm-services

SAP AGS Whitepaper Test Management
http://service.sap.com/supportstandards

SAP Enterprise Support

Testing SAP Solutions

Professional Services
www.sap.com/services/testing
Best Practices: Regression testing of SAP-centric Business Processes

9 Recommendations

1. Lean documentation of important business processes
2. Setup of lean test systems
3. Test automation for critical business processes
4. Comprehensive test data for automated regression tests
5. Provisioning of easy to use manual tests
7. Unattended (‘lights out’) execution of automated regression tests
8. Manual test execution with guidance for business users
9. Management of the change process
Best Practices / Next Practice:
Regression Testing of SAP-centric Business Processes

Leverage the experience of other SAP customers and find out what works best for them.

Content

- Regression tests as integral part of the software change process
- 9 Recommendations for regression testing
- Customer use cases from Colgate-Palmolive, Ferrero, Sara Lee, ConAgra Foods, Soka-Bau

Best Practice available at


Test Management
Overview and Detailed Presentations and Offline Demos


- Presentations
- Offline Demos

Test Management
Information and SAP Contacts

Information

E2E Integration Testing: http://service.sap.com/testing
SAP TAO: http://service.sap.com/saptao
Application Lifecycle Management: http://service.sap.com/alm
SAP Standard for Test Management: http://service.sap.com/supportstandards
SAP Solution Manager e-learning material: http://service.sap.com/rkt-solman

Regional SAP Contacts

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Thank You!
Appendix

Automatic and semi-automatic validations

Consolidation

Approach for TBOM creation

Handling of Iterations
SAP TAO
Automatic Validation

Approach

- Validation steps in a test script check for certain objects on the screen with a condition when it's executed. The script passes only when all the validation steps pass.

- By default, SAP TAO includes two validation steps – Check whether transaction code is started & status bar information shows success.

SAP TAO Process Flow Analyzer

Business Analyst executes the transaction from SAP TAO

Test Script

- Upload

Automatically injected validation step
SAP TAO
Semi-automatic Validation

Business Analyst inserts validation steps

Test script created with validation steps

Test Design

Business Analyst executes the transaction from SAP TAO

SAP TAO

Test Script Execution

Customer SAP Landscape (SAP ERP, ...)

All validation steps are checked, and test scripts fail, if validation steps fail.
Consolidation of a test script from SAP TAO bundles all its components and creates a single component out of it.

**Benefits**
- Improves the performance of a test script
- Makes handling of iterations easier
- The component can be easily used to create a high level test case e.g. scenario test case
**Goal:** SAP TAO based test scripts can be used to create TBOMs.

**Step 1:** Test script and Business Blueprint mapping in SAP TAO

SAP TAO scripts know where to create TBOMs.

TBOM created in SAP SolMan after test script execution.

**Step 2:** Test script execution from SAP TAO
SAP TAO

Test data created by PFA

SAP TAO Process Flow Analyzer

Business Analyst executes the transaction from SAP TAO

SAP TAO based test script and it’s data excel is linked
SAP TAO
Additional test data records

First data record is automatically created during PFA upload

Additional data records are added by Business Experts
SAP TAO
Test execution with multiple iterations

Same test script is executed multiple times using different data records.