ROI reflection
Automation of regression test with SAP eCATT at INVISTA

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SAP Deutschland AG & Co. KG
SAP Test Management Consulting
INVISTA Resins & Fibers GmbH

- INVISTA is one of the world’s largest manufacturers and distributors of fibers, raw materials, polymers and intermediates made of polyester and nylon

- INVISTA produces and distributes in all major markets and fiber regions of the world
  → 70 locations in over 30 countries

- Global headquarters: Wichita, Kansas, USA

- European administration: Hattersheim (Main)

- 13 production locations in Europe

- All German locations certified according to DIN EN ISO 9001 and 14001

- SAP implementation: January 1998

- Plant in Östringen „birth place“ of SAP
very high degree of IT outsourcing realized
Project Target: Upgrade to R/3 Enterprise

Technical upgrade from release 4.0B to SAP R/3 Enterprise
- SAP modules: FI, CO, SD, SD-Tr., LES, MM, PP-PI, QM, IM, PS, PM
- Implementation of Logistic Auditing
- Installed add-ons: Waste Management, Customs Handling
- Interface to mySAP SRM (EBP) system
- Important interfaces to productive systems
- Custom developments: Z-Reports, Z-Transactions
- No redesign of the processes projected

Gathering of „low hanging fruits“
- Usage of the SAP Test Workbench and automation of tests with eCATT
- Authorizations
- End-user training (SAP Tutor simulations), introduction Train-the-Trainer concept

General Framework
- Time frame: October 2003 to April 2004
- Target: Going Live within a maximum of 30 hours
- Fix-price project with fine

SAP succeeded in the bidding process (RfP) amongst 11 providers
Approaches for Risk Reduction

Approaches to reduce the risks:
- Intensive analysis in order to determine the project coverage → RFP process
- Professional project management and clearly defined project structure
- Search for a competent consulting partner for all appearing services (“one-stop”)
- Optimization of tests with SAP Test Workbench and the deployment of eCATT
- End-user training as central element of the project
- Technology Consulting
- Risk sharing with the consulting partner
- Risk Management
Project Challenges

Application
- Adaptation of the applications if necessary (e.g. Invoice Verification)
- Adaptation of interfaces, custom developments and add-ons

Testing
- Functional test of all processes
- Integration test of all modules incl. interfaces and add-ons
- Test administration with the SAP Test Organizer
- Automation of processes with eCATT

Technology
- Conversion concept
- Authorization concept
- Go-Live and aftercare operations

Training of all employees incl. exercises and SAP Tutor
- Training conception and organization
- End-user training
- SAP Tutor simulations deployed as e-Learning material
Tasks
- Test management within the upgrade project
- Automation of future regression test processes

Results
- Test management
  - Test case design for manual test execution
  - Setup of test administration in the SAP Test Organizer
  - Test documentation, Monitoring and Reporting in the Test Organizer
- Automation of all critical business processes

Important prerequisite:
- Creation of test cases in a structured form!
- Target of INVISTA: covering the critical business processes with automated test scripts based on eCATT
Test Management approach at INVISTA

Identification of a Pilot
- Concept proposal for test management by SAP Test Management Consulting
- Proof of Concept for INVISTA

Roll-out of the project after successful realization in the pilot
- Setup of test catalogues (amongst others: definition of standards)
- Recording of manual test execution with the SAP Tutor
- Deployment of SAP Tutor recordings as input for automation
- Recording / linking the script modules to process chains
  ➔ Initial usage of test automation in the context of setting-up / upgrading further systems at INVISTA
  ➔ Reduction of manual test efforts already in the context of the upgrade project!
  ➔ Excellent basis for future regression tests!
Starting Basis 10/2003:
- SAP R/3, release 4.0B, mySAP SRM 2.0
- 900 manual test cases administrated in MS Excel

Phase 1: Upgrade project SAP R/3 Enterprise
- Usage of almost all SAP modules, except HR
- Usage of about 75% of the Enterprise functionalities
- Go-Live in April 2004

Implementation of test automation (setup)
- Test management
- Automation of future regression tests with SAP eCATT
- Know-How transfer
- Two-day conclusion workshop
- Operating manual
Overview test-relevant phases and activities in 2004

Phase 2: Maintenance of eCATT scripts (04 – 11/2004)
- Usage of the eCATT scripts during the Change Management

- Runtime: 14 hours!
- Size of Support Packages grows dramatically...
Overview test-relevant phases and activities in 2005

Phase 4: Change of provider

System relocation to USA (05-06/2005)
- Usage of the eCATT scripts in the context of system relocation and hardware change

Change of provider to offshore (03-08/2005)
- Knowledge transfer & validation of the employees of the provider
  ➔ Securing the support quality

Phase 5: Rearrangement of the material groups
(11-12/2005)
- Usage of the structures within the SAP Test Workbench and usage of the eCATT scripts
Overview test-relevant phases and activities in 2006

Phase 6:

Carve-out of a business unit with 4 plants (06-08 / 2006)
- Asset deal with closing on deadline
- Engagement to hand over a running business unit

Subsequently:

Change of fiscal year according to 4-4-5 strategy for the new business unit (November 2006):
- Replication and adaptation of the existing eCATT scripts

Phase 7:

Occurrence of a critical SQL error after UNIX patch (October 2006)
- Incorrect standard transactions
- Loss of connection SAP → Database
# Phase 1: Upgrade to SAP R/3 Enterprise

<table>
<thead>
<tr>
<th></th>
<th>Effort for manual testing estimation based on experience (days)</th>
<th>Given effort for automated testing (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandbox System</td>
<td>100</td>
<td>Recording iTutors (test cases)&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Development System</td>
<td>100</td>
<td>Set-up Test Workbench &amp; test automation</td>
</tr>
<tr>
<td>Consolidation System</td>
<td>100</td>
<td>Additional manual test activities in Consolidation System by key users (risk minimization)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

<sup>1</sup> Input for end user training, test automation
ROI already reached with the first deployment of the scripts

→ Saving of **132** days or approx. **44% !!!**

- No manual test activities in the Sandbox and the Development System
- Direct effect for quality improvement: error detection at an early stage by developing eCATT scripts
- Due to the high test coverage, the continuous development over the system chain and the consequent usage of the eCATT scripts, manual testing did only report errors in authorization. All functional errors have been detected already by eCATT.
# INVISTA Test Cases

<table>
<thead>
<tr>
<th>Module</th>
<th>Transaction</th>
<th>Manual Test Cases</th>
<th>Transaction</th>
<th>eCATT Scripts</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>Z_CO</td>
<td>40</td>
<td>Y_CO</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Z_EC</td>
<td>6</td>
<td>Y_EC</td>
<td>6</td>
</tr>
<tr>
<td>FI</td>
<td>Z_FI</td>
<td>99</td>
<td>Y_FI</td>
<td>65</td>
</tr>
<tr>
<td>IM</td>
<td>Z_IM</td>
<td>23</td>
<td>Y_IM</td>
<td>7</td>
</tr>
<tr>
<td>MM</td>
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<tr>
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<td>Z_QM</td>
<td>86</td>
<td>Y_QM</td>
<td>9</td>
</tr>
<tr>
<td>SD</td>
<td>Z_SD</td>
<td>101</td>
<td>Y_SD</td>
<td>57</td>
</tr>
<tr>
<td>TEFI</td>
<td>Z_TF</td>
<td>63</td>
<td>Y_TF</td>
<td>6</td>
</tr>
<tr>
<td>Preliminary products</td>
<td>Z_VP</td>
<td>76</td>
<td>Y_VP</td>
<td>19</td>
</tr>
<tr>
<td>Wadis</td>
<td>Z_WA</td>
<td>24</td>
<td>Y_WA</td>
<td>0</td>
</tr>
<tr>
<td>Cross component</td>
<td>Z_SYS</td>
<td>59</td>
<td>Y_SYS</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>824</strong></td>
<td><strong>Total</strong></td>
<td><strong>267</strong></td>
</tr>
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<td></td>
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<td><strong>Total</strong></td>
<td><strong>267</strong></td>
</tr>
</tbody>
</table>

- **824 manual test cases**
- Coverage of 90% of all appearing business cases
- **267 automated test scripts**
- Coverage of 70% of all test cases
- Reduction by repeated usage
Phase 2: Maintenance

From April to November 2004 an additional effort of 3.5 days has been spent for the maintenance of the scripts

→ Preparation phase for support packages

- Maintenance and adaptation of the scripts because of the following changes in the system:
  - New RFC-Connection
  - New printer name
  - New Screen was integrated in the process

- Updating Operating Manual

- Quantification of saving effects is difficult

„The permanent deployment of the existing scripts reduces the test effort in the area of Change Management by factor 4!“

Christian Koch, In-house Consultant
Phase 3: Support Package – Upgrade

The following support packages have been implemented:

- BASIS: SAP base component from SAPKB62031 to SAPKB6245
- APPL: Cross components from SAPKA62031 to SAPKA62045
- APPL: logistics and accountancy from SAPKH47016 to SAPKH47022
- EA-IPPE: Add-on installation from SAPKGPIA06 to SAPKGPIA18
- EA-APPL: R/3 Add-on PLM, SCM, financials from SAPKGPA06 to SAPKGPA19

Enormous extents!

“Based on these facts, INVISTA now thinks about one Support Package upgrade per quarter.“

Lothar Hafner, INVISTA Cluster Lead
# Phase 3: Support Package – Upgrade

## Effort for manual testing estimation based on experience (days)¹

<table>
<thead>
<tr>
<th>System</th>
<th>Effort</th>
<th>Given effort for automated testing (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development System</td>
<td>25</td>
<td>Adjustment of the test scripts to new SP-level</td>
</tr>
<tr>
<td>Consolidation System</td>
<td>25</td>
<td>Expense of in-house Consultants</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

¹ spot test: only business critical cases and processes in scope
Phase 3: Support Package – Upgrade

Additional ROI resulting from the deployment of the eCATT scripts in the Support Package upgrade test

→ Saving 45 days or approx. 90% !!!

- No key user involved in this test!
- Detection of errors in business critical processes
- Detection of errors in printing program

„With our eCATT scripts, the involvement of key users in the Support Package upgrade test could be entirely avoided.“

Lothar Hafner, INVISTA Cluster Lead
## Overall View 2004

<table>
<thead>
<tr>
<th>Phases</th>
<th>Effort for manual testing estimation based on experience (days)</th>
<th>Given effort for automated testing (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>300</td>
<td>168</td>
</tr>
<tr>
<td>Phase 2</td>
<td>/</td>
<td>3,5</td>
</tr>
<tr>
<td>Phase 3</td>
<td>50</td>
<td>5,5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>350</strong></td>
<td><strong>177</strong></td>
</tr>
</tbody>
</table>

→ Saving **173 days or approx. 50% !!!**
→ Additionally high application quality!
Phase 4: Change of Provider

System relocation to USA (05-06/2005)
- Adaptations due to system relocation
- Usage of the complete test cases of the SAP Test Workbench for manual tests, all interfaces, user assignments, etc.
- Usage of the eCATT scripts
- Regression tests for DEV & QA system
- Additionally: test of all printers with eCATT scripts

Change to a offshore application provider (03-08/2005)
- Usage of the structures within the SAP Test Workbench for training & validation of the employees of the provider
- Securing the support quality & knowledge of the business cases and processes
## Phase 4: System Relocation to USA

<table>
<thead>
<tr>
<th></th>
<th>Effort for manual testing estimation based on experience (days)</th>
<th>Given effort for automated testing (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development system</td>
<td>15</td>
<td>Support by SAP consultants</td>
</tr>
<tr>
<td>Consolidation system</td>
<td>25</td>
<td>Expenses of the in-house consultants</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40</strong></td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>11.5</strong></td>
</tr>
</tbody>
</table>

1 spot test: only business critical cases and processes in scope
Phase 4: System Relocation to USA

Additional ROI through the deployment in the regression test during hardware change, actual effort with eCATT: 11.5 PT

- Saving 28.5 days or approx. 70%!
- Performance bottlenecks of the systems recognized at an early stage
- Verification of the successful change to new infrastructure provider
- No key user involvement required
- Stability of crucial business processes guaranteed
- Reduction of the relocation risk

Revision of the DEV und QA system within 4 hours
Phase 4: Change of the Application Provider

Deployment of the test catalogues and test cases of the SAP Test Workbench for knowledge transition and validation of the employees of the offshore provider

Usage of the SAP Test Workbench for the initial training of the new support employees

- Overview business processes: knowledge transfer
- Monitoring and assessment of the quality of the skill adaptation over personalized work lists in the Test Workbench
- Quantification of saving effects is difficult

„With the help of the structures within the SAP Test Workbench we were able to train the employees of the application provider along our business processes and to assess the quality of their progress. The saving effect was enormous, however, difficult to quantify.

Lothar Hafner, INVISTA Cluster Lead
Phase 5: Rearrangement of Material Groups

- Adaptation of the material group structure in order to harmonize both European SAP systems and conversion of all documents
- Execution in two clusters: comparison possible
- Manual testing in comparison to automated testing

<table>
<thead>
<tr>
<th>Development system</th>
<th>Untested</th>
<th>Usage of eCATT scripts</th>
<th>0,5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consolidation system</td>
<td>8</td>
<td>Additional manual tests</td>
<td>1,5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td><strong>Total</strong></td>
<td><strong>2,0</strong></td>
</tr>
</tbody>
</table>

2 Automated testing with eCATT
Phase 5: Rearrangement of Material Groups

Additional ROI through the deployment within the regression test after master data change

- Saving 6 days or approx. 75%!
- Stability of critical business processes guaranteed
- Data constellations were comprehensible due to standardized test cases (no further explanation of tester required)

„A few hours after the conversion we had reliable results.“

Christian Koch, In-house Consultant
### Overall View 2005

<table>
<thead>
<tr>
<th>Phases</th>
<th>Effort for manual testing estimation based on experience (days)</th>
<th>Given effort for automated testing (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 4</td>
<td>40</td>
<td>11.5</td>
</tr>
<tr>
<td>Phase 5</td>
<td>8</td>
<td>2.0</td>
</tr>
<tr>
<td>Overall</td>
<td><strong>48</strong></td>
<td><strong>13.5</strong></td>
</tr>
</tbody>
</table>

- Saving of **34.5 days** or approx. **72%**!
- Rating of the employees of the application provider!
Phase 6: Carve-out of a business unit

Handing over a running business unit implied:
- Separation of the business units
- Creation of initial stocks, assets, etc.
- Characteristic: historical data was made available (except for financial data)
  ➔ Realized by completely reproducing the data and selectively deleting the financial data

Risk: Safeguarding of the correct function of the business processes
  ➔ Fast and reliable test with the automated test scripts

Challenge:
- Targeted time for the realization: 7 weeks
Phase 6: Carve-out of a business unit

Adaptation of the eCATT scripts to the new data:

- Verification of the correct function of the processes with the new data
- Securing the function of the new network
- Test efforts (manual, estimation based on experience): 50 days for extensive tests on DEV and QS system
- Test efforts (automated): 6 days

➔ Saving of 44 days or 88%!
➔ Unproblematic Go-Live
November 2006: Change of fiscal year

Change of fiscal year for the new business unit:

- Conceptual consulting support by SAP Consulting
- Reproduction and adaptation of the existing eCATT scripts
- Automated scripts secure the application stability for the new strategy
- Important step to minimize risks
- Manual test activities only in FI, e.g. for the month-end closing as well as for the verification of the Z_Reports (4 days in both test variants)

→ Saving of 14.5 days or 72.5%!
October 2006: Occurrence of SQL error after UNIX patch

- Abnormal, unusual connection dropouts and dumps in standard transactions, payment run and invoice creation
- Symptom 1: two SAP applications (on two instances) lose the connection to the database, dropout with ORACLE error: connection lost
- Symptom 2: additional interface problem of one instance, status confirmation for sent FAXes as well as the data transfer of the barcode system break
- Due to the error message no definitive analysis possible
- Reproduction of the error by automated test scripts in DEV and QS system
  - Excluding a network error for symptom 1
  - Identification of a erroneous router for symptom 2
October 2006: Occurrence of SQL error after UNIX patch

- Delivery of a repair level of the hardware vendor
- Verification of the problem solution through permanent execution of eCATT scripts

„With the help of manual tests, we would not have been able to act as fast and as effectively as we did. Over 14 days, a massive key-user deployment for manual tests is unimaginable.“

Christian Koch, Inhouse Consultant

„Without the eCATT scripts, this would have been an operation on the open heart. A patch that has not been released could not have been imported into the productive system without a verification in advance. It is recommended to keep the existing test scripts up-to-date at any times!“

Lothar Hafner, INVISTA Cluster Lead
### Overall View 2006

<table>
<thead>
<tr>
<th>Activity</th>
<th>Effort for manual testing estimation based on experience (days)</th>
<th>Given effort for automated testing (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 6</td>
<td>50</td>
<td>6</td>
</tr>
<tr>
<td>Change of fiscal year</td>
<td>20</td>
<td>5.5</td>
</tr>
<tr>
<td>Overall</td>
<td>70</td>
<td>11.5</td>
</tr>
</tbody>
</table>

→ **Saving of 58.5 days or approx. 84% !**
### Overall View 2004 – 2006

<table>
<thead>
<tr>
<th>Year</th>
<th>Effort for manual testing estimation based on experience (days)</th>
<th>Given effort for automated testing (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>350</td>
<td>177</td>
</tr>
<tr>
<td>2005</td>
<td>48</td>
<td>13.5</td>
</tr>
<tr>
<td>2006</td>
<td>70</td>
<td>11.5</td>
</tr>
<tr>
<td>Overall</td>
<td><strong>468</strong></td>
<td><strong>202</strong></td>
</tr>
</tbody>
</table>

- Saving of **266 days** or approx. **57%** !
- Additionally high application quality !
Conclusion: Automation of regression testing at INVISTA

- The SAP test tools are free of any license costs!
- All test objects and results are stored in one central system → replacement of Excel tables
- All business critical processes are now automatically tested
- Positive ROI already during the Upgrade Project
- Reduction of manual test efforts of key users
- INVISTA concentrates on the “business know-how”
- The SAP Test Management Consulting covers the script maintenance

„The test automation gives us security: if the scripts run without any errors we can be sure that our business critical processes run properly and we can minimize the risk.”

Lothar Hafner, INVISTA Cluster Lead
Example: Script „Preliminary Products“

- Create material ROH, material specification
- Create bill of material
- Assign bill of material, create test plan, change
- Create certificate profile
- Create control cycle
- Raw material stock: purchase, release, goods receipt
- Create process order
- Create charge, (ZACK) and generate inspection lot, confirmation process order
- Process monitor, CO54
- Simulation PMS – interface: download, upload of stock transfer
- Result entry: matrix, QM – VE, transfer posting in WM
Example: Script „Preliminary Products“

Production level 2

- Create material level 2, material specification
- Create bill of material
- Assign bill of material, create test plan, change
- Assign certificate profile
- Control cycle: PVB – stock transfer from level 1
- Create process order
- Create charge, (ZACK) and generate inspection lot
- Process monitor, CO54
- Simulation PMS – interface: download, uploads
- Result entry: matrix, QM – VE
- Call job RQEVAl30
  (prerequisite for transfer posting: removal of lock)
- Transfer posting
- SD-Prozess: Order to Cash
  - Creation of master data for process VORPROD
    - Debitor with sales view, material [HALB]
    - price conditions, bonus agreement
    - provision conditions
  - Create sales order with VA01
  - Removal of credit lock with VKM1
  - Create delivery with ZA06
  - Pre-disposition – create transport order
  - WAIT 20.
    REF (Y_VP_MAPPE_AUSLESEN, Y_VP_MAPPE_AUSLESEN_1).
  - WAIT 20.
  - Post goods issue, ZWAB
  - Invoice
Example: Script „Preliminary Products“

SD-Prozess: Order to Cash

- Creation of master data for process VORPROD
  - Debitor with sales view, material [HALB]
  - Price conditions, bonus agreement
  - Provision conditions
- Create sales order with VA01
- Removal of credit lock with VKM1
- Create delivery with ZA06
- Pre-disposition – create transport order
- WAIT 20.
  REF (Y_VP_MAPPE_AUSLESEN , Y_VP_MAPPE_AUSLESEN_1 ).
- WAIT 20.
- Post goods issue, ZWAB
- Invoice

Effort for manual testing: approx. 2.5 days with 9 testers

Effort for automated testing: 26 minutes !!
Further Information and Contacts

Success Story
- www.sap.com
  - Services
  - SAP Consulting
  - Customer Successes
  - Chemicals
  - INVISTA

SAP Test Management Consulting
- service.sap.com
  - tmc

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