

# Einsatz von HP QC zum Testen von kritischen Geschäftsprozessen im SAP-Umfeld

Automatisiertes Testen von kritischen Prozessen als fester Bestandteil des SAP Change Managements sowie im Rahmen von SAP-Erweiterungen und Release-Upgrades.  
Praxisbeispiel "Order-to-Cash" inklusive SAP Outbound- und Inbound-IDoc Verarbeitung bei HeidelbergCement.

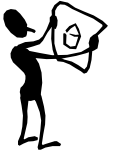
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**HeidelbergCement AG**



HP Software Anwendertreffen 2012

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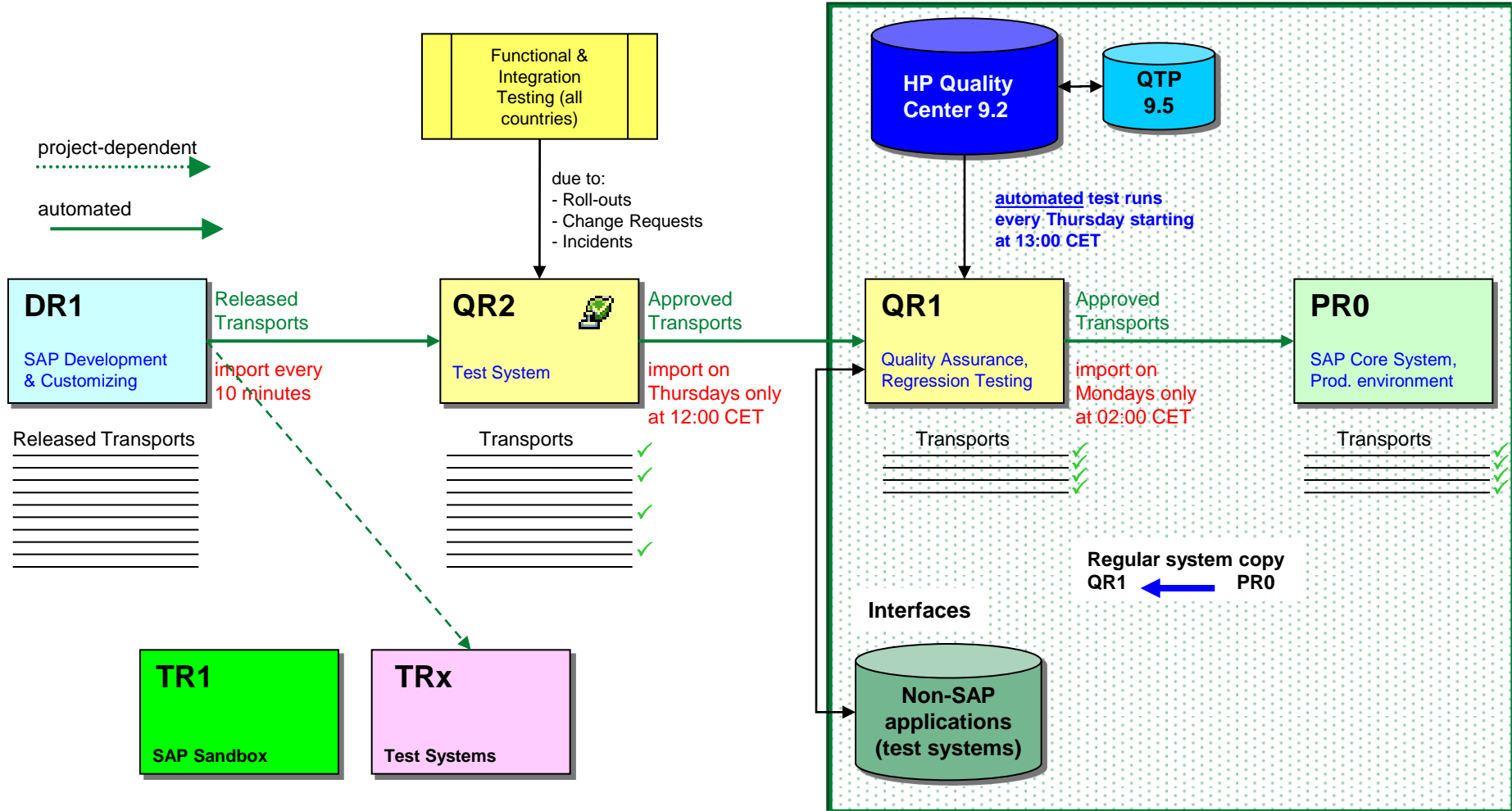


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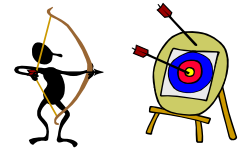
# SAP Change Management approach (SAP ECC 6.0)



*simplified view*

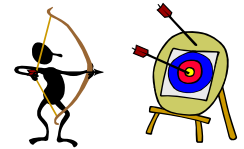


# Objectives of automated testing (1)



- **Ensure critical path of business is always up and running, hence regression testing needs to be sufficient & efficient as test coverage will never be 100%**
- **ROI from automation > manual testing**
  - That is, the initial investment to build up automated test scenarios plus the time spent on the subsequent maintenance and monitoring should be less effort than performing manual tests on a weekly basis
  - Savings across the entire test management lifecycle due to modularity & flexibility of HP software (test planning, execution and evaluation)

## Objectives of automated testing (2)



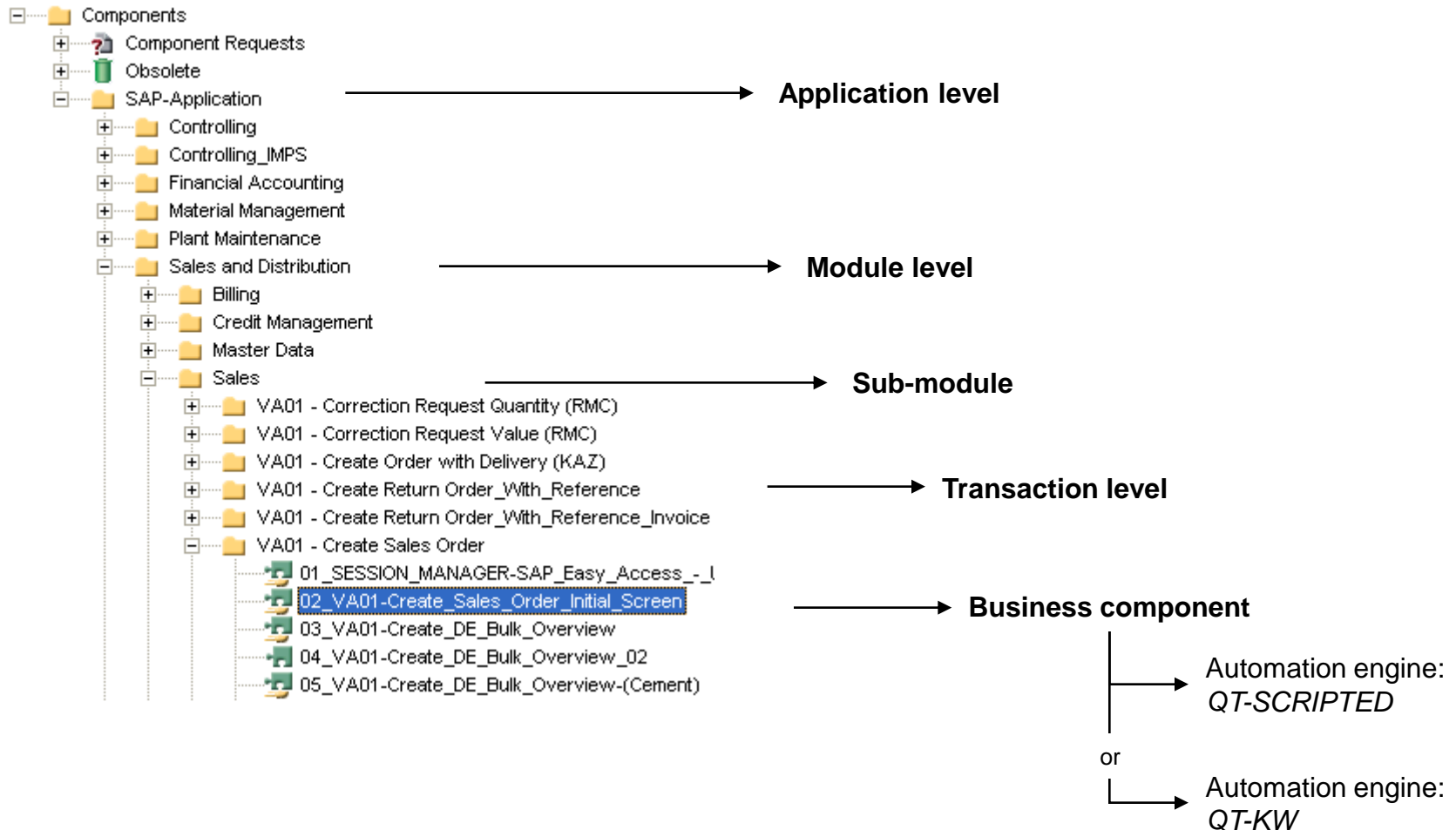
- **Regression testing / business process testing of the SAP system could lead to potential savings and benefits due to improved quality**
  - Reduction of emergency patches transported into the productive system
  - Reduction of resolution time for emergency patches
  - Reduction of incidents and regression cases in the productive system
- **Overcome the limitations of manual testing**
  - Resource constraints in the business makes effective manual testing difficult both qualitative and quantitative
  - Manual testing is often inefficient or prone to errors and inconsistencies

# Limitations of automated testing in SAP



- **Only where automation of critical end-to-end business scenarios is technically feasible and useful**
  - Our focus is primarily on SAP ERP, that is the automated testing of SAP transactions and reports used in a business process
  - Integration of non-SAP transactions (external dispatch systems, etc.) only when required and technically feasible
  - Communication flow between SAP and non-SAP systems shall be simulated as much as possible (WE19 - IDoc test tool, SA38 – programs for file uploads, etc.)
- **Process steps requiring unpredictable and non automatable user interactions**
  - E.g. certain manual steps during period-end closing such as master data corrections or postings are highly unpredictable, therefore difficult to automate

# Automation Framework (Business Components)



# Automation Framework (Business Components)



## Automation engine: QT-KW

Item	Operation	Value
Order Type	Set	Parameter("Order_Type")
Sales Organization	Set	Parameter("Sales_Organization")
Distribution Channel	Set	Parameter("Distribution_Channel")
Division	Set	Parameter("Division")
Sales office	Set	Parameter("Sales_office")
Sales office	SetFocus	
Create Sales Order: Initial	SendKey	ENTER

The QTP script in **Keyword View**, created via **BPT for SAP**

QTP = HP QuickTest Professional

## Automation engine: QT-SCRIPTED

```
RegisterUserFunc "SAPGuiEdit", "Set", "SAPGuiEdit_ParameterSet"

SAPGuiSession("Session").SAPGuiWindow("Create NO Order w/o deliv.:").SAPGuiEdit("Order reason").Set Parameter("Order_reason")
SAPGuiSession("Session").SAPGuiWindow("Create NO Order w/o deliv.:").SAPGuiEdit("Incoterms").Set Parameter("Incoterms")

UnregisterUserFunc "SAPGuiEdit", "Set"

SAPGuiSession("Session").SAPGuiWindow("Create NO Order w/o deliv.:").SAPGuiEdit("VPN").Set Parameter("VPN")
SAPGuiSession("Session").SAPGuiWindow("Create NO Order w/o deliv.:").SAPGuiEdit("VPN_2").Set Parameter("VPN_2")
SAPGuiSession("Session").SAPGuiWindow("Create NO Order w/o deliv.:").SAPGuiEdit("Customs No").Set Parameter("Del_plant")

If Len(Parameter("Shipping_cond")) <> 0 Then
    SAPGuiSession("Session").SAPGuiWindow("Create NO Order w/o deliv.:").SAPGuiComboBox("Shp.Cond.").Select Parameter("Shipping_cond")
End If

RegisterUserFunc "SAPGuiEdit", "Set", "SAPGuiEdit_ParameterSet"

SAPGuiSession("Session").SAPGuiWindow("Create NO Order w/o deliv.:").SAPGuiEdit("Req. deliv.date").Set date
```

The QTP script in **Expert View**, either converted from the Keyword View or created from scratch directly in QTP



# Automation Framework (Business Components)



## Component parameter → Input

Parameter Name	Value Type	Default Value	Description
Order_Type	String	zsi	Argument Text in operation Edit Box("Order Type").Set
Sales_Organization	String	0010	Argument Text in operation Edit Box("Sales Organization").Set
Distribution_Channel	String	01	Argument Text in operation Edit Box("Distribution Channel").Set
Division	String	10	Argument Text in operation Edit Box("Division").Set
Sales_office	String	de01	Argument Text in operation Edit Box("Sales office").Set

## Component parameter → Output

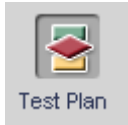
Parameter Name	Value Type	Description
outlmm_del_pick_rel_item2	String	outlmm_del_pick_rel_item2: 2110152672
outDelivery_LOGIS_CM_item3	String	outDelivery_LOGIS_CM_item3: 2180152396

# Automation Framework (Business Components)



- **Business Components are the individual steps, actions or screens a SAP transaction (Flow) is made of**
  - Same for non-SAP transactions
- **The components, once designed (e.g. through an Automation Engineer or Business Analyst), shall be re-used within the Test Plan module (Flow, Business Process) as much as possible**
  - Same components can be re-used within different Flows (transaction variants)
  - Then, incorporate such Flows into larger end-to-end business scenarios (Business Process)

# Automation Framework (Test Type: Flow)



The screenshot displays the SAP Business Process Testing interface. On the left, a tree view shows the 'Subject' hierarchy, including 'SAP-Application' and 'Sales'. The main area shows a list of components with their status and input parameters.

Component	Status	Input
01_SESSION_MANAGER-SAP_Easy_Access_-_U	Ready	OKCode_OK_Code_Edit_Box_Set_Text: <a href="#">VA01</a>
02_VA01-Create_Sales_Order_Initial_Screen	Ready	Order_Type: <a href="#">{Order_Type}</a> Sales_Organization: <a href="#">{Sales_Organisation}</a> Distribution_Channel: <a href="#">{Distribution_Channel}</a> Division: <a href="#">{Division}</a> Sales_office: <a href="#">{Sales_Office}</a>
03_VA01-Create_DE_Bulk_Overview	Ready	Sold_to_party: <a href="#">{Sold_to_party}</a> Ship_to_party: <a href="#">{Ship_to_party}</a>
04_VA01-Create_DE_Bulk_Overview_02	Ready	Order_reason: <a href="#">{Order_reason}</a> Incoterms: <a href="#">{Incoterms}</a> VPN: <a href="#">{VPN}</a> VPN_2: <a href="#">{VPN_2}</a> Del_plant: <a href="#">{Del_plant}</a> Shipping_cond: <a href="#">__</a>
05_VA01-Create_DE_Bulk_Overview_01	Ready	

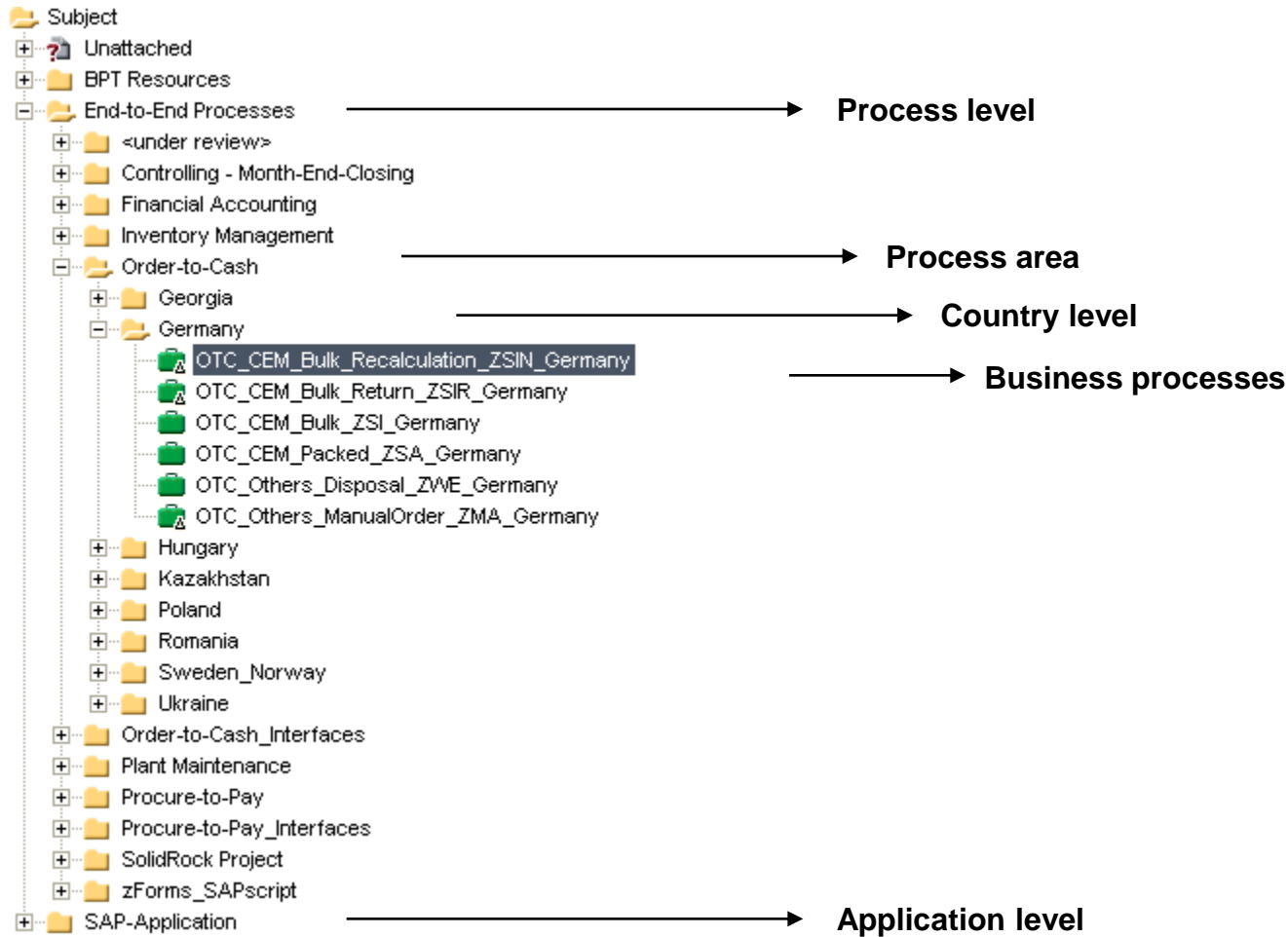
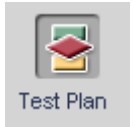


Same structure as in Business Component module

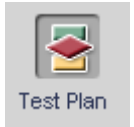
Flow of automated Business Components

Input parameters can be declared as *fixed values* or as *flow parameters*. Flow parameters will be visible within tests of type *Business Process*.

# Automation Framework (Type: Business Process)



# Automation Framework (Type: Business Process)



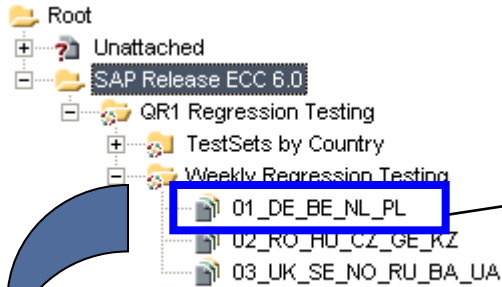
Component/Flow	Status	Input	Output	On Failure
1 <b>AutoLogon</b>	Ready	<b>01_SAPGUI_Autologon</b> Language: <a href="#">EN</a>		Continue
2 <b>VA01 - Create Sales Order</b>	Ready	<b>02_VA01-Create_Sales_Order_Initial_Screen</b> Order_Type: <a href="#">ZSI</a> Sales_Organisation: <a href="#">0010</a> Distribution_Channel: <a href="#">01</a> Division: <a href="#">10</a> Sales_Office: <a href="#">DE01</a> <b>03_VA01-Create_DE_Bulk_Overview</b> Sold_to_party: <a href="#">1079674600</a> Ship_to_party: <a href="#">1079674602</a> <b>06_VA01-Partner_selection_01</b> Partner_selection: <a href="#">Disposition</a> <b>04_VA01-Create_DE_Bulk_Overview_02</b> Order_reason: <a href="#">_</a> Incoterms: <a href="#">_</a> VPN: <a href="#">_</a> VPN_2: <a href="#">_</a> Del_plant: <a href="#">_</a> <b>05_VA01-Create_DE_Bulk_Overview-(Cement)</b> Material: <a href="#">100178</a> Order_QTY: <a href="#">25</a> Plant: <a href="#">0010</a> Storage_Location: <a href="#">1010</a> Shipping_Point_Recel: <a href="#">1010</a> Incoterms_item: <a href="#">_</a> OrderReason: <a href="#">_</a> MatCol: <a href="#">Material</a>	outCustomer outOrder_number outDelivery_number	Continue
3 <b>VL02 - Change Delivery</b>	Ready	<b>02_VL02-Change_Outbound_Delivery</b> Delivery_Number: <a href="#">[VA01 - Create Sales Order] outDelivery_number</a>		Continue
4 <b>VL03 - Document Flow</b>	Ready	<b>02_VL03-Display_Outbound_Delivery</b> Delivery_Number: <a href="#">[VA01 - Create Sales Order] outDelivery_number</a>	Shipment_Number	Continue
5 <b>VT02 - Change Shipment</b>	Ready	<b>02_VT02-Change_Shipment</b> Shipment_Number: <a href="#">[VL03 - Document Flow] Shipment_Number</a>		Continue

Flow parameters

Input value of this step is output value of previous step



# Automation Framework (Test Lab)

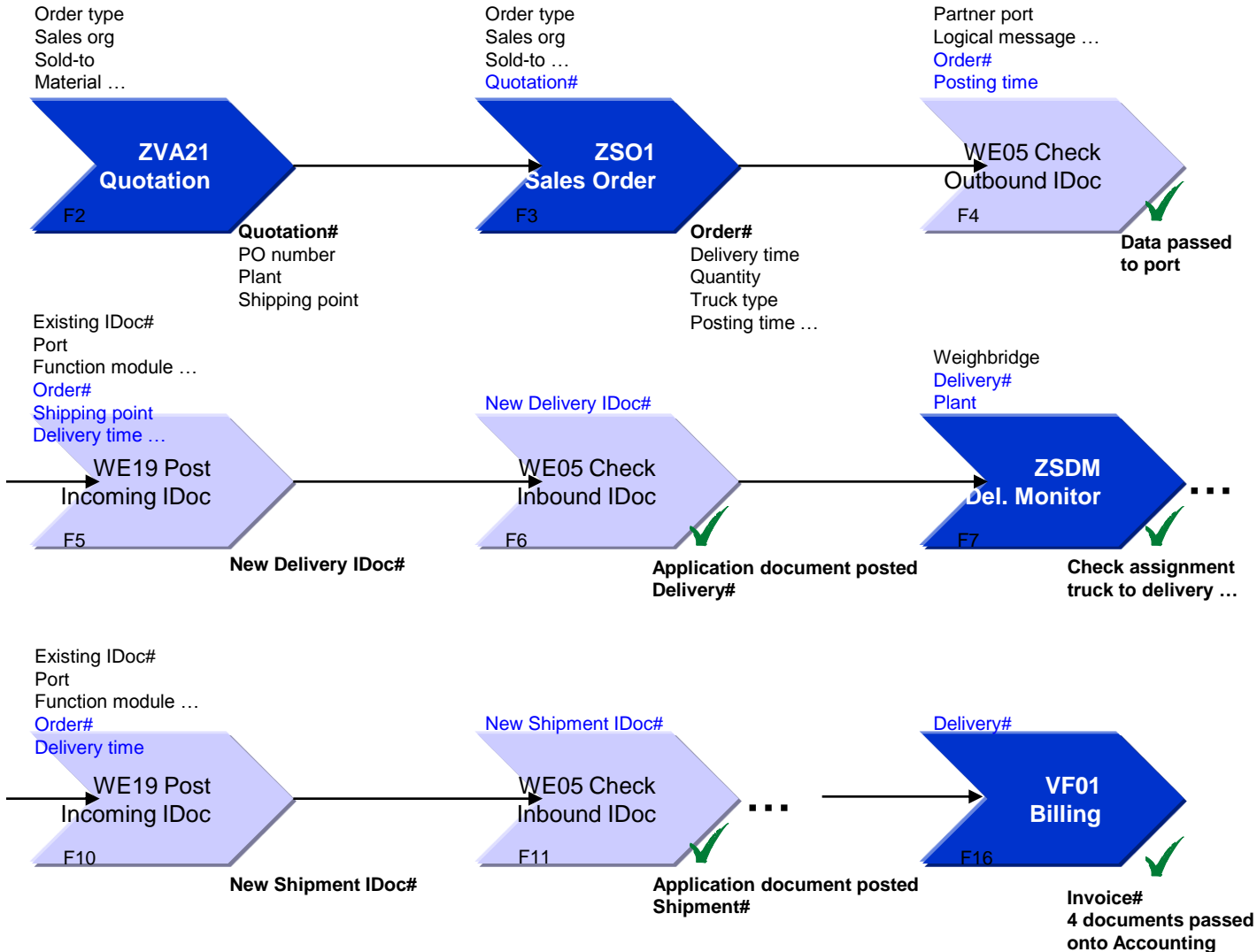


Each **Test Set** represents a physical PCs on which the automated tests are running every week, hence we use three PCs

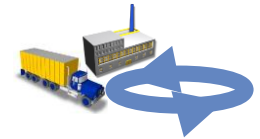


[1]Default_users_settings_1	✓ Passed	zLogon
[1]OTC_CEM_Bulk_ZSI_Germany	✓ Passed	Germany
[1]OTC_CEM_Packed_ZSA_Germany	✓ Passed	Germany
[1]OTC_Others_Disposal_ZWE_Germany	✓ Passed	Germany
[1]OTC_Others_ManualOrder_ZMA_Germany	✗ Failed	Germany
[1]OTC_CEM_Outbound_IDOC_E-Invoice_Crossgate_Fiducia_Germany	✓ Passed	Germany
[1]OTC_CEM_Bulk_Recalculation_ZSIN_Germany	✓ Passed	Germany
[1]OTC_CEM_Bulk_Return_ZSIR_Germany	✓ Passed	Germany
[1]OTC_CEM_Offline_FUMA_ZSA_Germany	✓ Passed	Germany
[1]OTC_CEM_Offline_FUMA_ZSI_Germany	✓ Passed	Germany
[1]OTC_CEM_Offline_FUMA_ZSIN_Germany	✓ Passed	Germany
[1]OTC_CEM_Offline_FUMA_ZWE_Germany	✓ Passed	Germany
[1]OTC_CEM_StandingOrder_Online_Schenck_Germany	✓ Passed	Germany
[1]Customer_Invoice_Upload_RMC_AGG_Germany	✓ Passed	Germany
[1]PTP_Goods_Receipt_Online_Schenck_Germany	✓ Passed	Germany

# Example: Order-to-Cash using IDoc



Announce new sales order  
 Assign truck to an order,  
 Update delivery information,  
 Complete picking,  
 Create shipment ...



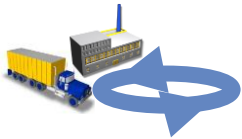
3<sup>rd</sup>-party software  
 (logistics, weighbridge)



# Example: Order-to-Cash using File Upload

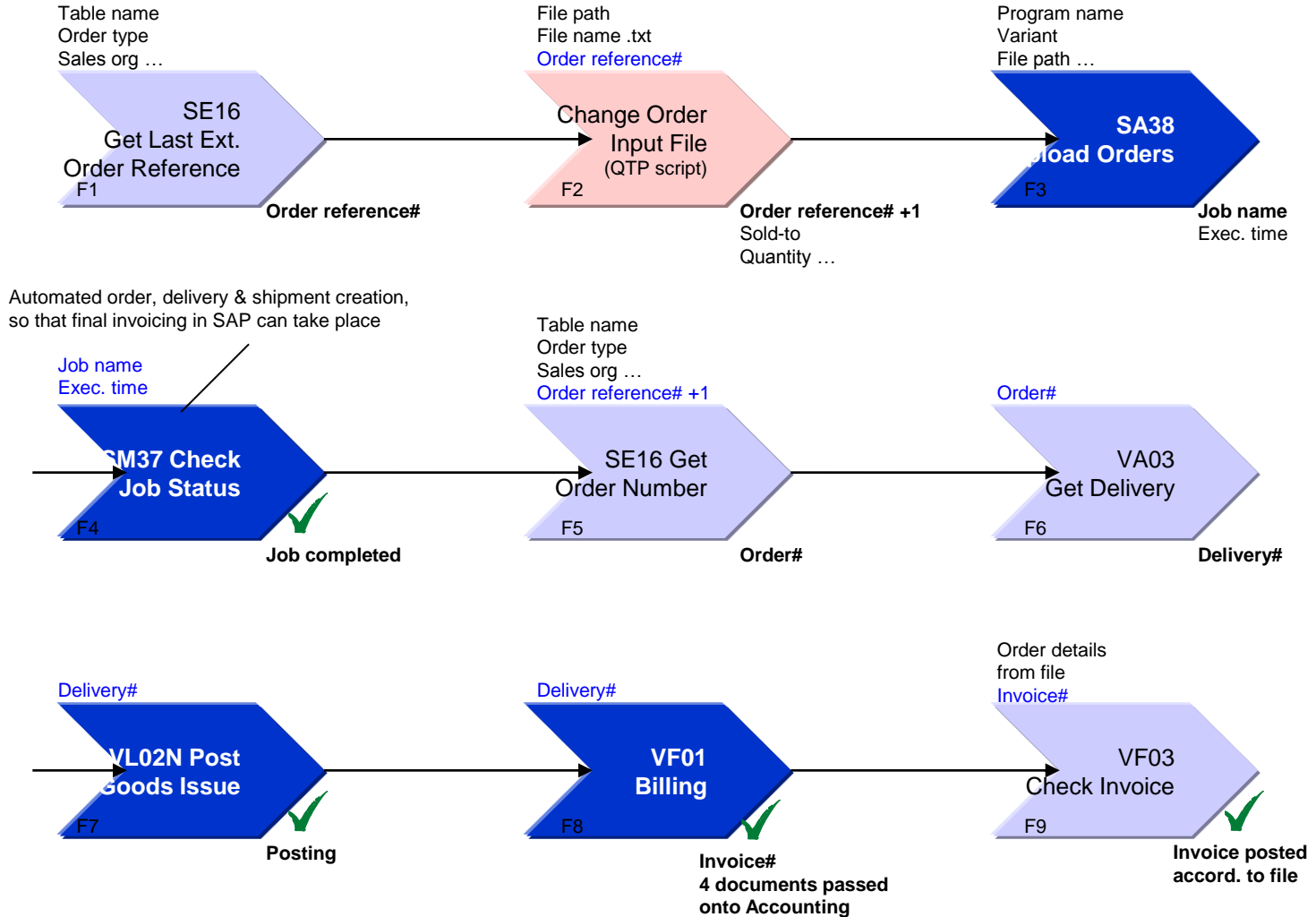


External order & delivery creation



3<sup>rd</sup>-party software  
(logistics, weighbridge)

*in real life this communication takes place offline*





# Other examples using QTP



- **Transaction execution in non-SAP systems that are interfaced with SAP (online interfaces)**
  - Instead of using WE19 - Posting Incoming IDoc
  - Requires a test system for non-SAP system (dispatch, logistic systems, weighbridges)
  - Note that object recognition in QTP may be an issue
  - Makes end-to-end testing in SAP more complex and difficult
- **Automated SAP forms / printout check**
  - QTP *bitmap* checkpoints placed on pdf forms
  - Checkpoints compare expected (“frozen”) form layout with actual layout
  - Works well for harmonised / standardised SAP forms (e.g. standard sales invoice)
- **Electronic banking in SAP**
  - Bank file change via QTP script
  - File upload in SAP and clearing

# Examples for Flow automation in SAP



## Terminating a business process run under certain circumstances

```
SAPGuiSession("Session").SAPGuiWindow("QRX(1)/010 Change Contract:").SAPGuiEdit("Contract").Set Parameter("Contract")
SAPGuiSession("Session").SAPGuiWindow("QRX(1)/010 Change Contract:").SendKey ENTER
```

```
If SAPGuiSession("Session").SAPGuiWindow("QRX(1)/010 Change Contract:").Exist(5) Then
```

```
    vsStatusBar = SAPGuiSession("Session").SAPGuiWindow("QRX(1)/010 Change Contract:").SAPGuiStatusBar("StatusBar").GetROProperty("MessageType")
```

```
    For i = 1 to 15
```

```
        If vsStatusBar = "E" Then
```

```
            Wait(5)
```

```
            SAPGuiSession("Session").SAPGuiWindow("QRX(1)/010 Change Contract:").SendKey ENTER
```

```
            If SAPGuiSession("Session").SAPGuiWindow("QRX(1)/010 Change Qty").Exist(5) Then
```

```
                Exit For
```

```
                i + 1
```

```
            End If
```

```
        End If
```

```
    Next
```

```
End If
```

```
If SAPGuiSession("Session").SAPGuiWindow("QRX(1)/010 Change Contract:").Exist(5) Then
```

```
    Reporter.ReportEvent micFail, "Sales Contract", "Contract creation failed"
```

```
    exitrun
```

```
End If
```

# Examples for Flow automation in SAP



## Terminating a business process run under certain circumstances

```
vsDelivery = Parameter("Delivery_No")
```

```
If Len(vsDelivery) = 0 Then
```

```
Reporter.ReportEvent micFail,"Create Sales Invoice","Delivery Number does NOT exist."
```

```
exitrun
```

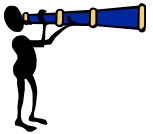
```
Else
```

```
SAPGuiSession("Session").SAPGuiWindow("Create Billing Document").SAPGuiTable("Docs to be processed").SetCellData 1, "Document", Parameter("Delivery_No")
```

```
SAPGuiSession("Session").SAPGuiWindow("Create Billing Document").SAPGuiButton("Execute (F8)").Click
```

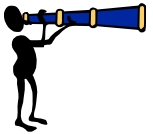
```
End If
```

# Some figures (1)



- **Average runtime approx. 6 hours per PC (13:00 – 19:00) every Thursday**
  - The regression tests run from three separate hosts (PCs) in order to shorten the overall runtime; and using three different test user IDs
- **What is mainly checked !**
  - HPQC checks that a business scenario runs through end-to-end and that no errors occur
  - Check that SAP returns a message of type “success” after the “**SAVE**” or “**POST**” button was pressed
  - Check that the SAP document flow is consistent – e.g. SD invoice shows the subsequent postings to Accounting (“Documents in Accounting”)
  - For inbound interface scenarios: transactional data from 3<sup>rd</sup>-party system is properly imported into SAP and that subsequent SAP process concludes without errors (e.g. IDoc return code 53; postings in SAP correspond with data in flat file)
  - For outbound interface scenarios: transactional data from SAP is properly sent to external system (e.g. IDoc return code 02 or 03; data in flat file correspond with the respective test scenario in SAP)

## Some figures (2)



- **Number of documents created during the Thursday regression test run**
  - E.g. SD Cement process shows 5 SD/MM documents and 4 FI/CO documents – so 9 documents in total
  - With currently approx. 140 business scenarios our test users produce over 1.300 documents in QR1 each week
- **Regression errors detected so far**
  - Short-dumps (e.g. in SD module) after transports into QR1, affecting processes in some or all countries
  - Incorrect invoice runs (no accounting documents after invoice creation)
  - System regression resulting in posting errors (e.g. documents not passed on to accounting) due to process & customising changes made in one module, but affecting another process and module
  - Electronic banking, bank file could not be uploaded in some countries
  - Detected change management issues – e.g. deliberate change in the customising caused test scenario to fail after transport into QR1 – but the same issue occurred then also in PR0 due to missing business alignment (new global settings in Purchase-to-Pay, change in accounting rules, etc.)



# The End