



Capture Accurate Solution Requirements with Exploratory Modeling at SAP

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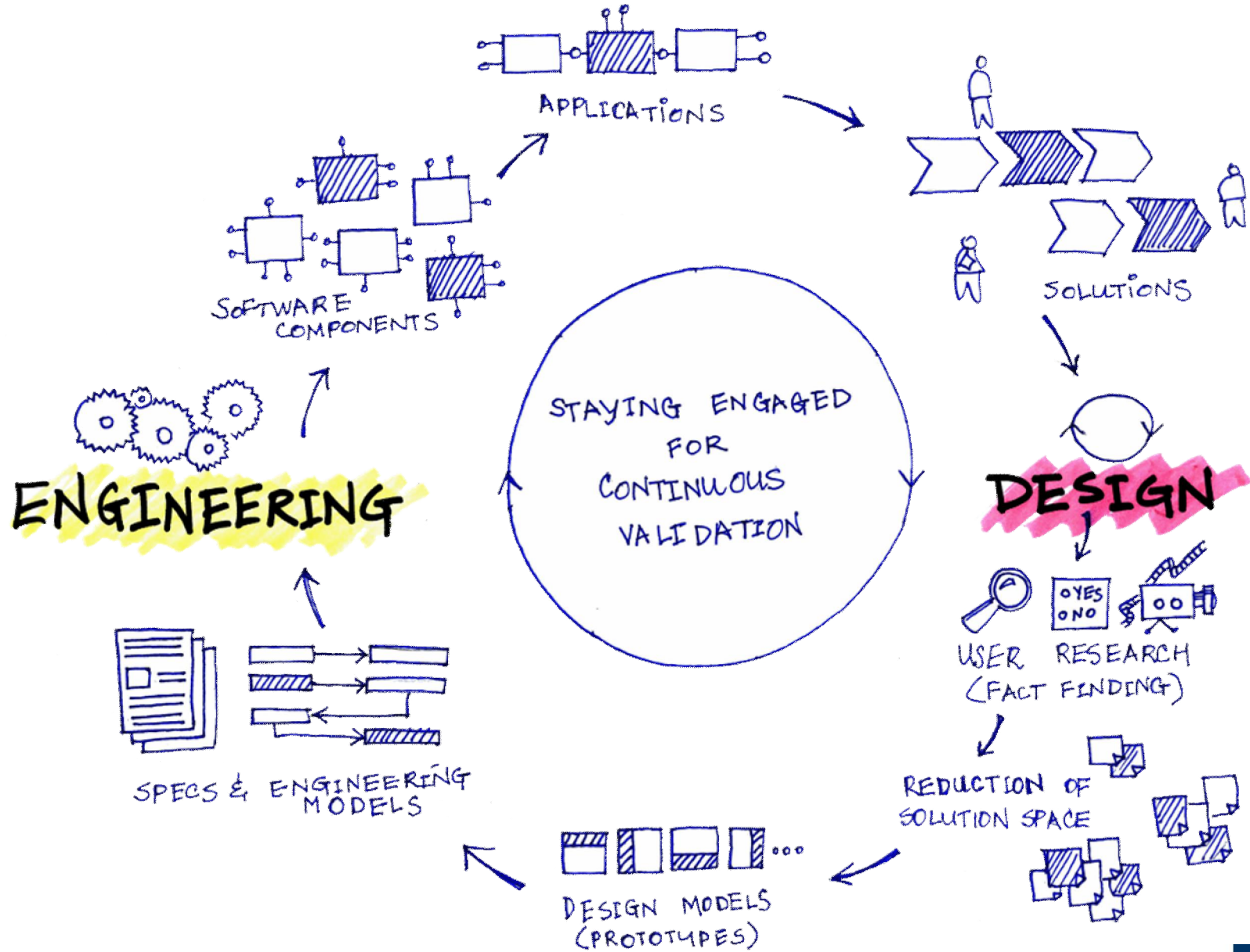
Some Words about ...

Duplicate Analyzer – An A/P Clerk Solution

xCarrier – A Shipping Manager Solution

Summary

... our Team: BPR

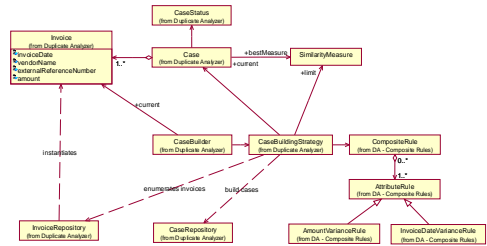
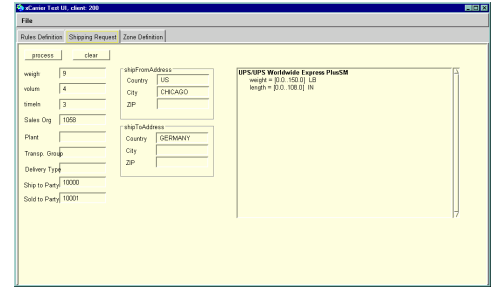
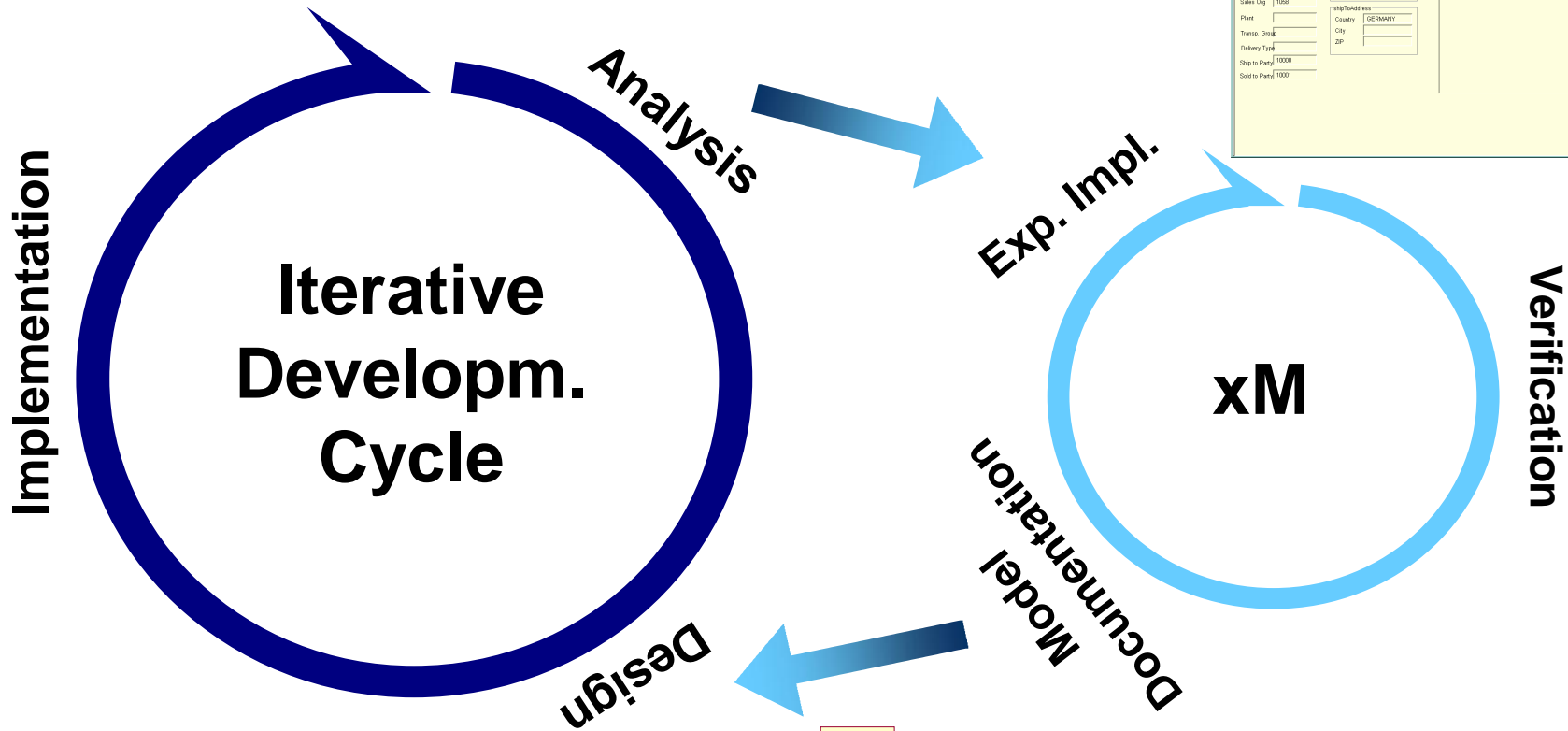


Challenge Summary (Andreas Tönne)



- Find a modeling process that
 - Expresses the domain in enough formal rigor
 - Can be understood by the customer
 - Produces agreeable proof of the model
 - Is fast enough to take place at the speed of communication
- Get right what the model does instead of how it is written up

... Exploratory Modeling

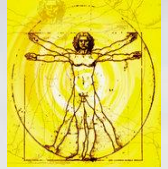


... Effective Model Building

To jumpstart your success with building models, here are some lessons learned/best practices to keep in mind when defining your models:

- Name domain terms as close as possible to the customer's usage of words.
- Make no technical distinction of data, entities and immaterial concepts like services. When done correctly, all objects are represented alike because the customer does not make these distinctions in his understanding too.
- Model processes and colloquial descriptions of use cases directly in the program's flow of control. Your program should make sense when read out aloud.
- Choose the simplest possible implementation that suffices to illustrate the processes and control flow. Efficiency considerations or geeky frameworks are out of scope.
- Extend the pure model implementation by clearly separated additions that facilitate experiments with the model (e.g. GUI, interfaces to existing systems, mockups).
- Run a continuous feedback-loop between experiments and the current model documentation. The output of a cycle is a model document and not the implementation.

xM Summary (Andreas Tönne)



- xM is a modeling process that combines
 - Smalltalk as a modeling language
 - Continuous experimentation with runnable Smalltalk models
 - Model documentation accordingly to the project requirements
- Results in high quality, verified models
- Good customers reassurance early in a project



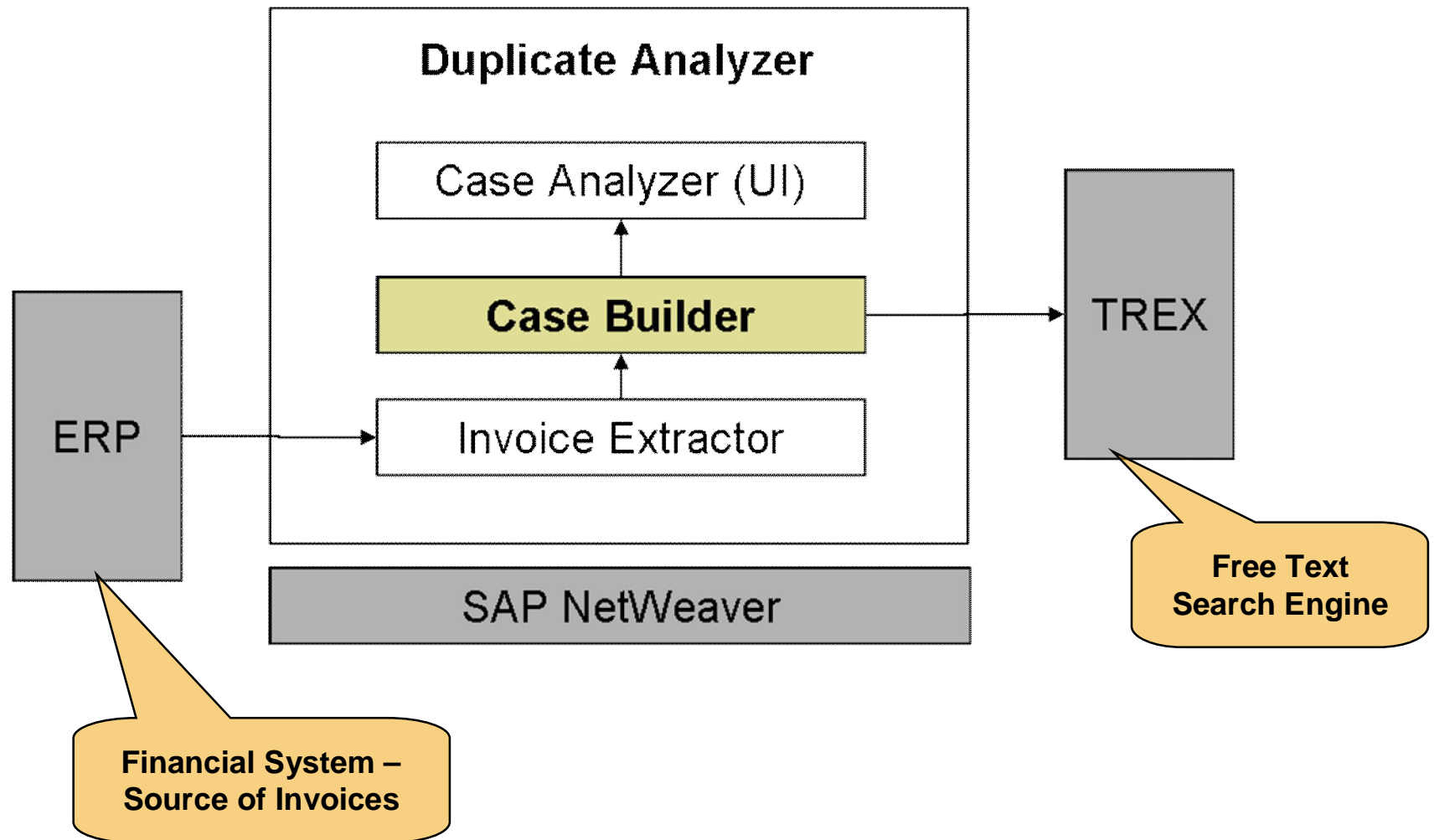
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Duplicate Analyzer – An A/P Clerk Solution

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Summary

Duplicate Analyzer – Architectural Overview



The Design of the Case Builder

Basis is similarity of a set of attributes (invoice number, supplier name, amount, invoice date)

We used our free-text search engine (TREX).

We quickly had a working prototype that analyzed large number of invoices, and identified and ranked possible duplicates: the pilot customers were very happy

BUT:

- **We did not feel that we understood the domain**
- **The A/P clerk was not able to tell us, how he/she recognizes a duplicate**
- **We were not able to change the algorithm.**
- **We got too many „wrong“ duplicates**

Demo

Duplicate Analyzer – The Experimental Environment I

Duplicate Analyzer Settings

Database Table: 2004 Comp0001

Read Limit: 10000

Rule Type: MaxingCompositeRule

Limits

Vendor Name: 900

Reference Document: 900

Invoice Date: 1000

Amount: 990

Vendor Name | Reference Number | Invoice Date | **Amount**

Percentage

Variance: 10

Number Swapping

Cancel

Accept

Duplicate Analyzer - The Experimental Environment II

Duplicate Analyzer

File Running Debugging

All Cases All Mature Cases Invoices: 10000 Cases: 11983 Mature: 1983 Runtime: 52385

Saved Current Only in Saved Only in Current

0001;0015752370;2004 = (1000, 1000, 1000, 920)
0001;0015752371;2004 = (1000, 1000, 1000, 920)
0001;0015752372;2004 = (1000, 1000, 1000, 920)
0001;0015752369;2004 = (1000, 1000, 1000, 920)
0001;0015752370;2004 = (1000, 1000, 1000, 920)
0001;0015752371;2004 = (1000, 1000, 1000, 920)
0001;0015752372;2004 = (1000, 1000, 1000, 920)
0001;0015752373;2004 = (1000, 1000, 1000, 920)
0001;0052137930;2004 = (1000, 1000, 1000, 1000)
 -0001;0052137930;2004
 -0001;0052139526;2004
0001;0052137929;2004 = (1000, 1000, 1000, 1000)
0001;0015752369;2004 = (1000, 1000, 1000, 920)
0001;0015752370;2004 = (1000, 1000, 1000, 920)
0001;0015752371;2004 = (1000, 1000, 1000, 920)
0001;0015752372;2004 = (1000, 1000, 1000, 920)
0001;0015752373;2004 = (1000, 1000, 1000, 920)
0001;0015752374;2004 = (1000, 1000, 1000, 920)
0001;0015752369;2004 = (1000, 1000, 1000, 920)
0001;0015752370;2004 = (1000, 1000, 1000, 920)
0001;0015752371;2004 = (1000, 1000, 1000, 920)
0001;0015752372;2004 = (1000, 1000, 1000, 920)
0001;0015752373;2004 = (1000, 1000, 1000, 920)
0001;0015752374;2004 = (1000, 1000, 1000, 920)
0001;0015752375;2004 = (1000, 1000, 1000, 920)

Doc Key: 0001;0052137930;2004
Vendor: 'Stadtwerke Walldorf GmbH'
Reference: '1000529/6002524'
Date: 1. Februar 2003
Amount: 49.0d

Doc Key: 0001;0052139526;2004
Vendor: 'Stadtwerke Walldorf GmbH'
Reference: '1000529/6002524'
Date: 1. März 2003
Amount: 49.0d

100%

Duplicate Analyzer

Duplicate Analyzer

Welcome ASUG user

[Log Off](#) [Send feedback to](#)



- Cases
- Case Details
- Case Images
- Case Log
- Settings



Search Criteria

Amount from:

Amount to:

Posting Date from:

Posting Date to:

Invoice Date from:

Invoice Date to:

Vendor Name:

Acc Doc Id:

Currency:

Invoice Num:

Status:

- New
- Under Review
- Duplicate
- Not a Duplicate
- Duplicate Solved

Duplicate Cases

Click on a case to see the case details

Id	Invoice Number	Vendor Name	Amount	Curr	Invoice Date	Posting Date	Status	Similarity
▶ 0008:0016234527:2005	1804	NEUMAMED CORP.	6,800.00	USD	10/01/2005	12/08/2005	New	☆☆☆☆☆
▶ 0008:0016235549:2005	SAPA053E4	BLUETRANS ASSOCIATION	431.91	USD	10/10/2005	12/12/2005	New	☆☆☆☆☆
▶ 0008:0016239028:2005	2006	MASTERMED PARTNERS LLC	90.00	USD	12/20/2005	12/20/2005	New	☆☆☆☆☆
▶ 0008:0016239030:2005	2006	GREENFOOD INC.	75.00	USD	12/20/2005	12/20/2005	New	☆☆☆☆☆
▶ 0008:0016240258:2005	11302005	FEDFISH COMPANY	3,300.00	USD	11/30/2005	12/27/2005	New	☆☆☆☆☆
▶ 0008:0016240259:2005	11302005	FEDFISH COMPANY	2,250.00	USD	11/30/2005	12/27/2005	New	☆☆☆☆☆
▶ 0008:0016240275:2005	11302005	FEDFISH COMPANY	2,790.00	USD	11/30/2005	12/27/2005	New	☆☆☆☆☆
▶ 0008:0016235445:2005	2005	KILOGROUND BANK	19,400.00	USD	12/12/2005	12/15/2005	New	☆☆☆☆☆

Row 1 of 8

Total Cases: 8 Selected Cases: 8



Duplicate Analyzer

Cases Case Details Case Images Case Log Settings

Details for Case 0008;0016234527;2005 0008;0016237277;2005 [Previous Case](#) [Next Case](#)

Note: Save to Log Status: New Under Review Duplicate Not a Duplicate Duplicate Solved

0008;0016234527;2005

Invoice Number: 1804 Vendor Num: 0090670192
 Invoice Date: 10/1/2005 Vendor Name: NeumaMed Corp.
 Posting Date: 11/17/2005 Clearing:
 User Id: I806308
 Description: M.Applebe@Celanese / 090105 - 093005 / 49821

Item	PO	Description	Quantity	Line Amount
002	5000049821	M.Applebe@Celanese9/12/5-3/30/06\$85K3	80	6,800.00

Row 1 of 1

Balance Due: 6,800.00 USD

0008;0016237277;2005

Invoice Number: 1804 Vendor Num: 0090670192
 Invoice Date: 10/1/2005 Vendor Name: NeumaMed Corp.
 Posting Date: 12/8/2005 Clearing:
 User id: I806308
 Description: M.Applebe@Celanese / 090105 - 093005 / 49821

Item	PO	Description	Quantity	Line Amount
002	5000049821	M.Applebe@Celanese9/12/5-3/30/06\$85	80	6,800.00

Row 1 of 1

Balance Due: 6,800.00 USD

[Compare Images](#)

Zoom In Zoom Out

Leading Invoice 0008;0016234527;2005

Duplicate 0008;0016237277;2005

Communication/Common Understanding

- Got a much better understanding of the domain
- Closed the communication gap with the A/P clerks and...
- ...learned to „think as“ an A/P clerk!

Technical Results

- Got a much more flexible solution
- Added and tested new algorithms
- Improved run-time behavior

Business Results

- Found new Duplicates
- Identified a new process gap causing duplicates

Project Results

- Finished in 7 days!



Some Words about ...

Duplicate Analyzer – An A/P Clerk Solution

xCarrier – A Shipping Manager Solution

Summary

xCarrier – The Real World Application

Welcome, Shipping Manager

xCarrier

Overview

Shipments

Setup

Reports

Exceptions & Work Items

- Alerts(1)
- Notifications(4)
- Tasks(1)
- Escalations(7)

My Carriers

 US Express shipping volumes gone up 30% over the past three month. US Ground shipping volumes gone up 10% over the past month.

Updates are available for: rates, routing codes, labeling.

Contact: Jack Monroe
License: 948572903
[More Details...](#)


 C.O.D is now available when shipping to Israel.

Contact: Keith Adams
License: 432313459
[More Details...](#)

 C.O.D is now available when shipping to Israel.

Contact: Chris Roberts
License: 523234536
[More Details...](#)

Other xCarrier Providers

 TNT provides businesses and consumers worldwide with an extensive range of services for their mail and express delivery needs. TNT serves more than 200 countries.

[More Details...](#)

US Shipping Volumes

Report for FedEx Full Report

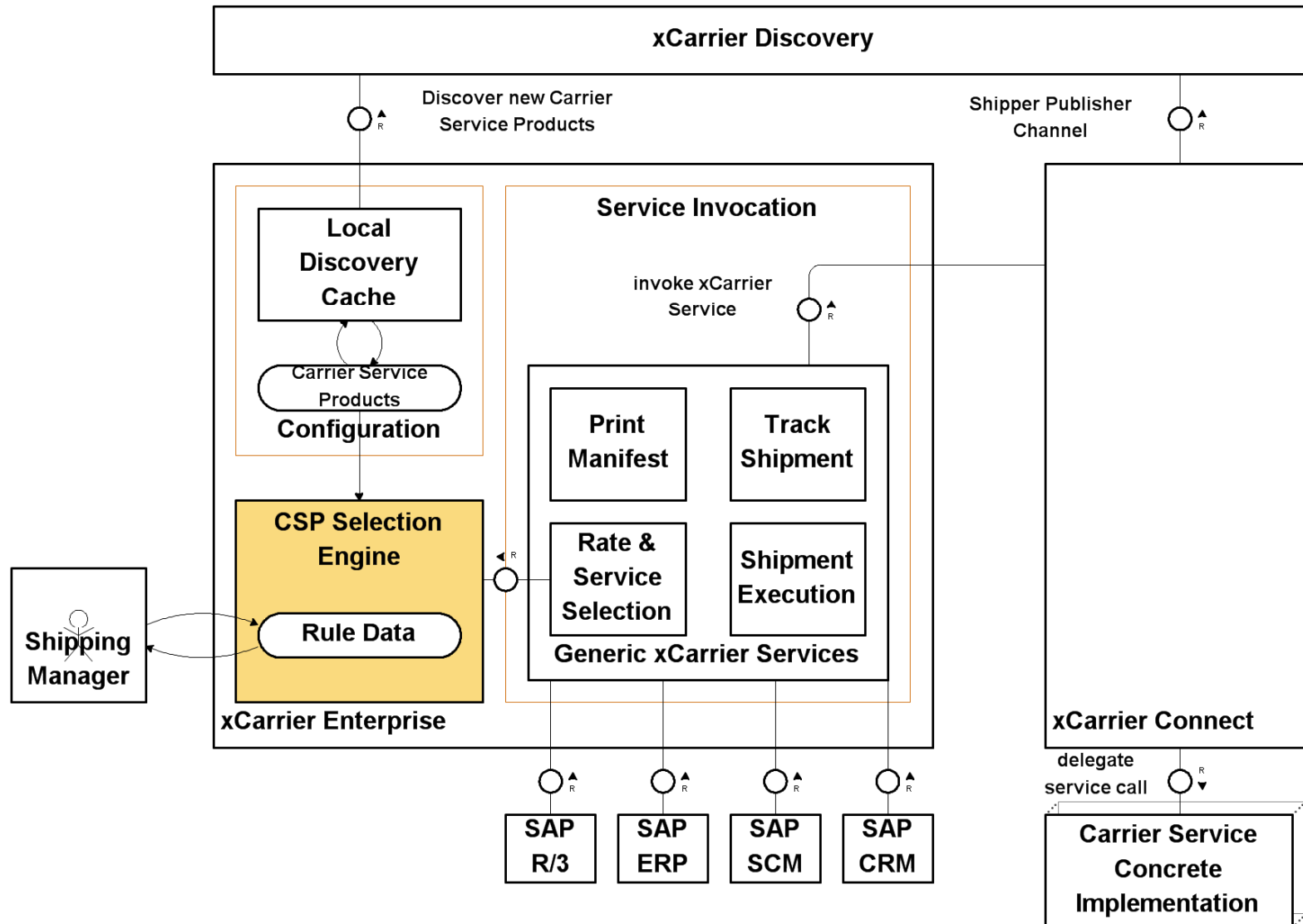
Region/Service Type	Oct '05		3 Month Range	
	Shipments	Freight Charges	Shipments	Freight Charges
East Coast				
FedEx Priority Overnight	15800 (+32%)	\$79000	12000 - 15800	\$60000 - \$79000
FedEx Standard Overnight	105130 (+0.05%)	\$210260	105000 - 105130	\$210,000 - \$210260
West Coast				
FedEx Priority Overnight	1580 (+31%)	\$7900	1200 - 1580	\$6000 - \$7900
FedEx Standard Overnight	10130 (+0.04%)	\$20260	10000 - 10130	\$20000 - \$20260
Totals				
FedEx Priority Overnight	17380	\$86900	13200 - 17380	\$66000 - \$86900
FedEx Standard Overnight	115,260	\$230520	115000 - 115260	\$230000 - \$230520

Coffee Beans Express News

Click on any headline for a complete story:

- [Agribusiness exports up 8.8 percent](#)
BIS Oct 9th, 2005, 21:28 - Length: 806
- [Agribusiness exports up 8.6 percent](#)
BIS Oct 9th, 2005, 21:26 - Length: 806
- [Aust taps into Japan's discovery of coffee](#)
ABX Oct 9th, 2005, 18:53 - Length: 969
- [Add sugar and stir: Aussies hope to milk Japan's coffee boom](#)
ABX Oct 9th, 2005, 18:39 - Length: 969
- [Twenty-four percent of coffee drunk by Colombians is imported](#)
EFE Oct 9th, 2005, 16:36 - Length: 2325
- [NA-FIN-US-Coffee](#)
AWS Oct 7th, 2005, 15:21 - Length: 698
- [NA-FIN-US-Coffee](#)

xCarrier Enterprise - Details



- **Inadequate Requirements:**
Customers didn't know exact requirements for a rule engine
- **Re-Use of existing components (rule engines) without exact requirements**
- **Communication Gap**
- **Deficiency of Understanding each other**

- **Requirements were driven by technology but not by the customer!**

This calls for xM!

For carrier, service product and service option selection we implemented a rule engine prototype in Smalltalk (in about 1 week)

After two weeks we were able to verify the scope of rules at customer sites

The optimization of the results was done in an ABAP component.

The rule maintenance was done in Java WebDynpro front-end, and the resulting rules were persisted in the Smalltalk component.

The integration to the NetWeaver stack was done via Web services.

xCarrier – The Experimental Environment I

xCarrier Test UI, client: 200

File

Rules Definition | Shipping Request | Zone Definition

```

IF #weight is less 2.0 LB THEN USE UPS / UPS Next Day Air
IF #volume is greater 1000 L AND #shipFromAddress is less e
IF #weight is less 10.0 LB THEN USE UPS / UPS 2nd Day Air
IF #nco1 is equal 'CIF' AND #weight is less 10.0 LB THEN U
IF #weight is less 10.0 LB THEN USE UPS / UPS 2nd Day Air
IF #deliveryPriority is equal '1' AND #nco1 is equal '0030' AND
IF #weight is less 25 KG AND #timeInTransit is less equal 10
IF #timeInTransit is less equal 5 TAG AND #weight is less equ
IF #weight is less equal 10 KG AND #timeInTransit is less
IF #nco1 is equal 'ABC' AND #weight is less equal 10 KG AN
IF #salesOrg is equal '0010' AND #weight is less equal 10.0
IF #salesOrg is equal '0010' THEN USE UPS / UPS Ground
IF #salesOrg is equal '0010' AND #weight is less equal 10 KG
    
```

Create Delete Modify Clear

IF #weight is less equal 10 KG AND #timeInTransit is less equal 5 TAG AND #shipToAddress

2UQ73ICK8PP Express Shipping to Europe

Rule Attributes

Rule Pri: Medium Valid From: 9/20/06 Valid To: 9/20/08

ShipFrom: ShipTo: EUROPE GERMANY

Rule Conditions

weight	is less equal	10	KG
timeInTransit	is less equal	5	TAG
shipToAddress	is equal	GERMANY	

Rule Action

activate use carrier: UPS product: UPS World option:

xCarrier – The Experimental Environment II

xCarrier Test UI, client: 200

File

Rules Definition Shipping Request Zone Definition

process clear

weigh 9

volum 4

timeln 3

Sales Org 1058

Plant

Transp. Group

Delivery Type

Ship to Party 10000

Sold to Party 10001

shipFromAddress

Country US

City CHICAGO

ZIP

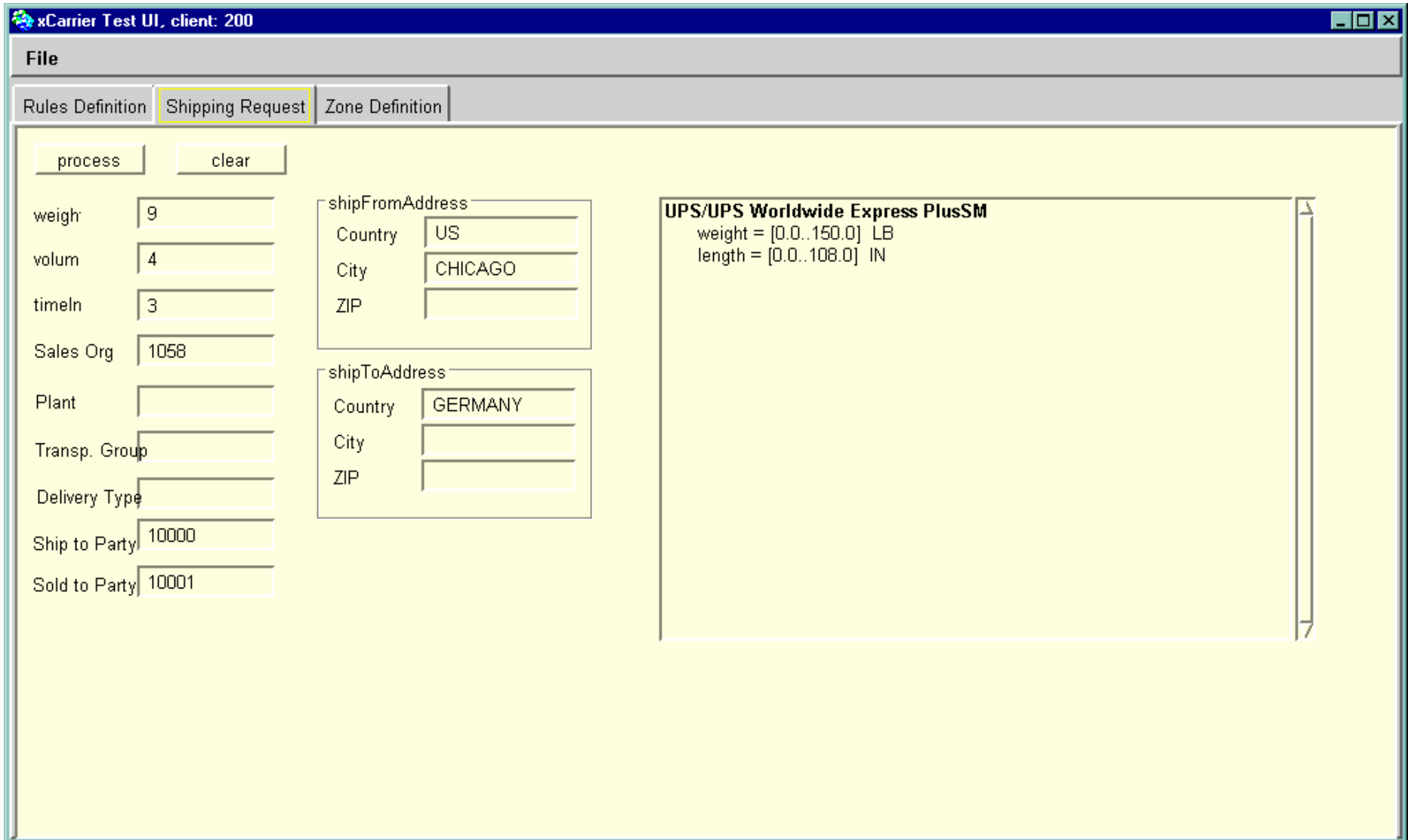
shipToAddress

Country GERMANY

City

ZIP

UPS/UPS Worldwide Express PlusSM
weight = [0.0..150.0] LB
length = [0.0..108.0] IN



xCarrier – The Real World Application II

Welcome. Shipping Manager

xCarrier

Define a Rule for Carrier & Service Selection

Description:

Valid from: to:

Active

Shipment Conditions

Ship from:

Ship to:

Conditions:

[Add Another Condition](#)

Shipping Method

Carrier and Service:

Shipping Options: Options list is not available

id from	Valid to	Ship from	Ship to	Active
		Any location	Any location	<input checked="" type="checkbox"/>
/2006	7/31/2006	South America,	North America, Mexico	<input type="checkbox"/>
/2006	9/30/2006	Any location	Any location	<input type="checkbox"/>
/2006	9/30/2006	Any location	Any location	<input type="checkbox"/>
/2006	9/30/2006	Any location	Any location	<input type="checkbox"/>
/2006	9/30/2006	South America, Argentina	South America, Bolivia	<input type="checkbox"/>
3/2006	9/29/2006	Africa, South Africa	Europe, Austria	<input type="checkbox"/>
0/2006	9/20/2007	Any location	Europe,	<input type="checkbox"/>
0/2006	9/20/2008	Any location	EUROPE, GERMANY	<input checked="" type="checkbox"/>
		Asia, Singapore	Asia,	<input checked="" type="checkbox"/>
		Any location	Any location	<input checked="" type="checkbox"/>
		Asia, India	Asia, India	<input checked="" type="checkbox"/>
		Asia, India	Asia,	<input checked="" type="checkbox"/>

By Sales Organization and Weight UPS Express Saver

Communication/Common Understanding

- **Were able to verify requirements on customer site**
- **Got much more precise requirements for rule engine**

Technical Results

- **Were able to choose appropriate rule engine**

Business Results

- **Our pilot customers got what they wanted – although they were not aware what they really needed!!!!**

Project Results

- **First verification cycle with customers after 10 days!**
- **No major changes in rule engine during pilot phase**



Some Words about ...

Duplicate Analyzer – An A/P Clerk Solution

xCarrier – A Shipping Manager Solution

Summary

Explorative research and modeling of domain knowledge

Discovering (and testing) heuristics

Rule systems

It enables fast customer feedback

It supports executable case studies

Questions to our Team

Does this really work for you?

Does the fact that Smalltalk requires its own environment bother you?

Do you still see an overall improvement, when you re-implement a component for productization?

Will you use this for all projects?

Will other teams at SAP do the same?

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