



SAP RESEARCH

SYSTEMATIC THOUGHT LEADERSHIP FOR INNOVATIVE BUSINESS

Automating BPM with SWS Technologies

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SAP Research, SAP AG

THE BEST-RUN BUSINESSES RUN SAP





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Introduction

Business Process Management

Improvements using SWS

Summary & Outlook

THE BEST-RUN BUSINESSES RUN SAP





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SAP Research

- Research department of SAP

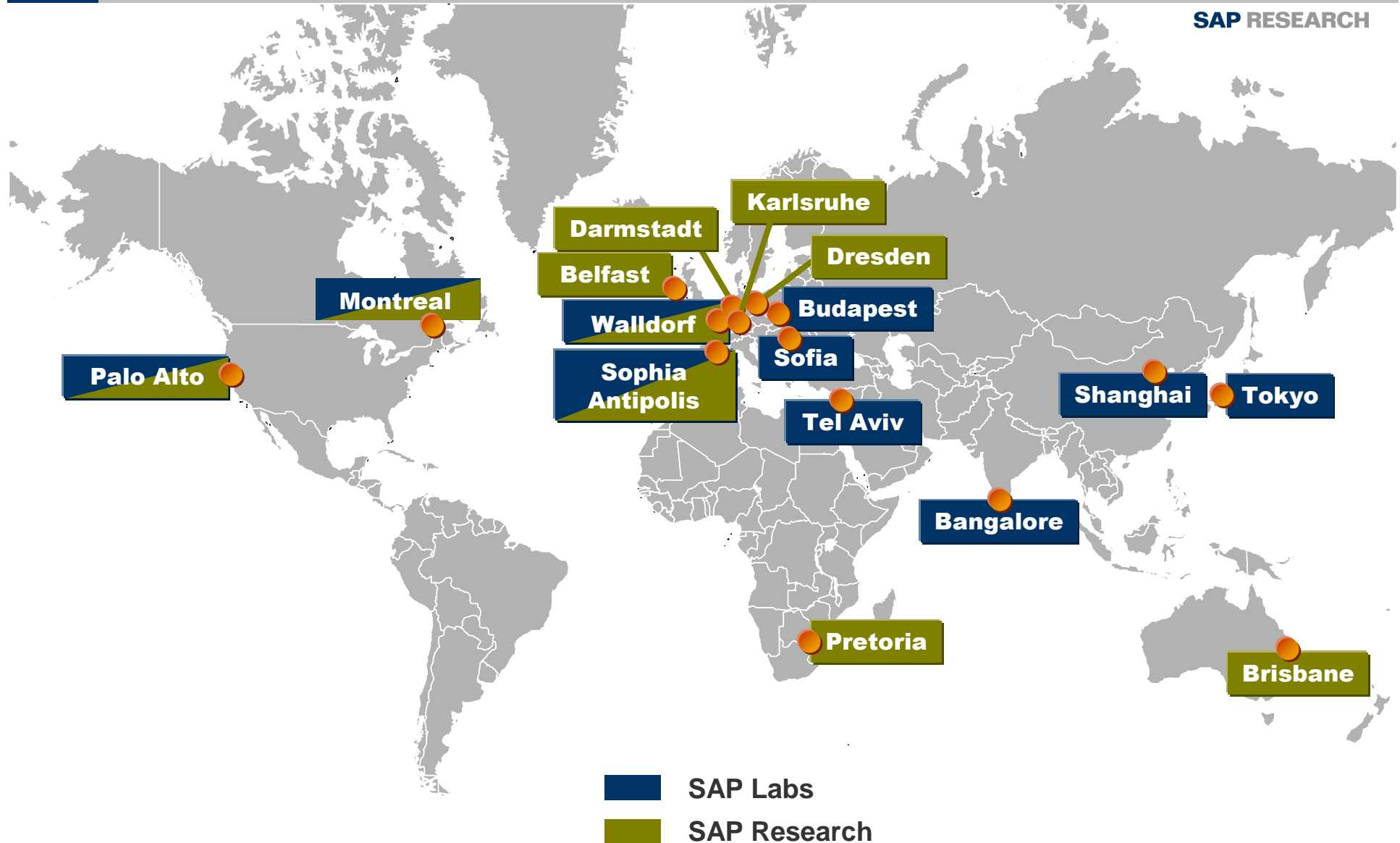
- SAP Research - Core Parts
 - ◆ SAP Inspire
Corporate Venturing (0.5-2y)
 - ◆ SAP Research
Applied Research (3-5y)

- Involved in public funded research projects

- Joint PhD program with different universities

The global Research- & Development network of SAP

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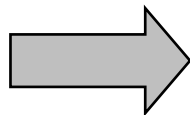


DIP

- EU founded research project
- **Semantic Web Services = Web services + Semantic Web technology**
- **Automation of certain task in Web service lifecycle, for example**
 - ◆ Discovery
 - ◆ Mediation
 - ◆ Composition

SAP enterprise SOA

- Basis architecture for next generation SAP software
- Currently under development



Application of SWS in “enterprise SOA”

Business Requirements

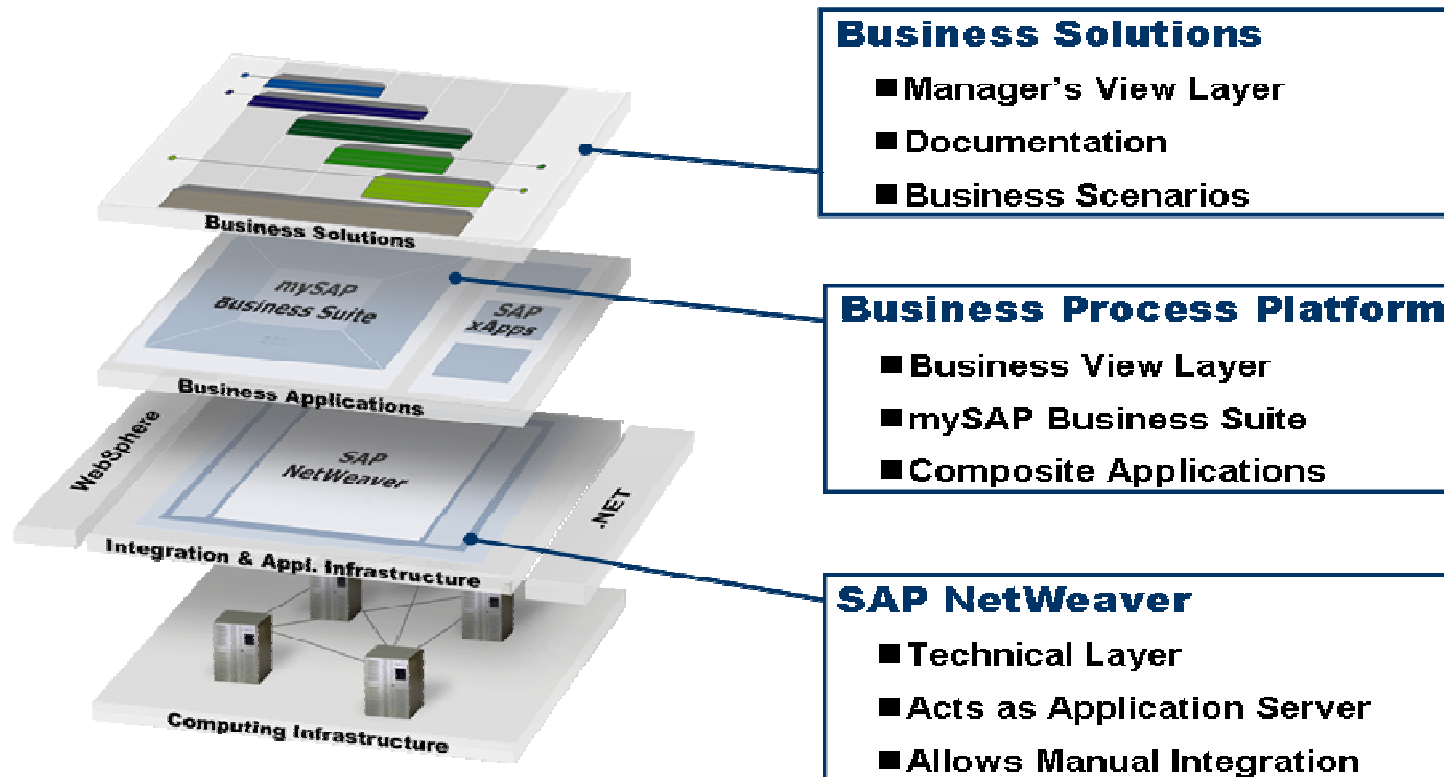
- Flexible adoption of business processes
- Integrability with business partners

Enablers for Flexible Business

- Facilitate re-use of components
- Increase manageability of systems
- Ability to integrate within heterogeneous business landscape
- Connect manager's business view
with technician's system configuration perspective
- Make relationships between processes explicit

SAP Solution – “enterprise SOA”

- Based on open Web service standards
- Enterprise Service = Web service + business semantic
- Flexible architecture

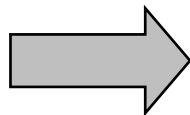


Business Process Management (BPM)

- Part of “enterprise SOA”
- Manual modeling

Improvement of BPM

- Automation
- By Semantic Web Services (Web services + semantic Web technology)
- Automation of Web service lifecycle tasks
(eg. Discovery, Mediation, Composition)



Application of SWS in “enterprise SOA”

SAP enterprise SOA

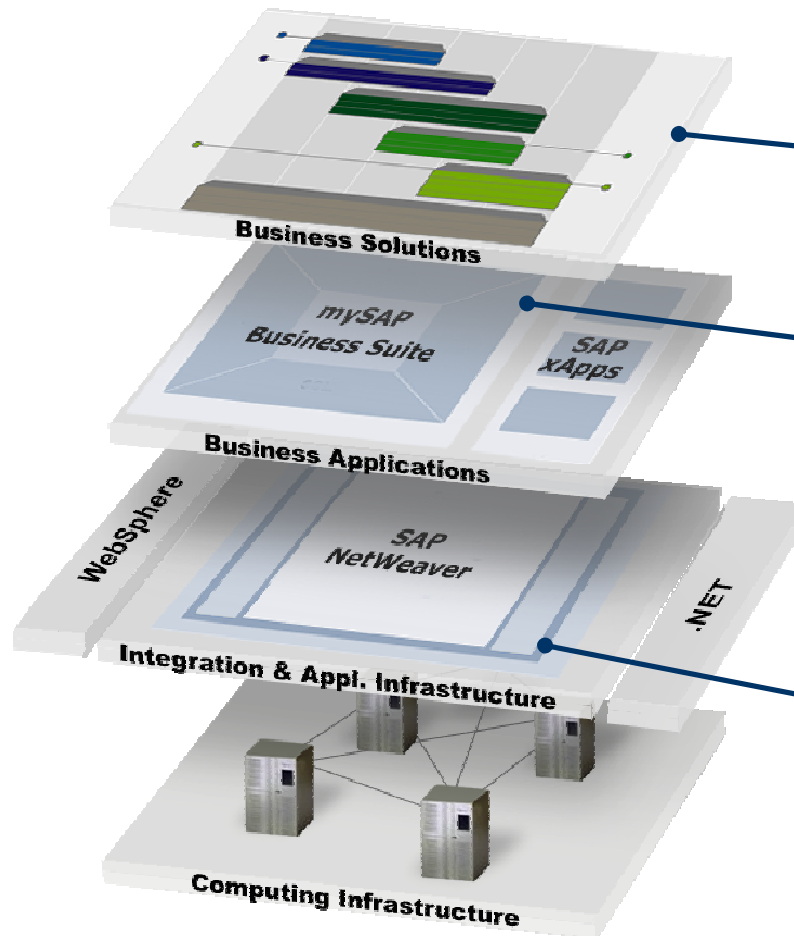
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High-Level Overview of SAP enterprise SOA

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Business Solutions

- Manager's View Layer
- Documentation
- Business Scenarios

Business Process Platform

- Business View Layer
- mySAP Business Suite
- Composite Applications

SAP NetWeaver

- Technical Layer
- Acts as Application Server
- Allows Manual Integration



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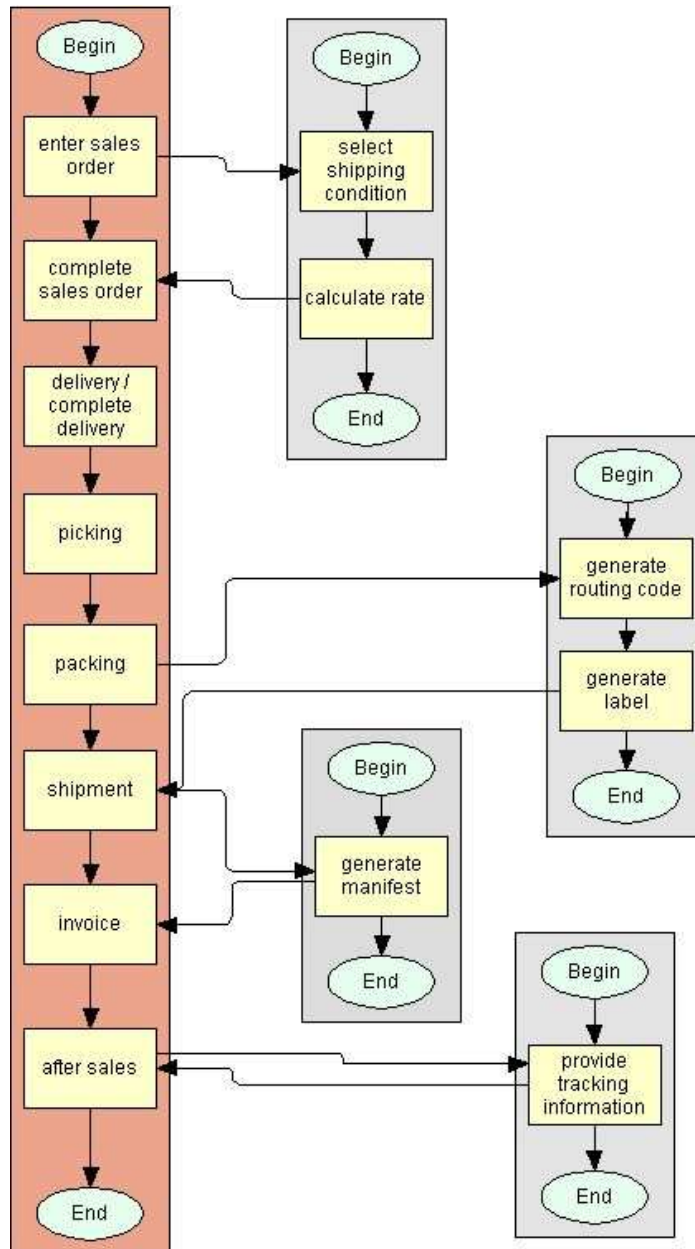
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Example Logistics Process

- Part of an “Order-to-Cash” process
- Carrier-Shipper interaction is frequently occurring
- Maintenance and dynamic changes are a major problem

■ Shipper
■ Carrier

BPM-based implementation

- **SAP Research toolset**
 - ◆ Prototypes
 - ◆ Not part of SAP products

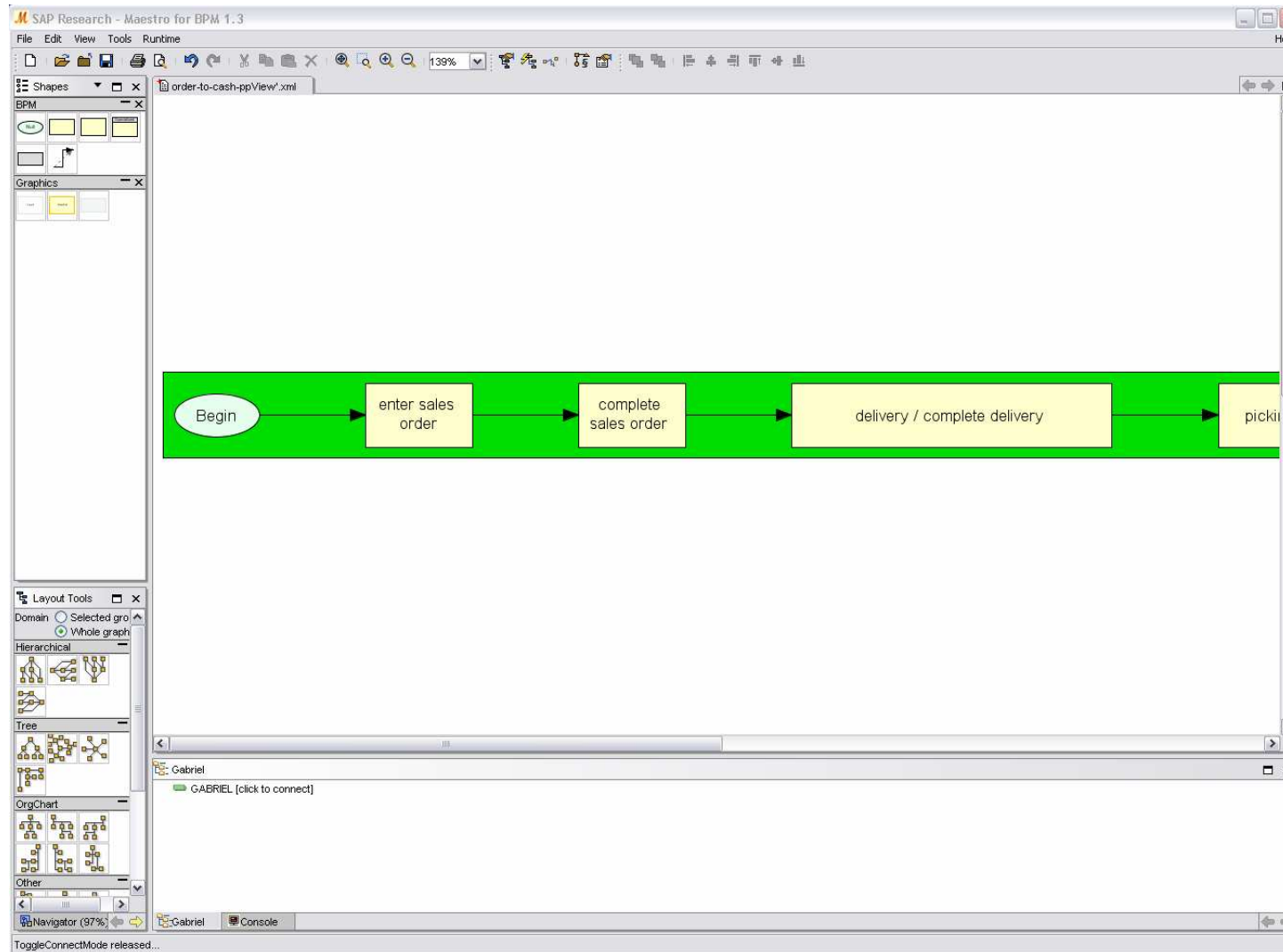
- **Necessary implementation steps**
 1. **Domain expert creates a graphical representation of the process**
 2. **Connect process steps to services operations**
 - a. **Locate appropriate service**
 - b. **Create mappings for input and output messages**
 3. **Deploy completed process to repository**

Advantages

- **Design time flexibility**

Single-Party BPM Implementation

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Cross-Organizational BPM Implementation

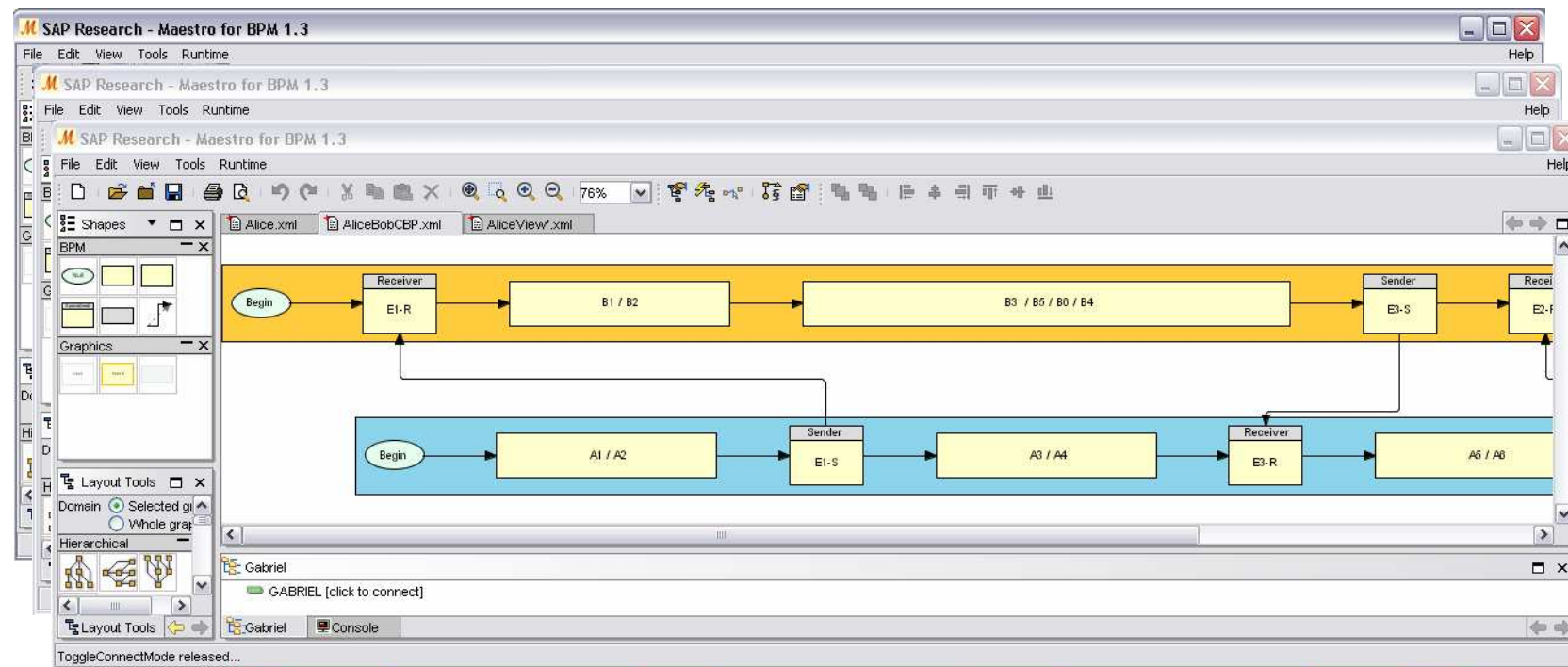
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Public vs. private processes

- Hide confidential process details
- Present partners a process view

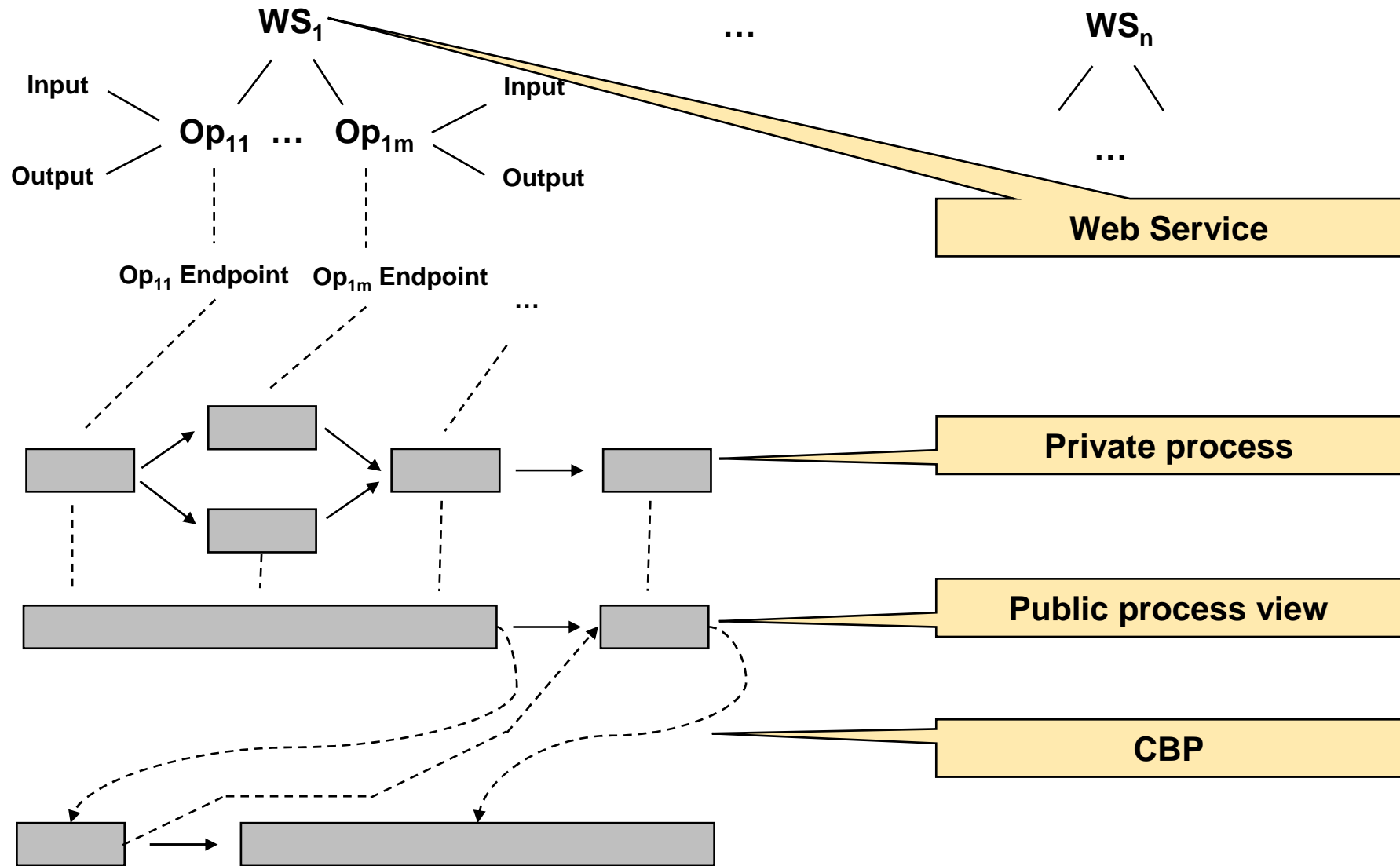
Collaborative Business Processes (CBP)

- Process involving different parties



Schematic Overview of BPM

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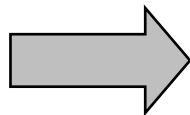


Manual development tasks

- **Manual integration of business processes**
 - ◆ **Creation of the CBP by linking of process steps**

- **Manual alignment of interfaces**
 - ◆ **Mapping of service messages**

- **Hard-coded choice of business partner**
 - ◆ **Service selection during design time**



Automating BPM

Goals

- Suggest CBP automatically
→ **Composition**
- Integrate arbitrary Web service interfaces
→ **Mediation**
- Dynamic runtime selection of appropriate service
→ **Selection**

 **Automating BPM using SWS technologies**



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Summary & Outlook

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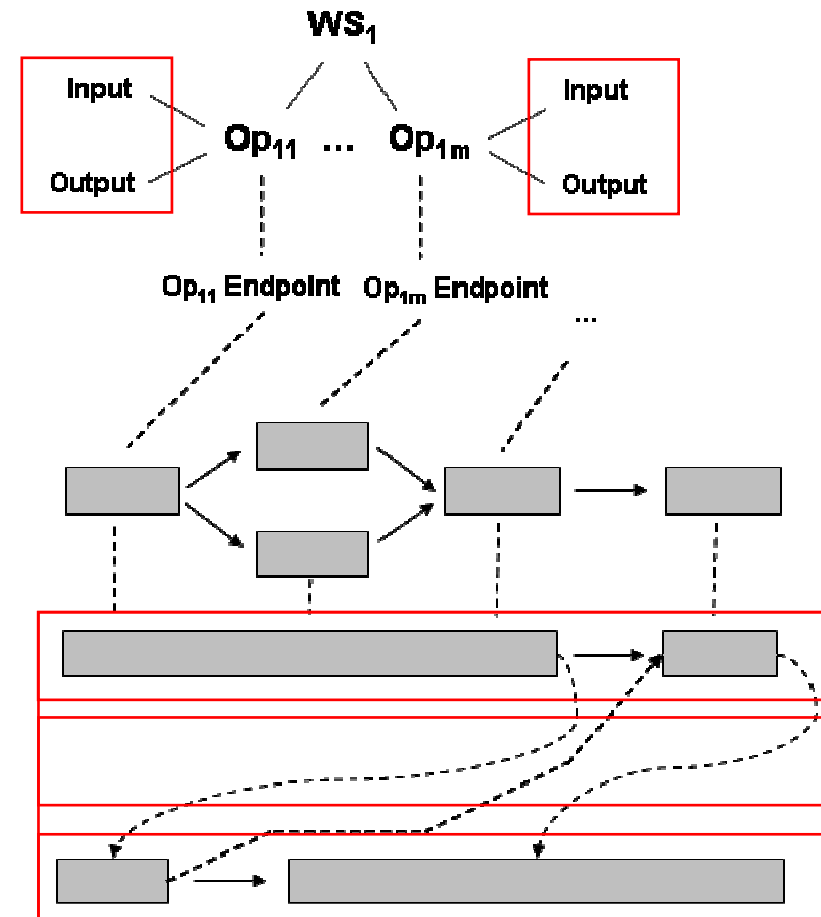


Focus on design time in this talk

- Mediation
- Composition

Implementation steps

1. Lift syntactical service descriptions
2. Create SWS representations of processes
3. Create message mappings
4. Compose CBP



Automating BPM by SWS – Lifting

Input

- XSDs (part of WSDL), domain ontology

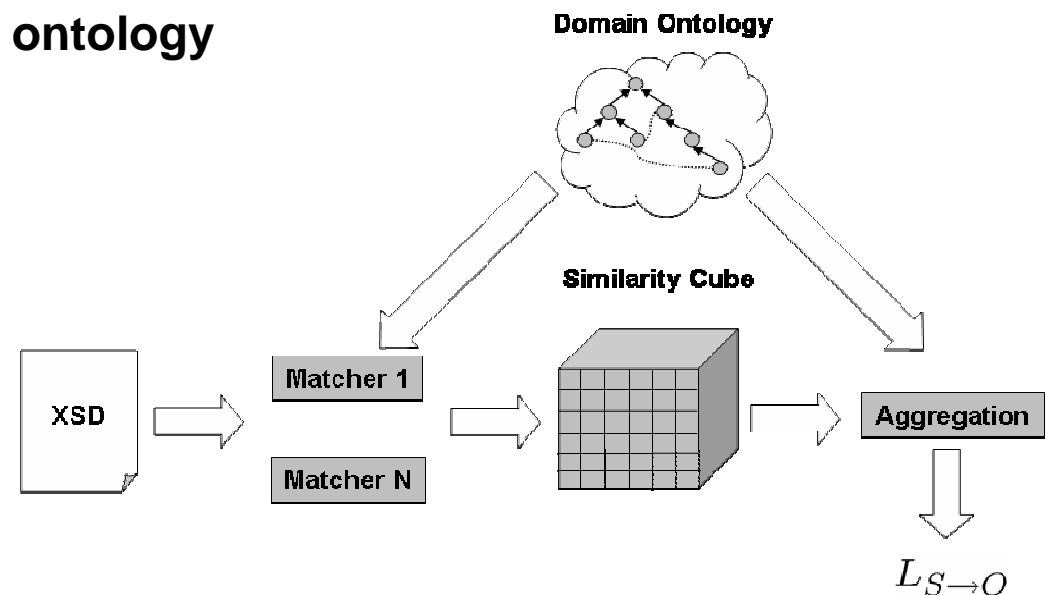
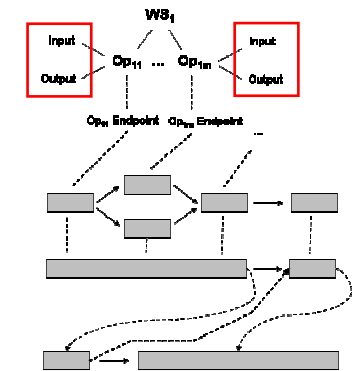
Output

- Relation between message elements and ontology concepts

Realization

- Matching XSDs and domain ontology
- Composite matcher

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Automating BPM by SWS – Create SWS Representations

Input

- Lifting, WSDLs, public processes

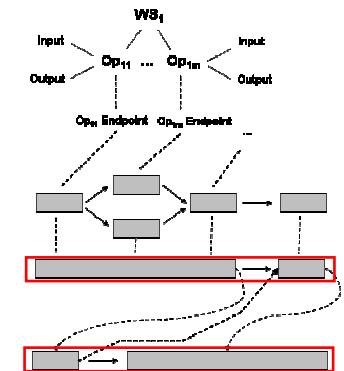
Output

- Workflows for use in composer

Realization

- For each party we need...
 - ◆ ...its messages as ontology concepts
 - ◆ ...behavioral constraints (UML2AD representation for ILOG composer)
- Shipper
 - ◆ WSDL message → ontology concept (input from lifting)
 - ◆ WSDL operation → input & output node constructions, connected via seq'al edge
 - ◆ public process → control nodes in UML2AD
- Carrier
 - ◆ WSDL message → ontology concept (input from lifting)
 - ◆ WSDL operation → input & output node constructions, connected via seq'al edge
 - ◆ Trivial fork-join process over all input & output constr → control nodes in UML2AD

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Automating BPM by SWS – Create Message Mappings

Input

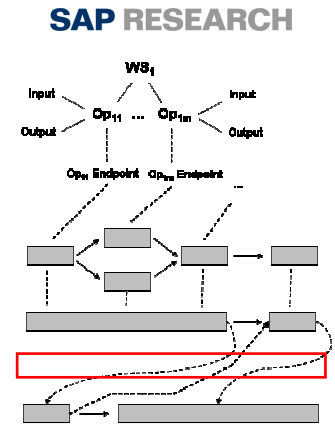
- Liftings of XSDs, domain ontology

Output

- Executable mapping between 2 messages
 - SAP XI
 - XSLT engine

Realization

- Connect message elements that are lifted to similar ontology concepts
- Propose possible complex mapping to user



Automating BPM by SWS – Compose CBP

Input

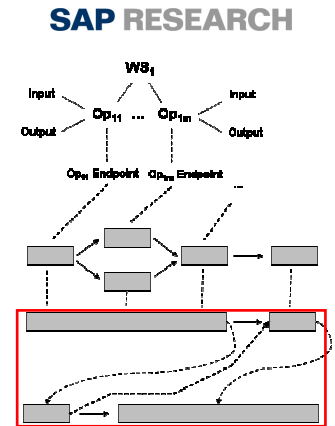
- SWS representation, mappings

Output

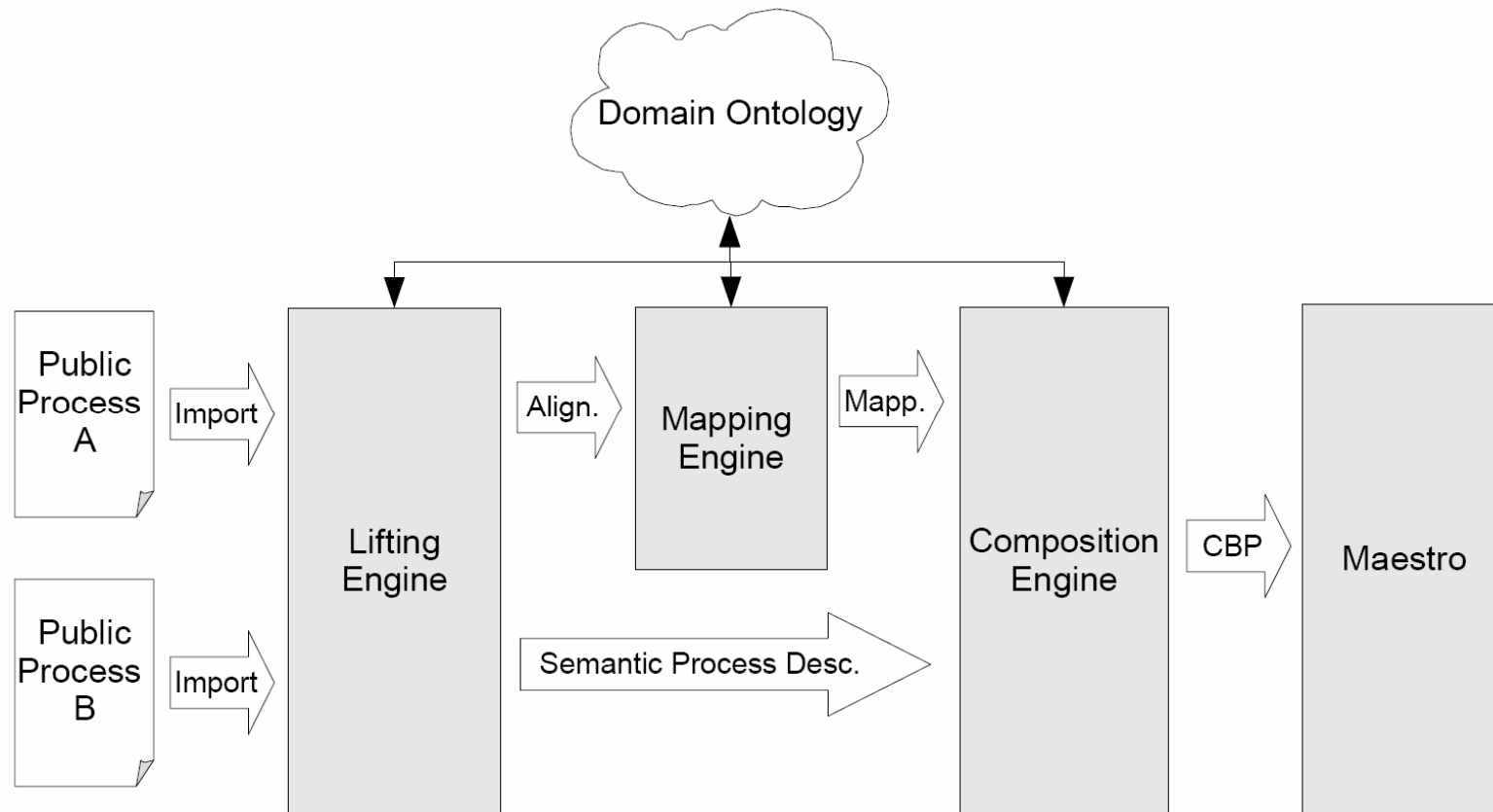
- Composed workflow

Realization

- Basically, connect corresponding inputs & outputs (SWS represent'n)
 - Which inputs & outputs correspond is input from mapping step
 - Connect corresponding inputs & outputs via mapping where needed (input from mapping)
- Impl. By existing composer technologies



Design time architecture



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Summary

- Approach to apply Semantic Web Services technology to business process management
 - **Automatically** suggest CBP
 - **Automatically** generate message mappings
 - **Automatically** choose appropriate service during run time
- Integration in state-of-the-art BPM tool
- Results are presented to user for checking

Outlook

- Currently implementing the presented approach
- Add Semantic Web Service technology to improve runtime
 - Dynamic service selection
 - Adaptive / fault tolerant BPM solution

Questions?

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Q&A

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