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SYSTEMATIC THOUGHT LEADERSHIP FOR INNOVATIVE BUSINESS

# Automating BPM with SWS Technologies

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THE BEST-RUN BUSINESSES RUN SAP





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**Introduction**

**Business Process Management**

**Improvements using SWS**

**Summary & Outlook**

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## Introduction

Business Process Management

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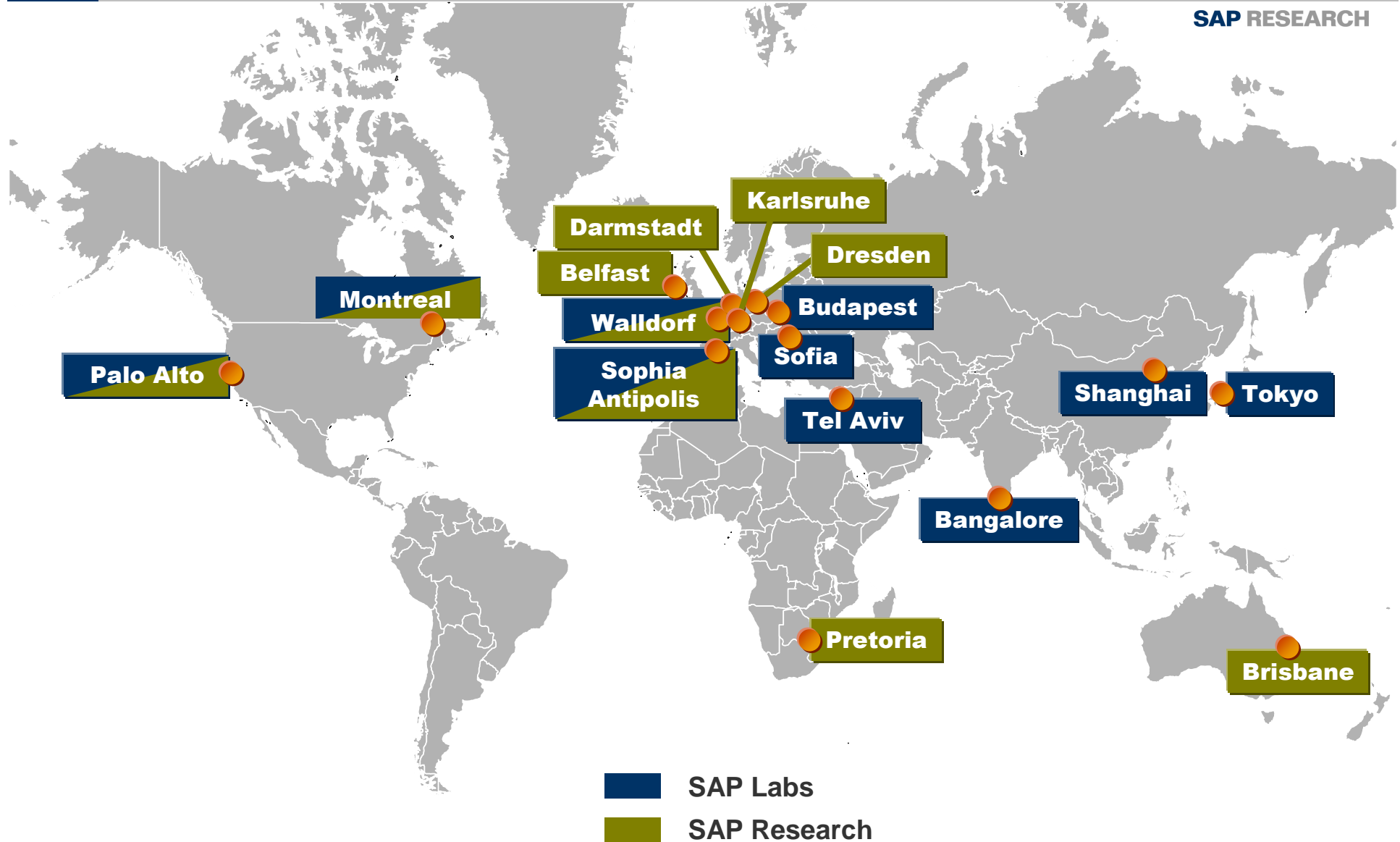


## SAP Research

- 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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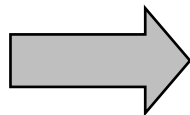


## DIP

- 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

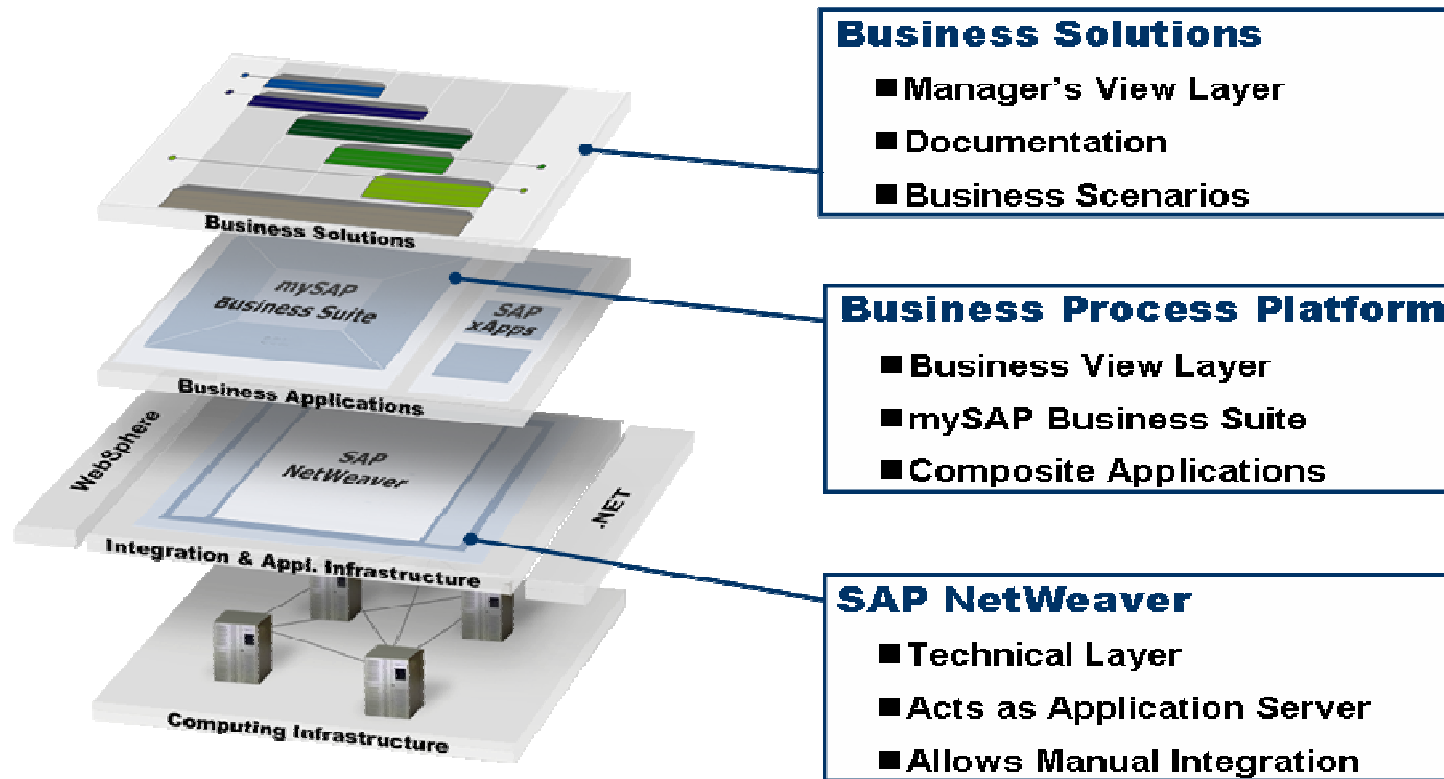
- Flexible adoption of business processes
- Integrability with business partners

## 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



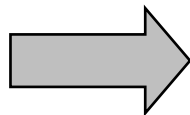


## Business Process Management (BPM)

- 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

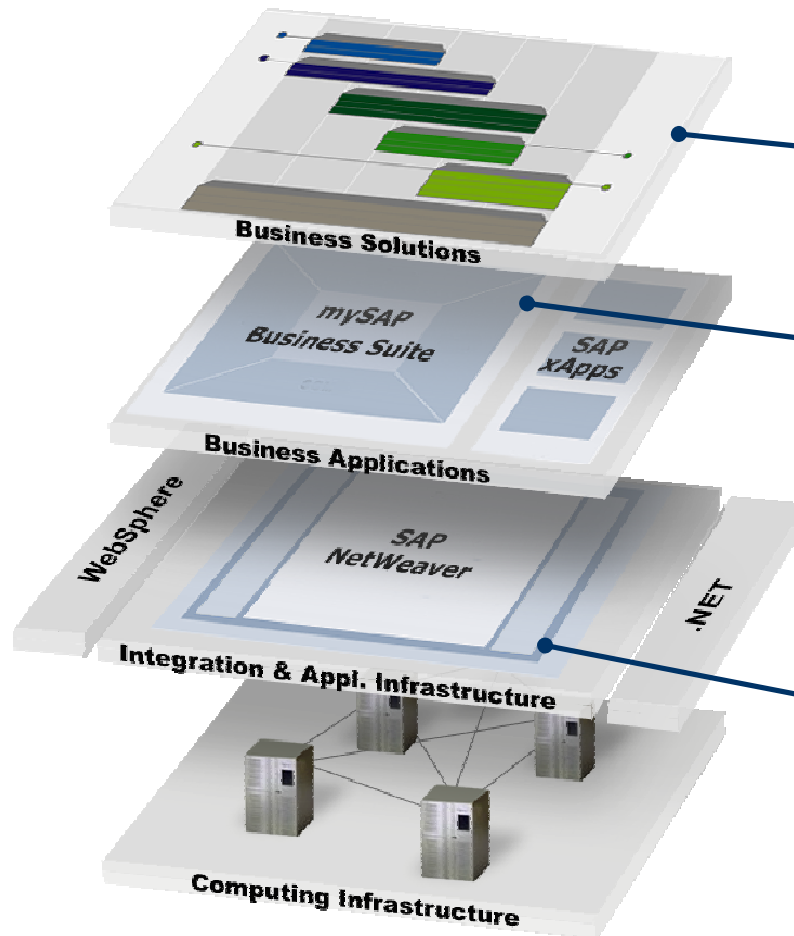
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# High-Level Overview of SAP enterprise SOA

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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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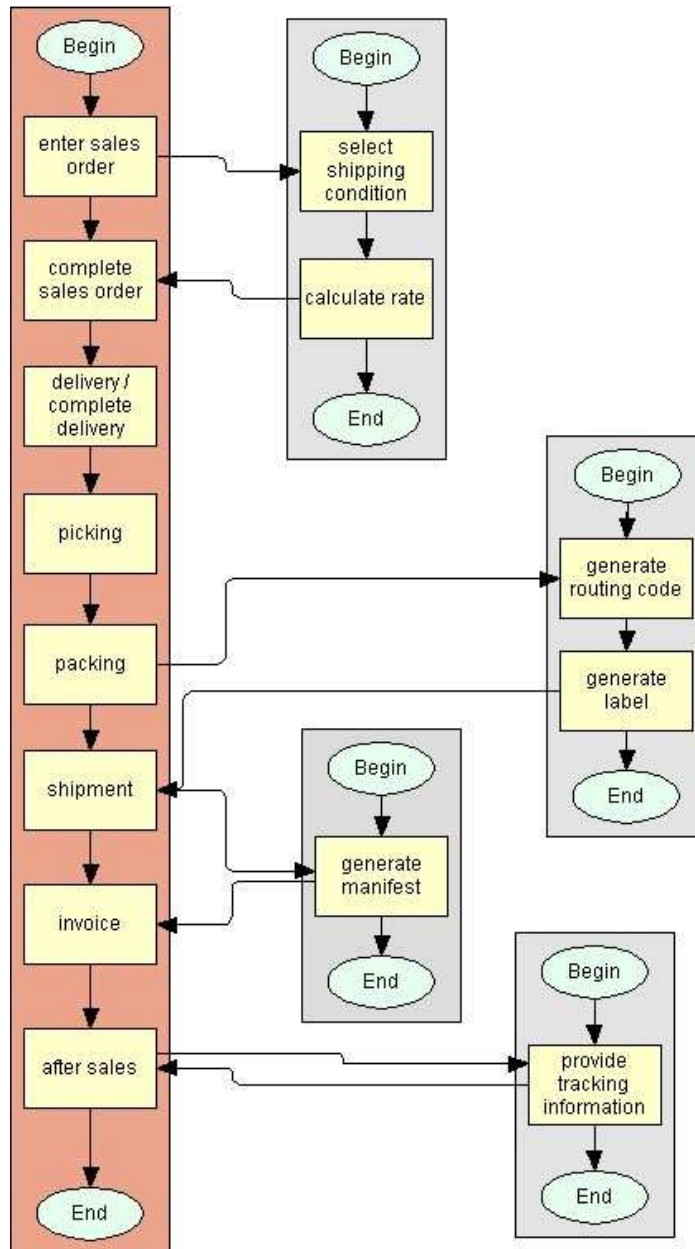
**Business Process Management**

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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

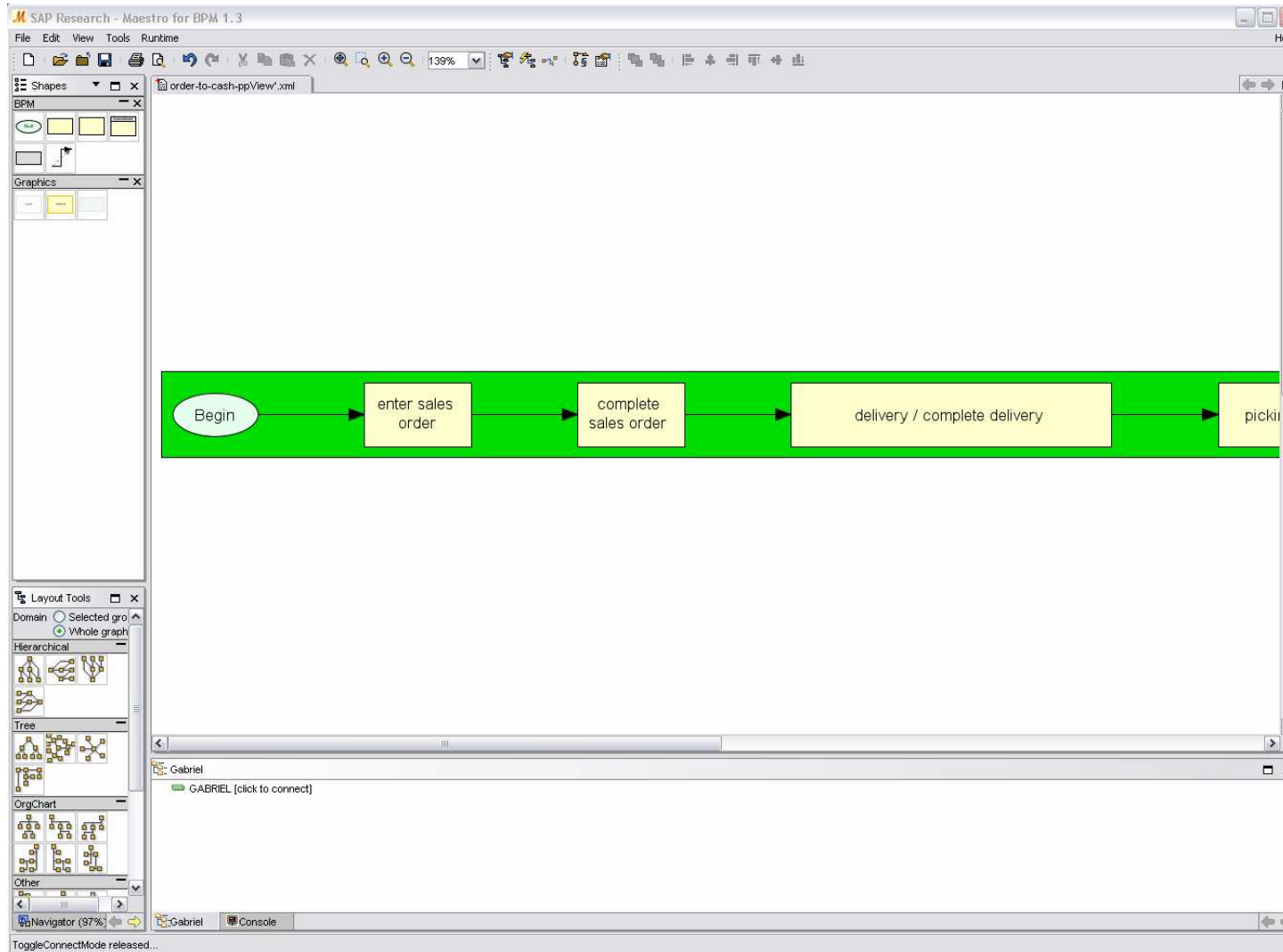
- **SAP Research toolset**
  - ◆ Prototypes
  - ◆ Not part of SAP products
  
- **Necessary implementation steps**
  1. **Domain expert creates a graphical representation of the process**
  2. **Connect process steps to services operations**
    - a. **Locate appropriate service**
    - b. **Create mappings 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

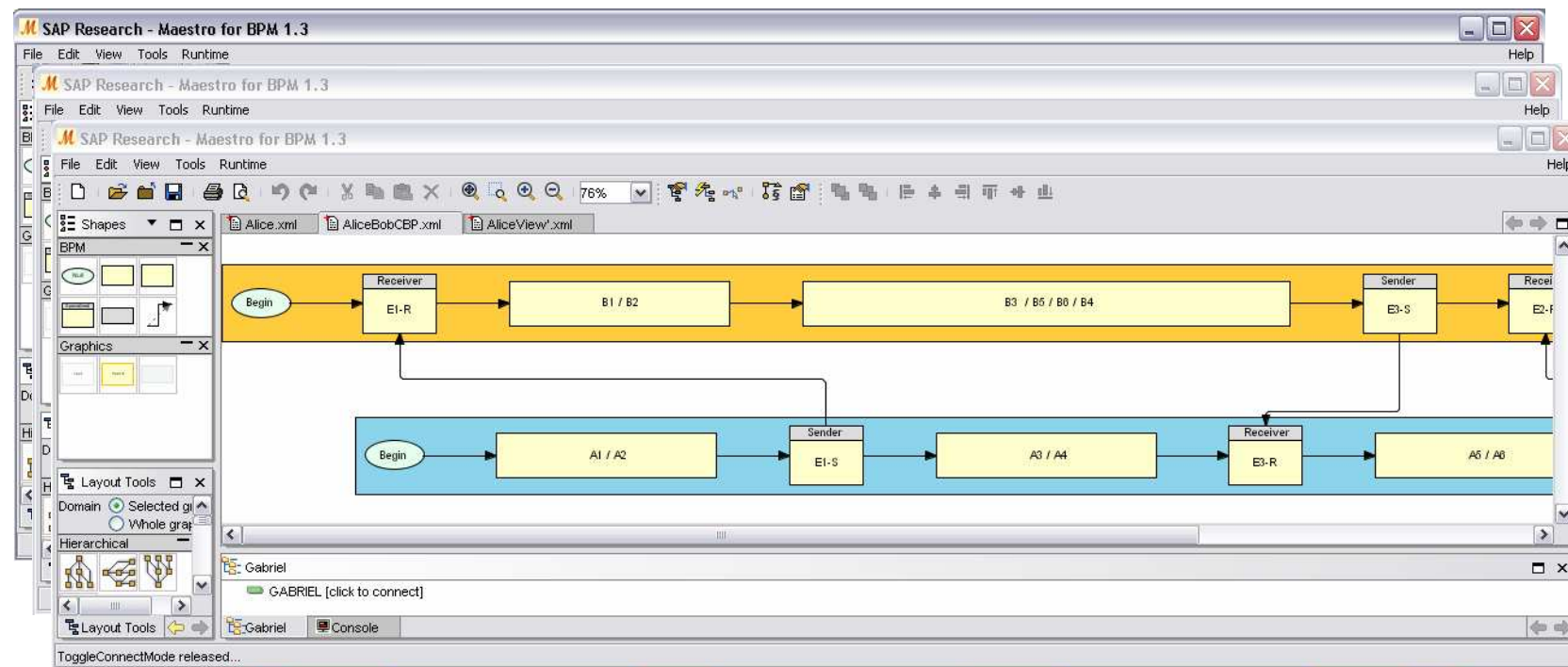
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## Public vs. private processes

- Hide confidential process details
- Present partners a process view

## Collaborative Business Processes (CBP)

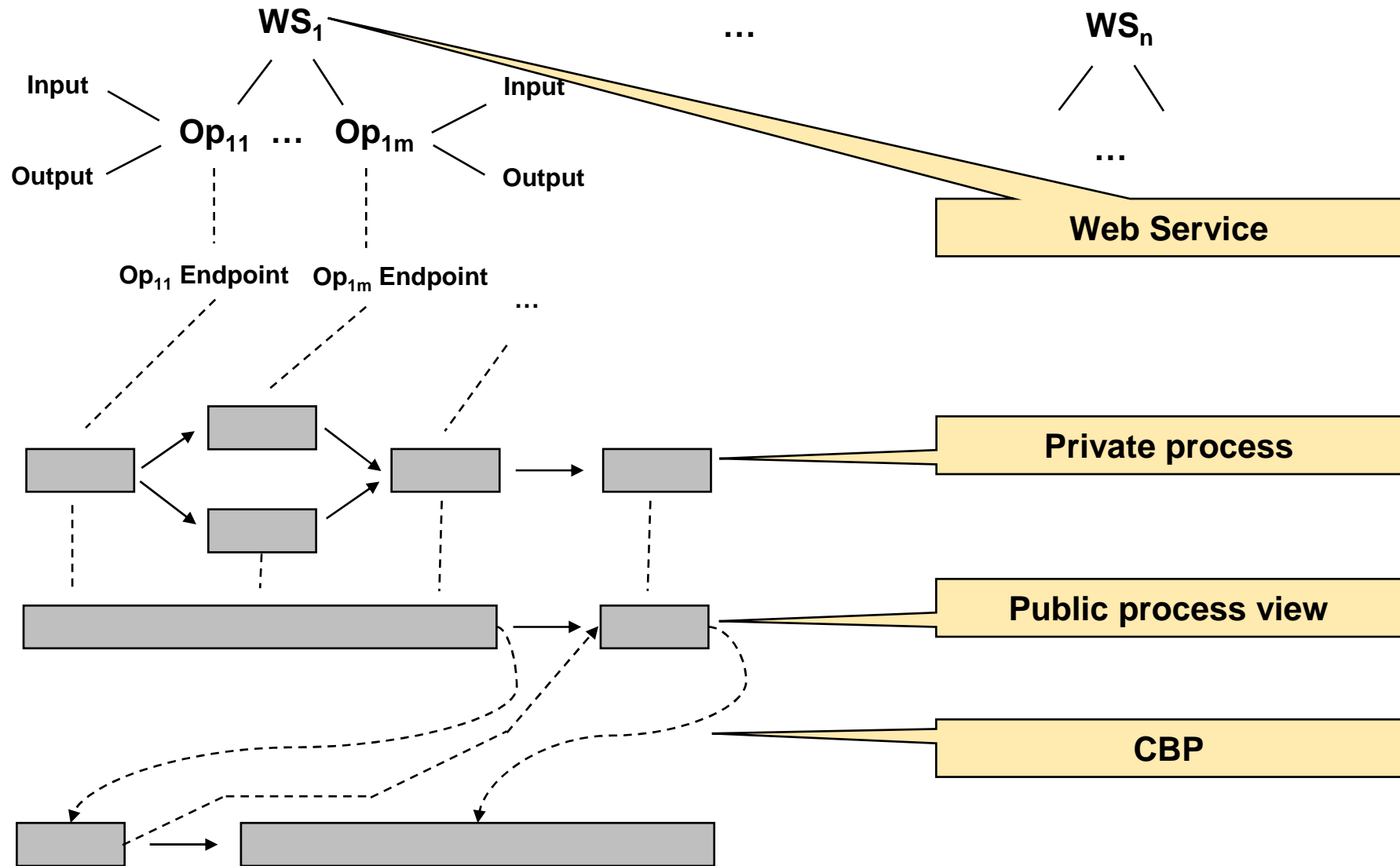
- Process involving different parties





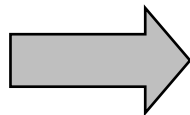
# Schematic Overview of BPM

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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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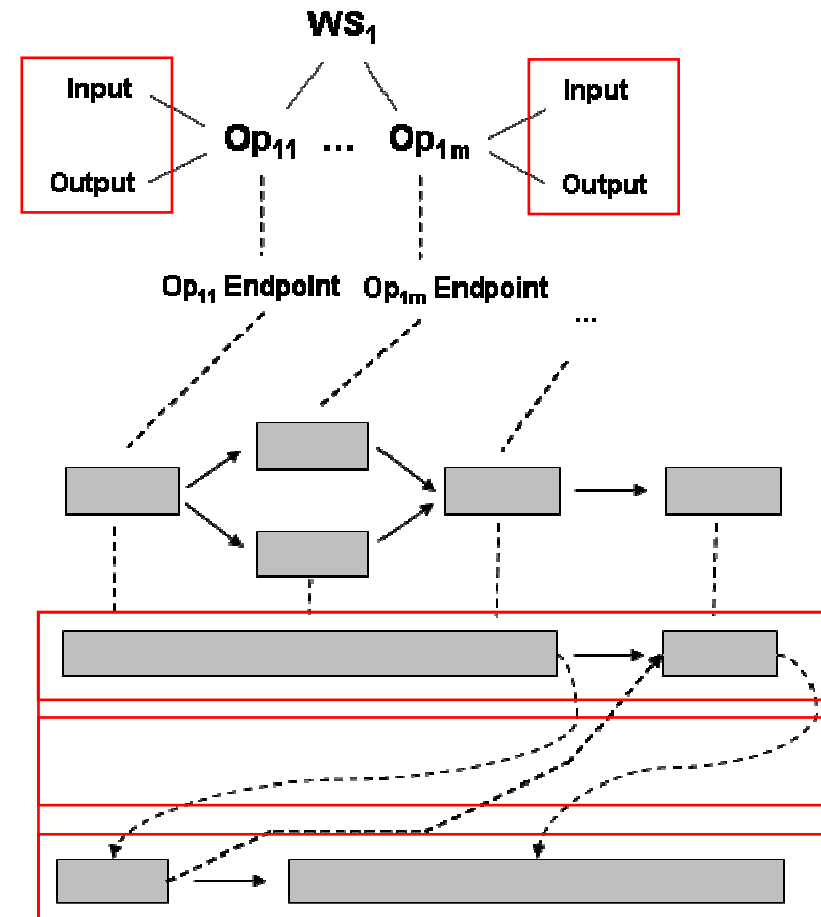


## Focus on design time in this talk

- 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

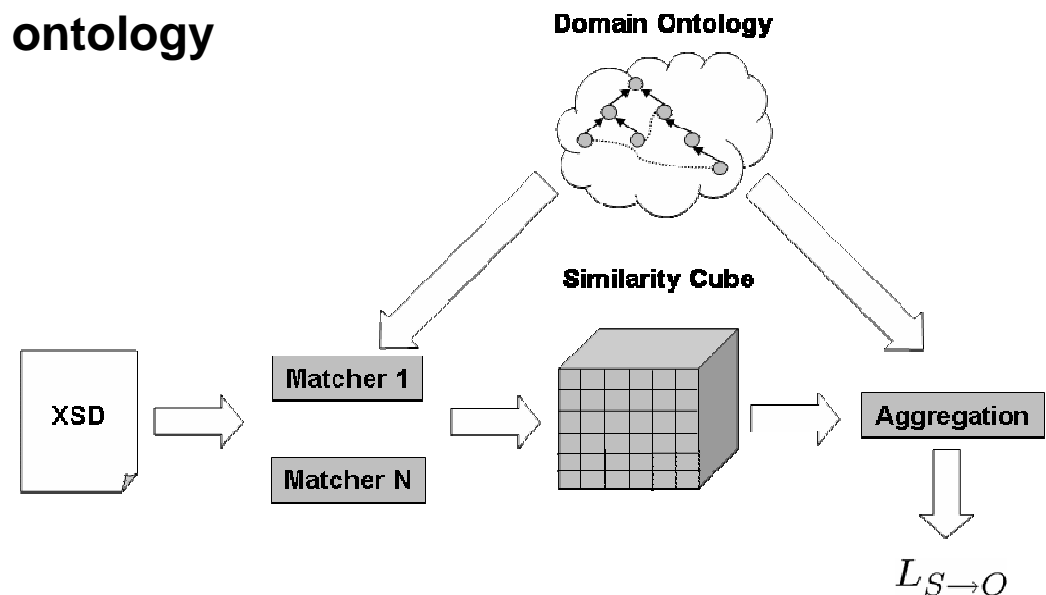
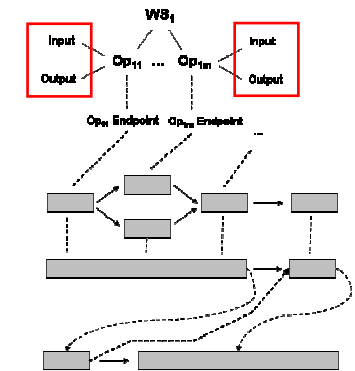
## Output

- 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

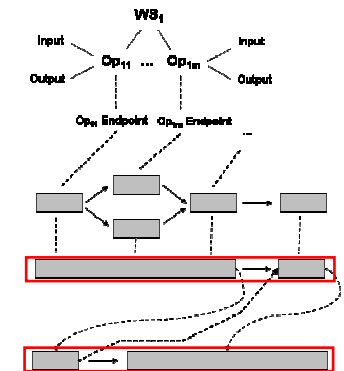
## Output

- 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

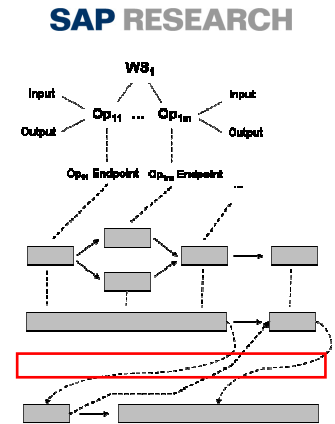
- Liftings of XSDs, domain ontology

## 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

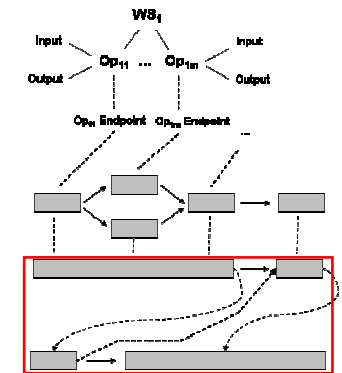
## Output

- Composed workflow

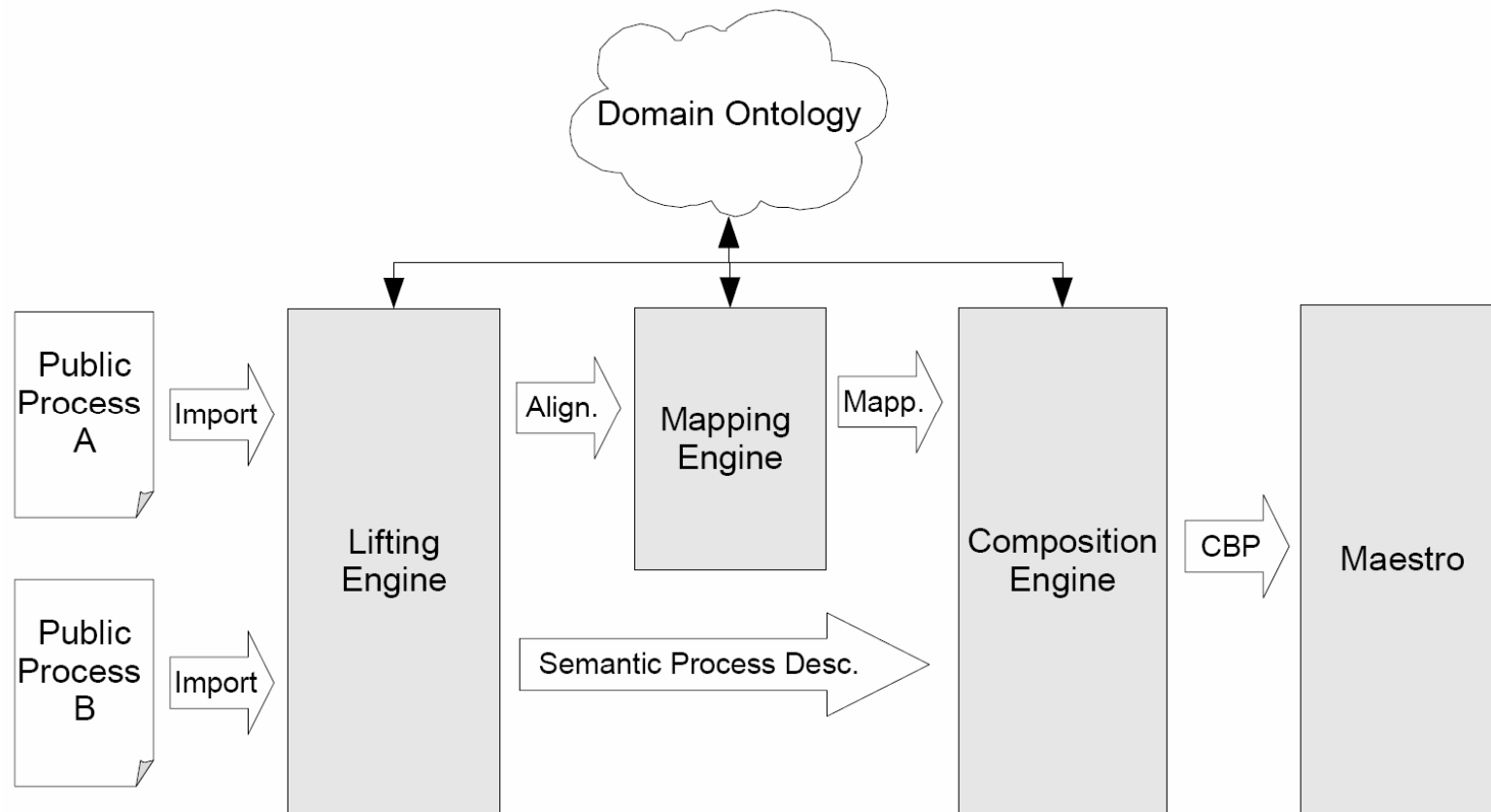
## Realization

- 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

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## 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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