SYSTEMATIC THOUGHT LEADERSHIP FOR INNOVATIVE BUSINESS

Automating BPM with SWS Technologies

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Introduction

Business Process Management

Improvements using SWS

Summary & Outlook

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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**

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The global Research- & Development network of SAP

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Darmstadt

Dresden

Belfast

Montreal

Budapest

Walldorf

Sofia

Palo Alto

Sophia Antipolis

Tel Aviv

Shanghai

Tokyo

Bangalore

Pretoria

Brisbane

SAP Labs

SAP Research

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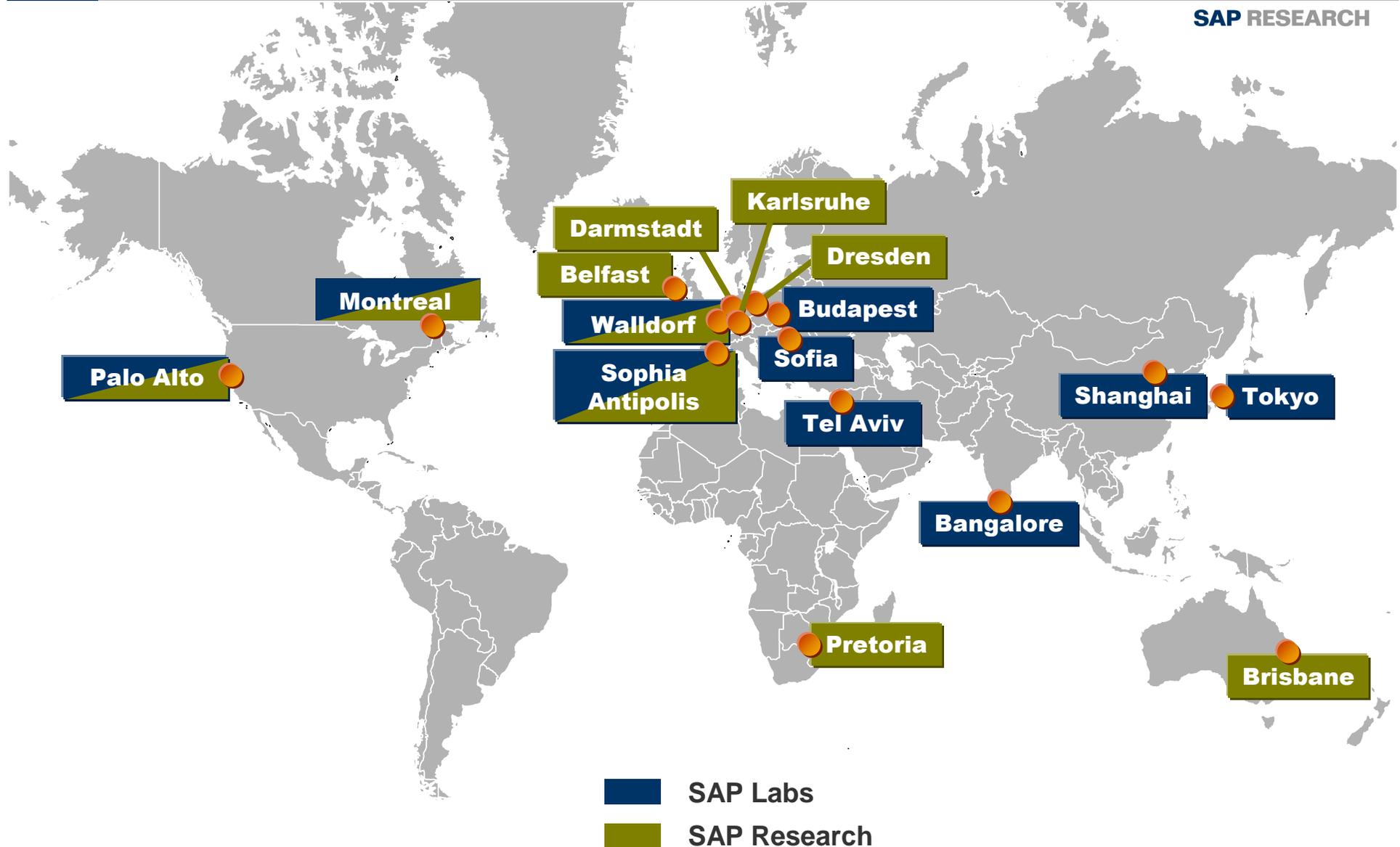
DIP

- **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**
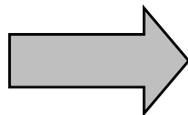
➡ **Application of SWS in "enterprise SOA"**

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 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

Business Solutions

mySAP Business Suite   SAP xApps

Business Applications

WebSphere   SAP NetWeaver   .NET

Integration & Appl. Infrastructure

Computing Infrastructure

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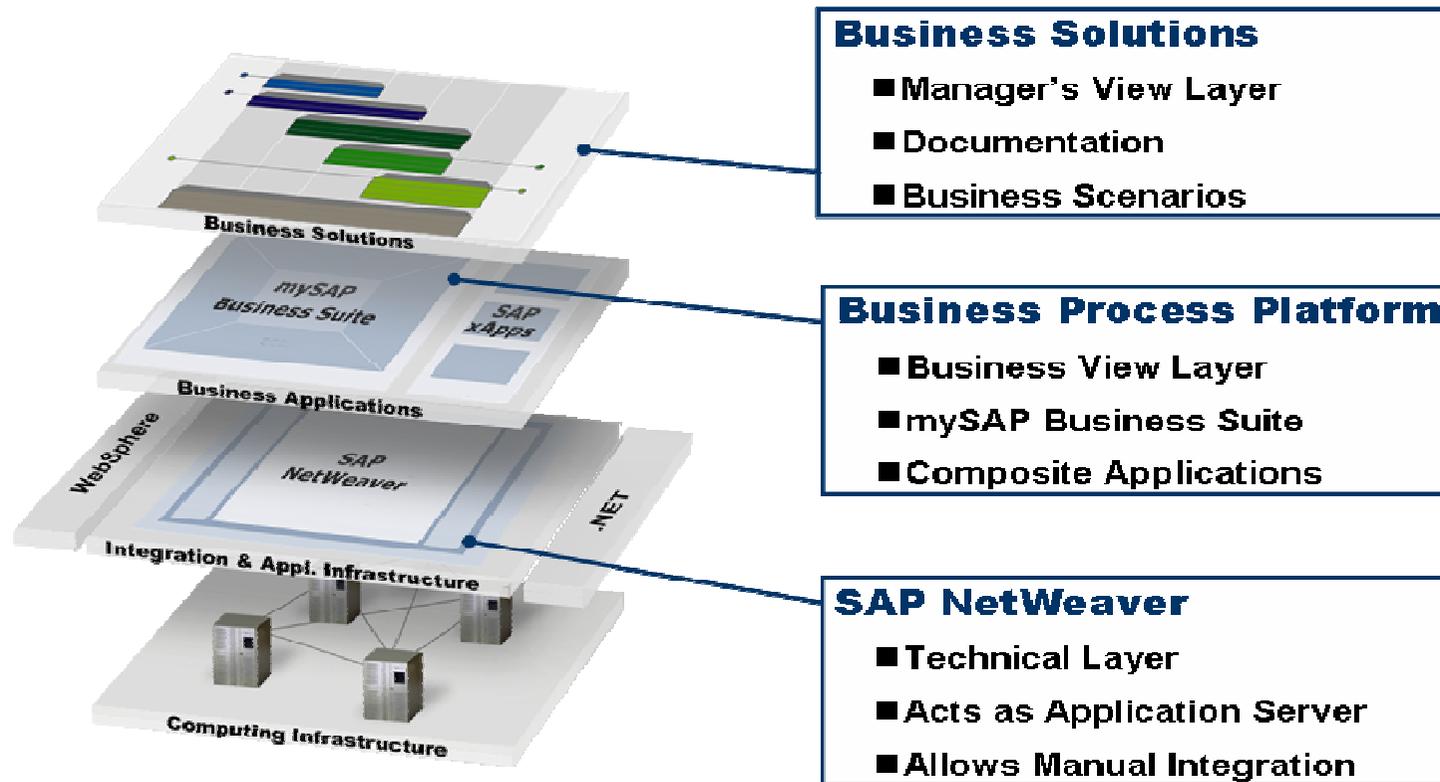
Business Process Management (BPM)

- **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)**
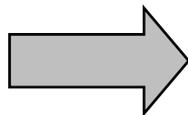
➡️ **Application of SWS in "enterprise SOA"**

SAP enterprise SOA

SAP enterprise SOA

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

Enablers for Flexible Business

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High-Level Overview of SAP enterprise SOA
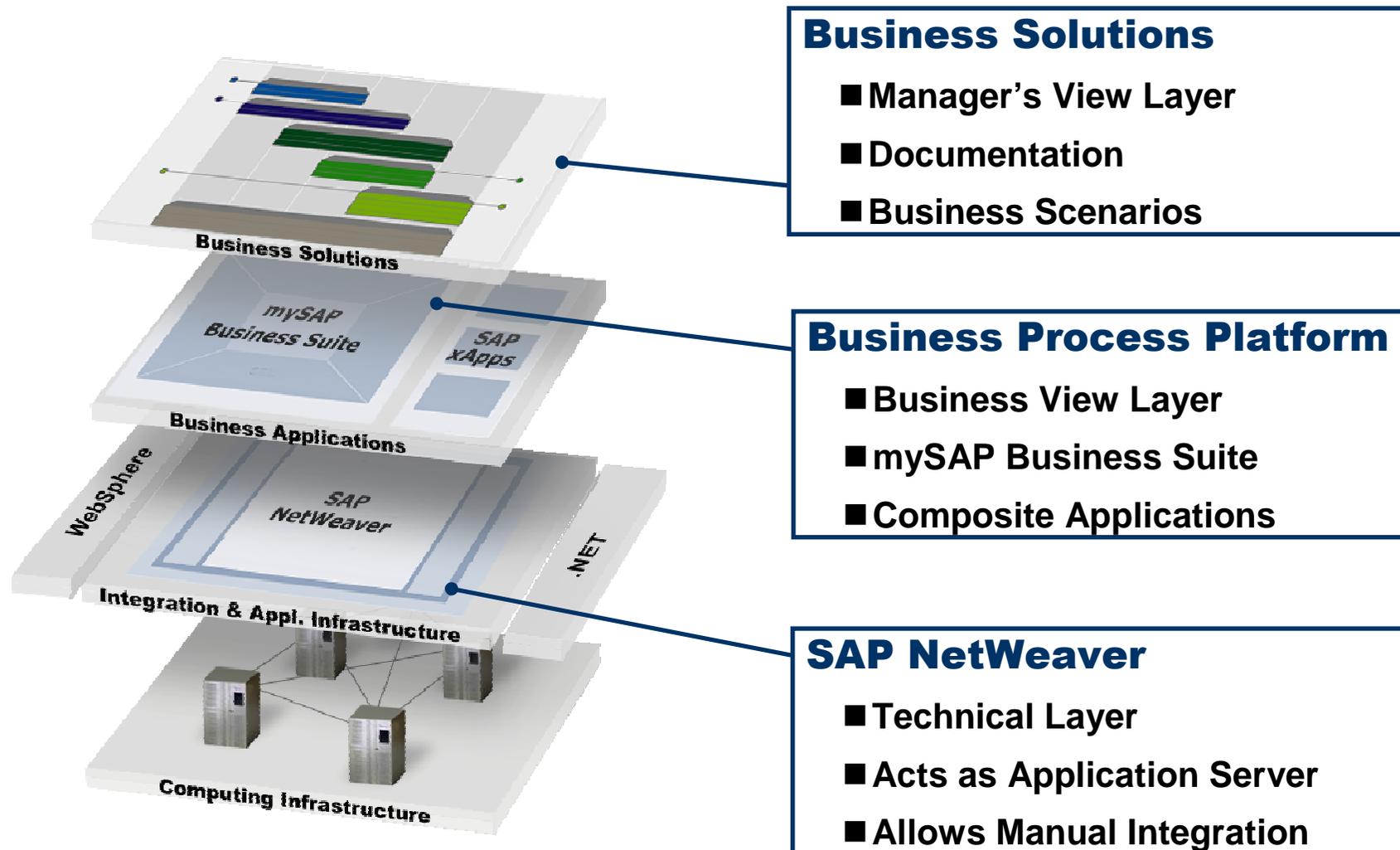
Business Solutions

- Manager's View Layer
- Documentation
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SAP NetWeaver

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Real-World Process
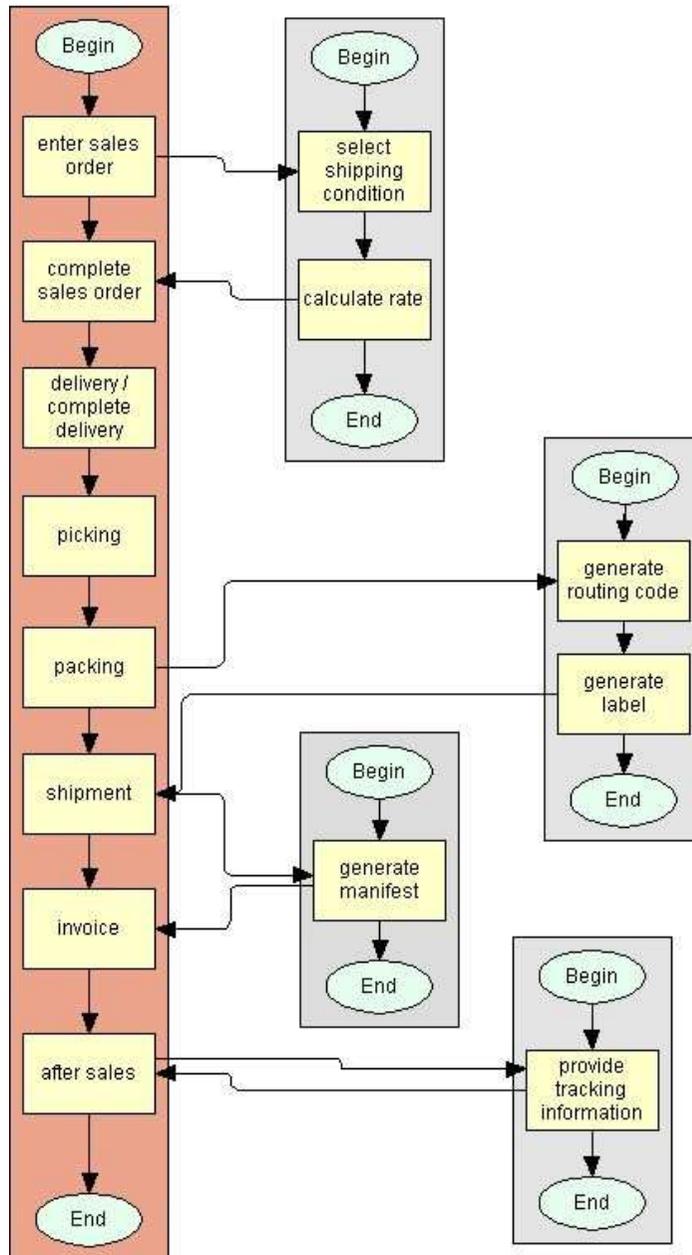
Example Logistics Process

- **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

Cross-Organizational BPM Implementation

Public vs. private processes

■ **Hide confidential process details**

■ **Present partners a process view**

Collaborative Business Processes (CBP)

■ **Process involving different parties**

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WS_1 ... WS_n

Input

Output

Op_{11} ... Op_{1m}

Input

Output

...

Op_{11} Endpoint Op_{1m} Endpoint

...

Web Service

Private process

Public process view

CBP
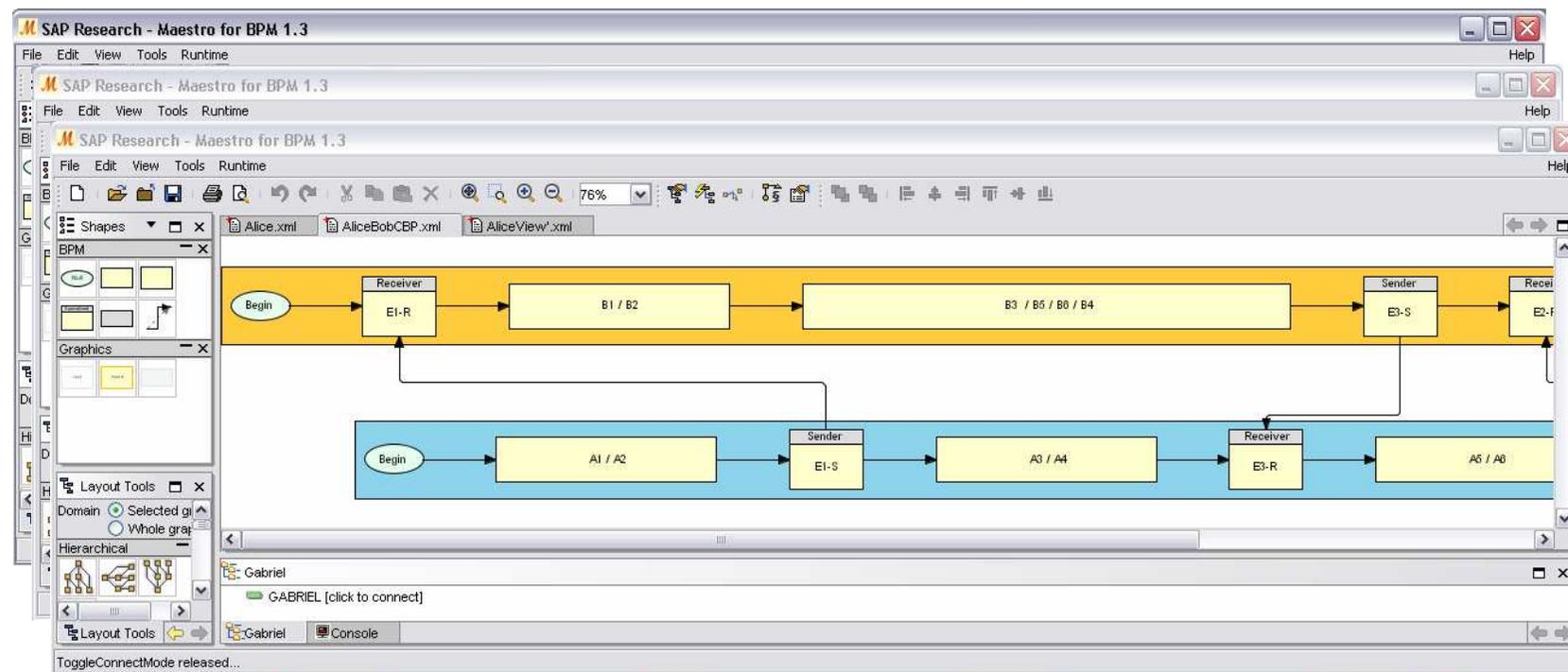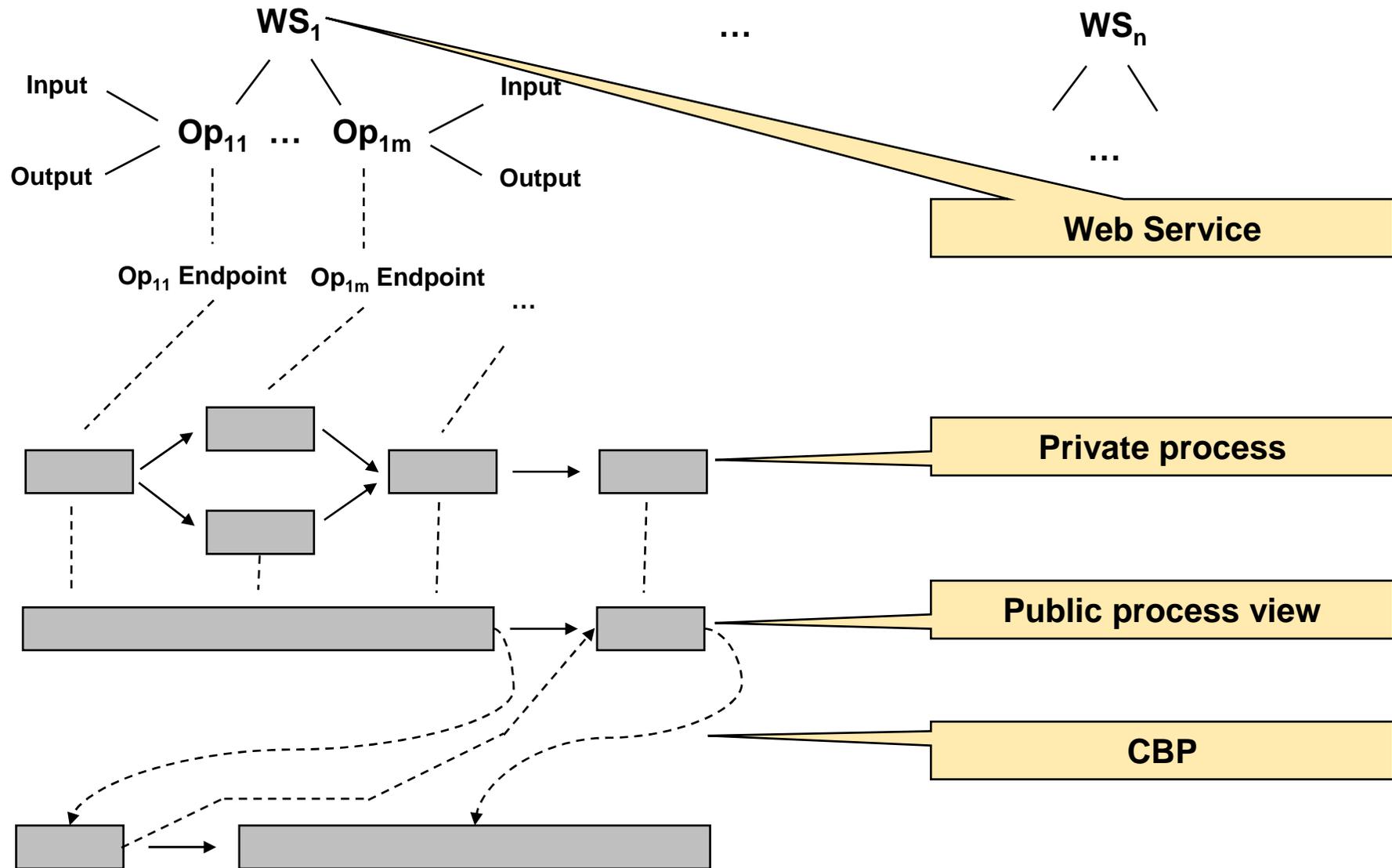
Manual development tasks

- **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**
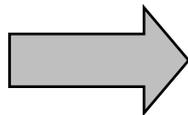
➡ **Automating BPM**

Goals

- **Suggest CBP automatically**

  → **Composition**

- **Integrate arbitrary Web service interfaces**

  → **Mediation**

- **Dynamic runtime selection of appropriate service**

  → **Selection**
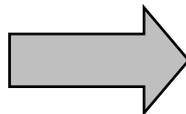
⇨ **Automating BPM using SWS technologies**

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Automating BPM by SWS – Overview

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**
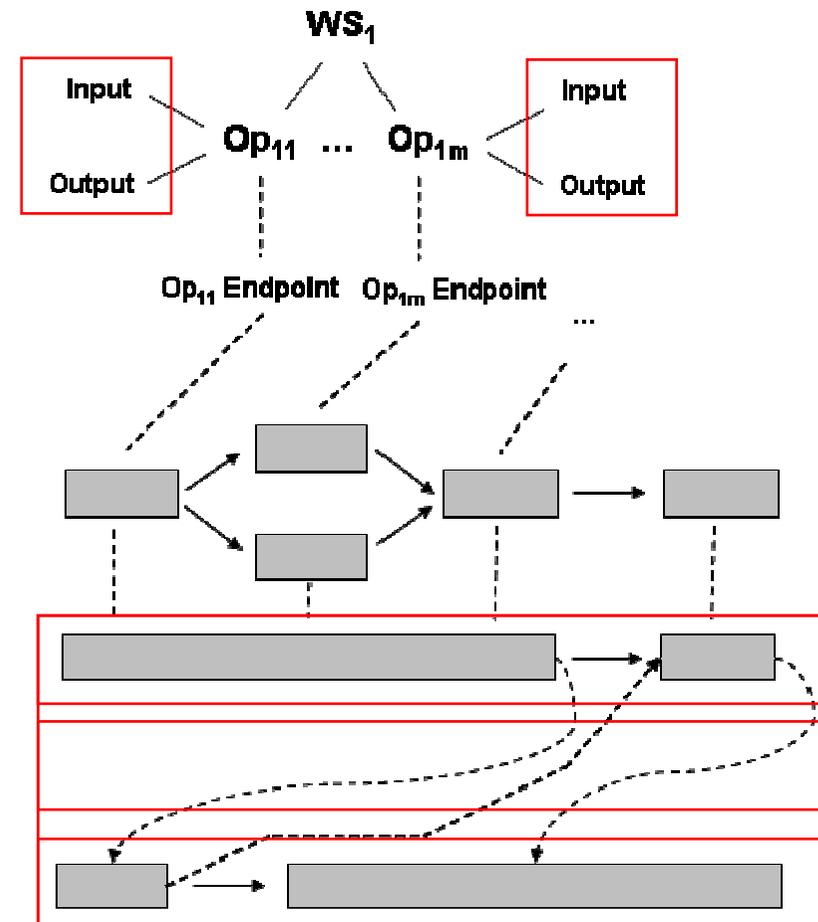
Automating BPM by SWS – Lifting

Input

- **XSDs (part of WSDL), domain ontology**

Output

- **Relation between message elements and ontology concepts**

Realization

- **Matching XSDs and domain ontology**
- **Composite matcher**
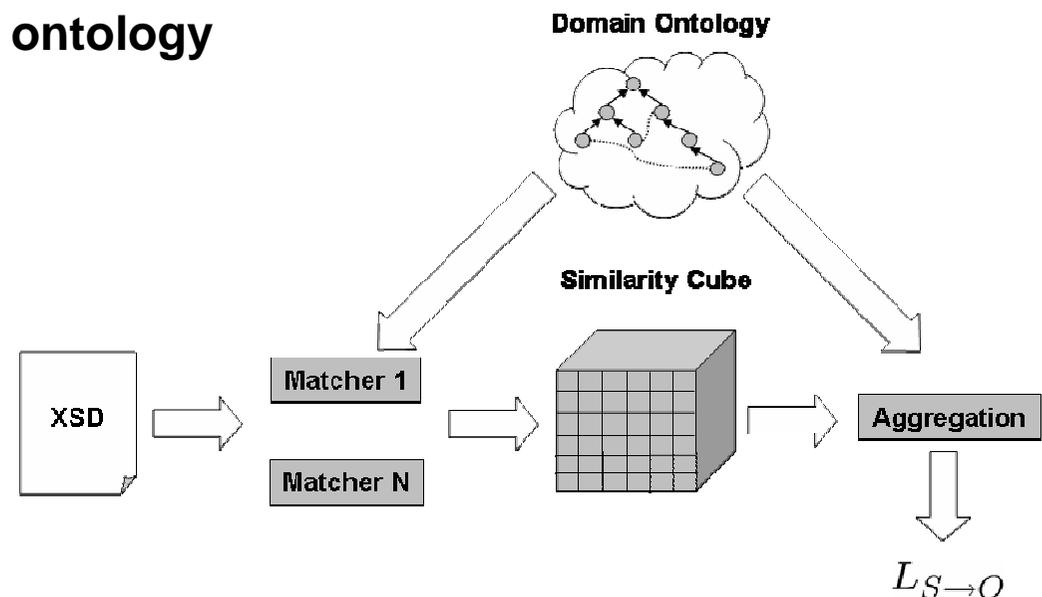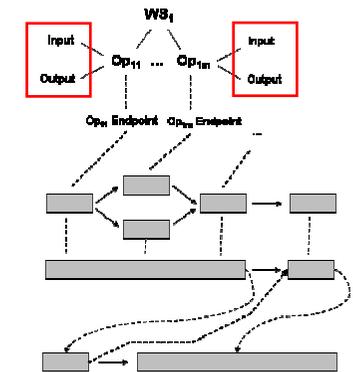
Automating BPM by SWS – Create SWS Representations

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**
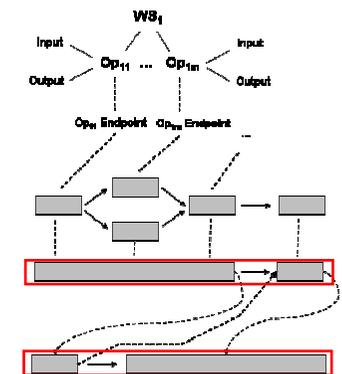
Automating BPM by SWS – Create Message Mappings

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**
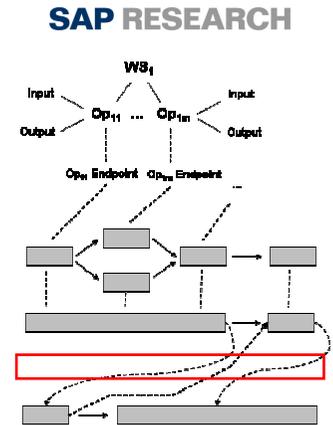
Automating BPM by SWS – Compose CBP

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**
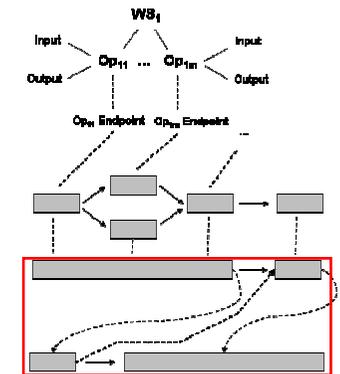
Design time architecture
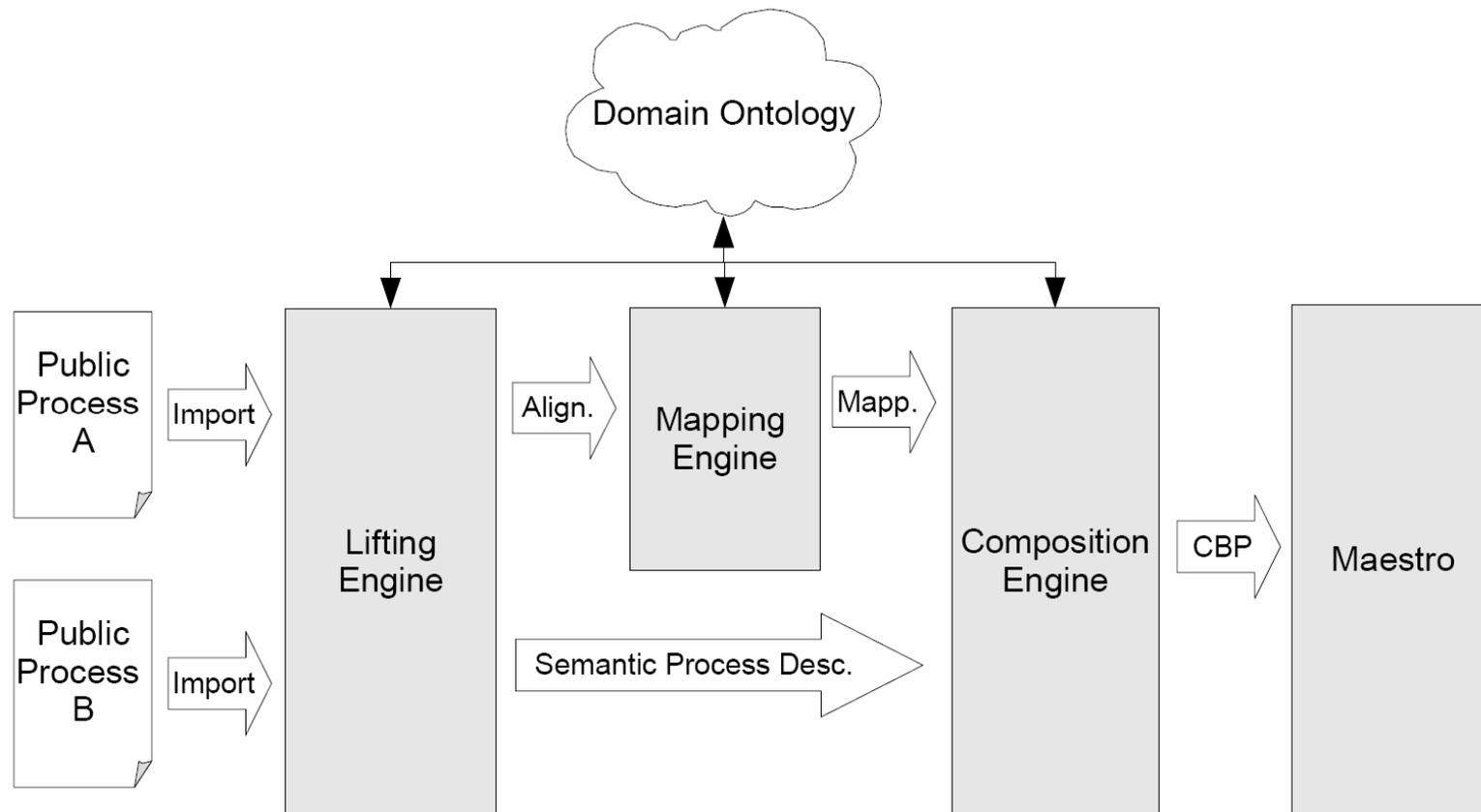
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Summary

- **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**

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Q&A

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