SOA & Web services

PV207 – Business Process Management

Spring 2015

Jiří Kolář

Last lecture recap

- Processes
  - **What is business process?**

Last lecture recap

- Processes
  - What is business process?
  - **What is BPM?**

Last lecture recap

- Processes
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  - What is BPM?
  - **What is BPM adoption?**

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- Processes
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  - What is BPM?
  - What is BPM adoption?
  - Why BPM ?
  - Roles in BPM
  - Process life-cycle
  - Phases of process based development
- BPMS
  - **BPMS components**

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  - What is BPM adoption?
  - Why BPM ?
  - Roles in BPM
  - Process life-cycle
  - Phases of process based development
- BPMS
  - BPMS components
  - Architecture
  - Human Tasks
  - Business Rules
  - BAM
  - Existing BPMS

Lecture summary

- Motivation for SOA
- Role BPM in IT management
- Core BPM architecture
- BPM – SOA relationship
  - SOA concept
  - SOA architecture
  - SOA Governance
  - SOMA
- TEAMBUILDING
- Web Services
  - What are WS?
  - Artifacts WS
    - WSDL
    - SOAP
  - WS - standards
- WS in Java
  - Client side
  - Server side
- REST

3 meanings of the word "service"

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  - Defined by a User Interface / Programming interface

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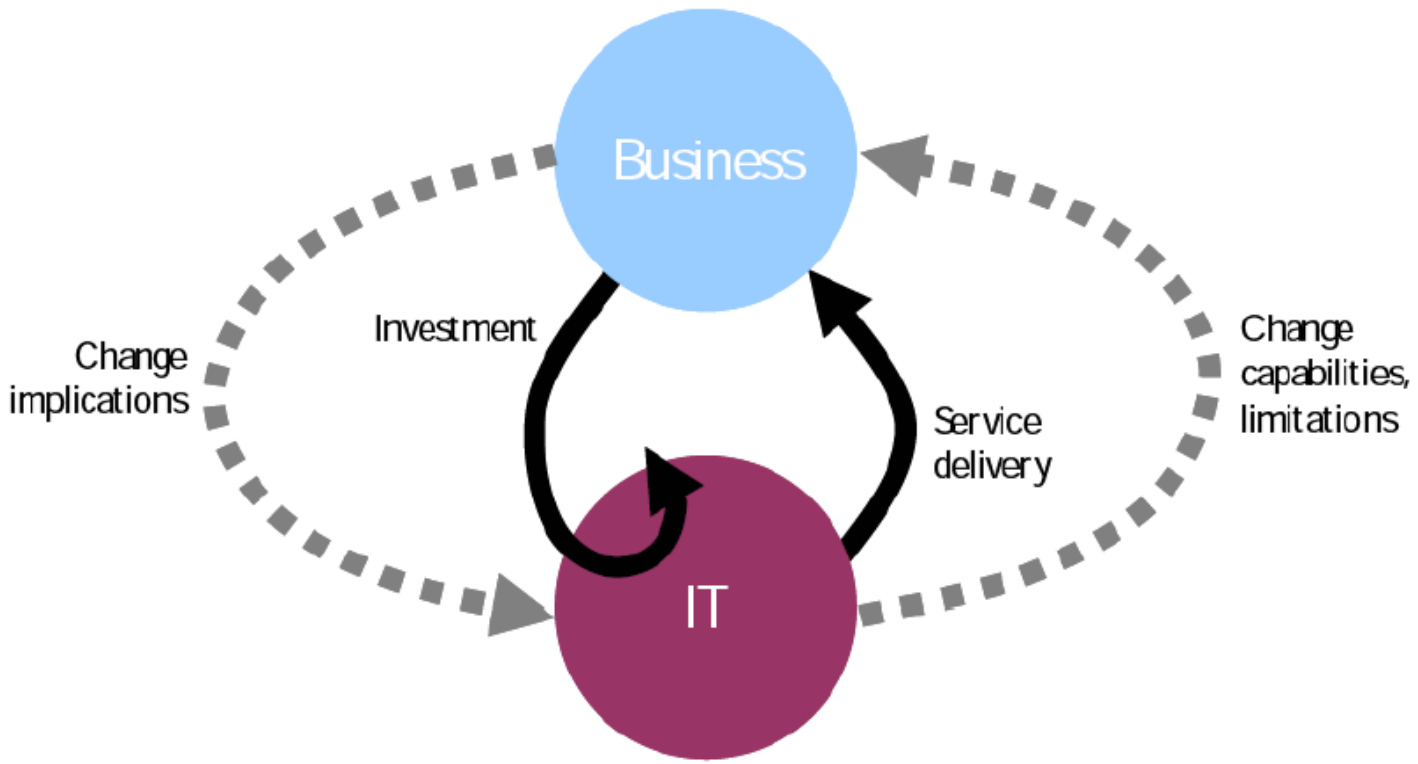
  - Defined by a User Interface / Programming interface
- Web Service
  - Google provides Web Service API for retrieving GPS coordinates of particular address
  - Defined by a WSDL/REST methods definition
  - Request - response model

Business & IT alignment

Figure 1: The elements of IT-business alignment



There are three important elements in IT-business alignment: investment, service delivery, and collaboration in change management.

Macehiter Ward-Dutton

SOA motivation

- **Reduction of costs** on development and integration
- Efficient **maintenance and integration** across various systems
- Component/service **reusability**
- Integration of **Legacy applications**
- Efficient **management and monitoring**
- **Just-in-time management** (real time business)

SOA definition

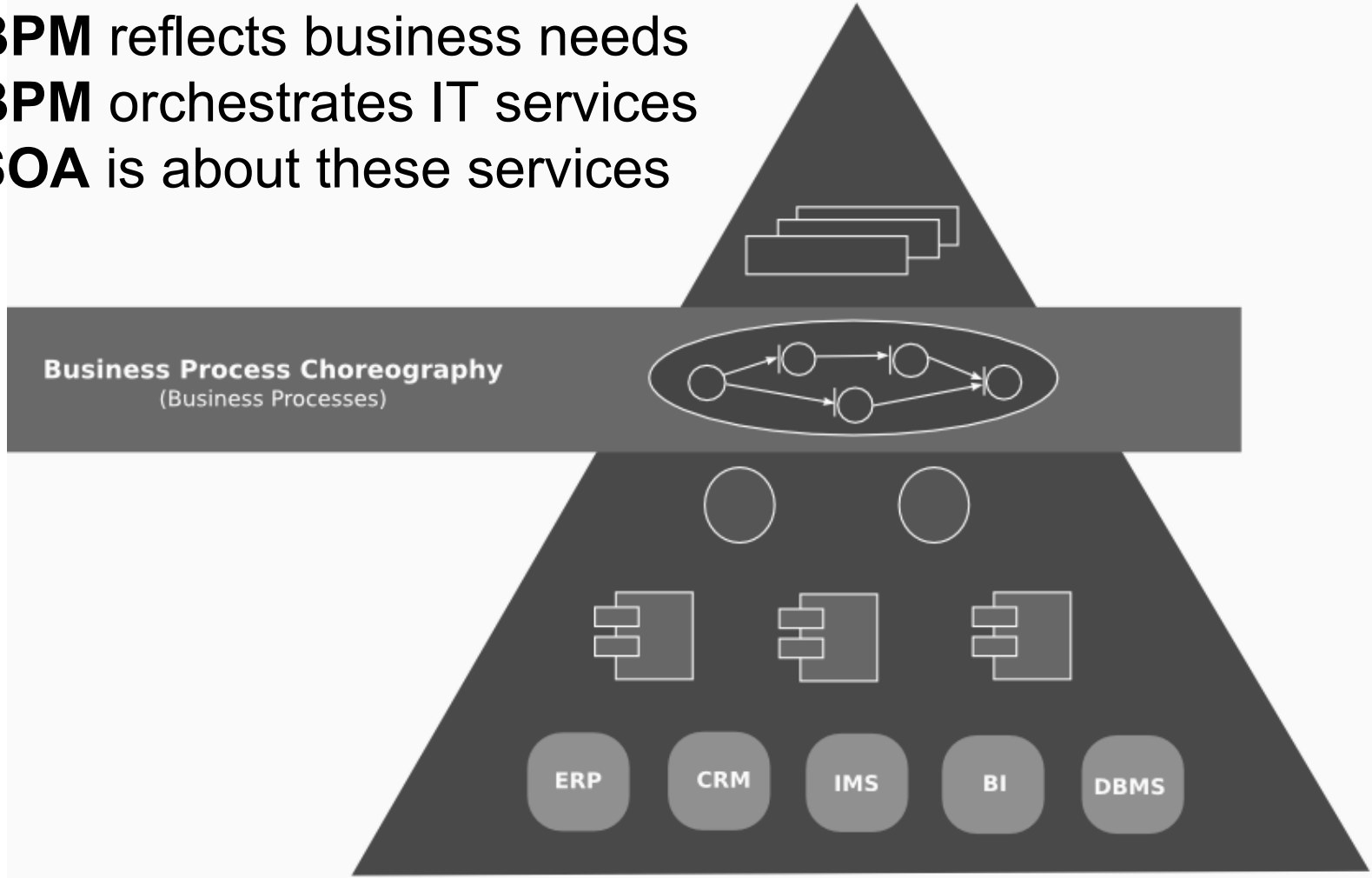
Service-Oriented Architecture *(SOA)* is an *architectural style* that supports *service-orientation*.

Service-orientation is a way of thinking in terms of services and service-based development and the outcomes of services.

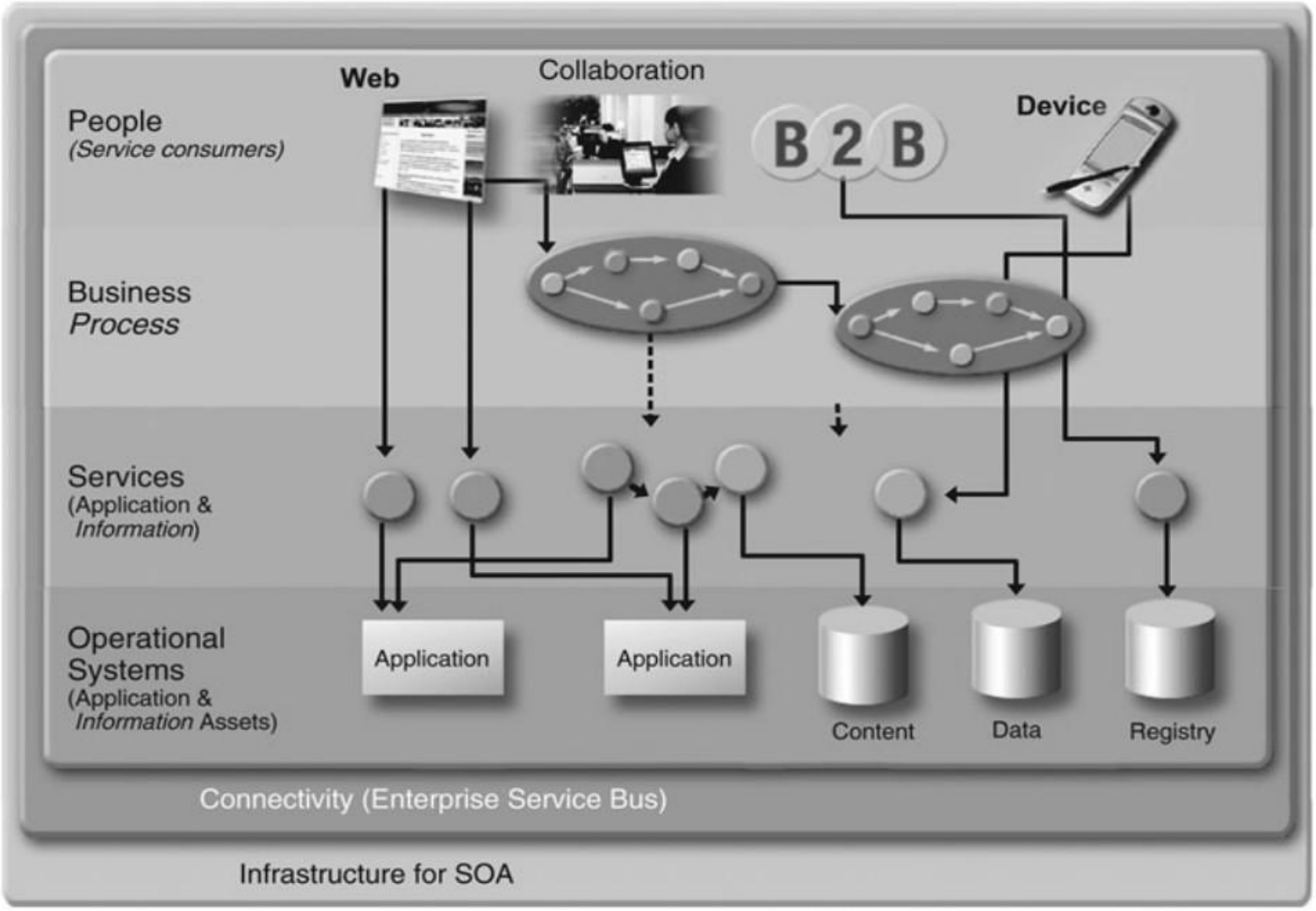
-- The Open Group

How is BPM and SOA related?

- BPM stands between IT and business
  - **BPM** reflects business needs
  - **BPM** orchestrates IT services
  - **SOA** is about these services

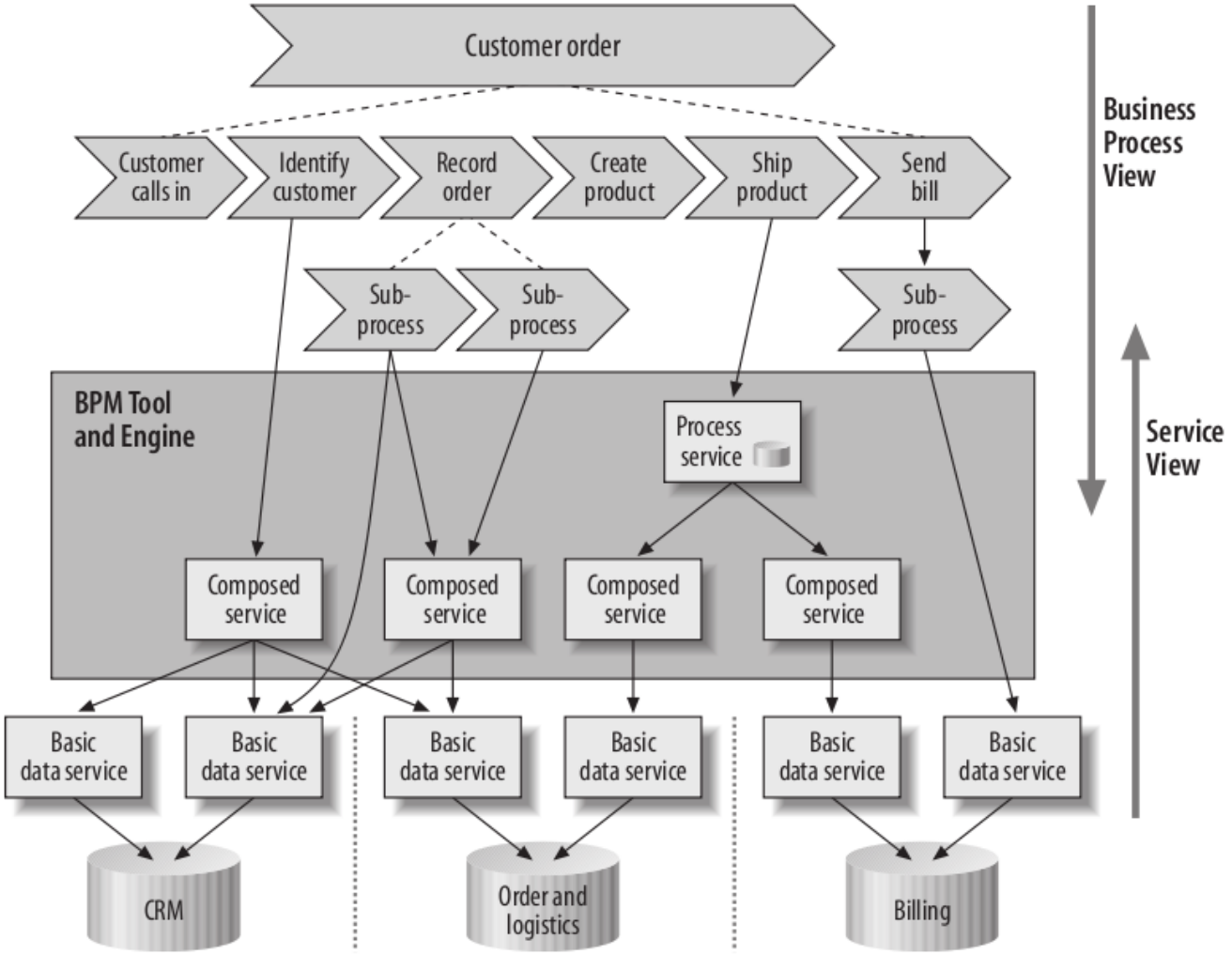


SOA Architecture



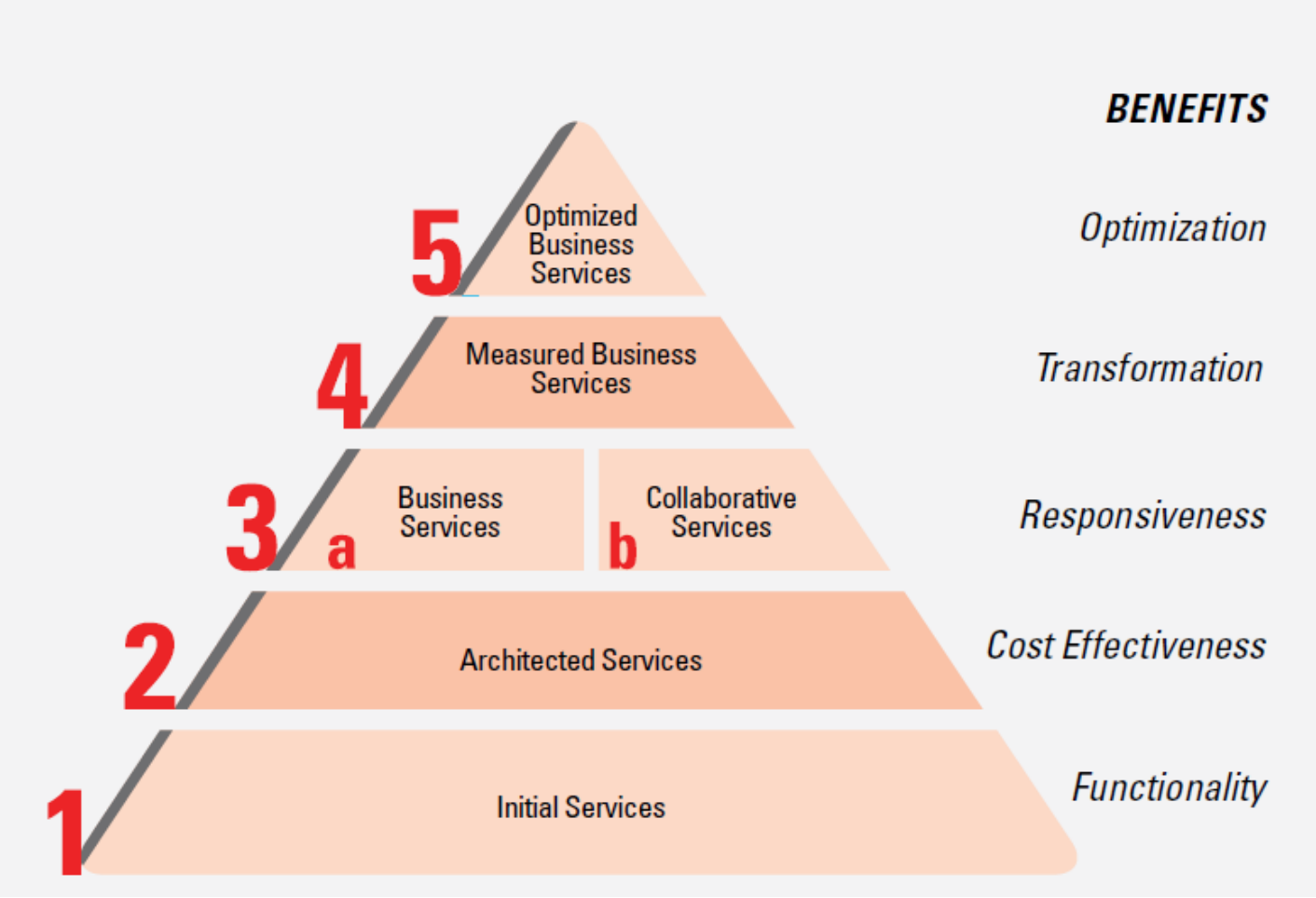
Source: SOA Community of Practice, SOA Solution Stack Project

BPM and SOA Relationship



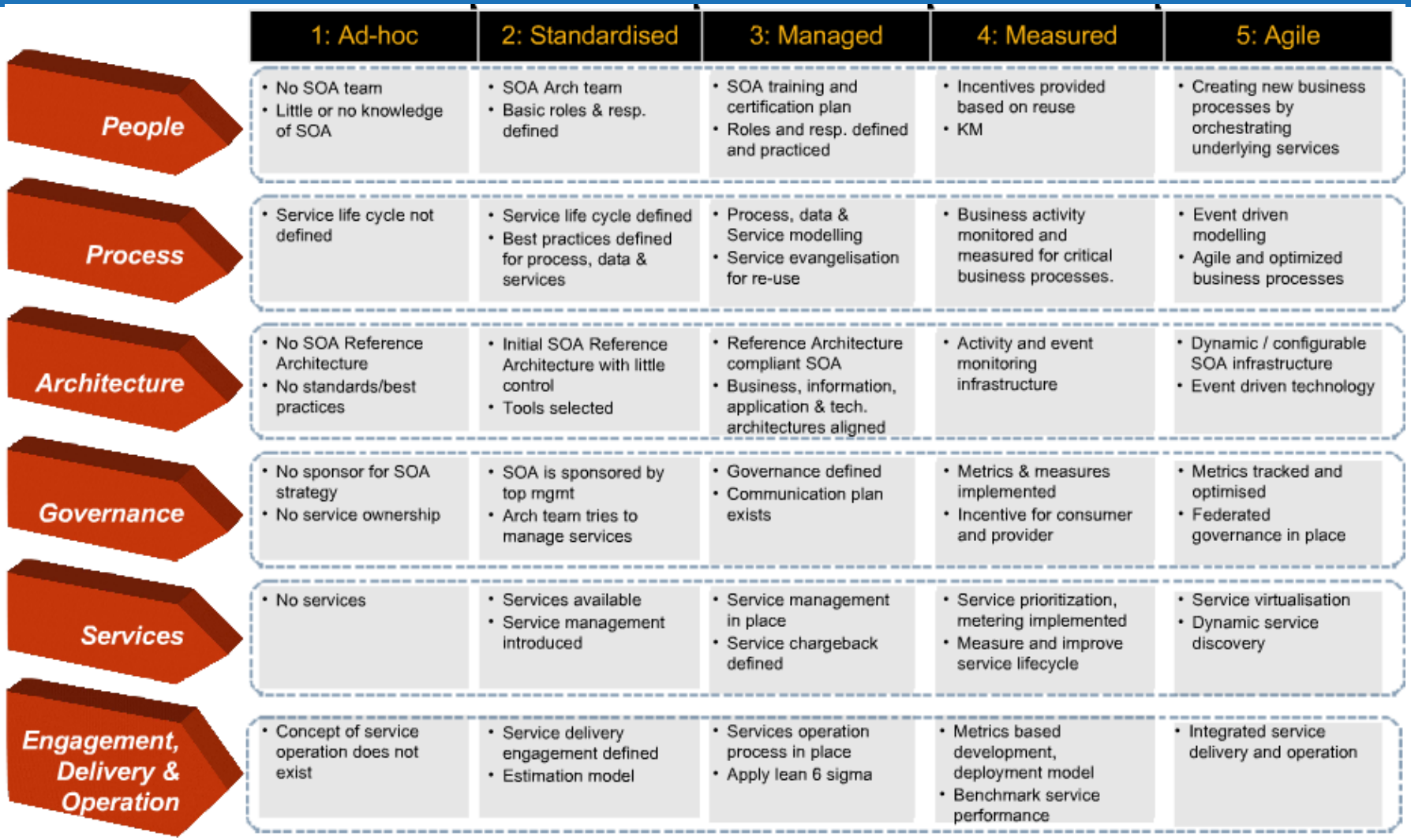
SOA in Practice, , Nicolai M. Josuttis

SOA – Maturity Model



Sonic Software Corporation, AmberPoint Inc., 2005

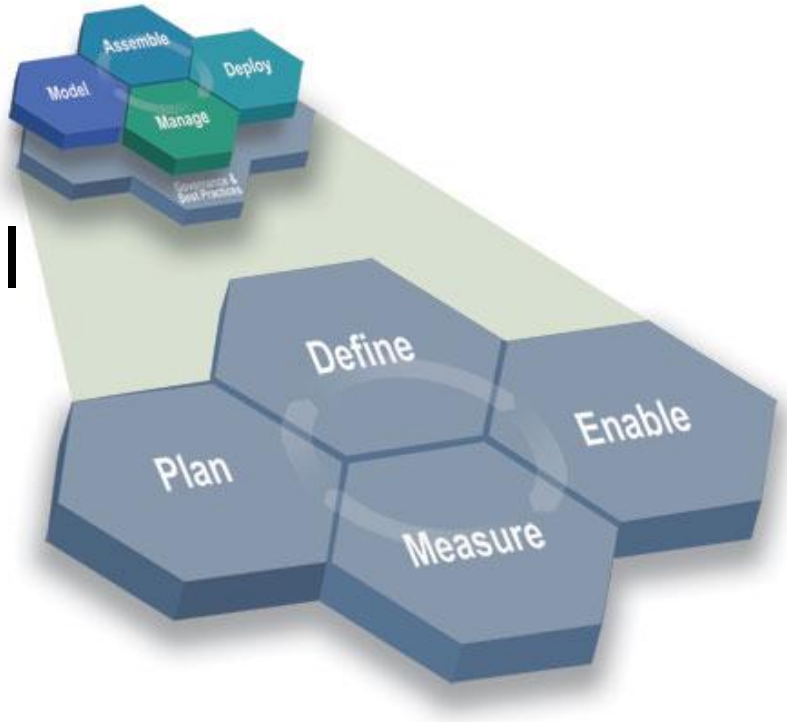
SOA Maturity Model – Dimension Matrix



	1: Ad-hoc	2: Standardised	3: Managed	4: Measured	5: Agile
People	• No SOA team • Little or no knowledge of SOA	• SOA Arch team • Basic roles & resp. defined	• SOA training and certification plan • Roles and resp. defined and practiced	• Incentives provided based on reuse • KM	• Creating new business processes by orchestrating underlying services
Process	• Service life cycle not defined	• Service life cycle defined • Best practices defined for process, data & services	• Process, data & Service modelling • Service evangelisation for re-use	• Business activity monitored and measured for critical business processes.	• Event driven modelling • Agile and optimized business processes
Architecture	• No SOA Reference Architecture • No standards/best practices	• Initial SOA Reference Architecture with little control • Tools selected	• Reference Architecture compliant SOA • Business, information, application & tech. architectures aligned	• Activity and event monitoring infrastructure	• Dynamic / configurable SOA infrastructure • Event driven technology
Governance	• No sponsor for SOA strategy • No service ownership	• SOA is sponsored by top mgmt • Arch team tries to manage services	• Governance defined • Communication plan exists	• Metrics & measures implemented • Incentive for consumer and provider	• Metrics tracked and optimised • Federated governance in place
Services	• No services	• Services available • Service management introduced	• Service management in place • Service chargeback defined	• Service prioritization, metering implemented • Measure and improve service lifecycle	• Service virtualisation • Dynamic service discovery
Engagement, Delivery & Operation	• Concept of service operation does not exist	• Service delivery engagement defined • Estimation model	• Services operation process in place • Apply lean 6 sigma	• Metrics based development, deployment model • Benchmark service performance	• Integrated service delivery and operation

SOA Governance

- Service definition
- Service deployment life cycle
- Service versioning
- Service migration
- Service registries
- Service message model
- Service monitoring
- Service ownership
- Service testing
- Service security

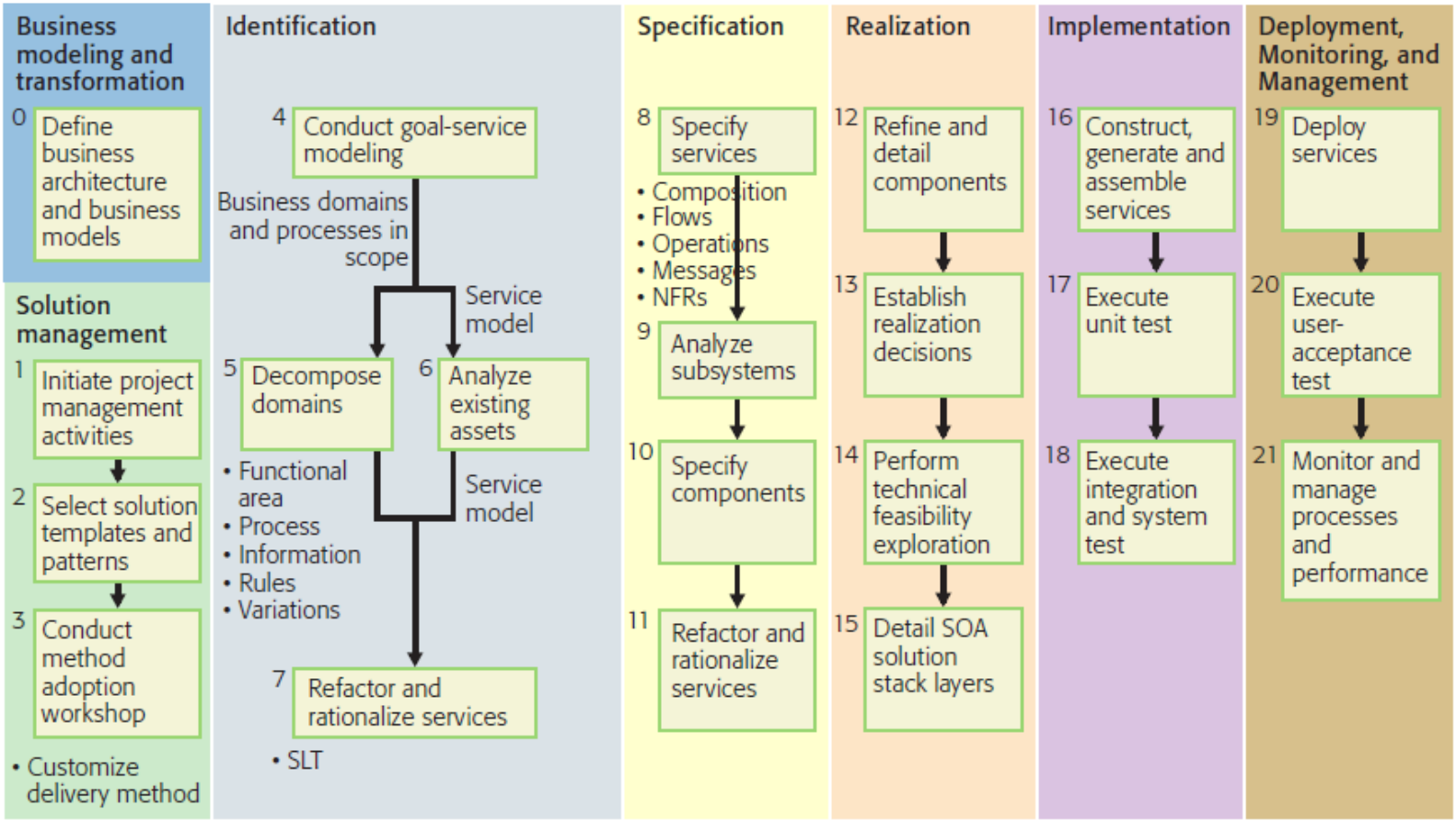


SOA – Methodologies

- SOA methodologies
  - IBM SOAD (Proprietary)
  - IBM SOMA (Proprietary)
  - SOA RQ (Proprietary)
  - CBDI-SAE
  - SOAF
- SOMA
  - Service-oriented modeling and architecture

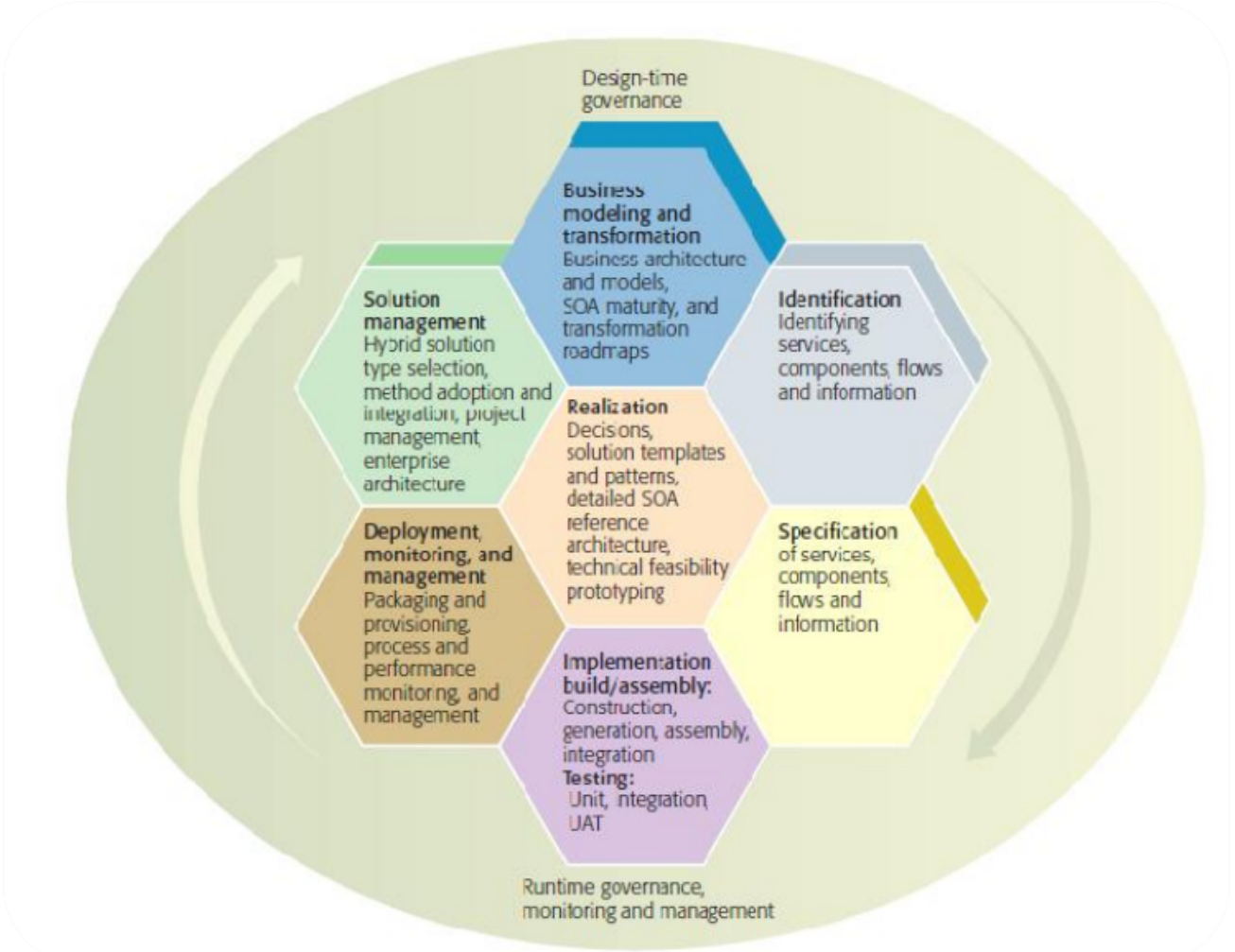
--Ali Arsanjani, Chief Architect,
SOA and Web services Center of Excellence,
IBM, Software Group

SOMA – Life-cycle flow



A. Arsanjani, IBM Systems Journal, Volume 47, Number 3, 2008

SOMA - Phases



A. Arsanjani, IBM Systems Journal, Volume 47, Number 3, 2008

Questions?

Break 10mins

Teambuilding

- Teams of 4 people
- Roles in the team
  - Teamleader
  - Business analyst
  - Process analyst
  - BPM/SOA developer
- Collective responsibility
  - Your success/fail in the course depends on success/fail of your team!!
- Good mix of skills is required
- Organise your work according to your needs

Team roles

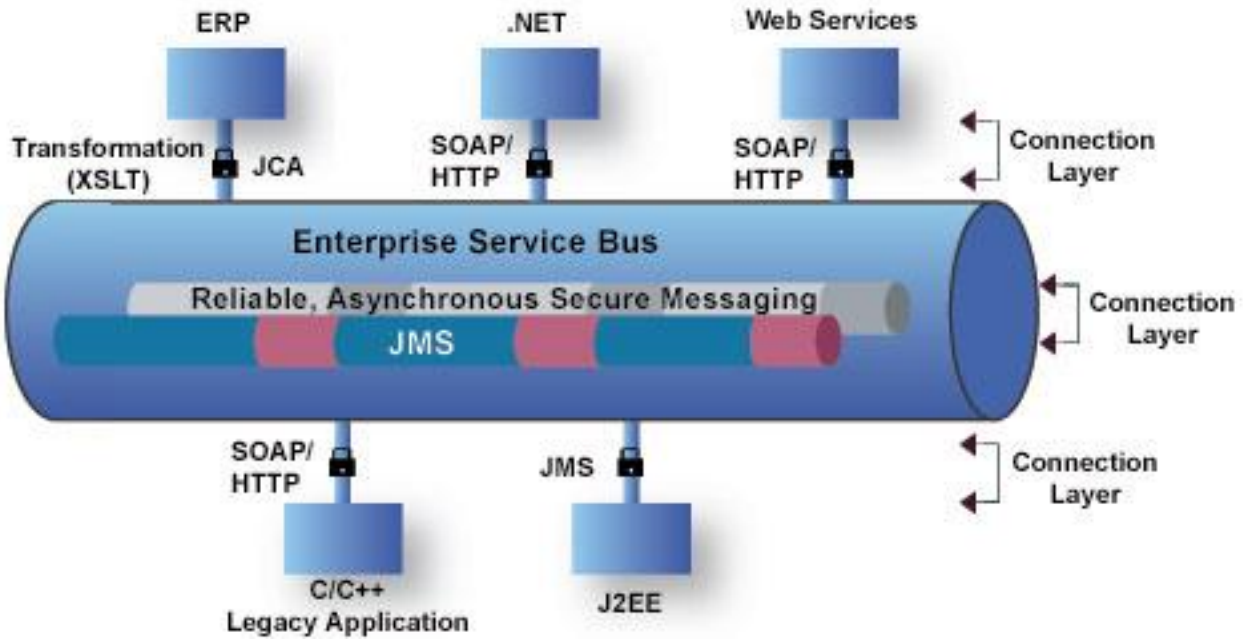
- Team Leader
  - Management - organising the teamwork (1 person)
  - Communication with lecturers and tutors
  - Couching
  - Skills:
    - Soft-skills, authority, responsibility
- Business analyst
  - "Expert" in domain you are going to analyse
  - Accuracy in writing analytical documents
  - Understanding of basics of strategic planning and business analysis
  - Skills:
    - Accuracy, responsibility, domain knowledge

Team roles

- Process analyst
  - Good knowledge of process modeling and BPMN
  - Good understanding of the domain
  - Skills:
    - Accurate, communicative, solution oriented
- BPM/SOA developer
  - Good understanding of process modeling
  - Technical skills
    - Chosen BPMS
    - Web services
    - Java/.NET programming
  - Required skills:
    - Patience, accuracy, technically skilled

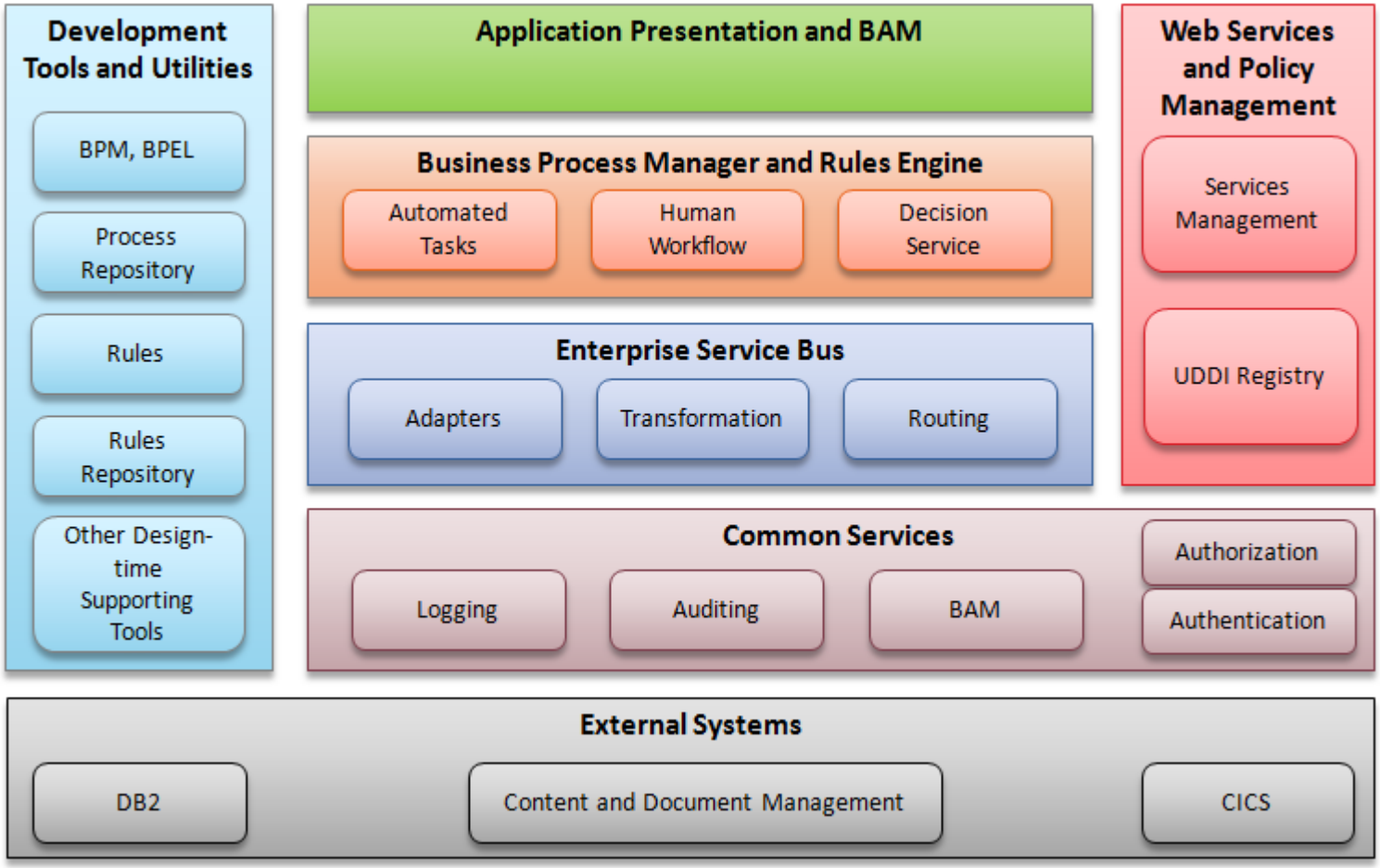
SOA in practice: ESB – Enterprise Service Bus

- Message routing
- Protocol conversion
- Security, reliability



http://wso2.com/products/enterprise-service-bus/

SOA in practice: ESB – Enterprise Service Bus



http://www.exadelfs.com/soaigniter.jsp

3 meanings of word "service"

- "Business" service
  - Restaurant owner can register his restaurant to Google database and be shown in Google Maps
  - Defined by contract / service offering
- "Technical" service
  - Users can search for their favourite restaurant in Google Maps
  - User interface for "Human task"
- **Web Service**
  - Google provide Web Service API for retrieving location of certain address
  - WSDL interface definition
  - Request - response model

Web Service

- Service for message transport and remote procedure calls
- Messages are transported in XML format
- Transport protocol is HTTP/HTTPS (mostly)
- Web service define:
  - Operations (method) a and their parameters
  - Return types

WSDL

- WSDL (Web Service Description Language)
  - Describes basic interface of the service
  - Methods
  - Parameters and their types
  - Return values
  - Specify **where** is WS available
    - Protocol (HTTP/HTTPS/SMTP)
    - Port (:1666)
    - machine (kore.muni.cz)
    - URL (http://kore.muni.cz:1666/My Service)

WSDL example

```
<?xml version="1.0" encoding="UTF-8"?>
<definitions name="PrvniSluzba"
 targetNamespace="urn:mojeURI"
 xmlns:tns="urn:mojeURI"
 xmlns:SOAP-ENV="http://schemas.xmlsoap.
org/soap/envelope/"
 xmlns:SOAP-ENC="http://schemas.xmlsoap.
org/soap/encoding/"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns:xsd="http://www.w3.org/2001/XMLSchema"
 xmlns:ns1="urn:mojeURI"
 xmlns:SOAP="http://schemas.xmlsoap.org/wsdl/soap/"
 xmlns:WSDL="http://schemas.xmlsoap.org/wsdl/"
 xmlns="http://schemas.xmlsoap.org/wsdl/">

<!-- definice typů -->
<types>
 <schema targetNamespace="urn:mojeURI"
     xmlns:xsd="http://www.w3.org/2001/XMLSchema"
     xmlns="http://www.w3.org/2001/XMLSchema"
     elementFormDefault="unqualified"
     attributeFormDefault="unqualified">
  <element name="cislo" type="xsd:long"/>
  <element name="vysledek" type="xsd:boolean"/>
 </schema>
</types>

<!-- komunikační zprávy -->
<message name="jePrvocisloRequest">
 <part name="cislo" element="ns1:cislo"/>
</message>
<message name="jePrvocisloResponse">
 <part name="vysledek" element="ns1:vysledek"/>
</message>

<!-- dostupné operace -->
<portType name="Cisilka">
 <operation name="jePrvocislo">
   <documentation>Operace jePrvocislo()</documentation>
   <input message="tns:jePrvocisloRequest"/>
   <output message="tns:jePrvocisloResponse"/>
 </operation>
</portType>

<!-- volatelné přes HTTP -->
<binding name="PrvniSluzba" type="tns:Cisilka">
 <SOAP:binding style="rpc" transport="http://schemas.xmlsoap.
org/soap/http"/>
 <operation name="jePrvocislo">
  <SOAP:operation style="rpc" soapAction=""/>
  <input>
   <SOAP:body use="literal" namespace="urn:mojeURI"/>
  </input>
  <output>
   <SOAP:body use="literal" namespace="urn:mojeURI"/>
  </output>
 </operation>
</binding>

<!-- adresy komunikačních bodů -->
<service name="PrvniSluzba">
 <documentation>Sluzba pocitajici
prvocisla</documentation>
   <port name="PrvniSluzba" binding="tns:PrvniSluzba">
    <SOAP:address location="http://localhost:10000"/>
   </port>
</service>
</definitions>
```

SOAP

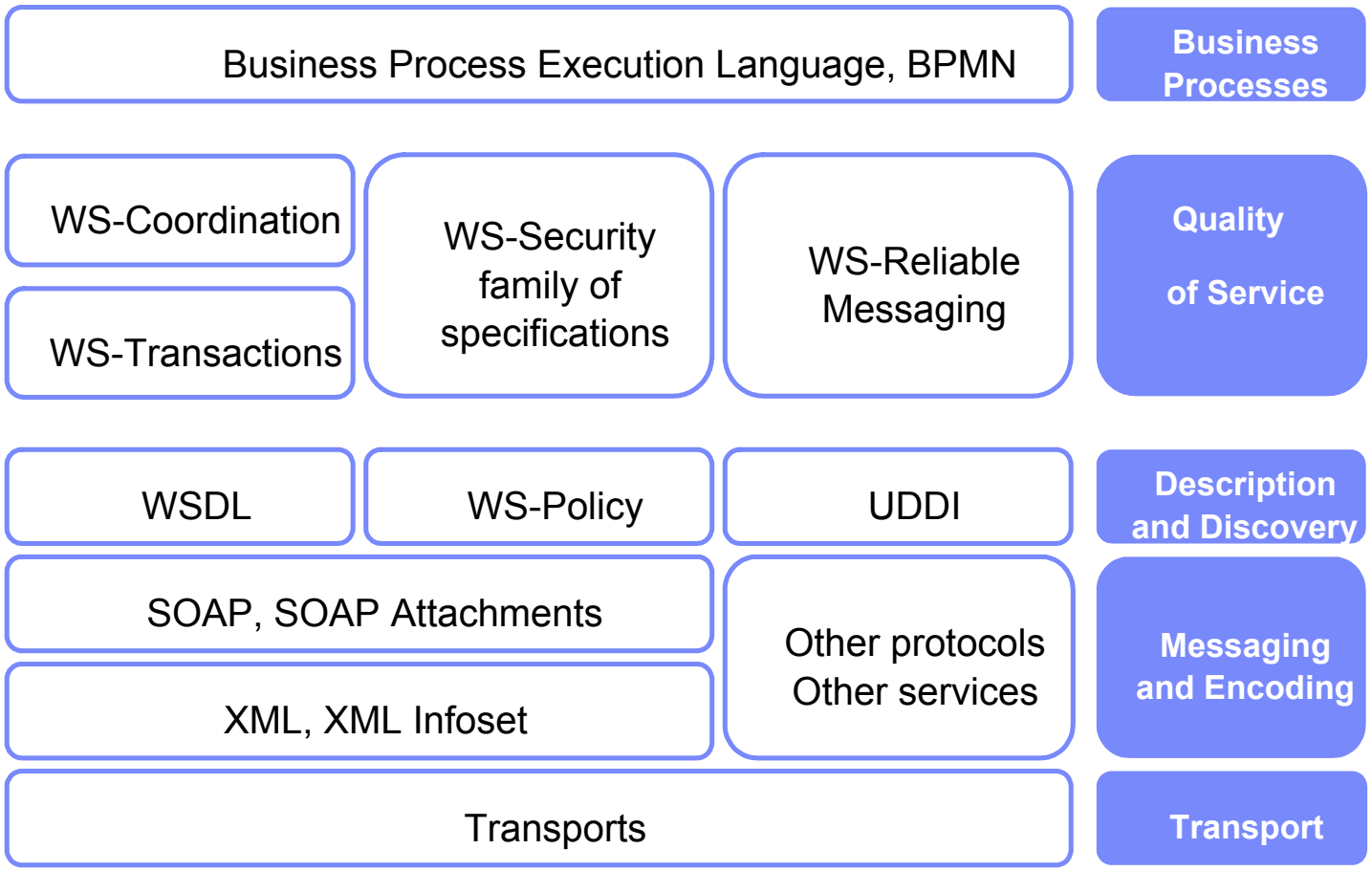
- Protocol for **transfer of XML messages**
- Used for **communication between service and its consumer** (client)
- Common use of HTTP/HTTPS as a transport protocol
- Request – Response communication model

SOAP example

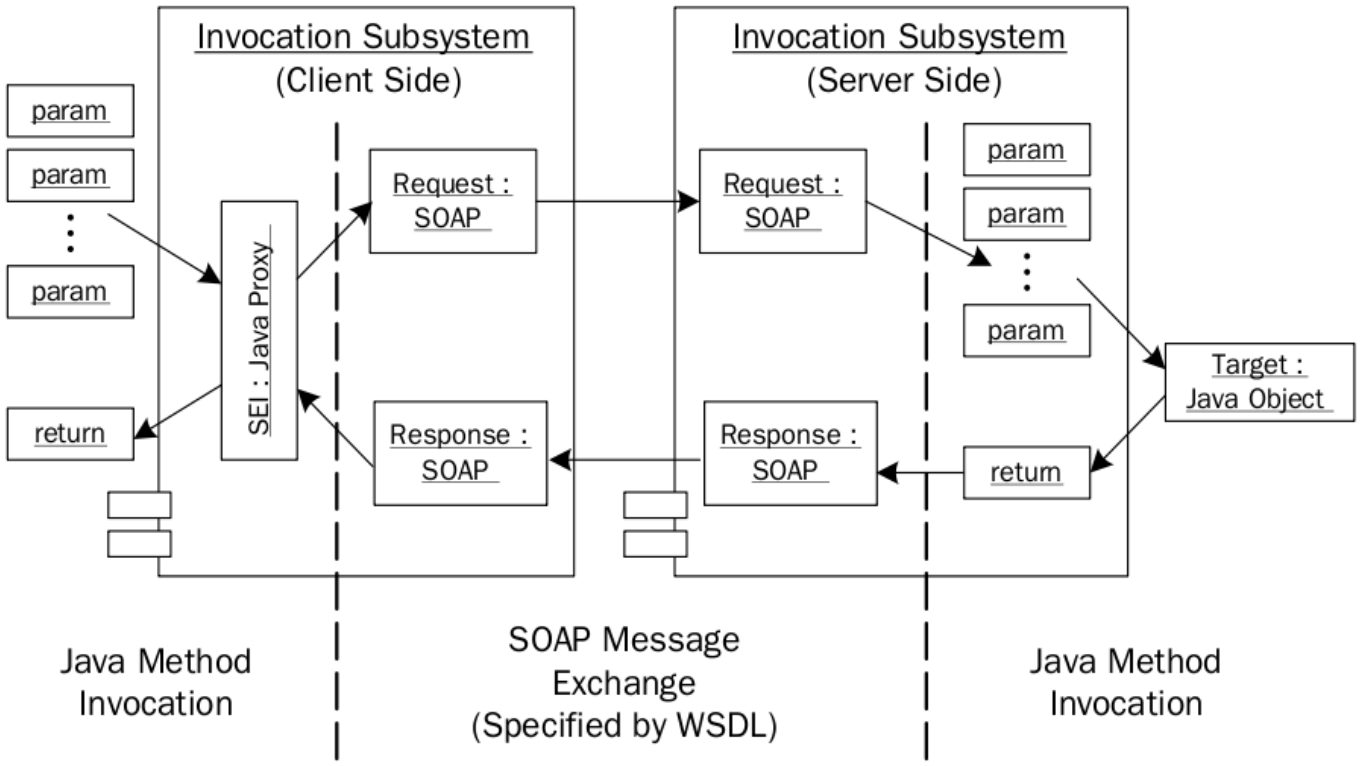
```
POST / HTTP/1.1
Content-Type: text/xml; charset=utf-8
Content-Length: 423
Connection: close
SOAPAction: ""

<?xml version="1.0" encoding="UTF-8"?>
<env:Envelope
  xmlns:env="http://schemas.xmlsoap.
org/soap/envelope/"  xmlns:xsd="http://www.w3.
org/2001/XMLSchema"
  xmlns:xsi=""

 <env:Header/>
 <env:Body>
  <jePrvocislo xmlns="urn:mojeURI">
    <cislo xsi:type="xsd:long">1987</cislo>
  </jePrvocislo>
 </env:Body>
</env:Envelope>
```

```
HTTP/1.1 200 OK
Content-Type: text/xml; charset=utf-8
Content-Length: 468
Connection: close

<?xml version="1.0" encoding="UTF-8"?>
<env:Envelope
  xmlns:env="http://schemas.xmlsoap.
org/soap/envelope/"  xmlns:xsi=""
xmlns:xsd="http://www.w3.org/2001/XMLSchema">

 <env:Body>
  <jePrvocisloResponse xmlns="urn:mojeURI">
   <vysledek xsi:type="xsd:boolean"
>true</vysledek>
  </jePrvocisloResponse>
 </env:Body>
</env:Envelope>
```

WS - Standards

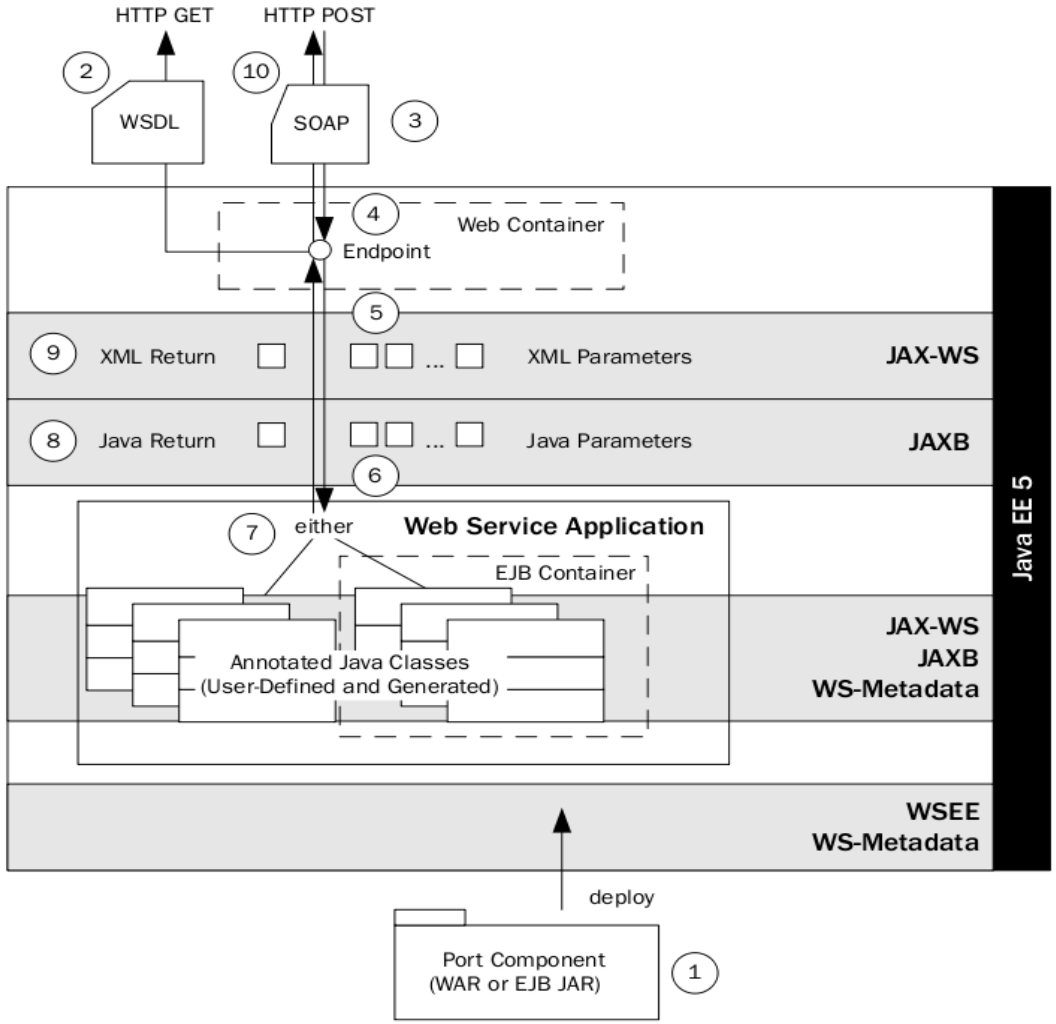


Web Services in Java



WS in Java - Server

- JAX-WS
- JAXB
- WS-Metadata
- REST



WS in Java - Client

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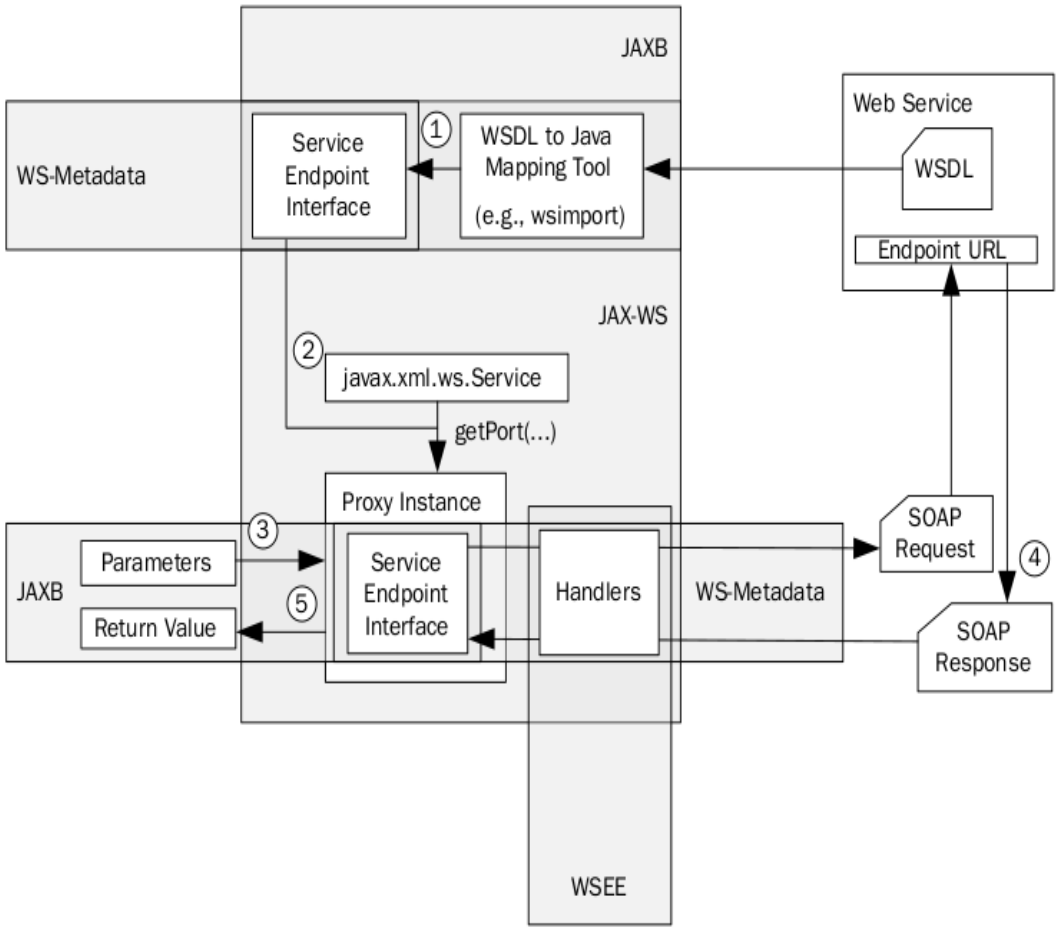


RESTful Web Service

- Representational State Transfer
  - Client-server
  - Stateless
  - Unified interface
  - Resource identification

- RESTful WS:
- HTTP/HTTPS
- POST, GET, PUT & DELETE
- XML, JSON, YAML
- WADL

WS Standards

- JAX-WS (JSR-224)
- JAX-RS (JSR-311)

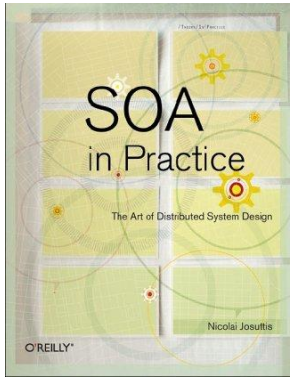
- Apache Axis, Axis2
- Apache CXF
- Jersey

Web Service tutorials

- Web Services
  - http://netbeans.org/kb/docs/websvc/jax-ws.html
- REST
  - http://netbeans.org/kb/docs/websvc/rest.html
- NetBeans Trail
  - http://netbeans.org/kb/trails/web.html

SOA - Information Resources

- SOA in Practice, Nicolai M. Josuttis, 2007, ISBN-13: 978-0596529550



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FIN
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